



To the Future

Saskatoon Fire Department Continuous Improvement Initiative



Saskatoon Fire Department
September 2014

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Message from the Fire Chief

The Saskatoon Fire Department is responsible to provide emergency response and protection for nearly 100 billion dollars' worth of taxable buildings and assets. This value has recently been growing by 1 billion each year. The fire service is at a pivotal point in its history and there is opportunity to increase the effectiveness of our department while keeping our focus on staff safety and community service.

The Saskatoon Fire Department looks forward to refining its current community impact across a spectrum of services directed to finding new efficiencies and opportunities for the department and the citizens of Saskatoon. One way to accomplish this will be to leverage the workload analysis of fire department personnel as identified by RAND¹.

Beginning in March of 2014, at the direction of Civic Administration, the Saskatoon Fire Department undertook a program that would address the City of Saskatoon's strategic priority of Continuous Improvement in order to be able to embrace the 21st century. Saskatoon's Strategic Plan identifies ***A Culture of Continuous Improvement*** as one of the goals, with the vision of Saskatoon being the best-managed city in Canada.

The Continuous Improvement (CI) Strategy is a corporate-wide approach to ensure that the delivery of services to citizens is done in the most effective and efficient way possible. While CI process will continue to be a work in progress as it is implemented, the strategies developed will be continually evaluated as to their effectiveness. This experience gained within the Fire Department will also help to increase knowledge, understanding and create ownership for continuous improvement within the corporation.

Firefighter and civilian safety remain the highest priority throughout the application of the CI process and as a result, the recommendations contained in this report continue to support best practices, taking into consideration current and future risks.

In the past, a firefighter has been able to take on multiple roles. Firefighting, vehicle extrication, and dangerous goods responses were just some of the tasks every firefighter would be expected to respond to. With increasing complexities in vehicles and the expanding fields of dangerous goods etc, we can no longer expect all staff to be proficient in all areas. Specialized training is required to successfully mitigate these more complex incidents safely as we look to the future and how we provide service to a future city of 500,000 citizens.

The latest Civic Services Survey identified Fire Protection as a key strength and the public gave the fire service the highest corporate satisfaction rating (p.27). As the Saskatoon Fire Department moves into the future, we will increase proactive community engagement which will elevate community safety while maintaining the effective response model that presently exists.

As we analyzed the data gathered during the CI process, we continually used this thought to guide our process:

"If you always do what you always did, you will always get what you always got."

1. The RAND Corporation did a study of Fire Department deployment policies which tie available resources to their distribution and movement in "Fire Department Deployment Analysis"

Executive Summary

Municipal governance sets fire protection service levels within a community. Examining public demands, insurance needs and the best practices of other similar communities also shapes Fire Service levels. The proposed level of service is then balanced against the requisites of labour law and standards such as Occupational Health and Safety, and industry practices such as the National Fire Protection Association (NFPA).

The report shows that the present level of service and staffing is based on best practice and provides the correct elements of safety response required and meets the populace needs for protection. The deployment analysis used here shows that the plan for development of future fire protection should be changed to increase life safety while providing a significant cost saving. This would be done by relocating future construction and will result in the elimination of two stations. Adoption of this plan represents an overall capital saving of over 11 million dollars and an annual operating saving of 3.6 million. It also shows that the efficiencies that can be discovered through the evaluative and collaborative steps of:

- Deployment analysis
- Staff allocation and assignment
- Revision of training programs and specialty services
- Response configuration review
- Service reviews

The strategic plan of the City of Saskatoon emphasizes the importance of safety for both citizen and staff. Successfully meeting the challenge of this qualitative measure described in the plan makes a vibrant and safe community possible. Two of the goals outlined in this plan, Quality of Life and Continuous Improvement, are heavily reliant on an effective and engaged fire service in order to realize these objectives. Long after a citizen or neighborhood has received emergency services, many of the outcomes of the emergency response, such as tangibles of property and asset loss, can be measured. However, there is an additional qualitative component to emergency response that is difficult to measure. These emergency services intangibles would be the indirect costs associated with a community's loss in productivity, social wellbeing and overall confidence in the future. We believe citizen confidence will continue as highlighted in the 2014 Civic Services Review. The Saskatoon Fire Department will continue to deliver a safe, best practices service level.

With the tremendous change in building construction and content, the dynamics of fire fighting is changing. With response time becoming more and more critical due to these, long term strategies will need to be implemented. These will include:

1. This first CI effort has identified actual and potential savings of approximately **\$16.8 million** over both long and short term initiatives.
2. Civic Facilities have identified that three fire stations (#3, #4, #5) having reached the end of their service life. With this forehand knowledge it is recommended that a complete deployment analysis be completed by a third party to consider alternate locations based on demographics and long term city growth.

3. Development of a dedicated training facility that will see training capacity to meet the challenges of the new fire dynamics and support the corporate initiatives of multiple civic departments as suggested in this report.
4. Direct continued working relationships with our internal departments, Local 80, Saskatoon Health Region, Emergency Management and Fire Safety and many other organizations moving to a common goal of community service.

The Saskatoon Fire Department has a proud history of serving Saskatoon and with these initiatives can continue do so in an efficient and effective manner into the future. Below is a brief reference guide to the Saskatoon Fire Department's **Continuous Improvement Initiatives**. These initiatives have been developed after conducting a thorough review of the department. The intent is to continue to evaluate and "fine tune" these initiatives as the Saskatoon Fire Department continues to move forward.

Summary of Proposed Continuous Improvement Strategies

#	Status	Description	One Time \$	Ongoing \$	Page #
1	Implemented	Sharps pick up		6,200	21
2	Implemented	New overtime arrangement		15,000	21
3	Implemented	Cancelled road tests		14,400	21
4	Implemented	Altered response configuration to Alarm Bells		7,000	23
5	Pending	Purchase "Move up Programming"		6,000	24
6	Implemented	Transition to 120 primary care paramedics		21,500	26
7	Pending	Consideration of lift assist fee	63,000 ^①		26
8	Pending	Re-staff all fire stations as per the breakdown in Table 6.	efficiency	efficiency	27
9	Pending	Adopt Fire Marque		250,000	28
10	Pending	Re-locate present Hampton Fire Station to Elk Point for 2016 / 2017	5,650,000 (capital) ^②	1,800,000 ^②	30
11	Pending	Requesting sale land for Stonebridge fire location 2017/2018	5,600,000 (capital) ^②	1,800,000 ^②	31
12	Pending 2015	Fire managed Attendance Support Program		37,700	31
13	Pending	Realignment of Training Division	Working with Local 80		32
14	Pending	Allow FSI's to work follow Operations day shifts and facilitate a mentorship program	Working with Local 80		33
15	Pending	Explore Efficiency / Revenue streams available to the SDC in all areas of training			34
16	Pending	Realign some 8175 with the new Corporate Bylaw Department		650,000 ^③	35
17	Pending	Fee for service amendment		1,600	37
18	Pending	Fee for service for multiple false alarms		75,000 ^①	39
19	Pending	Fee for service for file searches.		15,000	39
20	Pending	Fee for the service of issuing a Fireworks Vendor Permit.		1,500	40
21	Pending	Fee for the service of issuing a Pyrotechnics Fireworks Permit.		500	41
22	Pending	Update current amount of fee's identified in Bylaw 7990.		12,500	42
--	December 31, 2014	One time deferral of Capital reserve	600,000 ^④		No Ref
--	December 31, 2014	Annual average return to general revenue due to typical operating procedures		179,700 ^⑤	No Ref
--	Pending	Create new service agreements within the mutual aid call response areas of Saskatoon		30,000	No Ref
Total Savings			\$11,913,000	\$4,923,600	

- Note: There will be follow up reports to Council for fee for service change requests at 2015 Budget review. These C/I initiatives are #'s (7,17,18,19,20,21,22).

Description of Proposed Financial Savings

This table describes how the department will benefit from these savings. There are five types of department savings defined below. Each CI Strategy is placed next to the appropriate definition.

①	Potential short term as values are considered unsustainable through public compliance.
②	The relocation of the two proposed fire stations will result in a an overall savings in both Operating and Capital.
③	This estimated savings is a result of a non- ask for realignment of staffing within fire prevention.
④	The one time deferral and capital was made possible by consideration of apparatus service life and the change in replacement of a full aerial apparatus with the smaller multipurpose ladder unit by 2019
⑤	The annual average return is a result of the operating budget based on staffing allocations on an annual basis and savings in major repair expenditures

Department History

Saskatoon was founded as a Temperance Colony in 1882. As Saskatoon grew through the first three decades it went from reservoirs, buckets and horses to its' first piece of motorized apparatus in a unionized professional department in 1909. From the beginning the primary objective of the Saskatoon Fire Department was to:

- a) Prevent fires from starting.
- b) Prevent fire loss of life and property in case fire does start
- c) Confine fire to the place of origin
- d) Extinguish the fire

This set of original priorities has not changed, even as the city has grown to its present size of 256,000. The personnel of the Saskatoon Fire Department clearly understand the serious nature of those objectives. Since its inception, 19 members of the Saskatoon Fire Department have fallen in the line of duty performing these four objectives. The names of those firefighters are memorialized at #6 Fire Station.



Until 1990, fire response was the primary role of this service. At that time, and well before the formal concept of Continuous Improvement, the Saskatoon Fire Department looked to the future needs of our growing community. Because of that vision the department took on a wide range of specialties in order to support the community. These specialties range from all forms of rescue, emergency medical and

hazardous materials situations and are now part of civic bylaw. With these skill sets in the fire service, citizens, contractors and companies can live, build and produce knowing that the appropriate resources are available to meet their personal needs, required safety plans and Provincial Occupational Health and Safety Standards.

Current Department Conditions

The Saskatoon Fire Department is responsible for emergency planning and response to mitigate all incidents of concern within the City of Saskatoon and surrounding Rural Municipalities that are covered by applicable service agreements. The Department's responsibility to enforce the above initiatives is mandated through both the Fire Prevention Act 1992 (soon to be the Fire Safety Act) and the Emergency Planning Act. The responsibilities of the Saskatoon Fire Department are then enabled through the Cities Act and the Saskatoon Bylaw 7990 within Part II Section 4, codified June 18 2012, to include:

- Fire suppression
- Fire prevention and inspections
- Fire investigations
- Educational programs
- Airport fire and protective services
- Water rescue
- Tactical rope rescue
- Vehicle extrication
- Structural collapse,
- Confined space entry
- Trench rescue
- Rapid intervention rescue
- Dangerous goods emergency service
- Pre-hospital emergency medical service

Based on the RAND study, fire suppression can be described as having two distinct forms. The first being the 'potential for loss creates a latent demand (often called potential demand) for fire protection. Fire companies must be available to respond in case a fire occurs. Second, when fires actually occur, latent demand is converted into realized demand—events that (in principle) require the fire department to respond and put the fires out. (RAND,1988).'

