

Performance Audit of
Fire Prevention Division

May 2017

City Internal Auditor's Office

City of College Station

File#: 17.03

Why We Did this Audit

Over the past few years, several major fires have devastated communities throughout the United States. Due to these events, fire prevention efforts, especially through inspections, have been more frequently on citizens' minds. Moreover, the Fire Department has received limited audit coverage since the formation of our Office in 2007, and past risk assessments identified the Fire Prevention division as a high risk cost center.

In fiscal year 2016, the division was budgeted to spend \$813,000 – about 4.9% of total Fire Department expenditures – and had budgeted 7 full time employees. However, one of these positions is for an assistant chief, who does not contribute to the division's work load.

What We Recommend

Investigate strategies to bolster annual existing inspection activities. Increasing existing structure inspections annually will decrease the City's risk both directly and indirectly – by encouraging safer behaviors and motivating compliance without inspection.

Develop a process to report fire cause and origin information to aid public education and code enforcement efforts. A defined data gathering process, developed with public education and code enforcement activities in mind, will improve effectiveness and efficiency with little-to-no cost to fire investigators.

Audit Executive Summary: Fire Prevention Division

What We Found

The Fire Prevention Division is charged with the following activities: 1) enforcing adopted fire and life safety codes, 2) investigating fires to determine their cause and origin, 3) educating the public about fire and life safety hazards, and 4) regulating outside burning when allowed by state law.

In general, the Fire Prevention Division is compliant with all federal, state, and local laws and regulations. When compared to similar jurisdictions, the City's Fire Prevention Division receives an average amount of personnel and funding. Furthermore, the Division appears to be providing more services and public education programs than the average similar jurisdiction. In addition, we found that the burn permitting process adequately transfers risk to the permit holder. Overall, the Fire Prevention Division is meeting or exceeding industry standards, most likely due to a strong focus on accreditation. This being said, there were two key areas that could be improved:

Annual Inspections. Due to rapid growth throughout the City, the Fire Prevention Division is currently forced to allocate most of its resources towards new construction inspections and reviews. We found that these limited existing structure activities generally appear to be directly effective. In other words, all fires investigated by the Fire Prevention Division in fiscal years 2015 and 2016 were unpreventable by code enforcement officials. However, many structures are not inspected meaning code compliance cannot be confirmed. This potentially leaves the City open to unidentified hazards and an unknown level of risk.

Fire Information Dissemination. Through our review, we found that the Fire Prevention Division's current reporting system is not accurate and presents limited fire origin and cause information. This lack of information hinders the Division from conducting needed analysis such as identifying high fire risk structures and evaluating the impacts and effectiveness of public education programs.

Fire Prevention Division Audit

Table of Contents

Introduction.....	1
Audit Objectives	1
Scope and Methodology.....	1
Background.....	2
Findings and Analysis.....	5
Overall, Fire Prevention Efforts Appear to be Effective	5
The Division Complies with Applicable Laws, Regulations, and Ordinances	5
Fire and Life Safety Code Enforcement Focus on Higher Risk Areas.....	6
Data Suggests that the Division’s Efforts to Prevent Fires Seem to be Effective	8
Fire Investigation Data is Incomplete and Difficult to Extract	8
Fire Prevention Public Education Programs Reach Thousands of Citizens	10
Public Education Programs May Be Hampered by Insufficient Information	11
Burn Permitting Process Adequately Reduces the City’s Liability.....	12
Recommendations.....	13
Appendix A: Benchmarking Results.....	15
Appendix B: Fire Risk Quantification	34
Appendix C: Responses to the Audit Recommendations	38

Introduction

The Office of the City Internal Auditor conducted this performance audit of the Fire Prevention Division pursuant to Article III Section 30 of the College Station City Charter, which outlines the City Internal Auditor's primary duties.

A performance audit is an objective, systematic examination of evidence to assess independently the performance of an organization, program, activity, or function. The purpose of a performance audit is to provide information to improve public accountability and facilitate decision-making. Performance audits encompass a wide variety of objectives, including those related to assessing program effectiveness and results; economy and efficiency; internal control; compliance with legal or other requirements; and objectives related to providing prospective analyses, guidance, or summary information. A performance audit of the Fire Prevention Division was included in the fiscal year 2017 audit plan based on direction given by the Audit Committee.

Audit Objectives

This audit addresses the effectiveness of the City's fire prevention services and activities and answers the following questions:

- Does the Fire Prevention Division follow all applicable federal, state, and local laws or regulations?
- Does the Fire Prevention Division align with best practices, as stated in the Texas Fire Chiefs Association's Best Practices Manual?
- How does the Fire Prevention Division's policies, procedures, and practices compare to other jurisdictions with similar challenges?
- Does the burn permitting process adequately reduce the City's risk liability?

Scope and Methodology

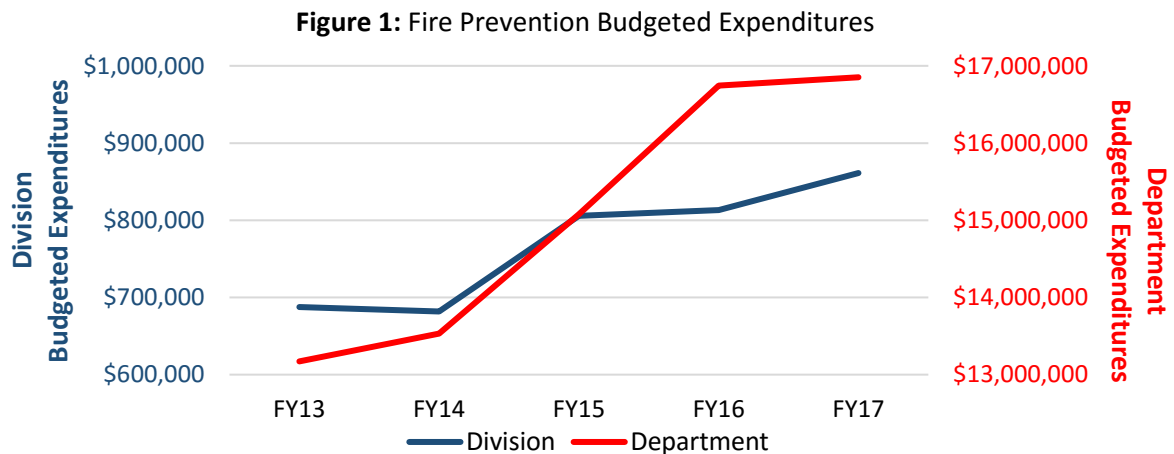
This audit was conducted in accordance with government auditing standards (except for the completion of an external peer review),¹ which are promulgated by the Comptroller General of the United States. Audit fieldwork was conducted from February 2017 through April 2017. The scope of review varied depending on the analysis being performed. The methodology used to complete the audit objectives included:

¹ Government auditing standards require audit organizations to undergo an external peer review every three years.

- Reviewing the work of auditors in other jurisdictions and researching professional literature to identify: 1) fire prevention best practices, 2) industry trends, and 3) general challenges facing fire prevention functions.
- Comparing applicable policies and procedures and relevant state and federal laws or regulations to current Division practices.
- Interviewing pertinent staff in the Fire and Planning & Development Services departments.
- Reviewing existing structure and new construction inspection and permitting records.
- Analyzing fire cause and origin documentation and data.
- Designing a fire risk schedule based on the International Building Code’s structure occupancy types.
- Verifying the accuracy and completeness of fire prevention payments and fees.
- Surveying similar jurisdictions regarding their fire prevention functions.
- Evaluating staffing and work load levels.
- Reviewing and analyzing public education programs and attendance data.

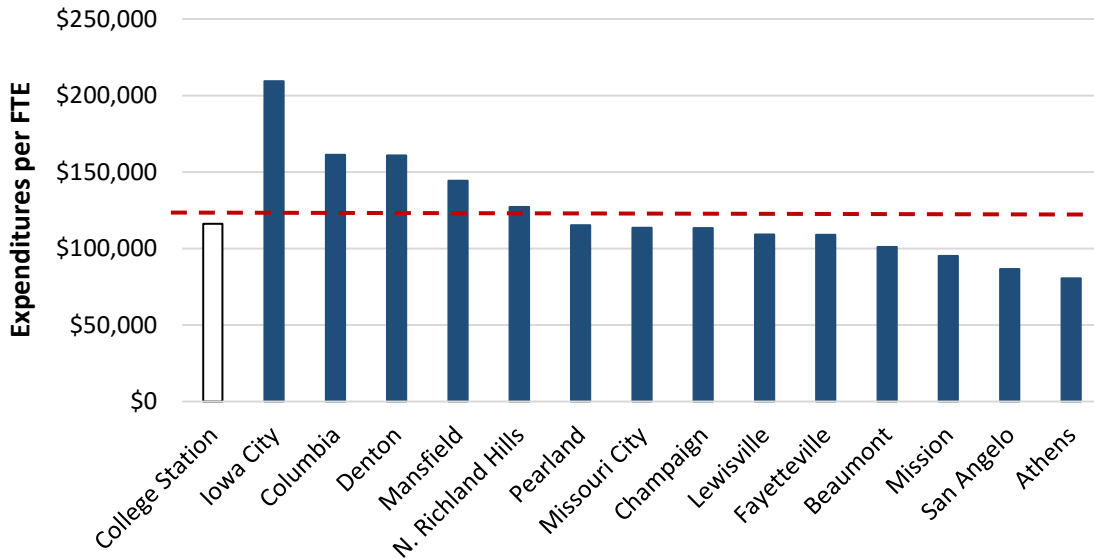
Background

Fire Prevention is a division within the Fire Department that currently consists of seven budgeted full time employees: this includes one Assistant Fire Chief, one Fire Marshal, four Deputy Fire Marshals, and one Public Education Officer. However, while the Assistant Fire Chief is paid out of the Fire Prevention budget, they do not contribute to the services the Division provides. Instead, this position oversees the department’s accreditation process as well as the prevention and training divisions. This position was added in fiscal year 2015, which contributed to a significant budgetary increase, however, it has been vacant since Nov. 2016. The most significant non-personnel related increase occurred in this most recent fiscal year and made up about 45 percent of the department’s overall funding increase of \$108,500 that year. This can be seen in Figure 1 below:



Resource Comparison. When we reviewed budgetary and personnel data for fire prevention functions throughout the nation, we found that on average fire departments spend about 5.58 percent of their funding on fire risk reduction. This is close to our average fire department expenditures (about 5.11 percent) on fire prevention. The budgetary information in the figure below was obtained through each municipality’s website and fiscal year 2016 annual budget and compares resources through a single metric – budgeted dollars per full time equivalent (FTE):

Figure 2: Resource Comparison



As we can see, the City expends slightly below (\$7,000) the average amount per full time equivalent. When we compare absolute resource amounts as well (actual full time employees and budgeted expenditures), we find that the City is still average. For instance, the City’s Fire Prevention Division employs seven full time employees, which is the average number in similar jurisdictions; and the Division budgeted about \$813,000 for fiscal year 2016, which is about \$11,000 more than the average of similar jurisdictions. The cities and data used in this benchmarking study can be seen in Appendix A.

Fire Prevention Activities. In order to reduce the risk of fire casualties and the likelihood that a fire will occur within the City of College Station, the Fire Prevention Division provides the following services to the City as a whole:

- 1) Enforces adopted² fire and life safety codes;
- 2) Investigates fires to determine their cause and origin;
- 3) Educates the public about fire and life safety hazards; and
- 4) Regulates outside burning when it is allowed by state law.