An audit report conducted by Robert Prosser & Associates in January of 2005 states that "in our opinion, Saskatoon Fire department substantially meets the requirements of National Fire Protection Association (NFPA) Standard 1710."

NFPA 1710 defines the requirements for effective and efficient organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments to protect citizens and the occupational safety and health of fire department employees. The general overview of the standard outlines that the first arriving apparatus should be on scene in four minutes 90% of the time after the receipt of the alarm. The total compliment of staff needs to be 16 after 8 minutes 90% of the time.

However, within that audit, it was also noted that the departments minimal staffing of four firefighters per apparatus on a fire scene is compensated by the number of apparatus able to respond to fire alarm which meets the minimum requirements. The table below outlines the response times found for 2013. It must be noted that as the city

grows the ability of all the peripheral stations to meet this time line will become increasingly difficult.

Hall	Apparatus	Response
1 Hall	Engine 10	2:23
	Engine 12	2:32
	Engine 13	2:25
	Ladder 1	1:50
2 Hall	Engine 21	2:46
	Engine 22	3:23
3 Hall	Engine 3	3:21
4 Hall	Engine 4	3:47
5 Hall	Engine 5	2:40
6 Hall	Engine 6	3:03
	Rescue 6	3:34
7 Hall	Engine 7	3:26
8 Hall	Engine 8	2:44
	Ladder 8	1:48
9 Hall	Engine 9	3:02

Table 1

Finally, by following the best practices of NFPA Standard 1710 as listed above, the Saskatoon Fire Department is also in compliance with the Saskatchewan Occupational Health and Safety *“Code of Practice for Fire Fighters”*.

I. Deployment Analysis

The Department currently operates 12 front line engines and two aerials out of nine fire stations. Ideally each apparatus is staffed with five personnel to allow for annual leave, training, illness etc. with a minimum staffing level of four per apparatus. The minimum shift staffing for the tour of duty is 56.

In 2013 crews responded to 11071 emergency and non-emergency calls, see figure 6 on page 16, not including inspection activity or community engagement events

There are 280 staff members who work for the SFD in the fire suppression division and the remainder of the divisions including Prevention bring the full time employee total to 334.

Compton and Granado stated in the (2nd Edition, International City Management Association, Municipal Management Series, 2002) that the tasks of an engine company at an incident are considered to reach 100% efficiency when using a five person crew. Apparatus efficiency will fall to 65% with a four person crew, and then reduced again to 38% if a three person crew is utilized. The SFD has by Standard Operating Procedure (SOP) identified that a 4 person crew will be the minimum staffing for an apparatus comprised of one officer and three firefighters. Studies conducted on departments that utilize three person crews reveal that there is a 56% increase in the injury rate of responders and as indicated above a dramatic drop in the engine company’s ability to complete tasks. A 2010 report in the National Institute of Science and Technology on Residential Fire ground Field Experiments (p14) not only corroborated the staff safety previously quoted, but apparatus staffed with a 4 person crews were also shown to increase civilian rescue efficiency to 80%. The conclusion of this author is that a 4 person crew as outlined in the Standard Operating Guideline is validated.

The Saskatoon Fire Departments current staffing model allows the department to meet the NFPA 1710 guidelines and not jeopardize the responders any more than the inherent risks already encountered by crews. The staffing numbers needed to meet this minimum Standard Operating Procedure is approximately 1.34 FTE’s (Full Time Equivalents) per position. The industry best practice used by the SFD, and departments across Canada, takes into consideration annual leave, overtime, sick time, accommodations, and staff vacancies. When applied to the SFD this formula results in a

department profile of 13 apparatus x 4 positions x 4 shifts x 1.34 = 278.7 FTE's. Figure 1 describes the five year department average staff level based on these numbers.

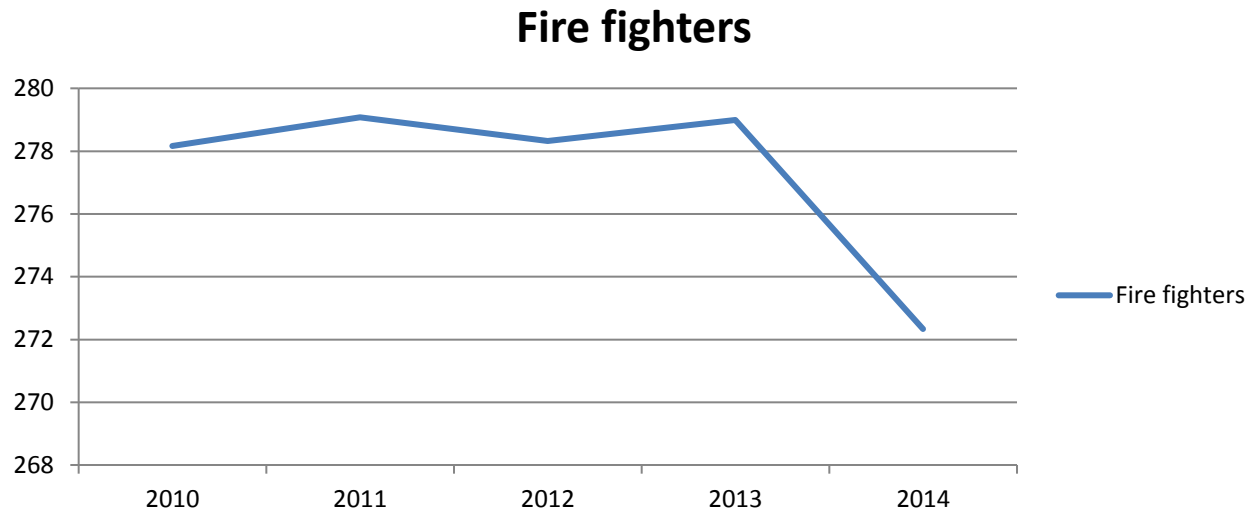


Figure 1

There are presently nine stations covering the city as outlined in Figure 2. There are two more stations in the planning stages that will see one in Elk Point and the other in the Holmwood Business sector. With the current densification and construction styles seen in any modern city, it is important for the Saskatoon Fire Department to maintain the current average response times of four minutes in order to meet its core value of protection for the citizens of Saskatoon and the prevention of conflagration (a large destructive fire).

Given the current densification and construction styles in North American cities, rapid response times are imperative to ensure the fire service can continue to safely protect citizens and their property. New material technologies and present construction practices have led to an entire new form of hazard in the fire service. This hazard is light weight construction and the contents of the properties. The contents carry three times more heat energy than the classic style materials. With fire growth being exponential it will more than double in size each minute it is allowed to burn.

Previous construction styles up until the late 70's using dimensional lumber could be considered structurally stable under fire load for up to 20 minutes. The new light weights are now failing in less than six minutes. The National Research Council of Canada recently identified the toxins rendered from these contents will lead to non- survivable conditions within the structure in less than five minutes.

This is then compounded by the proximity of structures within the new neighbourhoods, with no exterior fire separation. This was evident in the MacEwan Park fire in Edmonton where over 100 residences were consumed by fire in only hours.



This method of construction and densification is predominant in Saskatoon and continues to be our future. This is another reason why we have to consider these external influences and change how we do the business of protecting life and property. It will take more training and the continued practice of timely response.

A future consideration that should be evaluated is residential sprinkler systems.

Though sprinklers will not replace the fire service, it will allow the firefighters the opportunity to succeed in controlling the fire to the room of origin rather than jeopardizing the neighbourhood as outlined above.

The geographic boundaries of the Department include the entire corporate limits of the City of Saskatoon and through special response agreements, the rural municipalities of Corman Park, Blucher, Vanscoy, portions of the RM of Dundurn and the Whitecap Dakota Sioux First Nation



Figure 2 (Appendix 1a) illustrates the current response time averages for each current fire station in the city. These time benchmarks meet the corporate 'best practice' mandate by adhering to the NFPA 1710 response recommendation of four minutes travel time or six minutes from receipt of alarm.

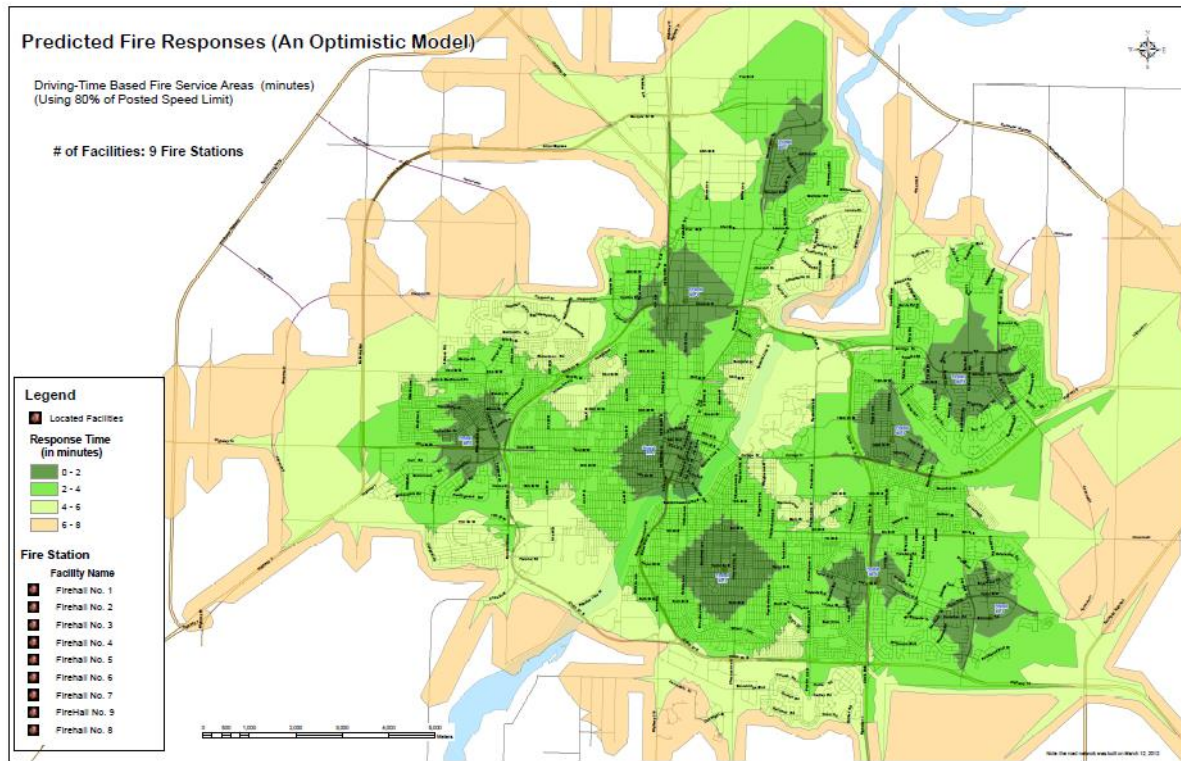


Figure 2

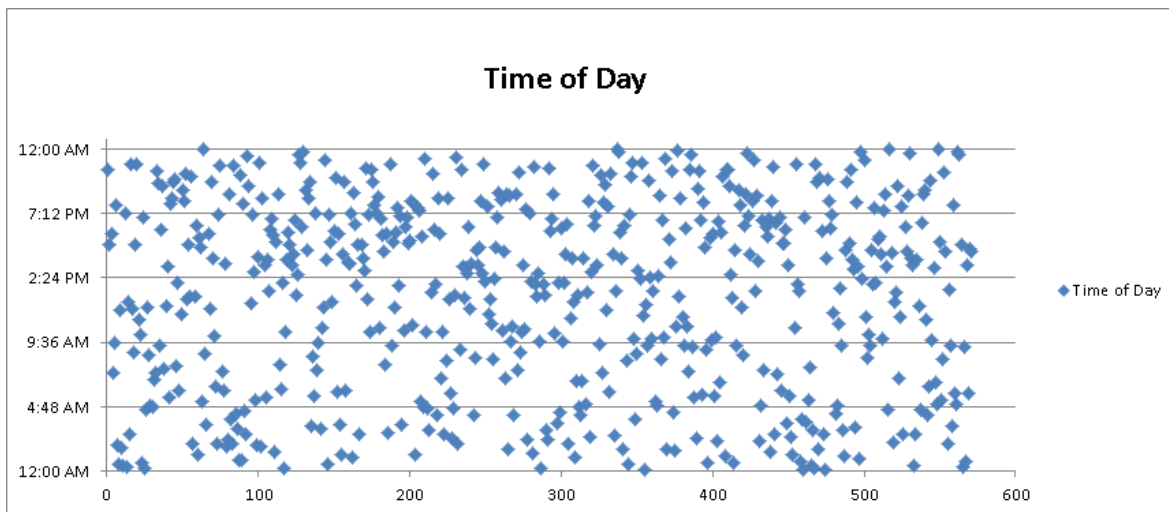


Figure 3

Bottom numbers represent number of structure fires

Figure 3 represents 568 structure fires in Saskatoon over a seven year period. As indicated by the tabulated data there is no apparent pattern to the occurrences as to time of day and associated risk.

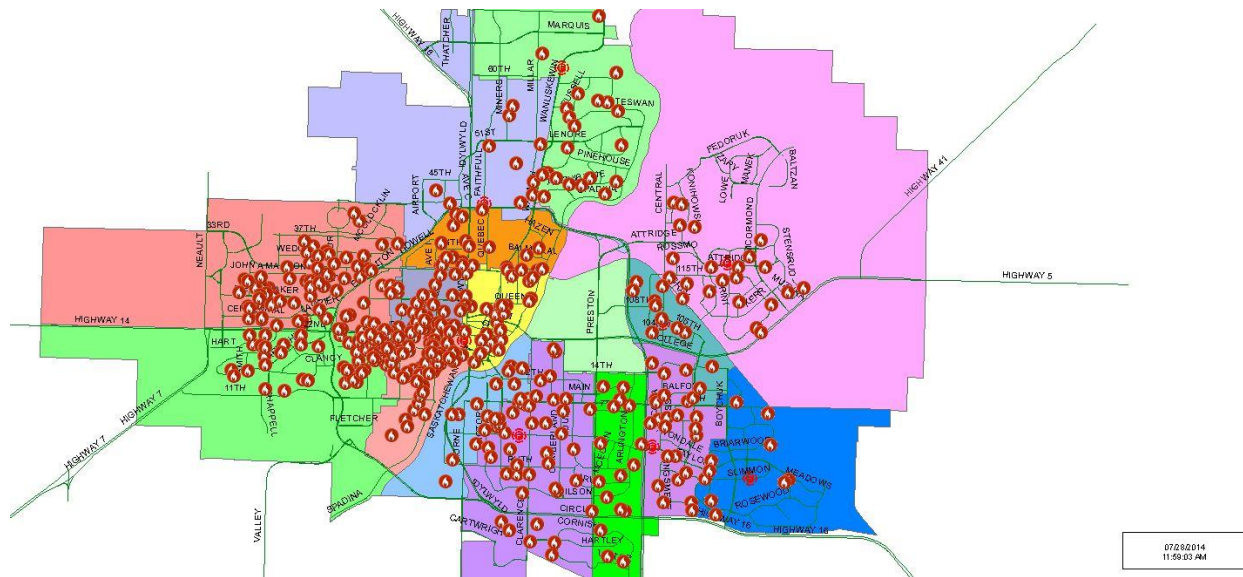


Figure 4

Figure 4 shows the locations of the previously mentioned 568 structure fires overlaid on the City of Saskatoon. There is a noted concentration on the west side of the river in the downtown area, but a general dispersion of incidents is visible. This represents structure fires only and is not indicative of the over 36,000 other emergencies attended. Table 2 outlines the breakdown of the other common response types.

Type of Call	Number of Calls
Motor Vehicle Collision	6002
Hazardous Materials	3348
Outside fires	3007
Emergency medical responses	<u>24,262</u>
Total	36,619

Table 2

Despite the documented frequency of the department's timely response to working fires and related emergency incidents it is important to note that the Saskatoon Fire Department is actively engaged in more than just traditional fire related calls for service. In 2013, the SFD responded, on average, 30 times a day for a total of over 11,000 calls for service.

In describing the present service levels firefighter per capita is not a benchmark statistic but one of trending. As seen in figure 5 there has been a 40% increase in the resident to firefighter ratio over the last four decades. The growth of Saskatoon has been unprecedented in Canada and capacity within the Department is being challenged. Of these challenges training is one of the hardest hit areas.

As mentioned earlier, we can no longer expect the firefighter to be a master of all trades. The complexity of incidents is increasing due to technological advances and this is in all facets of the fire trade. The advancements in building construction have seen the structural stability compromised by the effects of fire and heat in less than seven minutes. Comparatively, buildings from the 1960's were considered stable under the same impacts for as long as 25 minutes.

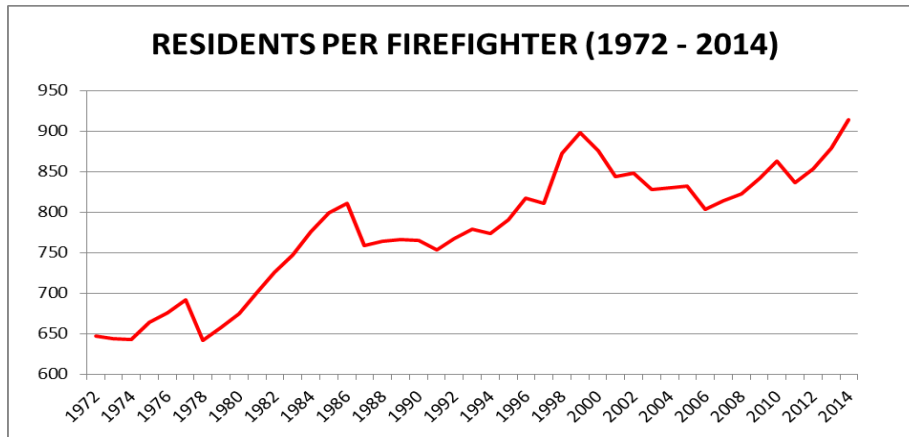


Figure 5

Reducing infrastructure cost through densification is part of the future landscape, but urban Greenfield development will still create extended response times. Due to this, a timely response is still the preferred point of service measurement.

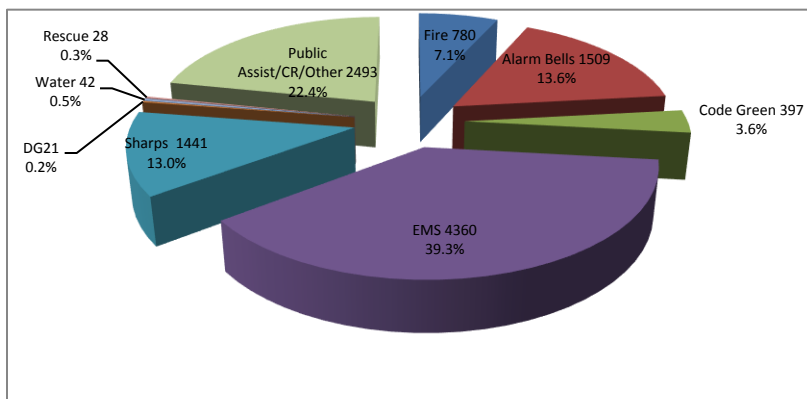


Figure 6

Figure 6 provides an overall breakdown of call types for the 2013 reporting period.

II. Workload Analysis

Apparatus movement is not a true indicator of departmental effectiveness. The insurance industry has stated that the effectiveness of the fire service is based on availability of resources, and that those resources must be available more than 90% of the time. However, not all measures of department effectiveness are quantifiable. The perception of the citizen regarding the protective services available to them from their local fire station is that there will be sufficient resources available in that station, to respond to their immediate needs, whenever the need arises.

A study conducted by the RAND Corporation entitled *Fire Department Deployment Analysis: A Public Policy Analysis Case Study* indicates that “in most localities fire companies spend less than five percent of their time actually responding too, or working at, alarms. The rest of the time they provide insurance against catastrophe and loss of life by being available and close by when fire occurs” (Walker et al, 1981).

The statistics that have generally been referred to as incidents are no more than a recording of the activity of the apparatus, not the effectiveness of the task accomplished.