² Current adopted fire and life safety codes include: 2015 International Fire Code and 2015 NFPA Life Safety Code Handbook.

Table 1 below summarizes division funding and work load during fiscal years 2015 and 2016:

Table 1: Division Work Load Summary

Fiscal Year	Resources		Code Enforcement		Investigated	Public Education		Permits
	Funding	FTE	Construction	Existing	Fires	Attendees	Hours	Burn
2015	\$805,798	7.00	INC ³	951	27	7,494	221.67	36
2016	\$813,032	7.00	1,105	304	31	10,793	231.50	52
<i>Avg:</i>	\$809,415	7.00	N/A	628	29	9,144	226.59	44

Through conversations with similar jurisdictions throughout the nation, we found that most Fire Prevention functions focus on reducing fire risk using similar activities but with varying strategies. For instance, most similar jurisdictions provide public fire and life safety education programs for citizens, however, the focus of these programs varies widely across municipalities. Moreover, almost all jurisdictions perform existing structure inspections, however, some municipalities inspect all structures annually, while others conduct a limited amount. Differences in services are expanded upon in Appendix A.

Intradepartmental Services. The Fire Prevention Division also provides several services to the Fire Department itself. For instance, twice a year, the department goes through the process of selecting firefighter applicants through a written examination and physical evaluation. During these semiannual recruitment periods, the Fire Prevention Division dedicates a staff member to conduct background checks on approximately thirty applicants. This takes about two to three months for each testing period and markedly limits that employee’s ability to conducted fire prevention activities. Moreover, a separate staff member takes time away from their typical duties to recruit for the department. Though this takes less time (about half a month each testing period), it curtails the Division’s fire prevention activities. This being said, of the thirteen Texas municipalities interviewed, 46 percent said they do conduct background checks for their department and 54 percent said they do not, indicating that the City’s Fire Prevention Division is not unusual in this regard.

Community Risk Reduction Efforts. According to the Federal Emergency Management Agency (FEMA), community risk reduction can be defined as programs, initiatives, and services that prevent or mitigate the risk of or effects from fire, injuries, natural disasters, hazardous materials incidents, acts of terrorism, etc. Although our audit covered aspects of this program (i.e. public fire and life safety education, fire and life safety code enforcement, etc.), it does not look at community risk reduction holistically – a true community risk reduction program would span multiple departments and involve outside community stakeholders. This being said, the Fire Prevention Division and the Fire Department are leaders in this project and so continue to investigate new risk reductions methods and strategies.

³ Due to the implementation of TRAKiT, we could not gather the total new construction activities for fiscal year 2015.

Findings and Analysis

Overall, Fire Prevention Efforts Appear to be Effective

Based on the Texas Fire Chiefs Association's Best Practices manual, fire prevention functions in Texas should provide three general services: 1) fire and life safety code promulgation and enforcement, 2) fire cause and origin investigation, and 3) public fire and life safety education. We found that the City's Fire Prevention Division was performing all three of these services for the citizens of College Station, as well as reviewing and administering burn permits. In the following sections, the findings within each of the activities listed above are detailed and explored further.

The Division Complies with Applicable Laws, Regulations, and Ordinances

Compliance irregularities found were immaterial. In Texas, inspection and investigation activities are regulated by the Texas Commission on Fire Protection (TCFP). Specifically, the Commission requires individuals who are appointed to fire code enforcement duties and to fire investigation duties to be certified at minimum as a basic fire inspector and as a basic fire investigator, respectively. In our review we found only one inspection (0.03 percent) to have been conducted by a non-certified fire protection employee from fiscal year 2013 through fiscal year 2016. When we discussed this matter with City staff, they stated that this was most likely a data entry mistake. We also found that all investigations handled through the Fire Prevention Division were conducted by properly certified staff.

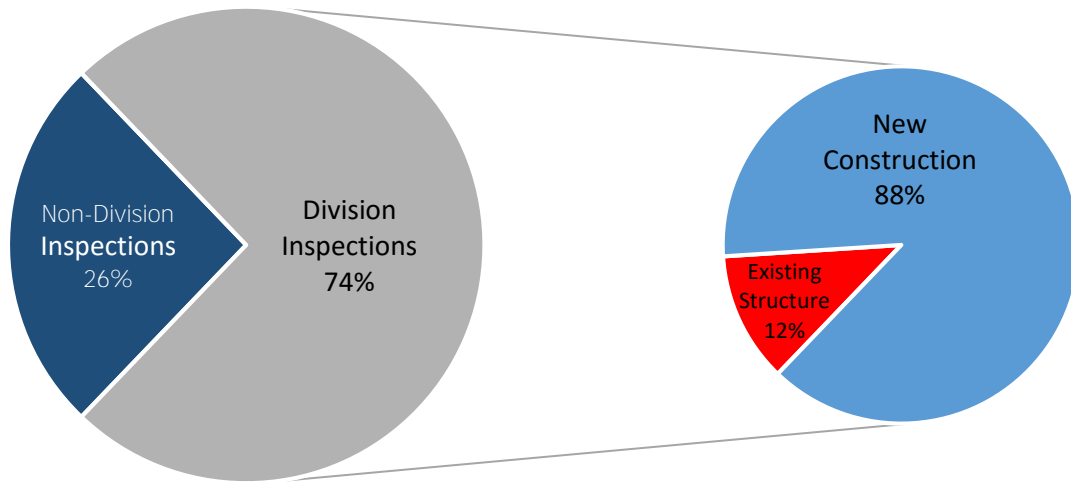
Using the City's TRAKiT system, we examined applicable fire inspection fees, which are paid through Planning and Development Services. In our review, we found that on average, the City makes about \$57,000 from fire inspections and tests annually. We also found three inspections/tests that were performed that did not have a matching payment in the system, however, we found this amount to be immaterial.

The Division adequately adopts and updates fire and life safety codes. The City generally enforces construction codes promulgated by the International Code Council, which are updated every three years. Once these updated codes are released, City staff works with the Construction Board of Adjustments and Appeals, as well as other key community stakeholders, to amend the updated documents. The new codes are then adopted by the City Council, allowing the City to stay abreast of current technologies and information relating to building safety. The Fire Prevention Division – specifically the Deputy Fire Marshals – then enforce the current fire and life safety codes through inspection and plan review.

The Fire Prevention Division must review and inspect all applicable new construction. Texas Local Government Code Section 214.904 states that a municipality must grant or deny a permit within 45 days of submittal, or provide written notice stating why the permit application could not be granted

or denied. Due to this time constraint, fire plan reviews must be completed as soon as possible. Similarly, fire inspections during and directly after the construction process are an unavoidable step in opening a business. Thus, fire and life safety inspectors are expected to be available when developers want them. For this reason, most of the Fire Prevention Division’s resources are spent on new construction. This can be seen in Figure 3 below.

Figure 3: Code Enforcement Activities⁴



Fire and Life Safety Code Enforcement Focus on Higher Risk Areas

Code compliance cannot be assured for all commercial properties annually. As we can see from Figure 3 above, 88 percent of the Division’s code enforcement activities are directed towards new construction, leaving limited time for existing commercial property inspections. Occasionally, these activities are supplemented through the efforts of certified firefighters who are either on light duty or are hired on overtime when funds are available. However, even with these temporary measures not all existing commercial properties within the City can be inspected every year.

Existing structure inspections are conducted on an informal, seemingly risk-based approach. Though there was no written policy or procedure, Division staff generally seemed to agree that schools should be the top priority when conducting existing structure inspections. These would then be followed by general assembly buildings (i.e. bars, restaurants, churches, etc.), hotels and motels, and finally apartment buildings. In order to evaluate the adequacy of this risk assessment, we developed a risk quantification scheme based on the risk of a fire death and the probability of a fire occurring categorized by the International Code Council’s occupancy types. The exact methodology can be seen in Appendix B and the results are shown in Table 2 on the next page:

⁴ Figure includes data from May 2015 to January 2017 (21 months) due to database limitations.

Table 2: Highest Fire Risk Occupancy Types

Occupancy	Risk Score	Avg. % of Inspections
R-3: Building contains 1 or 2 dwelling units; permanent inhabitants	76.30	1.43%
R-2: Building contains more than 2 dwelling units; permanent inhabitants	59.29	4.45%
I-2: Building intended for 24/7 custodial care; inhabitants incapable	49.09	1.00%
I-1: Building intended for 24/7 custodial care; inhabitants fully capable	44.63	0.57%
R-1: Sleeping units intended for transient usage	37.38	12.20%
E: Building intended for education through 12 th grade	33.45	6.46%
A-2: Assembly intended for food/drink consumption	29.67	24.82%
B: Building intended for office/professional/service-type transactions	27.67	16.36%
A-5: Assembly intended for outdoor sporting events/activities	25.52	0.14%
A-4: Assembly intended for indoor sporting events/activities	25.51	0.57%
<i>Average:</i>	40.85	68.01%

Though those listed above are the top ten riskiest occupancy types in terms of fire safety, not all of the listed types can easily be inspected by Fire Prevention officers. For instance, R-3 structures are generally one-or-two dwelling homes, however, they may include boarding houses, which explains why only a few have been inspected. Also, R-2 structures include multi-family apartments, of which only communal areas, not individual dwellings, can be compulsorily inspected. Noting this, we wanted to look where the Division was focusing most of its resources by comparing the average number of structures inspected by occupancy type to the total number of structures in that occupancy type throughout the City. For this analysis, we only investigated the top five riskiest occupancy types that Fire Prevention employees were generally able to inspect. These results are shown in Table 3 below:

Table 3: Inspections Focus

Occupancy	Total Structures in the City	FY15 Structures Inspected	FY16 Structures Inspected
I-2	7	185.71%	14.29%
I-1	56	12.50%	8.93%
R-1	36	211.11%	177.78%
E	50	80.00%	38.00%
A-2	236	50.42%	30.08%
<i>Avg. Percent of Structures Inspected:</i>		107.95%	53.82%

As we can see, it would appear that not all high risk occupancies are being inspected. When we discussed this with City staff, they stated that some of the occupancy types – specifically I-1 and I-2 – are required to receive an inspection each year to remain licensed. Due to this, the City charges an inspection fee and thus records these inspections in the City’s Planning and Development information system. Table 4 on the next page shows the number of required inspections conducted in fiscal year 2016.

Table 4: Required Existing Structure Inspections

Structure Type	Occupancy Type	Inspections
Day Cares	E	24
Foster Homes	I-2	17
Health Care Facilities	I-2	9
Nursing Homes	I-1	2

As we can see, this information seems to support that the Division is focusing inspections on higher risk areas. However, we learned that these inspections are sometimes recorded in both Planning and Development and the Fire Department’s information systems. In this way, we are unable to make a definitive statement about the frequency of inspections based on occupancy.

Data Suggests that the Division’s Efforts to Prevent Fires Seem to be Effective

Limited existing structure inspections do not seem to negatively affect the community. Though best practices suggest all existing structures should be inspected, current code enforcement efforts appear to be effective. After reviewing data on structure fires throughout the community, about 55 percent occur in buildings that the Fire Prevention Division can inspect (i.e. mercantile, manufacturing, or public buildings), however, we found that none of these fires could have been prevented by direct fire inspector action.

The Division should strive to provide annual inspections to all commercial properties. This being said, limited existing inspections put the City at a higher risk of fire loss. For this reason, it is appropriate for the Division to investigate other means of expanding existing commercial inspection activities. Based on our interviews with similar jurisdictions throughout the nation, we have identified several possible methodologies listed below:

- Define a multi-year inspection schedule by occupancy type based on risk that provides coverage to all structures.
- Oversee a commercial structure self-inspection program that ensures compliance through a set number of random inspections per year.
- Supervise a geographically-oriented inspection program performed by certified fire suppression crews.
- Fund additional fire and life safety inspectors through increased fire prevention fees.

Fire Investigation Data is Incomplete and Difficult to Extract

According to the NFPA’s *Guide for Fire & Explosion Investigations*, fire investigations are fundamental to the protection of lives and property from the threat of hostile fire and can help avoid future fire incidents. The guide also mentions that accurate fire statistics – based on fire investigations – are integral in developing fire prevention codes, standards, and training. According

to best practices, all fires within a municipality’s jurisdiction should be investigated for fire origin and cause and all investigations should be documented.

Table 5: Fire Types

All fires within the City’s jurisdiction may not be investigated by certified investigators. In order to more accurately understand fires in the City of College Station, we observed documentation for each fire investigation conducted by the Fire Prevention Division for fiscal years 2015 and 2016. In doing so, we found the following types of fires (see Table 5).

Fire Type	FY15	FY16	Total
Structure	18	22	40
Vehicle	3	5	8
Mobile/Trailer	2	4	6
Brush	2	0	2
Trash	2	0	2
<i>Totals:</i>	27	31	58

We then compared these documented fires to reports⁵ produced by the Fire Prevention Division each month summarizing their activities. In doing so, we found several discrepancies between the reported number of investigations and the observed number of investigations – both of which varied from the reported number of fires.

Table 6: Fire Investigations

	Reported Investigations	Reported Fires	Observed Investigations
FY15	26	34	27
FY16 ⁶	14	28	29
<i>Totals:</i>	40	62	56

As we can see in Table 6, the Division appears to be underreporting the number of investigations it performs. Moreover, it is not investigating every fire it reports having occurred. There are several possible reason for this: 1) some fires are so insignificant that fire investigators are not called to the scene, 2) fire cause and origin is evident, allowing fire suppression crews to handle the investigation, or 3) inconsistent data collection, preservation, and accounting methods within the Fire Prevention Division itself may cause discrepancies in reported versus observed data. We found evidence of all three reasons listed previously. Due to uncertainty about the integrity and accuracy of data, we can make no definitive statement as to whether all fires are investigated by certified staff.

The Fire Department’s current information system makes it difficult to identify past investigations. The database currently used by the Fire Department is not optimal for tracking and reporting fire investigations. This seems to be most directly due to a lack of adequate searching capabilities. This causes the Division to rely on individual staff members to appropriately and independently maintain their own fire investigation records for reporting purposes. This method is not only ineffective, but seems inefficient as well, and hinders other areas of Fire Prevention activities.

⁵ These reports include work load levels for code enforcement and public education activities as well.

⁶ Data for this fiscal year includes only the October through July due to the Fire Prevention report being incomplete.

Fire Prevention Public Education Programs Reach Thousands of Citizens

Fire and life safety public education programs are the most direct way a fire department can reduce fire risk in residences. In the City of College Station, about 52 percent of fires are caused by some sort of human action – be it intentional or accidental. This is not to say that all fires, indirectly or directly caused by humans, are preventable through public education, but best practices suggest programs should be tailored to the community’s specific demographics, needs, and risks areas.

Current proactive education programs focus on teaching children fire safety techniques – other programs are reactionary and driven by community requests. The Fire Prevention Division visits each elementary school and teaches kindergarten through fourth grade students a specific fire or life safety lesson each year. They also hold classes for pre-k students at fire stations, and biennially present the Shattered Dreams program to high school students, which focuses on the dangers of drinking and driving. The Public Education Office also gives presentations and trainings at the request of different groups and organizations. Table 7 below summarizes our findings of the citizens reached through the Division’s public education programs.

Table 7: Public Education Program Attendees

Fiscal Year	Kids	High Schoolers	College Students	Adults	Senior Citizens	Unknown	Total
2015	6,766	70	215	193	20	230	7,494
2016	7,736	545	485	504	33	1,490	10,793
<i>Percent:</i>	79%	3%	4%	4%	0%	9%	18,287

As we can see, most program attendees are children (pre-k through middle schoolers). Though youth are not at the highest risk of fatality during a fire⁷, we found that it was common practice for fire safety public education programs to focus on instructing them. This strategy capitalizes on pre-k through middle schoolers’ innate susceptibility to learning new information. Therefore, educating them about fire and life safety will have a positive effect on populations in the long term. We then compared observed fire investigation data to public education strategies based on demographic (i.e. Minors, College Students, and Adults). The results are shown in Table 8 and use only data from fiscal years 2015 and 2016:

Table 8: Public Education Effectiveness

Demographic	Percent of Fires ⁸	Percent of Attendees
Minors	5.26%	82.67%
College Students	47.37%	3.83%
Adults	31.58%	4.10%
<i>Totals:</i>	84.21%	90.59%

⁷ Individuals over the age of 65 are the highest risk group of fire fatalities.

⁸ In this table fires are considered unintentional but due to human action. This totaled 19 fires in FY15 – FY16.

As we can see, there does appear to be a correlation between educational focus (measured by percentage of program attendance) and causes of fires. Noting this, the programs seems to be most effective in the area it is directed to – youth. However, due to the large student population within the City, a heavier education focus on college students may be prudent, as almost half of all unintentional fires caused by individuals are caused by college students.

The Fire Prevention Division does not have jurisdiction over Texas A&M’s campus, nevertheless, reorienting the Public Education Office’s target audience to further include college students may be worthwhile. Through conversations with similar jurisdictions and our own analysis of fire causes, we determined several strategies to mitigate the fire risk posed by college students. These are listed below:

- Jointly fund a public fire and life safety education officer with the university.
- Require fraternity and sorority houses to install fire alarms and/or sprinklers and be inspected annually by City ordinance.
- Lead fire drills at fraternity and sorority houses.
- Highlight the importance of fire safety practices when disposing of cigarettes or other smoking materials.
- Prohibit the use of overstuffed, indoor furniture on porches or balconies by City ordinance.
- Produce a fire and life safety educational video specifically aimed towards college students.
- Administer a derelict building program that condemns and destroys dilapidated buildings that are a fire hazard.
- Partner with the university to participate in new student orientations.
- Conduct fire and life safety training with on-campus resident assistants.
- Illustrate fire and smoke environments on-campus through controlled burns or smoke demonstrations.
- Attend university job fairs and provide fire and life safety information and tips.
- Direct fire suppression crews in visiting on-campus housing and disseminating fire and life safety materials.

Public Education Programs May Be Hampered by Insufficient Information

Limited fire information hampers impact and effectiveness analysis. Over the course of our review, we found that the Public Education Office had done little analysis on the effects of its programs, however, this was not due to a lack of effort. Instead, the Office has been unable to measure its effectiveness due to incomplete and generalized data about fires. For instance, the Public Education Office has no readily available data about fire origin or cause. Though this data is being recorded by fire investigators it is not communicated to the Public Education Office. This creates inefficiencies and limits effectiveness within the Division as a whole.

To this effect, we recommend that a process should be developed to more readily communicate fire investigation information to the Public Education Office. This information should be based on the Public Education Office's needs, but should not unduly hinder fire investigators. We believe that this process will not only aid Public Education efforts, but will also facilitate more accurate reporting and ensure more complete record keeping.

Burn Permitting Process Adequately Reduces the City's Liability

According to the Texas Commission on Environmental Quality (TCEQ) guidelines, there are generally six acceptable reasons to have an outdoor burn in the state of Texas. These include: 1) firefighter training, 2) fires for recreation, ceremonies, cooking, or warmth, 3) fires for disposal or land clearing, 4) prescribed burns, 5) pipeline breaks and oil spills, and 6) other situations as determined by TCEQ's regional office. In the City of College Station, the Fire Prevention Division issues burn permits⁹ mainly to developers for disposal or land clearing purposes.

The burn permitting application seems to effectively transfer risk of loss to the applicant. To be issued a burn permit, an individual must complete a burn permit application stating their name, address, phone number, and the location of the burn; a Fire Prevention officer then inspects the burn site before issuance. At this time, the applicant signs the application, indicating they accept any and all risk of injury or loss associated with the open burning. After discussions with the City Attorney's Office and the Risk Management Division, we have concluded that the Fire Prevention Division has the proper authority to issue these permits and that the liability language included in this permit adequately transfers the risk from this activity to the applicant.

The City does not receive reimbursement for resources used when issuing a burn permit. The City does not currently charge an application fee for issuing a burn permit. When we interviewed similar jurisdictions we found that approximately 62 percent of Texas municipalities in our benchmarking study charge a fee. Of those municipalities that do charge a fee, the cost varies widely from \$25 to \$1,000 – one municipality even has two levels of fee charges depending on the length a burn permit is valid. This being said, collecting a fee for burn permits could help offset some of the costs associated with administering them.

The Division focuses on educating burn permit violators, but will issue citations when there is a risk to citizens. If an infraction of a burn permit's conditions is noted, the Fire Prevention Division may issue a Notice of Violation and levy a fine of up to \$2,000. Though this is true, the Division's current approach is education before enforcement. In other words, Fire Prevention personnel are more likely to instruct permit holders and aid them in aligning with permit conditions when notified of a violation – especially if the employee deems that the violation is not a large risk to the City. This strategy is likely to strengthen ties to the development community, however, this leniency could be taken advantage of, causing an unanticipated increase in risk.

⁹ The City is required and authorized to issue permits for open burning based on section 105.6.32 of the adopted 2015 International Fire Code.

Recommendations

In summary, our review generally revealed that the City's Fire Prevention Division was meeting or exceeding industry standards. We believe that the Fire Department's strong focus on accreditation has empowered the Division to reevaluate its processes and align more closely with best practices. To this effect, we offer two recommendations that we feel will further aid the Division in this enterprise:

1. Investigate strategies to bolster annual, existing structure inspection activities. Though the Division's current code enforcement activities appear to be effective, increasing existing structure inspections will decrease the City's risk. There are many potential strategies the Division could employ, however, the strategy chosen should accomplish two objectives: 1) directly decrease the City's fire risk by increasing fire and life safety code compliance throughout the City, and 2) indirectly decrease the City's fire risk by encouraging safer behaviors and cultivating a culture of fire and life safety throughout the City. These strategies could include:
 - Risk-Based Multi-Year Schedule. This strategy involves identifying high risk occupancy types and specific high risk buildings throughout the City and defining an inspection frequency for each. This method would allow the Division to spread existing inspections for lower risk structures over an appropriate amount of time (generally 1, 2, or 3 years) while still ensuring compliance coverage over the entire City.
 - Commercial Self-Inspection Program. Under this methodology, commercial structures conduct their own fire inspection and send in documentation to prove they align with current codes. Compliance is then ensured by inspecting a random sample of participating structures and levying a hefty fine if a violation is found. This approach requires community buy-in, which is usually incentivized through lower inspection fees, and would require designing adequate documentation. However, the random sampling method would grant the Division needed flexibility and indirectly educate property owners about fire safety.
 - Certified Suppression Crews. In this strategy, fire suppression crews would conduct straightforward inspections for structures within their response area, while challenging inspections would be handled by more experienced fire prevention employees. This methodology would require fire suppression employees to obtain their fire inspector certificate – costing time and money – as well as add to their work load. On the other hand, inspecting structures in their area could increase suppression crews' sense of ownership and familiarity with the community in their area.
 - Additional Staff Funded By Fees. Using this approach, revenue from increased or expanded fire prevention fees would directly pay for additional personnel to aid in division activities. An increase in fees allows the Division to provide more services and lower fire risk without effecting other City departments. Nevertheless, fee increases may harm relationships with developers, business owners, and other community members.