A true benchmark is an end result showing a reduction in civilian injury, firefighter injury and property loss. Our City is experiencing a high quality of life through safety initiatives of the fire service. The workload analysis needs to reflect both the emergency response and the community contact or “insurance” time that occurs annually and statistically compare that to the previously identified benchmarks.

A compilation study of the SFD’s workload to emergency response was conducted and indicated the average workload at 4.5% compared to the national average of 5%. This places the fire department in a positive position to continue to engage the community in proactive safety initiatives and still exceed the traditional spectrum of emergency service needs of the community. The continuous improvement initiative that the Saskatoon Fire Department has undertaken will see the re-deployment of staff in both the operations and prevention divisions to further enhance the departmental mandate of a safe community. Establishing the base line for 2015 will allow the measurables to be evaluated into the future.

Community Engagement

Measurables of the success of the fire service is the level of safety and security perceived by the citizens. These levels are attained by the ever-increasing opportunity for public contact and engagement.

Still recognizing the need to have properly trained staff and funding for fire extinguishment, it is statistically proven that you can invest reasonable portions of the budget into education and prevention activities and see effective results. This portion of the document will describe the present involvement of Saskatoon Fire with the community and the intent, through the continuous improvement process, of enhancing these programs and increasing the opportunity for community contact.

A present example is the Saskatchewan Rental Housing Supplement Program that has fire inspectors evaluating up to 1040 properties ensuring accommodations are safe to rent and live in. This initiative has seen a 46% drop in fires for this type of occupancy.

I. Current Program Review

This section describes current community engagement programs. This section is divided up into five areas of engagement, A) Fire Prevention, B) Emergency Measures, C) Public Education, D) Department Community Programs, and E) Department support of community events.

Department engagement with these programs is related to the workforce and deployment analysis. Opportunities to implement Continuous Improvement initiatives within the current Community Engagement Programs will be discussed in a later section.

A. Fire Prevention

Presently the Saskatoon Fire Department has a Prevention Division is comprised of 12 full time staff headed by the Fire Marshal who manages the day- to- day activities of the division. Fire Prevention is responsible for fire prevention through the Cities Act, relying on Bylaws 7990 and 8175. The Fire Prevention Officers have been divided into two specialty groups. The first group focuses its activities on Fire Prevention /Investigation while the second group works with issues related to Property Maintenance and Safety. Increases in the property maintenance concerns have made it difficult to proactively address the life safety issues that accumulate within both divisions.

Since 1996, the Fire Prevention Division has facilitated, and will continue to lead the Saskatoon Fire Department, with excellent community safety initiatives. At that time, City Council passed the Property Maintenance and Occupancy Bylaw No.7400 for the purpose of controlling fire, safety and nuisance hazards on properties. Since then the Saskatoon Fire Department has undertaken several inspection and enforcement activities. In addition, our Department established a Safety and Property Maintenance Hotline to receive complaints/concerns on a 24-hour basis.

In March 2001, the Saskatoon Fire Department embarked on a program to deal with problems associated with safe housing in Saskatoon, with emphasis on housing issues in the core area and the area surrounding downtown

Since May 1st, 2001, two Fire Inspectors were assigned to deal solely with issues specific to Safe Housing initiative on a full-time basis. The two original Fire Inspectors recognized the need to create the Safe Communities Task Force. This initiative grew quickly and the necessity to coordinate inspections with other agencies, This partnership grew to include the Saskatoon Police Service and Public Health Inspectors to deal with these complex or unique situations.

Bylaw No. 7400 was repealed and the Property Maintenance & Nuisance Abatement Bylaw No. 8175 was enacted in 2003 with the purpose of ensuring properties are properly maintained to a level that does not affect the safety, health and welfare of people or the amenity of a neighbourhood. The Division has seen a growth in the call volume from the inception at 300 complaints per year to the current 3000 per year.

The Safe Communities Task Force now meets quarterly but also networks on issues that might arise at any time.

B. Emergency Measures

Another function of the SFD enhances safety the citizens of Saskatoon through the Saskatoon Emergency Measures Organization (EMO). Governance for Saskatoon's EMO comes from the Saskatchewan Emergency Planning Act which mandates the existence of a municipal EMO, The EMO committee and an emergency planning bylaw (Saskatoon Bylaw 7269). Saskatoon EMO relies on two specific committees to fulfil its mandate. The Emergency Planning Committee consists of the City Manager, General Managers, Police Chief, Fire Chief and the Director of Media Relations. The EMO Sub Committee is composed of specific Directors within the City of Saskatoon, as well as management personnel from certain external organizations that have a role to play in disaster response. The primary external organizations attending the Sub Committee

include the Saskatoon Health Region, the University of Saskatchewan, the Canadian Red Cross and both the Public and Catholic School Boards.

The scope of responsibility for EMO includes activities related to civic disaster preparedness, response, recovery and mitigation. Day to day operations for EMO include the administrative support required for preparedness and mitigation activities while also maintaining a 24/7 disaster response and recovery capability. An additional duty recently added to the EMO portfolio is corporate Business Continuity Planning. In addition to facilitating disaster management within the City of Saskatoon, EMO must remain actively engaged with multiple jurisdictions and all levels of government. An example of this activity was the 2012 Exercise Domino. Domino was conducted over a period of seven days and was attended by 60 external organizations representing the Federal, Provincial and private sector. This ambitious exercise was primarily funded by the SFD with some financial support from both the provincial and federal emergency organizations. In addition to its regular duties, EMO was tied to the planning for Exercise Domino for 2 years. In the six months leading up to Domino, the Director of Emergency Planning exchanged more than 1500 emails and phone calls with representatives from participating organizations.

C. Public Education

The Department delivers quite a number of public education programs. Fire Safety education to elementary aged children and senior citizens remains a major focus for two reasons.

- 1) Statistics from the NFPA report “Demographics and other characteristics related to fire death” show young children and older adults are most vulnerable to fire death, and
- 2) These age groups most commonly request, attend and learn from fire safety presentations.

The department also has two programs which are unique to its operational mandate. After the Fire program sees firefighters from the neighbourhood station delivering fire safety packages to the surrounding homes within 72 hours of a devastating fire. Area residents have told us that they appreciate receiving concrete information about the cause of the fire and relevant fire safety information. Since we started the program we have distributed approximately 6,000 packages to 43 Saskatoon neighbourhoods affected by a fire incident.

Program FireStop is the voluntary, education-based program for juvenile fire setters used to stop fire play and prevent future fire-related incidents. The program accepts referrals from families, schools, fire department staff, police, social services and concerned citizens.

The Saskatoon strategic plan identifies the goal of developing ‘age-friendly initiatives to enhance quality of life as people age.’ One of the demographics that is particularly vulnerable are our senior citizens. SFD staff work with the Council on Aging and the Saskatoon Health Region to build new strategies and continue with in-house fire safety education. Examples of these collaborations include:

- Safety oriented ‘Seniors Fairs’ by Community Relations staff to residents of seniors’ condominium associations.

- Emergency planning presentations by EMO staff to residents of seniors' condominium associations.

D. Department Community Programs

Urban Camp is a program facilitated by Saskatchewan Corrections in which the SFD is recognized as a Community Sponsor. The Urban Camp mandate is to provide meaningful work for offenders without taking employment opportunities away from the general public. The Urban Camp objective is to assist the community sponsors with their projects so that they can achieve a standard of quality at each respective worksite. Examples of work done for the SFD by Urban Camp is mowing boulevards, clearing accessible sidewalk crossings and picking up litter along areas that are not under any other service agreements.

Introduced in 2005, the goal of the Saskatchewan Rental Housing Supplement Program, formerly known as the Home First Program, is to improve the overall standard of rental properties in Saskatoon. The program assists clients of Social Services by having rental accommodations inspected. As of December 2013, the Saskatoon Fire Department has completed 6,616 inspections of rental properties which would not normally have had an inspection prior to creation of the Program. All inspected properties are entered into the Provincial database to identify properties meeting minimum safety and health standards. Under the agreement with the Ministry of Social Services, the SFD conducts an average of 20 inspections per week at a cost of \$80.00 per inspection. The City's current Agreement with the Ministry of Social Services is for the period of one year and is continually reviewed.

Youth Works provides training and employment to young offenders, to help them re-pay victim(s) of their crimes. Potential youth are referred by youth workers from the Department of Corrections and Public Safety, Saskatoon Tribal Council, Saskatoon Community Mediation Services, or the John Howard Society. They assist in garbage removal collected by the Urban Camp, lane pickups and remediation of graffiti on public property.

E. Support of Community Events

Saskatoon Fire Department provides ongoing support to many community events. For most of the events, organizers simply request the appearance of on-shift operational staff to arrive at a designated time in an apparatus. However, the department also regularly supports events that require more active involvement. Support for either type of request is difficult with the current staff operational workload.

A few of the annual and high profile events supported by the Department are as follows:

- For the past 23 years, the Department supports L80 members who volunteer at the BRIT tournament by providing EMS and communications equipment, for the duration of the B.R.I.T tournament.
- Personnel from the Department annually attend the SGI Safety Fair where they set up a tent to hand out Fire Safety information to the public.
- The Department also provides support to the annual Fireworks Festival. This popular event is attended by as many as 50,000 people. The EMO coordinates (and attends) the event along with three full fire crews manning apparatus and staff for two boats patrolling the river.

- The Canada Remembers Airshow by positioning members from the Operations Division onsite during the events to provide for fire suppression and safety services.
- The Department has recently taken a more active role in the event planning in the city by developing and administering the Event Emergency Policy and providing risk assessments for each community event within the City of Saskatoon.

Continuous Improvement Strategies

The Saskatoon Fire Department is poised to move in a direction that is suited to a large growing city. The following section describes the reorganization that will improve operational, training and administrative efficiencies. Each area of improvement will be immediately followed by the department's Continuous Improvement recommendation. There is a tabulated CI summary located on page 43.

I. Operational Recommendations

A. Fire Suppression

A number of recommendations relating to the various divisions within the fire department are outlined in the next section. However, the Fire Operations Division received the majority of the attention in the Continuous Improvement process. This focus on operations is in line with the statement from Leonard Matarese, Director of Research and Project Development ICMA (International City Managers Association) Center for Public Safety Management that managers should evaluate areas "where the highest costs are incurred and, thus, the highest potential of overall cost reduction" resides (Sundvall, 2014).