2. Develop a process to report fire cause and origin information to benefit public education and code enforcement efforts. The Division's current reporting process is inaccurate and does very little to aid the Division in its activities. Through our interviews with jurisdictions similar to the City of College Station, we found that this is a common problem for Fire Prevention functions throughout the nation. This being said, information gathered on fires in the City is key to identifying hazard trends and implementing effective public education. When defining new reporting metrics and data collection systems, it is important to evaluate the needs of all activities within the Division and obtain input. The Division's new information process should: 1) report essential workload and effectiveness measures and 2) allow for critical analysis of division efficiency and impact.

Appendix A: Benchmarking Results

In conducting this benchmarking study, we wanted to answer the following questions:

- How does the City of College Station compare to similar jurisdictions in terms of activities performed or supervised?
- How does the City of College Station compare to similar jurisdictions in terms of staffing?
- How does the City of College Station compare to similar jurisdictions in terms of fire and life safety educational programs offered?
- How do large student populations effect similar jurisdictions?

In answering these questions, we wanted to identify both jurisdictions with similar laws and regulations as well as large student populations. In order to do this we broke potential comparison cities into Texas Cities, to compare services within a similar environment (legal, construction, etc.), and National Cities, to focus on the effects of large student populations. The methodologies for identifying potential comparison cities are detailed for each category below:

Texas City Methodology

- Identified every Texas city with a population over 50,000 and recorded demographic information using the U.S. Census Bureau.
- Calculated the variance between the City of College Station and previous identified Texas cities in the following categories: population, population growth, persons under 18, persons 65 years and over, race (White, Black, Hispanic, and Asian), median house value, median gross rent, higher education, labor force as a percent of population, per capita retail sales, median household income, and per capita income.
- Ranked each category from 1 to 62 with 62 being the smallest variance (closest to College Station) and 1 being the largest variance (furthest from College Station).
- Each category was assigned the following weights (see table below) to calculate a “Municipality Similarity Score.”

Table A-1: Texas City Similarity Weights

Category	Weight Percent	Category	Weight Percent
Population	30.0%	Retail Sales	4.0%
Growth	25.0%	Degree	1.0%
Household Income	9.0%	White	0.5%
Per Capita Income	7.0%	Black	0.5%
House Value	9.0%	Hispanic	0.5%
Rent	8.0%	Asian	0.5%
Labor Force	5.0%	Total:	100.0%

National City Methodology

- Identified every university with a Division 1 football program and their associated conference.
- Recorded the city, state, and total enrollment of each university and sorted by total enrollment.
- Identified the estimated metro area population for each city, as well as, the 2015 estimated population, 2000 population, 2010 population, median household income, and if the city had a “sister city.”
- Identified the university towns throughout the nation that most resembled College Station.

Using the previously described methodologies, we identified the following thirty-one cities, sorted by similarity:

Table A-2: Similar Jurisdictions¹⁰

Texas Cities		National Cities
Richardson, TX	Mansfield, TX	Tuscaloosa, AL
Round Rock, TX	Bryan, TX	Champaign, IL
Edinburg, TX	Odessa, TX	Athens, GA
League City, TX	Beaumont, TX	Bloomington, IN
Carrollton, TX	Mission, TX	Denton, TX
Lewisville, TX	Conroe, TX	Gainesville, FL
Allen, TX	North Richland Hills, TX	Fayetteville, AR
Pearland, TX		Auburn, AL
Killeen, TX		Iowa City, IA
San Angelo, TX		Columbia, MO
Tyler, TX		Lawrence, KS
Missouri City, TX		Greenville, NC

Below we have summarized some of the information we gathered from each similar jurisdiction after reviewing their website and interviewing a staff member. It is important to note that any mention of arson investigator, especially for Texas cities is excluded from the information below to preserve the identity of certified peace officers. In addition, we were unable to speak to all cities listed in Table A-2, this is denoted in the following list with a “*” symbol next to the city’s name.

Texas Cities

Richardson, TX

Population: 110,815

Services Provided: The Fire Prevention Division provides public education and commercial inspections; issues burn, fireworks, hazardous transportation, vehicles in an assembly, fire protection systems (backflow, duct smoke detectors, fire hydrants, fire service mains, fire department connections, and hood suppression systems) and tent permits; and conducts background checks.

¹⁰ Cities that are bolded have been used as benchmarking cities by College Station in the past.

Estimated Annual Activity Level: 173 fire incidents; 30-40 investigations; 1,074 new construction inspections and plan reviews conducted by the Code Department; 3,929 existing inspections – prioritized based on NFPA hazard levels, low hazard structures are inspected every other year.

Fees: Charge 1% of total fee with minimum \$60 for permits; \$100 for re-inspections (over 2 inspections), and \$100 for tanks.

Personnel: The division has 6 FTE and employs a couple of part-time employees during the summer. Current staffing includes 6 inspector/investigators and 1 employee that only performs inspections. Usually staff must have an inspector certification prior to joining the office and obtain a fire investigator certification according to their position.

Education Programs: The division provides online information for victim recovery after fires, certificate of occupancy checklist, home fire safety checklist, safety publications for: space heaters, children, cooking, BBQ grills, and fire evacuations, and water safety tips; and previously provided a “File of Life” program (contains medical information to aid emergency personnel in case of an emergency), fire safety house, citizens fire academy, CPR and first aid lessons, home inspection requests, smoke and carbon monoxide detector assistance, fire extinguisher training, Explorer Post 991. However, currently they don’t have a public education employee so they have to turn down class requests due to lack of staffing.

Round Rock, TX

Population: 122,767

Services Provided: The Fire Prevention Division provides public education, plans reviews, permitting, fire safety inspections, and fire investigations. They do not conduct background checks.

Estimated Annual Activity Level: 10 structure fires; 6-8 investigations; 800 plan reviews; 3,000 existing inspections – conduct inspections based on risk categories: beginning in January and continuing throughout the year in the following order: assemblies, hotels and apartments, city facilities, assemblies again, schools, strip centers/malls/multi-story, and start over.

Fees: Don’t charge for annual inspections, charge \$15 for open records/subpoenaed records request (\$0.10/standard page, \$.50/oversized page, \$1.00 for CD’s, \$3.00 for DVD’s, and \$2.50 for VHS), but do have comprehensive fees for inspections and permits:

License Application Fees		Inspection Permit Fees	
Day Care	\$50	Fire alarm/sprinkler systems	\$60 min
Foster/Adoptive Care	\$50	Fire Alarm System	\$60/panel plus \$1/device
Day Care/Foster Home Re-inspections	\$25	Fire Sprinkler System	\$10 per riser plus \$2 per head
Hospital	\$50 plus \$1 per bed	Fire Sprinkler Visual – Partial	\$25
Nursing Home	\$50 plus \$1 per bed	Fire Suppression System	\$50
Assisted Living	\$50 plus \$1 per bed	Re-Inspection	\$50
Hydrant Testing	\$100	Fireworks	\$50 per show
		Burn Permit	\$50

Personnel: The division has 6 FTE consisting of a Fire Marshal (Battalion Chief), an assistant fire marshal (captain), and 4 inspectors (lieutenants). Staff must be certified inspectors before joining the office and work to become certified investigators during employment.

Education Programs: The division facilitates the Rock Solid Safety Team; delivers programs in local elementary schools, assisted living centers, festivals, and business family days; is developing preschool and middle school programs; and runs fire extinguisher training, an Explorer Post 911 (a high school program to promote the firefighting profession), and an informal juvenile firesetters program.

Edinburg, TX*

Population: 84,497

Services Provided: The Fire Prevention Division of the Public Safety Department provides fire inspections, fire code developments, fire sprinkler and alarm plan reviews, new business license inspections, fire investigations, and fire safety educational programs.

Education Programs: The division runs a caravan and open house for fire prevention week; hosts station, museum tours, career day, and a poster contest (students enter message); and provides general fire safety training, fire extinguisher training, a fire safety house, smoke alarm assistance, fire drills, educational clown shows, fire sprinkler demo, and home fire life safety inspections.

League City, TX

Population: 98,312

Services Provided: The Fire Prevention Division assures compliance with fire and building codes; conducts fire prevention classes and programs, fire inspections, and home fire safety inspections; investigates fires; issues permits; provides fire safety tips; offers fire prevention classes; and conducts plat/plan reviews. Does not conduct background checks for the Fire Department.

Estimated Annual Activity Level: 30 structure fires and over 1,300 calls; required to investigate every fire; unknown new construction inspections and plan reviews; 1,365 existing inspections – try to inspect all structures annually.

Fees: Charge for plan review. Operational permits and system reviews fee schedule are as follows:

Fire Alarm Systems		Fire Sprinkler Systems	
Fire Alarm Plan Review	50% of permit fees	Sprinkler Plan Review	50% of permit fees
Base Fee	\$100	Base Fee	\$150
Fire Alarm Control Panel	\$75	Fire Pumps	\$150/Fire Pump
Annunciation Panels	\$25	0-10 Sprinkler Heads	\$100
0-10 Devices	\$75	11-25 Sprinkler Heads	\$150
11-25 Devices	\$125	26-100 Sprinkler Heads	\$250
26-100 Devices	\$200	101-200 Sprinkler Heads	\$375
101-200 Devices	\$300	201-600 Sprinkler Heads	\$425
201-600 Devices	\$400	Over 600 Sprinkler Heads	\$500
Over 600 Devices	\$500	Re-inspection Fees	\$100/re-inspection
Re-inspection Fees	\$100/re-inspection		

Required Operational Permits			
Aerosol Products	\$125	HPM Facilities	\$150
Amusement Buildings	\$150	High Pile Storage	\$75
Aviation Facilities	\$150	Hot Work Operations	\$50
Carbon Dioxide	\$0	Lumber Yards and Woodworking Plants	\$100
Carnivals & Fairs	\$50	Fueled Vehicles in Assembly Buildings	\$50
Cellulose Nitrate Film	\$150	LP Gas	\$100
Compressed Gases	\$150	Open Burning	\$75
Cryogenic Fluids	\$150	Open Flames & Candles	\$50
Cutting and Welding	\$75	Place of Assembly	\$50
Dry Cleaning Plants	\$150	Repair Garages & Motor Fuel Dispensing	\$75
Exhibits and Trade Shows	\$50	Spraying & Dipping Facility	\$75
Explosives	\$150	Storage of Scrap Tires & Tire Products	\$75
Flammable and Combustible Liquids	\$150	Temp. Membrane Structures & Tents	\$50
Fumigation and Thermal Fogging	\$50	Waste Handling	\$100
Hazardous Material	\$150		

Other Additional Annual Fees			
Health Care Fac./Nursing Homes	\$100	Access Control Systems	\$100
Day Care Facility (up to 12 clients)	\$75	Flammable/Comb. Storage Tanks	\$50/tank
Day Care Facility (over 12 clients)	\$100	Food Truck Permit	\$75/vehicle
Apartments (less than 16 units)	\$75	Kitchen Hood Supp. System	\$150
Apartments (more than 16 units)	\$150	Pyrotechnics/Fireworks Permit	\$100/event
Hospital (less than 50 beds)	\$75	Pyrotechnics/Fireworks Standby	\$200/engine
Hospital (more than 50 beds)	\$150	Smoke Control Systems	\$100/system
Foster Home	\$50	Standpipe Systems	\$125/riser
Smoke Control systems	\$100/system		

Personnel: The division has 6 FTE which consists of 4 full time and 2 part-time employees and the Fire Marshal. The division normally hires individuals that are already certified as inspectors or fire investigators. They recently stopped offering certification pay.

Education Programs: The division offers classes to the public to inform and instruct in the prevention of fires including: evacuation plans, general fire safety, fire extinguisher operations, EDITH, stop, drop, and roll, and the importance of smoke detectors. Fire station tours are also offered. At this time, they typically don't conduct a lot of programs, but do provide classes and events on request from schools.

Carrollton, TX

Population: 133,168

Services Provided: The Fire Prevention Division provides plan reviews, inspections of new commercial construction and public education programs; reviews applications for fire permits; conducts on-site life safety and fire prevention inspections of non-residential occupancies; inspects residential properties on request; issues permits for installation or removal of above or underground tanks; responds to citizen complaints; and investigates every accidental and criminal incendiary fire within the City. The division does not conduct background checks.

Estimated Annual Activity Level: 30-40 fires; 30-40 investigations; 75-100 new construction inspections and plan reviews; 500 existing inspections – moving towards a risk-based approach based on NFPA hazard categories and judgement.

Fees: Operational permit fees are \$75 and no other fees are charged; no fee for burn permits.

Personnel: Division has 8 FTE, all of whom are inspectors and 4 of whom are investigators. New staff receive training after being hired and staff receives a bump in pay if they certify for an intermediate or master firefighter.

Education Programs: The division provided apparatus visits, child car seat checks, CPR/AED/first aid training, fire extinguisher training, fire safety in the workplace training, Juvenile Firesetters Program, senior citizens safety training, Shattered Dreams program, station tours, and online fire prevention safety tips (fire prevention week, candles, cooking safety, fire drills, home escape plan, fire escape planning for older adults, carbon monoxide poisoning, emergency lights, and lightning safety); however, the division recently cut the Public Education Officer from their budget, but do still provide public education on request by the schools and participate in fire prevention month.

Lewisville, TX

Population: 104,039

Services Provided: The Fire Prevention Division is under the Developmental Services Administration and reviews architectural and engineering plans for compliance; conducts annual fire inspections of all commercial and industrial structures; inspects all construction projects; verifies safety of natural gas well sites; and does not conduct background checks. The Investigations/Public Education division is under the Fire Department and investigates fires.

Estimated Annual Activity Level: almost 0 commercial fires but unsure how many other fires; don't conduct investigations; 600-700 new construction inspections and plan reviews; 3,000 existing inspections – annually inspect every commercial structure in the City

Fees: Fee schedule is shown below.

Acceptance Test/New Installations		Miscellaneous Permits/Fees	
Sprinkler System (per riser/system)	\$125 + 0.012/sq. ft.	Tent/Air-Supported Structures	\$50
Remodel/Alteration 0-40 heads	\$50	Fire Hydrant Flow Test	\$50
Remodel/Alteration (41 or more heads)	\$100	Explosives/Blasting Agents	\$50
Automatic Extinguishing System	\$75	Fireworks	\$50
Fire Alarm System (per building/floor)	\$100 + \$2.00/device	Fumigation/Thermal Insect Fog	\$50
Standpipe System (per system)	\$100	Places of Assembly	\$50
Re-inspection fee for tests of special fire protection systems	Original Fee + 50%	Misc. Permits (Access Control)	\$50
		Flammable/Comb. Liquids/Tanks	\$50
		Liquefied Petroleum Gases	\$25
		Christmas Tree Lots	\$50
		Re-inspection Fee	Original Fee + 50%

Annual Inspection Permits			
Occupancy Type	Min. Fee	Max. Fee	Variable Fee
Assembly (A)	\$20	\$250	\$0.010/sq. ft.
Business (B)	\$25	\$275	\$0.011/sq. ft.
Educational (E)	\$20	\$250	\$0.010/sq. ft.
Factory (F)	\$25	\$300	\$0.012/sq. ft.
Hazardous (H)	\$50	\$425	\$0.017/sq. ft.
Institutional (I)	\$50	\$175	\$0.007/sq. ft.
Mercantile (M)	\$30	\$350	\$0.014/sq. ft.
Residential (R-1 & R-4)	\$20	\$200	\$0.008/sq. ft.
Storage (S)	\$25	\$300	\$0.012/sq. ft.

Personnel: Have 7 FTE who must have a year of experience in municipal inspection and must hold or almost hold the fire inspector certificate prior to hiring.

Education Programs: The Investigations/Public Education Division provides fire safety skits, smoke detector assistance, a “Lil’ Squirt House” (children “put out” flames on a mini house), educational clown shows, open houses (fire station tours, displays and hourly demonstrations), and visits from Santa.

Allen, TX

Population: 98,143

Services Provided: The Fire Prevention Division issues permits; investigates fires; conducts hazard inspections; and provides services to builders and developers including: plan review, environmental site assessments, permits, and life safety system inspections, and public education. The division does conduct background checks but for the Fire Prevention Division only.

Estimated Annual Activity Level: 7-10 total fires and 5-7 structure fires; investigate about half of fires – battalion chief calls the division when needed; unknown new construction inspections and plan reviews; 2,700 structures but not inspecting all due to new construction – Categorize buildings into annual, biennial, and triannual inspections, annual inspections are higher risk and triannual are lower risk.

Fees: Inspections are all free, plan review is based on square footage for fire alarms or sprinklers (2 cents/square foot; over 100,000 sq. ft. then 17 cents/square foot), do have trench burn permit fee of \$1,000 a day, charge \$50 for the first re-inspection, \$75 for the second, and \$100 for the third.

Personnel: The division has 7 FTE consisting of 1 Fire Marshal, 1 Public Administrator, 1 Assistant, and 4 inspector/ investigators. New employees must be a certified inspector and fire investigator and must have at least an Associate’s degree. Employees do receive certification pay based on TCFP certificates and get \$50 per certification a month.

Education Programs: The Public Training and Education division of the Fire Department provides a Citizens Fire Academy annually, Juvenile Fire Setters Program, and Community Emergency Response Team. They also provide apparatus displays and fire station tours when scheduled in advance.

Pearland, TX***Population: 108,821**

Services Provided: Fire Marshal’s Office is responsible for the protection of life and property through code enforcement (fire and life safety inspections), plan reviews, fire inspections, and fire cause determination. Public education is conducted through the Community Education Division.

Education Programs: The division facilitates firefighter appearances and provides car seat safety checks, CPR, automated external defibrillator, and first aid courses.

Killeen, TX**Population: 140,806**

Services Provided: The Fire Prevention section of the Fire Operations Division provides fire code safety inspections, fire investigations, plan reviews, public fire education, and background checks on new hires for the entire fire department.

Estimated Annual Activity Level: Over 200 fires, a significant portion of which are structure fires; 130 investigations – only investigates fires of which suppression crews are unable to determine cause and origin; 390 certificates of occupancy and plan reviews; 1,018 existing structure inspections.

Fees: Residential Fire Alarm permit is \$10 annually, Commercial Fire Alarm is \$25 annually, Health Care Facility \$500 for initial permit and \$125 annually; do not charge for burn permits; inspections fees shown below:

Inspection Fees			
Daycare Center	\$37	Witness Test	\$50 for first ½ hour + \$25/ half hour after
Foster Home	\$37		
Registered Family Home	\$33	Sprinkler System	\$125
Nursing Home	\$135	Natural Gas System	\$50
Hospitals	\$180	Fixed Fire Suppression	\$50
Other	\$37	Fire Alarm System	\$50

Personnel: Division has 6 FTE consisting of 1 Fire Marshal, 1 secretary, and 4 inspector/investigators. Staff are promoted from suppression crews and are required to obtain inspector and investigator certifications within the first two years of promotion, but they generally gain these certifications faster than this.

Education Programs: The section provides smoke detector assistance, CPR classes, and child safety seat classes, but they do very little public education as it’s usually handled by crews.

San Angelo, TX**Population: 100,450**

Services Provided: The Fire Prevention Division provides education, inspections, investigations (fire death/injury, fires, and bomb threats); and handles citizen code complaints, plan reviews, the “Dangerous Building” Program (review buildings that need to be brought up to standards), Internal Affairs for the Fire Department, and department background checks.

Estimated Annual Activity Level: 60 structure fires; 123 fire investigations; 200 plan reviews; 4,000 existing inspections – try to inspect all structures annually.

Fees: Fee schedule is below:

Inspection Fees			
Registered Homes and Foster Homes	\$25	Hazardous Materials	\$50
Institutions Requiring a State Inspection	\$50	High-Piled Storage	\$95
Schools, Day Care Centers, and Head Starts	\$172	Industrial Ovens	\$50
Apartment Complex	\$172	Lumber Yards & Woodworking Plants	\$95
Hotel/Motel	\$134	LP Gas	\$50
Aviation Facilities	\$98	Misc. Combustible Storage	\$50
Alcoholic Beverages Licensed Establishments	\$100	Open Burning	\$100
Hospitals and Nursing Homes	\$317	Pyrotechnic Special Effects Material	\$75
Amusement Buildings	\$50	Repair Garages and Gas Stations	\$76
Automatic Fire-Extinguisher Systems	\$25	Spraying and Dipping	\$76
Carnival and Fairs	\$300	Storage of Scrap Tires & Tire Products	\$86
Combustible Dust-Producing Operations	\$50	Tire-Rebuilding Plants	\$50
Compressed Gases	\$50	Waste Handling/Recycling Facilities	\$95
Cryogenic Fluids	\$50	Wood Products	\$50
Dry Cleaning Plants	\$50	Wrecking Yards	\$95
Explosives	\$50	Fire Watch (2 hr. min.)	\$65/hr.
Exhibits and Trade Shows	\$86	Fire Code Compliance (includes Plan Review and Inspection)	\$172
Fire Alarm and Detection Related Equipment	\$40	Other Facilities and Operations	\$25
Flammable and Combustible Liquids	\$50		
Permit Fees			
Sprinkler System Installation	\$182	Hood System Installation – Witness the Acceptant Test of the System	\$86
Fire Alarm Systems	\$172	After-Hours Inspections (2 hr. min.)	\$50/hr.

Personnel: Division has 8 FTE consisting of the Fire Marshal, 1 administrative assistant, and 6 other staff members, 2 of which are only fire inspectors and of which 4 are both inspectors and investigators. Typically the division wants staff to have at least one certificate before moving into the division but have opportunities to train; they have some education incentives that pay about \$150 a month.

Education Programs: The Division provides fire prevention training once a month at the City's new hire orientation, a variation of this course to any entity upon request (about 2 working lunches a month) and fire extinguisher training upon request; and visits all the schools annually, community fire prevention activities, and news channels to talk about smoke detectors and other fire prevention tips.

Tyler, TX*

Population: 103,700

Services Provided: The Prevention Division performs development and plan reviews for construction projects and conducts the hiring and background investigation of all new applicants to the Department.