In 2002, the ICMA also stated in "Managing Fire Services" that at least four and often eight or more firefighters, under the supervision of officers, "should respond to fire suppression operations." Further, ICMA also said that, "If about 16 trained firefighters are not operating at the scene of a working fire within the critical time period, then dollar loss and injuries are significantly increased, as is fire spread."

Based on these statistics, the Corporate NFPA 1710 audit, OH&S safety audits and the Insurance Industry we found that the SFD is currently staffed to meet the scope of service as outlined in Bylaw 7990.

The department then began looking at the services it was providing and began working through many alternate delivery models, which over time would result in a more efficient department with an enhanced safety record.

In the late 1990s, the SFD began supporting a safety initiative within the Health Region to pick up discarded sharps in residential neighbourhoods. On average a fully staffed apparatus responded 1,500 times annually. Our statistics show that 90% of the sharps are in the area of our downtown station (#1 fire hall). A trial was conducted dispatching a lone staff member from an aerial ladder crew in a decommissioned inspector's vehicle when calls were within Station's No 1, 2 and 4 District. To date, this initiative has been working well and will continue into the future.

CI Recommendation 1: Implemented. Anticipated annual savings \$6,200.00
Staff members from Station 1 apparatus are temporarily re-assigned to a passenger vehicle to conduct sharps pickup.

Article 13c of Local 80's Collective Agreement identifies what a staff member is paid when called back for an incident. Through an MOU staff are now allowed to either take time in lieu of pay for overtime worked or pay.

CI Recommendation 2: Implemented Anticipated annual savings \$15,000.00
MOU implemented to allow overtime to be taken as time or pay.

As a result of an external audit in 1982, the department has conducted monthly high-speed road testing of apparatus as a part of a preventative maintenance initiative. However, when manufacturers were consulted about the program as part of the CI process, they suggested this was an outdated practice and recommended its immediate cessation.

CI Recommendation 3: Implemented Anticipated annual savings \$21,000.00
The practice of routine road tests has been discontinued.

An evaluation was conducted of response to automated alarm systems. The SFD Dispatch Centre receives reports of alarms generally two ways:

An **Alarm level 1** is used when alarm bells are initiated in an apartment or other high life hazard occupancy. Typically, even if our dispatcher makes phone contact with an occupant of the building, other than the caretaker, we continue code red, full general response. (Three engines, Ladder Truck and Battalion Chief)

Alarm Level 1 Response Percentages

False/Unintended Activation	87.04% (262)
Unidentified Cooking Odors	5.31%(16)
Pot on Stove	4.32%(13)
Sprinkler Flow (no fire)	2.32%(7)
Smoke Condition	0.66%(2)
Structure Fire	0.32%(1)

Table 3

A Divided Alarm Response occurs when an alarm system is initiated within a building and is reported to our dispatch by a proprietary alarm monitoring company. In a Divided Alarm no contact with an occupant or representative of the building is made so the lead apparatus is sent code red and all others code green. As a matter of standard operating procedure we also dispatch a divided response

when an alarm is received from a hospital called in by their switchboard operator. A Code Red response is lights and sirens in emergency response. Code Green is non-emergent

In 2013 SFD responded to 301 **Alarm Level 1** (Code Red full general) calls.

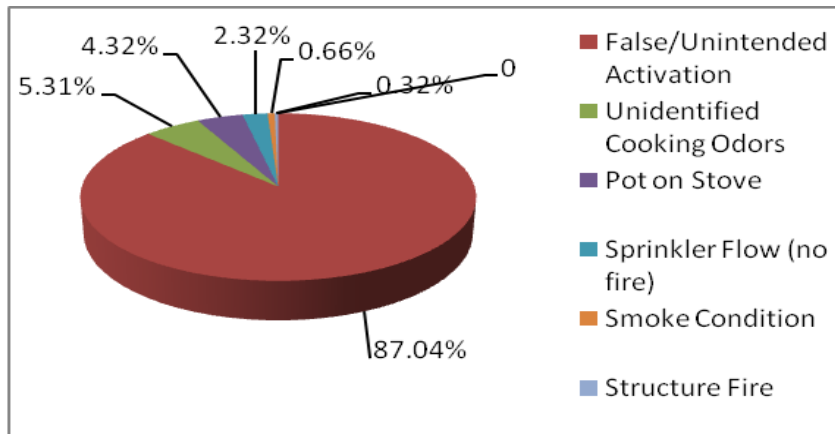


Figure 7

Divided Response Percentages

False Alarm	63.7% (770)
Pot on Stove	26.9% (325)
Sprinkler or Water flows	5.8% (70)
Smoke Condition	2.9% (35)
Unidentified Odors	0.5% (5)
Structure Fires	0.2 (3)

Table 4

Table 4 shows that during this same reporting period, SFD responded to 1208 **Divided Alarm Responses** (sent via Alarm Company): for a total of 1509 alarms in 2013

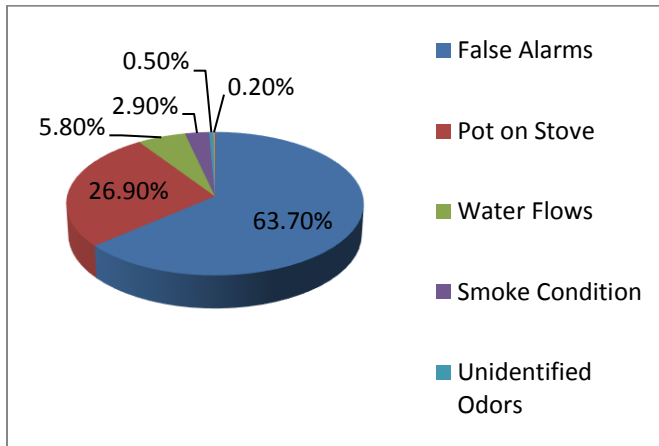


Figure 8

Figure 8 breaks down the various conditions found during alarm bell responses

Not every alarm bell response should have a single or dual resource respond as certain calls have inherently higher levels of risk and warrant a full general response. Consideration must be given to various criteria such as life hazard, construction style, passive and active fire resistance capabilities, time of day etc.

At this time, the most desirable risk management model is to send two engines in response to alarm company calls. We would continue to apply the divided response (one code red, one green) for the currently assigned criteria. Ideally, to ensure an appropriate response is sent to each alarm we must correlate the apparatus deployment to the occupancy risk profile. This assessment of the buildings in each district will take considerable time as preplanning must be completed. Eventually we may find a single engine response would be appropriate to unverified alarm signals in low or moderate risk occupancies.

In discussions with the city insurance underwriters, Canadian comparators, and as the authority having jurisdiction it is our recommendation that the Department change divided response from a full general alarm of five apparatus to two engines (or engine/aerial). The cost savings for this initiative can be found in the summary.

CI Recommendation 4: Implemented Anticipated annual savings \$7,000.00
Response configuration to Alarm Bells has been changed to reflect appropriate response and will be reviewed at the end of 2015 to determine if any further changes are required.

The fire service relocates resources to backfill empty fire halls. These relocations occur for a variety of reasons:

- Crew participation in required annual training and recertification exercises
- To support community contact events

- Emergency responses to fire, medical or rescue oriented incidents that would leave a station vacant for an extended time frame.

Resource relocation is arranged when one of these incidents would leave the district station vacant for a specific time frame. By evaluating the level of risk caused by the vacant station, apparatus relocation can be considered from one station to another. Based on this information, it is important to review current relocation practices to address target risks. The move up module would aid in quantifying the associated risks. In 2013 there were 781 relocates for various reasons as explained above. Even if a reduction of 30% - 40% could be considered this would be a primary efficiency in the operation and equate to over 4000 km / year of travel.

CI Recommendation 5: Pending Anticipated annual savings \$6,000.00
Though speculative, the anticipated long term efficiency/effectiveness is based on 2013 statistics. The majority of the return will be in efficiency/effectiveness. The department should purchase a computer application, such as the 'Move Up Module' to help Fire Administration develop a relocation policy and procedures that will help to reduce the number of unnecessary apparatus movements and the risks associated with empty stations.

Fire Operations are considered the 'bread and butter' of the fire service. However, given the tremendously increased scope of responsibility for the modern fire department, new strategies must be adopted by the department to allow for the retention of the diverse skills and knowledge base required in this dynamic profession.

Those new strategies are listed individually below by scope of practice:

Past practice has been for staff to change stations frequently and have opportunity to work with the various crews and experience different neighbourhoods. This approach can lead to inefficiencies in training, familiarization and engagement within the community. When a crew is familiar with their peers, and the composite of the neighbourhood, there is a direct increase in safety. Statistics have shown that when there are multiple firefighter fatalities, 90% of the buildings had life safety violations against them. This staffing strategy will enhance staff's ability to perform their job in a safe and efficient manner. SFD fire operations staff are involved in fire fighting and inclusive in that skill is meshed Hazardous Materials, Emergency Medical Services, Technical Rescue, and Water Rescue. The future strategy will see station directed specialties, caps on number of participants and a training program revitalized to this format.

In order to ensure staff are effectively trained and have sufficient exposure to emergencies requiring their specialty, the SFD is reorganizing its stations into 'Specialty Halls'. Some stations will be designated with specialties to allow for focused training and longer tours of stay while all stations will remain fire and EMS capable. Stations will also have hazardous materials operations and vehicle extrication phase one with sufficient tools to perform rapid entry if necessary at MVCs. Staff will have opportunity to select the specialty they wish to stay with or apply for the necessary training to move to

the specific station. Once personnel transition to a specialty hall, they will begin the focused training needed to ensure greater proficiency in their chosen specialty.

A. Hazardous Materials Services

All operational staff will continue to possess an operations level training for hazardous materials. Stations #7 will focus on Dangerous Goods Technical response with #9 in support as the Decontamination group. This will allow them to become more proficient in managing hazardous materials incidents. Staff will be assigned to the Haz Mat stations for the designated time, allowing them to be completely engaged in the specialty as well as the neighboring community.

B. Emergency Medical Services

Since 1990, the Saskatoon Fire Department has played an integral role in the delivery of pre-hospital emergency medical care in the City of Saskatoon. Until the change in mandate as outlined in Bylaw 7990, rudimentary first aid was all that the department offered. Now, not only is it important to deliver the pre-hospital care to the citizens, it is also fundamental to the success of the all hazards approach of the department. These skill sets allow staff to assess and deliver care during incidents of fire, hazardous materials, technical rescue, motor vehicle collisions and water rescue. Presently Provincial Health supports our service by giving \$42,000.00 annually, assisting in payment for licensing fees.