Education Programs: The Division provides smoke alarm assistance.

Missouri City, TX***Population: 74,139**

Services Provided: The Fire Prevention Division conducts plan reviews for all new commercial construction projects; participates in the City’s development team and in the permitting process; conducts field inspections of all new commercial construction; processes and reviews applications for fire permits; conducts on-site fire inspections of all existing nonresidential occupancies; receives and responds to citizen complaints; and investigates every undetermined or incendiary fire within the City.

Education Programs: The division provides fire extinguisher training, smoke detector assistance, fire station tours, “After the Fire” guide for residents or business owners who suffer a fire loss, and a fire house clown program that provides education to elementary school children.

Mansfield, TX***Population: 64,274**

Services Provided: The Fire Prevention Division provides fire prevention inspections and complaint checks; educates citizens of all ages; investigates fires; and reviews plans.

Education Programs: The Division provides fire safety clowns, fire safety materials, fire station tours, fire apparatus visits, a citizen’s fire academy, fire and life safety handouts, and public education presentations.

Bryan, TX**Population: 82,118**

Services Provided: Fire Marshal’s Office conducts fire investigations, fire inspections, site inspections and plan reviews; and provides public fire and safety education. They do not conduct background checks.

Estimated Annual Activity Level: 114 total fires and 58 structure fires; all fires are investigated but not always by the Marshal’s Office; 547 plan reviews and 87 sprinkler/alarm permit; 830 existing inspections, and 194 structure ownership or tenant change inspections.

Fees: Do not charge a plan review fee, charge a testing fee for alarms (\$30), fire extinguisher (\$30), 10 day burn permits (\$200), 30 day burn permit (\$500), day cares (\$30), foster homes (\$30), fuel line (\$30), fuel tank (\$30), natural gas line (\$30), fire sprinkler standpipe test (\$65), health care facility (\$50), and nursing home (\$50).

Personnel: Have 6 FTE consisting of the Fire Marshal, 4 deputy fire marshals that are inspectors and investigators, and a clerk. Staff must be a certified paramedic prior to hiring and must obtain their inspector and investigator certifications within two years. The Division does have certification pay, which maxes out at \$375 a month.

Education Programs: The office provides online smoke detector tips and information, online EDITH information, online “After the Fire: Returning to Normal” information; conducts a pre-k program for about 3 weeks every year, but most education is conducted by request. Also, according to the 2015 Fire Department Annual Report, the Fire Marshal’s Office scheduled 75 public education events which included over 7,200 attendees.

Odessa, TX**Population: 118,968**

Services Provided: The Fire Marshal's Office provides fire investigations, public education, inspections for existing and new construction, plan review, but does not conduct background checks.

Estimated Annual Activity Level: About four times more fires than investigations; 130 investigations – don't investigate every fire; 50 plan reviews; the City has about 5,500 structures, and they inspect about 600 per year.

Fees: Don't charge any fees.

Personnel: The Division has 8 FTE consisting of the Fire Marshal, an assistant fire marshal, and 6 inspector/investigators. Staff must be certified inspectors and investigators one year after hire. Staff receive about \$250 a month per certification, which caps at \$600 a month.

Education Programs: The office presents programs to kindergarten, 1st, and 2nd graders; facilitates fire station tours, safety demonstration programs including: CPR demonstrations, fire extinguisher trainings, evacuation preparation and drill demonstrations, general fire safety demonstrations, and emergency management demonstrations; provides a fire safety house, which educates 3rd graders about EDITH, a citizens fire academy, smoke detector assistance, work place training, home inspections on request (don't have any enforcement power), and a child safety seat program.

Beaumont, TX**Population: 118,129**

Services Provided: Beaumont Fire-Rescues Planning Section reduces community & firefighter risk through four programs: public education & information, fire code compliance, fire investigations, and critical infrastructure protection/emergency management; operates the Fire Museum of Texas; conducts existing and new construction inspections; assists in issuing fire protection systems, storage tanks, fuel dispensing, tent, burn, and fireworks permits; and conduct background checks for the department.

Estimated Annual Activity Level: 194 structure fires and 505 total fires; 220 fire investigations; 645 certificate of occupancy inspections; 286 existing inspections – try to inspect all structures annually but actually inspect hospitals and nursing homes quarterly, schools annually, day cares annually, and try to prioritize others by how long it has been since an inspection occurred.

Fees: Charge \$50 for annual inspections required by the state – some are required quarterly (\$200 a year), a plan review fee is included in the permit fee, also charge a re-inspection fee of \$100.

Personnel: The division has 8 FTE consisting of the Fire Marshal, an assistant fire marshal, 4 inspector/investigators and 2 inspectors. Staff must obtain at least the basic inspector certification, and some must obtain the fire investigator certification. The division doesn't require certifications before hiring, but priority is given to employees who already have certifications. Extra pay is not provided for certifications.

Education Programs: The division facilitates the Fire Prevention & Family Safety festival, firefighter speakers, a pre-k and early elementary student reading program, school presentations, firefighter appearances, fire station visits, and many programs through the Museum; and provides smoke detector assistance, a fire safety house, fire extinguisher training, fire/evacuation & shelter-in-place drills, and a youth fire-setter intervention program.

Mission, TX

Population: 83,298

Services Provided: The Fire Marshal’s office enforces City ordinances and fire codes; reviews plans; conducts fire inspections; provides fire safety education; undertakes fire investigations; and conducts background checks for the department.

Estimated Annual Activity Level: 40 fires, 27 of which are vehicle and structure fires; only investigates fires that are unknown or suspicious in nature – about 15; 770 new construction inspections; 2,474 existing structure inspections – try to get all structures each year.

Fees: Fee schedule is shown below:

Inspections		Tests	
Day Care	\$30	Underground Tanks	\$50
New Business Occupancy		Above Ground Tanks (10 gal or less)	\$50
Plan Review	\$25/hr (min 2hrs)	Above Ground Tanks (10 gal or more)	\$75
Fire Alarm Plan Review	\$50	Automatic Hood	\$30
Sprinkler Plan Review	\$100 + \$0.5/head over 200	Above & Below Ground Hydrostatic (2hrs)	\$50
Permits & Fees		Fire Sprinkler	\$50
Burn Permit	\$50	Fire Alarm	\$50
Fuel Tank Permit	\$50	Fire Alarm Qualification	\$50
Working Log/Double Permit Fee (standby)	\$250		
Fire Report	\$10		

Personnel: The division has 5 FTE consisting of the Fire Marshal, 2 assistant fire marshals, 2 lieutenants who are all are inspector/investigators. Staff must be a certified inspector and fire investigator eventually, but must be a certified inspector to be hired. Fire Prevention employees get a \$4,000 stipend to make the position’s pay more even with fire suppression employees who get about \$4,000 of overtime pay each year.

Education Programs: The office facilitates fire safety clown shows for schools, requested fire extinguisher trainings and fire drills for schools and businesses; visits job fairs; and provides online safety tips for senior citizens and businesses.

Conroe, TX

Population: 68,602

Services Provided: The Fire Marshal’s Office is the division of the Conroe Fire Department that manages public education, fire and building code enforcement – including plan review, and new construction inspections; investigates fire cause and origin; and conducts background checks.

Estimated Annual Activity Level: 250 total fires; 40-45 investigations; 553 new construction inspections; 1,764 existing inspections – inspect structures that require state licenses annually, and inspect all other structures on a 2 to 2 ½ year rotation; have started paying certified suppression crew members overtime on their days off to perform inspections.

Fees: Don't charge for fire alarm permits, charge \$85 per riser for sprinkler permits, don't charge for annual inspections, \$300 for Fireworks Permits, \$25 for burn permit, and don't charge for re-inspections.

Personnel: The office has 5 FTE consisting of the Fire Marshal and 4 lieutenant fire marshals that are inspectors and investigators. Two suppression crew members perform investigations after business hours. Staff must be a certified paramedic prior to hiring. Staff should eventually be an inspector, instructor, and investigator, but lieutenants are promoted without those certifications and then must be trained, usually within a year.

Education Programs: The office facilitates fire station tours, and education programs for groups or organizations that include: fire extinguisher classes, workplace and home fire safety, public talks on topics of the group or organizations choice, fire prevention month presentation, and EDITH training in the fire safety trailer; and participates in community sponsored events. Currently, education is limited to visiting elementary schools and day cares in October – other education is generally by request.

North Richland Hills, TX***Population: 69,204**

Services Provided: The Fire Prevention Division provides fire code analysis on all new and proposed developments, fire and life safety education training for the community, timely fire origin and cause investigations; reduces false fire alarm calls through investigations; and reduces fire probability and loss through inspections and code enforcement.

Education Programs: The division facilitates a citizen's fire academy, community emergency response team, and CPR and automated external defibrillator training.

National Cities

Tuscaloosa, AL***Population: 98,332**

Services Provided: Fire Prevention Division reviews plans for all new construction, alterations, additions and change of occupancy.

Education Programs: The Division provides educational programs on a variety of fire and life safety topics; promulgates educational downloads from campus fire safety, the National Fire Protection Association, and the US Fire Administration on their website, as well as, fire self-inspection checklists, Type I hood requirement checklists, outdoor grilling safety handout, and "After Your

Emergency” online pamphlets; and provides a car seat installation and smoke alarm assistance program.

Champaign, IL*

Population: 86,096

Services Provided: The Fire Department’s Safety and Prevention Division provides prevention and preparedness training and resources to the community. The Building Safety Division conducts all inspections; receives permit applications; and reviews for code compliance.

Personnel: The Building Safety Division was budgeted for 9 FTE and the Safety and Prevention Division was budgeted for 3 FTE.

Education Programs: The Safety and Prevention Division provides smoke alarm assistance, information on carbon monoxide detectors, CPR classes, Knox Box information, and station tours.

Athens, GA

Population: 122,604

Services Provided: The [Fire Prevention/Investigation Division](#) handles fire investigations, fire inspections – including night time inspections of assemblies (bars or restaurants), fire code enforcement, plan reviews, public education, burn compliance, and citizen fire and life safety complaints.

Estimated Annual Activity Level: 153 fire incidents; 36 fire investigations; 232 individual new construction inspections and plan reviews; 4,287 existing inspections.

Personnel: The division has 7 FTE consisting of the Fire Marshal, an assistant fire marshal, a senior fire inspector/investigator, 3 fire inspector/investigators, and an office assistant.

Fees: They charge for plan review, and charge a re-inspection fee if the violation is not fixed.

Students: According to Division estimates, students cause about 15% of fires and about 15% of fires are in student dorms or apartments. The City recently put a moratorium on multi-story housing in the downtown district and they don’t have jurisdiction over campus.

Education Programs: The division provides a smoke detector assistance program, a fire safety house by request, and some education for Greek houses; and sends materials to middle schools during fire prevention week.

Bloomington, IN

Population: 84,067

Services Provided: The Fire Prevention Division provides fire investigation, public education programs, fire prevention inspections, and plan review.

Estimated Annual Activity Level: 3,000-4,000 runs and 900 fire incidents; 70 investigations; 300-400 new construction inspections and plan reviews; 2,500 existing inspections – includes routine inspections (2,000).

Personnel: The division has 3 FTE consisting of 2 inspectors and a prevention officer.

Fees: They don't charge for services or annual inspections.

Students: According to Division estimates, students cause about 55% of fires and about 50% of fires are in student dorms or apartments. 19.2% of the department's runs are to university owned buildings, but they don't have jurisdiction over campus.

Education Programs: The division provides pre-school programs (generally through day cares), fire station tours, a "Be Cool About Fire Safety" program, a "Fire in the Workplace" program for adults, a new program for college students during student orientation, and portable fire extinguisher training for businesses and local organizations.

Denton, TX**Population: 131,044**

Services Provided: The Fire Prevention Division provides public education, fire code enforcement inspections, record keeping, fire investigations, and plan reviews of all new construction.

Estimated Annual Activity Level: 300 structure fires; unknown number of fire investigations; 1,700 new construction inspections, 2,000 system tests (i.e. sprinklers and alarms) and 700 operational permit inspections (maybe burn permits, fireworks, etc.); 1,600 existing inspections – trying to implement a risk-based inspection approach.

Personnel: The division has 11.25 FTE consisting of 12 actual staff members.

Fees: Don't charge for routine inspections but do have a re-inspection fee based on square footage (average \$35); charge \$35 for system tests; operational permits and construction permits are \$200 each.

Students: The division could not estimate the number of fires caused by students but stated that a medium to low percentage of fires are in student dorms or apartments. The division doesn't have jurisdiction over campus, and the City has an ordinance prohibiting BBQs on a balcony or patio.

Education Programs: The division provides hazard prevention and preparedness training, online fire prevention tips and a fire safety clown program; trains senior citizens every two years; and visits elementary schools twice a year and high schools annually.

Gainesville, FL**Population: 130,128**

Services Provided: The Fire Rescue Department's Risk Reduction Bureau handles fire and life safety code interpretation, fire inspections, plan reviews, night inspections of public assemblies, post fire investigations, issuance of burn/fireworks permits, complaint investigations, designation of fire watches, injury prevention, and public education.

Estimated Annual Activity Level: 1,100 fire incidents; 82 fire investigations; individual new construction inspections/plan reviews are conducted by the Building Department; 2,575 existing inspections – prioritize based on the hazard rating of a building.

Personnel: Bureau has 6 FTE consisting of 3 inspectors, a fire investigator, a fire and life educator, and the Fire Marshal.

Fees: Charge for inspections based on square footage (usually between \$70-\$150), burn permits, special event inspections after hours, tent inspections for Christmas trees or fireworks, crowd manager training, which is required by the state for certain occupancies, and public records requests that take a lot of time.

Students: Based on division estimates, students don't cause an abnormal amount of fires and no more than 10% of fires are in student dorms or apartments. The bureau does not have jurisdiction over campus.

Education Programs: The bureau provides education programs for both [adults](#) and [youth \(90% youth about 5% college students – generally RAs\)](#), which for youth includes: a junior fire academy, a child safety seat inspection program, a fire safety video of which citizens can request a copy, Operation Extinguish! (an intervention program designed to curb juvenile fire-setting activities), Kiwanis Safety City (a 2 acre complex developed to teach kids fire, electric, bike, and pedestrian safety in a secure environment), Kids Challenge (a kids competition involving semi-firefighter activities), Camp Amigo (a one-week summer camp for burn victims), and Explorer Post 972 (a high school program to promote the firefighting profession); and for adults includes information online and a smoke detector assistance program.

Fayetteville, AR

Population: 82,830

Services Provided: The Fayetteville Fire Department has both a Fire Marshal's Office and a Community Education Division. The Fire Marshal's Office conducts inspections for business licenses, apartments and licensed facility inspections, and existing inspections by complaint; reviews plans; conducts fire investigations; processes fireworks, mobile vendor, and tent permit applications; and provides information on Knox Boxes.

Estimated Annual Activity Level: 3,000-4,000 runs and 900 fire incidents; 85-115 investigations; 600-800 new construction inspections/plan reviews; 200 existing inspections – don't really do these unless by complaint due to staffing.

Personnel: The division has 5 FTE.

Fees: Have a fire inspection fee built into the permitting process, but no other fees.

Students: The division could not estimate the number of fires caused by students but stated that the majority of fires aren't in student dorms or apartments but that students do generate a lot of runs – business is noticeably slower in the summer. The division does not have jurisdiction over campus but will perform fire investigations on campus if requested.

Education Programs: The division provides fire station tours, preschool on-site visits and fire safety lessons, fire safety education for schools, School Fire Marshal Program (interactive presentation and training for school students), fire safety trailer, fire safety education for businesses, civic groups, and

organizations, fire extinguisher training, smoke detector assistance program, home safety evaluation programs, youth fire intervention taskforce (YFIT), and the Family Fire Safety Academy; talks to senior citizens quarterly; and attends the university's job fair every fall.

Auburn, AL

Population: 62,059

Services Provided: The Fire Prevention Division visits each business once a year to develop a “pre-fire” plan to aid firefighters in the event of a fire (involves some advice on conditions that may be hazardous to occupants). They also provide educational services and issues burn permits. The Code Enforcement Division under the Building Office is responsible for the enforcement of all adopted codes – including fire.

Estimated Annual Activity Level: 215 fire incidents; 12-15 investigations; new construction inspections and plan reviews done by the Code Department; 1,892 existing inspections – conduct pre-fire plans; run fire drills in the schools every month and inspect them then.

Personnel: Fire prevention activities are performed by a battalion chief over an inspector position – suppression crews perform inspections.

Fees: No charge for plan review; Codes Enforcement Division does charge for inspections.

Students: Based on division estimates, students cause about 20% percent of fires and 5% of fires are in student dorms or apartments. The division doesn't have jurisdiction over campus but they do inspect on-campus fraternities.

Education Programs: The division provides fire safety presentations for residents, businesses, schools, preschools, child care facilities, senior citizens, and public events, and fire safety tips for: oxygen, space heaters, Christmas trees, Thanksgiving, grilling fires, and winter holiday fires; facilitates fire station tours, fire truck displays, and fire safety house visits (mobile vehicle); and performs an on-campus burn every 3-4 years to show how quickly fires spread.

Iowa City, IA*

Population: 74,220

Services Provided: The Fire Prevention Division inspects new construction and existing structures to ensure code compliance; investigates fires; and provides Public Education programs.

Personnel: The division has 1 FTE.

Education Programs: The division provides presentations for schools, day cares, senior citizens, at risk students, and preschool children, a Safety Village, a fire academy for RAs, a juvenile fire-setter intervention program, training for crowd control managers, fire safety talks and exit drills for on- and off-campus occupancies, car seat assistance, partnership with SAFE KIDS Johnson County, fire station tours, and smoke alarm assistance.

Columbia, MO

Population: 119,108

Services Provided: [The Fire Marshal's Division](#) handles fire investigations, fire inspections, code enforcement, plan reviews, permits, public education, public information, and campus fire safety.

Estimated Annual Activity Level: 300 fire incidents; 200 fire investigations; 5,000 individual new construction inspections/plan reviews; Fire Suppression crews conduct yearly routine existing inspections

Personnel: The division has 5 FTE consisting of a Fire Marshal and 4 Assistant Fire Marshals. Fire suppression staff do a lot of the education and public relations requests.

Fees: Do not charge fees – not even for permitting.

Students: Based on department estimates, students cause about the same amount of fires as other segments of the population and there are only 1 or 2 on-campus fires a year. The division does not have jurisdiction over campus, but the Fire Marshal is paid half by the City and half by the university, so has slightly more influence.

Education Programs: The division facilitates teaching resources and opportunities to citizens of all ages; conducts arson prevention and firesetting intervention programs; provides firefighters as community role models at businesses and school events. These include safety tips for homes, businesses, and off-campus housing, as well as teacher resources, school programs, firefighter visits, station tours, and the juvenile fire-setters program. The division also tries to get involved with fraternities, sororities, and student organizations.

Lawrence, KS**Population: 93,917**

Services Provided: The Fire Prevention Division issues burn permits; enforces codes; conducts annual inspections and night time inspections of assembly occupancies; investigates fires; [inspects homes](#); reviews plans; handles coroner investigations; and administers the Knox Box program. The Training & Education Division provides public education.

Estimated Annual Activity Level: 251 fire incidents of which 90 were structure fires; 251 fire investigations; 927 individual new construction inspections and plan reviews; 6,314 existing inspections – all commercial properties are inspected on an annual basis – congregate assemblies receive inspections twice a year and A-2s receive frequent night inspections.

Personnel: Prevention Division had 3 FTE and the Training Division had 3 FTE.

Fees: Do not charge fees.

Students: They could not estimate the number of fires caused by students, but about 40% of fires are in student housing. They do not have jurisdiction over campus, but the City adopted an ordinance prohibiting indoor, stuffed furniture from being on outdoor balconies, patios, etc. because a significant number of fires were initiated that way.

Education Programs: The [Training & Education Division](#) facilitates a CPR program, a Chaplain program (designed to council victim families and personnel), Explorer Post 2555 (a high school

program to promote the firefighting profession), Greek Academy (fraternity and sorority program that provides fire safety/survival training), a juvenile fire-setters intervention program; and provides programs for youth (focuses largely on 3rd through 6th graders), college students (full day of training for RAs, visit dorms and Greek houses and provide education), businesses, and smoke alarm assistance.

Greenville, NC**Population: 90,597**

Services Provided: The City of Greenville has a Fire Inspections, Cause Investigations and Permits Division which investigates fires; inspects buildings; and reviews permits. The Fire Prevention & Life Safety Services Division provides public education.

Estimated Annual Activity Level: 200-300 fires per year; all fires are investigated per state law; no estimate provided for individual new construction inspections and plan reviews; 2,500 existing inspections – required to follow the North Carolina fire code (inspection schedule by occupancy – see [website](#)).

Personnel: The division has 4 FTE consisting of 1 Fire Marshal, 2 Deputy Fire Marshals, and 1 Life Safety Educator.

Fees: Charge for permits and inspections for licensing purposes.

Students: The division could not provide estimates for the number of fires caused by students or the number of fires in student housing. The City requires all Greek houses to have a fire system and receive fire inspections once a semester, but the division generally does not have jurisdiction over campus.

Education Programs: The division provides smoke alarm assistance, business inspections, fire safety talks and demonstrations, child care seat inspections, educational programs for apartment and dormitory safety, and an educational fire safety clown team program; and partners with the university for fire and life safety programs for college students.

Appendix B: Fire Risk Quantification

In order to evaluate the Fire Prevention Division’s annual inspection strategy, we developed a methodology to assign fire risk to each International Building Code occupancy that had been inspected by the division in the last year. We identified two major components of fire risk:

- 1) The probability that a fire will occur; and
- 2) The probability of a fire death.

In our risk scheme, fire probability was weighted double the probability of fire death.

To begin, we identified the occupancies that the Fire Prevention Division had inspected between May 2015 and January 2017. The results of this classification can be seen in the Table B-1 below. We then only assigned fire risk scores to those occupancy types.