The Saskatoon Fire Department emergency medical services have reduced mortality and increased the quality of life for the citizens due to their level of medical training and to the timeliness of their arrival throughout the city. The department continues to support the Saskatoon Health Region through a tiered response agreement to ensure citizens receive timely emergency medical assistance. Since 1995 it has been a requisite for employment with the SFD to have an Emergency Medical Technician license. Study shows the number of trained and certified Primary Care Paramedics (PCP's) on the department will be capped at approximately 120.

SFD is a signatory partner to the Saskatoon Regional Health Authority's Tiered Response Agreement, which means that we provide support to the local ambulance provider for 114 emergency medical determinants that are considered life threatening. *There is no remuneration for our response and care. In 2013, the Department responded to 4,360 EMS calls. There were 266 cardiac arrests within this total.* National statistics show that up to 56% of all cardiac arrests occur in homes and that with every minute delay in defibrillation, the survival rate of a cardiac arrest victim decreases by 7% to 10%. The SFD average response time to an emergency is under four minutes and every apparatus is equipped with an Automatic External Defibrillator (AED) and all staff are trained in CPR. It should also be noted here that the average response time to emergency calls of the ambulance service is about nine minutes. Additionally, the ambulance service is placed in a position of having no ambulances available for up to 90 minutes a day.

The Department will ensure we maintain the minimum number of PCP trained staff to efficiently deliver emergency medical services within Saskatoon, but will decrease the cost of the program to the department by reducing the number of staff for whom we must pay licensure fees, from 186 to 120. This move will not reduce the level of service expected by the citizens of Saskatoon but will result in significant efficiencies.

CI Recommendation 6: Implemented Anticipated annual savings \$23,000.00
To continue meeting the emergency medical needs of the citizens the department will maintain 120 Primary Care Paramedics. This has been identified to be the optimum number of pre-hospital care providers and a transitional process of retirement from the program will begin December 2014

SFD works with the Saskatoon Regional Health Authority to provide for community oriented service for those who need assistance in their home. Unfortunately, through the current framework of the Home Care Act, private care homes are utilizing the good will of the fire staff to provide this service at no charge thus avoiding the purchase of adequate staff or equipment. The department performed 572 lifts in 2013 and of those, 422 lifts were provided for registered care homes.

CI Recommendation 7: Pending Anticipated short term \$84,000.00
The Department will report further to Council to consider a fee for service charge for lift assists to all non-emergent incidents that occur in registered care homes.

The fee outlined in CI Recommendation #7 would be considered short term and not sustainable. This is due to the inappropriate use of the intent of the service being eliminated.

C. Technical Rescue Services

The Rapid Intervention Team (R.I.T), required as a safety team for working fires, will come from either #4 or #6 station. In depth extrication and rescue training will be provided for the staff at these stations to support the highly technical nature of these critical specialty programs. Less advanced rescue capacity will be delivered to staff stationed at Stations #2 and #5. All other stations will receive basic rescue training which will allow those personnel to create safe conditions for victims and staff while awaiting the arrival of highly trained rescue crews. By employing the new station assignment model described in this report, fewer staff will need to be included in lengthy training and those trained staff will gain experience at these specialties for a longer period of time.

D. Water Rescue Services

Water rescue and training will only operate from #1 station. Staff will choose a specialty and be posted accordingly for the appropriate period of time.

Station #	Fire Suppression	EMS	Technical Rescue	Wildland Fire Fighting	Hazardous Materials (Haz Mat)	Water Rescue
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	

Table 5

Table 5 – details the specialty services provided from each station. Every station will continue to specialize in fire suppression and EMS.

CI Recommendation 8: Pending Gains are in departmental efficiencies
Re-staff all fire stations as per the breakdown in Table 5

II. Administrative Recommendations

This section will provide a description of various areas within the department where improvements can be made. Each area of improvement will be immediately followed by the department's Continuous Improvement recommendation.

A. Fire Marque

The Fire Marque Indemnification Technology is a program designed to return to the Fire Department the expenses incurred by the department responding to an insured peril subject to the terms and conditions of the property insurance policy. There is no cost to the municipality and will have no effect on the home owner's deductible nor will their property insurance premiums be adversely affected. There are presently over 40 Canadian municipalities using this service and it is anticipated to return to our department \$250,000. Fire Marque utilizes their data and asset base to collect the expenses on behalf of the City and the funds are directed only to the operating aspect of the fire services. There is presently an outstanding report to council.

CI Recommendation 9: Pending Anticipated annual return of \$250,000
There is presently an outstanding report to council asking solicitors to amend the bylaw to enable Fire Marque to act on behalf of the City of Saskatoon to collect the insurance for fire services rendered.

B. Station Deployment Analysis

Utilizing a computer generated modeling assessment tool developed through the City of Saskatoon's GIS department a number of projections were calculated. These models were run to identify locations that would allow the fire service the ability to empirically justify station location to best meet the demands of future growth.

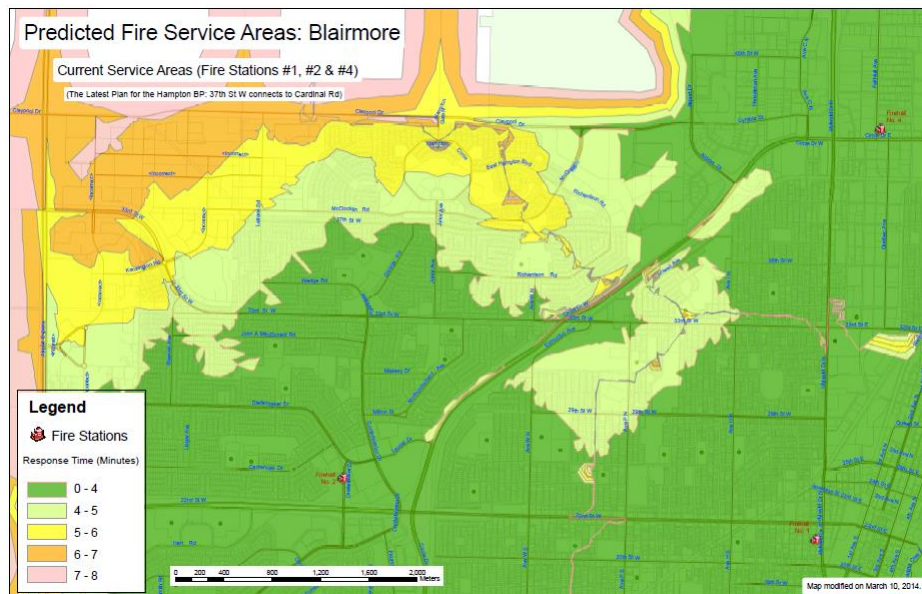


Figure 9

Figure 9 (Appendix 1b) shows the current service areas for Fire Stations number 1, 2, and 4. As noted in the map legend, current fire station locations result in a significant portion of the northwest corner of the city with a 5-7 minute response times. It will also note the proposed location lies very close to an existing response district.

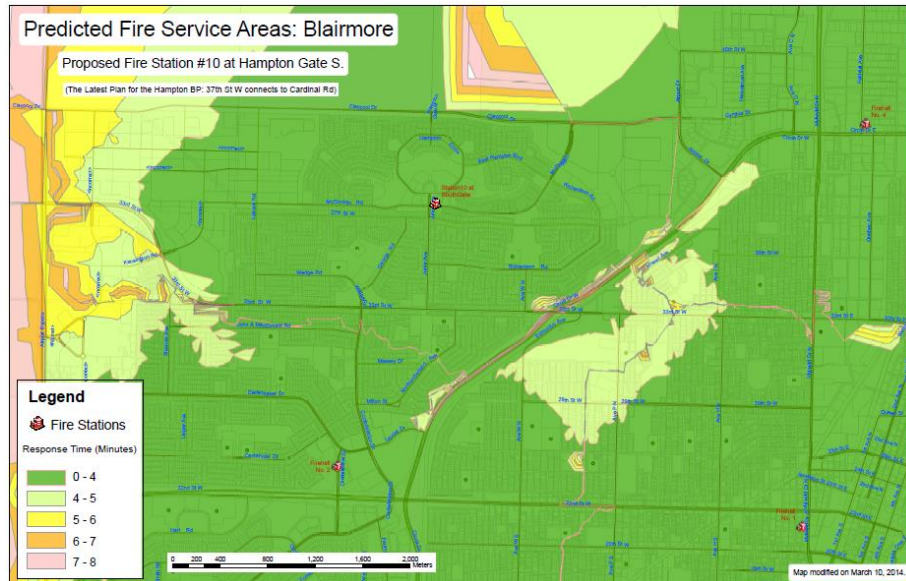


Figure 10

In Figure 10 (Appendix 1c), the placement of the currently identified site of Station 10 in the proposed area of Hampton Gate South will give coverage to much of Hampton Village but with considerable overlap.

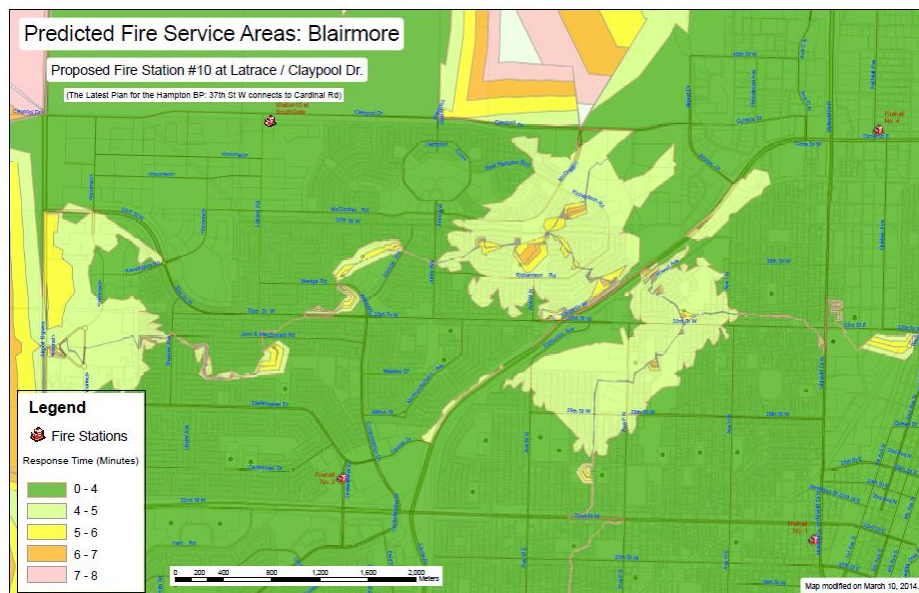


Figure 11

Figure 11 (Appendix 1d) shows the response time results if Station 10 were to be relocated to Latrace Road and Claypool Drive. Also included is a proposal to create a connector road by extending 37th Street West to Cardinal Crescent to allow inclusion of Station 4 to this response area and an additional route in or out of the neighbourhood.

CI Recommendation 10: Pending Anticipated long term 5.6M capital / 1.8M operating

Fire administration request the Director of Saskatoon Land to sell the present identified fire station location in Hampton Village and purchase the appropriate parcel of land located on the corner of Claypool Drive and Latrace Road in the proposed Elk Point neighbourhood. It is also requesting that the Administration examine the possibility of a roadway connection from 37th Street West to Cardinal Crescent when considering the Hampton Village Business Park Concept plan.

The neighbourhood that was identified for the next station location was in the neighbourhood of Stonebridge on Melville St. The predictive modeling presented in Figures 12 and 13 (Appendix 1a, e) show limited area that falls outside the response mandate of the remainder of the city. Its present identified location will adjoin the response district of Station #3.

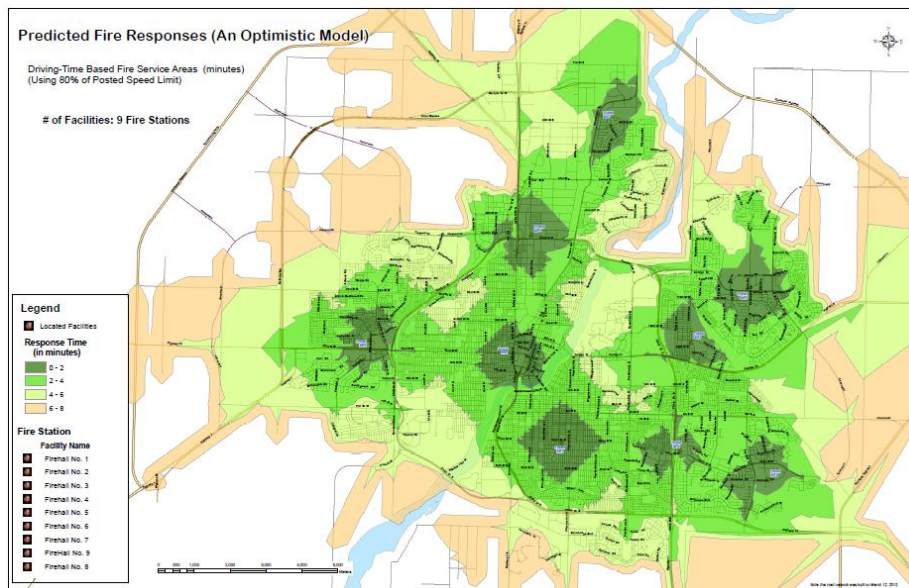


Figure 12

The scope of the response area is not adequate to build a fire station in the identified location on Melville St. With the variables of the developments in the south portion of the city such as Corman Park, Highway 11 corridor, The Willows, English River, Greenbryre and the south west further study needs to be conducted. Placement of a station in either the south or southwest is for future consideration and modeling based on proposed neighbourhood development plans.

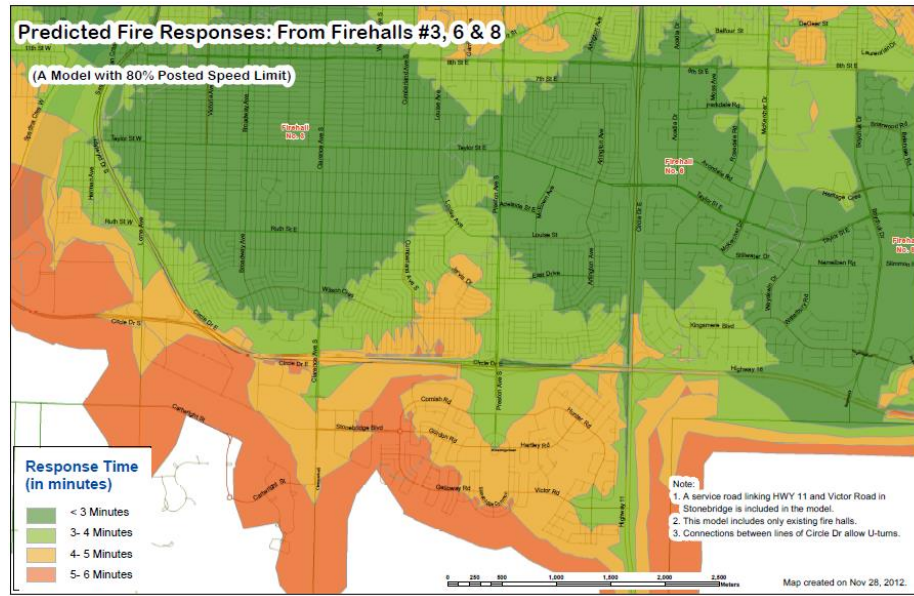


Figure 13

CI Recommendation 11: Pending Anticipated 5.6M capital / 1.8M operating
Based on the deployment strategy listed fire administration requests that Council approve the Director of the Saskatoon Land to sell the present identified fire station location on Melville Street and place the sale proceeds into the Property Realized Reserves for the purchase of a suitable site in the Holmwood Suburban Area once the local road network is identified.

The City of Saskatoon has a very strong attendance support program, however, the fire service has unique needs. Multiple fire services were contacted to look at their program and the “Surrey Fire Service” has been identified as having the most effective program to implement and manage. The Attendance Management Program will require more direct H/R input which will have a long term benefit in the reduction of sick time usage. To quantify the program it would be estimated to take two years from the inception to correlate the data. The Surrey model showed a 35% reduction in sick time based their staffing model. Applying this same model to current overtime numbers would equate to a anticipated \$37,700 saving

CI Recommendation 12: Pending Potential long term \$37,700
Coordinate the implementation of the fire based Attendance Management Program to assist staff with short-term illness circumstances.

C. Staff Development Center (Training Division)

The Training Division of the SFD is known as the Staff Development Centre (SDC). The SDC provides all training and safety related activities for the staff of the Department. The process of consolidating specialties to specific Stations, as previously described in

Recommendation 8, would also create efficiencies within the SDC by increasing the length of time that personnel are exposed to a specific specialty. This consolidation will also allow SDC to create a training program that will empower some Operations personnel to deliver training to their peers. This newly created training role will provide more training opportunities without increasing SDC training staff. As a result of leveraging some of the Operations personnel into a training role, instructors within the SDC will have more availability and flexibility to better manage their training programs and have more time to deliver in depth training to personnel on the fire floor.

There are three specific areas within the Training Division that can be improved to enhance the division: Each area will be described below.

- Training Delivery
- Training Division Work Hours
- Training Facility

Despite the efficiencies gained through consolidation of specialties to specific halls, it will remain challenging for SDC instructors to provide the contact training time needed to keep department personnel adequately trained. The methods currently used to deliver training should be expanded to enlist personnel from the Operations division to become Specialist Coordinators. Some firefighters, and officers, would be selected to facilitate training in one of the following programs:

- Water Rescue
- Technical Rescue
- Emergency Medical
- Hazardous Materials
- Fire Fighting

Efficiencies in training delivery would be gained through the creation of Specialty Coordinators on each of the four battalions. The Coordinators could be comprised of four Station Captains to assist with program management and four to six fire fighters on each of four battalions to deliver specialized operational content to all the crews on their battalion.

Training Level	Trainer Qualifications	Division Responsible
1	Fire Service Instructor programming	Training Division
2	Specialty Coordinators (technical experts)	Operations Division
3	In-Service programming (Captain)	Operations Division

Table 6

CI Recommendation 13: Pending Working with Local 80
Work with Local 80 to implement additional wage scale for Specialist Coordinators.

Under the collective agreement this Division is staffed with four Fire Service Instructors working a 37.5-hour workweek. The Instructors are responsible for 21 different training

offerings, from standard firefighting to specialized technical training into both the initial training programs as well as the recertification courses. Overall organizational efficiencies will be found by addressing the key issues experienced by this Division. Limited access to adequate training time generates overtime. This could be alleviated by developing, and the utilizing, on-shift subject matter experts to deliver training and by allowing FSLs to work on shift. In addition, the Division would operate more efficiently with the purchase of software to track training records.

CI Recommendation 14: Pending Working with the Local 80
Allow FSLs to work on day shift, rather than straight days to facilitate a training mentorship program to staff in the Operations Division.

Currently the department has no dedicated training facility where routine firefighting skills can be practiced. This is a critical deficiency, jeopardizing safety of firefighters as they try and protect citizens.

According to the annual fire statistics published by the Council of Canadian Fire Marshals and Fire Commissioners', fire deaths and losses have been consistently decreasing over the past three decades. Unfortunately the decline in real world exposure translates into inexperience in our firefighters and more importantly Fire Officers. In the United States, statistics indicate that although incidents of fire are down, firefighter injuries and deaths have remained constant. This fact, combined with the growth of department staff, and technical scope of responsibility since the 1990's, brings the department to a point where a dedicated training facility is a necessity.

Discussions have been taking place to co-locate a training facility at the planned Civic Operations site. Though there is no funding plan in place the facility could be utilized for training with other City Departments requiring training specialties such as Fall Protection, Trench/Confined Space Awareness, SCBA, and First Aid etc. Over the past number of years the department has been struggling to meet the demands of maintaining key skills in all disciplines.

The Training Division has on numerous occasions been contacted by other civic Departments to support them in many various areas and disciplines. Some of these are:

- SCBA training (Self Contained Breathing Apparatus)
- SCBA Fit testing
- Filling of SCBA tanks,
- Fall Arrest Training
- Fire Extinguisher training

Another area is Fit testing (validating face fit to mask). This is required by the OH&S regulations to be performed annually on all staff that may be required to use either an SCBA or Respirator. Currently other civic Departments are contracting with private sector to provide this service at a cost of \$50 each. There is approximately 50 civic staff that require annual fit testing. This year we have been contacted by the City of Saskatoon Safety Division to provide fit testing on 120 – 140 summer students. The

SFD currently owns and operates a Porta-Count to evaluate the fit of face pieces and respirators for fire fighters. The discussion of fit testing is a single example out of many that would support the development of a common training needs for any and all COS departments. Cross charging is not a revenue stream but a corporate efficiency that requires further investigation.