Table B-1: Inspected Existing Structure Occupancies (May 2015 – January 2017)

Occupancy	Description	Total	Percentage
A-1	Assembly intended for performing arts/movies	7	1%
A-2	Assembly intended for food/drink consumption	173	25%
A-3	Assembly intended for worship/recreation/amusement	19	3%
A-4	Assembly intended for indoor sporting events/activities	4	1%
A-5	Assembly intended for outdoor sporting events/activities	1	0%
B	Building intended for office/professional/service-type transactions	114	16%
E	Building intended for education through 12 th grade	45	6%
F-1	Building intended for creating/finishing/repairing; moderate hazard	15	2%
F-2	Building intended for creating/finishing/repairing; low hazard	4	1%
H	Building intended for creating/storing hazardous materials	5	1%
I-1	Building intended for 24/7 custodial care; inhabitants fully capable	4	11%
I-2	Building intended for 24/7 custodial care; inhabitants incapable	7	1%
M	Building intended for the display and sale of merchandise	170	24%
R-1	Sleeping units intended for transient usage	85	2%
R-2	Building containing more than 2 dwelling units; permanent inhabitants	31	4%
R-3	Building contains 1 or 2 dwelling units; permanent inhabitants	10	1%
S-1	Building intended for storage; moderate hazard	3	0%
Total:		697	100%

In order to evaluate the probability that a fire would occur, we identified the percentage of fires that occur in each occupancy type nationally and in the City of College Station specifically to calculate a fire probability risk score (out of 200).

To obtain national numbers, we used the NFPA’s “Fires by Occupancy or Property Type” report issued in March of 2017. To obtain City percentages, we used information from documented fire investigations. The results of each are shown by occupancy type in Table B-2 on the next page:

Table B-2: Fire Probability Calculation

Occupancy	Nat. Pct.	City Pct.	Score	Occupancy	Nat. Pct.	City Pct.	Score
A-1	0.04%	0.00%	0.04	H	0.33%	0.00%	0.33
A-2	1.67%	6.67%	1.67	I-1	0.25%	0.00%	0.25
A-3	0.62%	0.00%	0.62	I-2	1.18%	0.00%	1.18
A-4	0.02%	0.00%	0.02	M	1.52%	1.67%	3.19
A-5	0.04%	0.00%	0.04	R-1	0.76%	0.00%	0.76
B	1.66%	6.67%	8.33	R-2	23.58%	35.00%	58.58
E	0.89%	5.00%	5.89	R-3	51.59%	45.00%	96.59
F-1	0.33%	0.00%	0.33	S-1	1.63%	0.00%	1.63
F-2	0.33%	0.00%	0.33	<i>Total:</i>	86.45%	100.00%	186.45

We then developed a schedule for fire death risk by occupancy type based on the International Code Council’s (ICC) “Risk Factors of Use and Occupancy Classifications.” This publications lists seven factors that that the ICC uses to judge riskiness. These factors are listed below:

- Nature of the hazard (i.e. internal or external origination and impact on occupants, structure, and contents)
- Number of persons normally using the building or structure
- Length of time the building is normally occupied
- Whether people normally sleep in the building
- Whether building occupants or users are expected to be familiar with the building layout and means of egress
- Whether a significant percentage of the building occupants or users are or are expected to be members of vulnerable population groups (i.e. infants, young children, elderly persons, person with physical or mental disabilities, or persons with other conditions or impairments that could affect their ability to make decisions)
- Whether a significant percentage of building occupants or users have familiar or dependent relationships

Using these seven factors, we developed criteria and a risk scoring schedule to judge each occupancy type. This fire death risk schedule and an explanation for each criteria can be seen below:

Table B-3: Fire Death Risk Scoring

Criteria	Assignment	Points	Criteria	Assignment	Points
Acceptance of Hazard:	Voluntary	0	Used for Sleep:	No	0
	Involuntary	10		Yes	20
Expectations of Protection:	Moderate	3	Layout Familiarity:	Familiar	0
	High	7		Unfamiliar	10
	Very High	10	Vulnerable Populations:	Unlikely	5
Volume of Users:	Low	3		Possible	10
	Medium	7	Likely	15	
Span of Use:	High	10	Dependent Relationships:	Unlikely	5
	Short	3		Possible	10
	Medium	7		Likely	15
	Long	10			

Acceptance of Hazard: Stated explicitly for each occupancy type in the ICC’s “Risk Factors of Use and Occupancy Classifications.”

Expectations of Protection: Stated explicitly for each occupancy type in the ICC’s “Risk Factors of Use and Occupancy Classifications.”

Volume of Users: Assigned based on general visitation rates – *high* volume was given to occupancies with a large number of irregular users (i.e. restaurant, retail store, movie theater, etc.); *medium* volume was given to occupancies where there are many regular users (i.e. schools, offices, apartments, etc.); *low* volume was given to occupancies where there are few regular users (i.e. one-or-two dwellings, storage compartments, etc.).

Span of Use: Assigned based on the length of time a user is in a particular structure per day – *long* span was given to occupancies where the average user stayed for longer than an average work day (10-24 hours); *medium* span was given to occupancies where the average user stayed for about an average work day (7-9 hours); *short* span was given to occupancies where the average user stayed for less than an average work day (0-6 hours).

Used for Sleep: Assigned based on whether or not the average user sleeps in the given occupancy.

Layout Familiarity: Stated explicitly for each occupancy type in the ICC’s “Risk Factors of Use and Occupancy Classifications.”

Vulnerable Populations: Assigned based on whether children, infants, elderly adults, inebriated or otherwise vulnerable users were present – *unlikely* was given to occupancies where generally healthy, unimpaired adults were expected to be the average user (factories, laboratories, storage units, etc.); *possible* was given to occupancies where vulnerable populations may make up a significant portion of users (movie theaters, offices, retail stores, etc.); *likely* was given to occupancies where vulnerable populations were expected to be the average user (bars, nursing homes, schools, etc.).

Dependent Relationships: Assigned based on whether vulnerable populations were dependent on non-vulnerable populations for their removal from a dangerous situation: *likely* was given to occupancies where the average user would need help escaping in a dangerous situation (hospitals, schools, etc.); *possible* was given to occupancies where a significant portion of users would need help escaping a dangerous situation (movie theaters, nursing homes, restaurants, bars, etc.); *unlikely* was given to occupancies where generally healthy, unimpaired, capable adults were expected to be the average user (factories, laboratories, storage units, etc.).

We then used this quantification methodology to calculate a fire death risk score (out of 100) for each occupancy type. These category assignments can be seen in Table B-4 on the next page:

Table B-4: Fire Death Risk Criteria Assignments

Occupancy	Acceptance	Expectations	Volume	Span	Sleep	Familiarity	Vulnerable	Dependent	Score
A-1	Voluntary	Moderate	High	Short	No	Unfamiliar	Possible	Possible	46
A-2	Voluntary	Moderate	High	Short	No	Unfamiliar	Likely	Possible	51
A-3	Voluntary	Moderate	High	Short	No	Unfamiliar	Possible	Possible	46
A-4	Voluntary	Moderate	High	Short	No	Unfamiliar	Likely	Possible	51
A-5	Voluntary	Moderate	High	Short	No	Unfamiliar	Likely	Possible	51
B	Involuntary	Moderate	Medium	Medium	No	Familiar	Possible	Possible	47
E	Involuntary	High	Medium	Medium	No	Familiar	Likely	Likely	61
F-1	Voluntary	Moderate	Low	Medium	No	Familiar	Unlikely	Unlikely	23
F-2	Voluntary	Moderate	Low	Medium	No	Familiar	Unlikely	Unlikely	23
H	Voluntary	High	Low	Medium	No	Familiar	Unlikely	Unlikely	27
I-1	Involuntary	High	Medium	Long	Yes	Unfamiliar	Likely	Possible	89
I-2	Involuntary	Very High	Medium	Long	Yes	Unfamiliar	Likely	Likely	97
M	Involuntary	Moderate	High	Short	No	Familiar	Possible	Possible	46
R-1	Voluntary	High	Medium	Long	Yes	Unfamiliar	Possible	Possible	74
R-2	Voluntary	Moderate	Medium	Long	Yes	Familiar	Possible	Possible	60
R-3	Voluntary	Moderate	Low	Long	Yes	Familiar	Possible	Possible	56
S-1	Voluntary	Moderate	Low	Short	No	Familiar	Unlikely	Unlikely	19

We then averaged the Fire Death and Fire Probability scores to compute a Fire Risk Score. The table below compares these scores side-by-side and is ranked in order from highest Fire Risk Score to lowest.

Table B-5: Fire Risk Score Calculations

Occupancy	Fire Death	Fire Probability	Fire Risk Score
R-3	56	96.59	76.30
R-2	60	58.58	59.29
I-2	97	1.18	49.09
I-1	89	0.25	44.63
R-1	74	0.76	37.38
E	61	5.89	33.45
A-2	51	8.34	29.67
B	47	8.33	27.67
A-5	51	0.04	25.52
A-4	51	0.02	25.51
M	46	3.19	24.60
A-3	46	0.62	23.31
A-1	46	0.04	23.02
H	27	0.33	13.67
F-1	23	0.33	11.67
F-2	23	0.33	11.67
S-1	19	1.63	10.32
<i>Average:</i>	<i>51</i>	<i>10.97</i>	<i>30.98</i>

Appendix C: Responses to the Audit Recommendations

The following are responses to the recommendations made by our Internal Auditor's Office.

1. The recommendation was made that we investigate strategies to bolster existing annual structure inspection activities. We concur with the findings in the report. Due to the steady increase in new construction, existing structure inspections have decreased. The Division has been asking for additional staff and support for the last 5-8 years; however, our previous administration had other priorities. In 1988, the Fire Marshal's office had 1 Fire Marshal and 3 Deputy Fire Marshals, while Harvey Road was still a cow pasture. In 2008, an additional Deputy Fire Marshal was added to assist with the ever growing workload within the Division. The last 10 years, the city population has grown at a rate of 20% reaching 110,000. Likewise, new businesses have kept up with if not exceeded the 20% growth rate. To keep up with the growth throughout the years, resources were reallocated to focus on new construction and plan reviews. When inspections are completed on new construction, they meet the requirements of the International Fire Code and National Fire Protection Association 101 Life Safety Code. However, after that, we are unable to complete the appropriate annual inspections to ensure the safety of our citizens and visitors. The increasing workload consists of the following:

- New construction plans reviews and inspections
- Citizens' complaints and inquiries
- Our own training for state mandated continuing education requirements
- Meetings
- New hire testing and background checks
- Occupancy checks
- Burn permits
- Mobile food vendor inspections
- Open record requests
- Fire Department inquiries
- Internal affairs investigations and fire investigations

The annual fire safety inspections on existing occupancies have decreased as shown below. The exception to that decrease is when we have individuals on light duty who were assigned to inspections only. That year, our inspections doubled. Our goal is to accomplish 90-95% of annual inspections with a compliance rate of 100%, with as few re-inspections as possible. We also strive to inspect our high hazard occupancies bi-annually.

Out of an estimated 2,300 businesses, the percentage of inspections per year:

- 2012 – 34%
- 2013 – 40%
- 2014 – 82%
- 2015 – 32%
- 2016 – 17%

- A. At this time the department has submitted service level adjustments for two civilian inspector positions. The intent of these positions is to conduct inspections on existing construction to lower the risk in the City.
 - B. Our office is also working on a proposal for adding fees for annual inspections, burn permits, fireworks permits, and an increase to current fees that have not been adjusted in 10 years. This proposal is to recover some of the fire department costs to provide these services.
 - C. Our office is also incorporating newly produced NFPA 1730 (Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education) to help better manage time and increase efficiency.
2. The second recommendation to develop a process to report fire cause and origin information to benefit public education and code enforcement efforts. We also concur with these findings. Currently we are investigating different systems such as Ez Fire Records and ProPhoenix that will better fit our needs providing a user friendly platform for retrieving data. The recommendations in NFPA 1730 will also help us address a better communication system through which to disseminate information to internal and external stakeholders.