CI Recommendation 15: Pending
Explore Efficiency /Revenue streams available to the SDC in all areas of training through a dedicated training facility.

D. Mechanical Division

The key issues facing the maintenance mechanical division is the current facilities. The apparatus are larger and more complex making the hoist unsafe for daily use.

Using an asset management software program Saskatoon Fleet Services realized tangible savings through identification of warranty coverage's potentially missed when not actively tracked. The software can also monitor the cost of each vehicle for labor, fuel, regular maintenance, parts and determining repetitive issues arising with certain types and brands of vehicles.

This program also provides a clear history of equipment performance which assists in the purchasing process by providing evidence of best value. It will also track and collect non-emergent and preventative maintenance work until the vehicle requires shop time at which time it builds all the jobs into one work order minimizing down time.

We would be able to clearly identify what the cost of maintenance is for our small vehicle fleet which would lead to informed decisions. We would expect to see data supporting whether we would be better served to lease or purchase vehicles and whether we should contract out the maintenance of our small vehicles fleet to allow our mechanics to focus on our emergency vehicles.

We have the opportunity to purchase 'Asset Works' through the existing contract currently in place with Fleet Services and City Transit. These two Departments could co-finance and share the program to maintain their fleets.

There are three other potential practices that the Mechanical Division could use to increase efficiency. First, environmental limitations were identified as the Department has outgrown it's current facility. Consider staggering the shifts of the mechanics to provide better utilization of the two bays with the goal of keeping all three mechanics focused on mechanical duties for greater periods of time. This will also increase productive hours of the shop potentially providing opportunity for the completion of critical jobs that might otherwise incur overtime to complete. Second, have the engine stationed at the Whitecap fire hall delivered to the shop or utilize light duty staff to courier the truck. Finally, the SFD should consider a larger inventory of commonly used parts.

E. Fire Prevention and Investigation Division

The Assistant Chief of Training held a focus group with members of this Division to discuss some of the issues and opportunities they saw within the division. The most pressing issue identified was the overwhelming workload facing the current number of inspectors. The introduction of Bylaw 8175 and the growth of the city have worked together to create a dramatic increase in demand for fire inspection and investigation services.

As indicated in the Department Fire Inspection Frequency Policy 2-22:

All buildings or occupancies classified as **A, B1, B2, C, F1, and Spray Coating Operations** will be inspected according to the following frequency schedule:

Class A	Annually
Class B1	Annually
Class B2	Annually
Class C	Annually
Class F1	Annually
Spray Coating	Annually

This frequency level is not being met by the Division despite the fact that fire crew inspections are currently inspecting all D, E, F2 and F3 occupancies. The Department needs to re-examine its mandate and the risks associated with not meeting our policy.

The Department is presently working with Community Service on the creation of a new Corporate Bylaw Inspection's Division that could see non-life safety issues being addressed in a different format through this group.

Presently, as a means to manage the large workload, the Fire Marshal has divided the inspectors into two groups, bylaw and fire inspectors. As a result the fire inspector's district is extremely large and adds a great deal to travel time.

Another issue that arose was how the rotation of two years impacted fire inspectors. It was indicated that after being out of the fire prevention side for that period of time inspectors took a long time to re-establish contacts and their code application skills.

In discussions with all of the firefighter focus groups concern was raised as to the size of building being inspected. Historically Firefighters inspected only part 9 buildings as categorized by the National Building Code of Canada. Larger buildings have greater safety stipulations that firefighters may be unaware of. Greater training will be required to ensure firefighters' inspecting these building are trained to current standards.

CI Recommendation 16: Pending

Realign the Prevention Division Districts to match that of the fire districts and have inspectors enforcing Bylaws 7990 and 8175. The inspector will be stationed at a station for a longer duration with the crews and collectively take responsibility for the prevention activities in the district. With present station numbers this is anticipated to have a long term saving of \$650,000

A comparative study on “Fee for Service” was conducted in both the western region as well as similar sized departments in other parts of Canada. Reviewing the present Fees for Service as outlined in Appendix “A” of Bylaw 7990 resulted in recommendations in the following areas:

- Consumer Low Hazard Fireworks
- Display High Hazard Fireworks
- False Alarms
- File Searches
- Fireworks Vendors Permits
- Pyrotechnics Indoor Fireworks

This section will describe the findings for each of these fee for service recommendations.

Consumer Low Hazard Fireworks – Fee for Service

The Fire and Protective Services Bylaw 7990 regulates the discharge of Consumer Low Hazard Fireworks by requiring a permit to be issued for each shoot. An application must be submitted to the Fire Marshal for review prior to the permit being issued. The application consists of event description including a list of the size and quantity of each type of fireworks, a drawing of fireworks display site, written confirmation the property owner is aware of the proposed fireworks shoot, and certificate of liability insurance.

The Fire Department issues an average of 8 permits per year for functions hosted by either community associations or religious organizations.

No other jurisdiction in western Canada charges a fee for this service. *It is recommended that Saskatoon Fire Department does not charge for this service.*

Display High Hazard Fireworks – Fee for Service

The Fire and Protective Services Bylaw 7990 regulates the discharge of Display High Hazard Fireworks by requiring a permit to be issued for each shoot. An application must be submitted to the Fire Marshal for review prior to the permit being issued. The application consist of event description including a list of the size and quantity of each type of fireworks, proof of valid fireworks supervisor status with Natural Resources Canada, scale drawing of fireworks display site, written confirmation the property owner is aware of the proposed fireworks shoot, and certificate of liability insurance.

The Fire Department issues an average of 13 permits per year for functions such as Canada Day, The Exhibition, U of S Husky’s Football, and the Fireworks Festival. The review of each application and issuance of the Display Fireworks Permit is conducted by the Fire Marshal and takes an average of 30 minutes. On average, an additional 15 minutes is needed for the Administrative Assistant to generate, distribute, and file application documents and permit.

Direct costs for the processing for each Display High Hazard Fireworks Permit includes the Fire Marshal cost at \$75 per hour and Administrative Assistant cost of \$30 per hour for a total of \$105 for each permit.

Time allocated for the processing of all Display High Hazard Fireworks Permits takes 9.75 hours of human resources.

Jurisdictions in western Canada that charge fees for Display Fireworks Permits include Winnipeg - \$150.00, Edmonton - \$157.00, Calgary, - \$122.00, Vancouver - \$100.00. The mean average is \$132.00 for each permit.

CI Recommendation 17: Pending Anticipated long term \$1,250
The Department will report further to Council to consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Display High Hazard Fireworks Permit at a cost of \$125 per permit.

False Alarm – Fee for Service

In 2013, Operations Division responded to 1,608 false alarms. 13% of all buildings reporting alarms accounted for 39% of all false alarms. This results in frequent users of the alarm system. To date in 2014 there have been over 1,400 false alarms with 155 properties requiring multiple responses.

False alarms are broken down into the following categories as identified in departments records management system. (RMS).

Type of Call	Alarm Bells Ringing			Alarm Remote		
	Total alarms	# buildings \geq 2 alarms /yr	# alarms for repeat offenders	Total alarms	# buildings \geq 2 alarms /yr	# alarms for repeat offenders
Commercial Structure	66	4	8	659	122	396
High Life hazard	25	5	15	48	6	26
High Rise	4	1	2	5	1	2
Residential (Multiple)	272	30	93	56	6	13
Residential (Single)	8	0	0	453	32	69
Unknown Investigation	11	1	2	1	1	0

Administering a false alarm program would include monitoring the RMS for multiple alarms within a 12-month period.

Initially, when fire crews respond to a false call, an information pamphlet would be left with the building owner or representative to inform them of the pending charges for subsequent false alarm responses. At the end of every month, a staff member will be designated to generate a monthly report and issue a letter for all false alarms, and if applicable, submit a summary of the false alarms and a bill for service.

It will be necessary to distinguish between alarms caused by equipment malfunction or failure, improper or inadequate installation or maintenance, work taking place on the system, fire drills where SFD has not been notified or building activities such as construction, renovation, maintenance or cooking. Exceptions would be incidents out of the control of the owner such as malicious or accidental activations such as children tampering with a pull station.

Based on the number of false calls in 2013 this would have resulted in 1,608 letters which 626 would have accompanying Sundry Accounts Receivable's.

Jurisdictions in western Canada that charge fees for false alarm include Edmonton and Calgary. Each has a tiered cost increases depending upon frequency of false alarms.

Edmonton

Commercial fire alarm

- 1st response to a false alarm – no charge
- 2nd response to a false alarm - \$79.00
- 3rd response to a false alarm - \$393.00
- 4th response to a false alarm - \$783.00

Residential fire alarm

- 1st response to a false alarm – no charge
- 2nd response to a false alarm - \$77.00
- 3rd response to a false alarm - \$385.00
- 4th response to a false alarm - \$768.00

Security alarms

- Residential – \$783.00
- Commercial - \$1,224.00

Calgary

- 1st response to a false alarm – no charge
- 2nd response to a false alarm - \$265.00
- 3rd response to a false alarm - \$265.00
- 4th response to a false alarm - \$530.00

Security alarms - \$530

CI Recommendation 18: Pending Anticipated long term \$138,000**This anticipated fee should be considered un-sustainable****The Department will report further to Council to consider amending the Fire and Protective Services Bylaw 7990 to adopt a tiered response to add a fee for service for multiple false alarms in a twelve month period.****1st false alarm – no charge****2nd false alarm - \$250.00****3rd false alarm - \$500.00****4th and subsequent false alarm - \$750****File Search – Fee for Service**

The Fire and Protective Services Bylaw 7990 establishes a fee for service in Schedule “A” for file searches. These requests originate primarily from engineering consultants and law firms. The fee in Schedule “A” for a requested fire inspection amounts to \$50.00 each.

The Fire Department conducts an average of 175 file searches per year.

A typical file search conducted by the Fire Marshal will take 1 hour to complete. This review includes previous fires, dangerous goods spills, aboveground and underground storage tanks, and outstanding code violation resulting from the most recent inspection and ensuring the review is within the requirements of The Local Authority Freedom of Information and Protection of Privacy Act. The clerical time to process the file and generate a formal letter is 15 minutes.

Direct costs for the processing for each file search includes the Fire Marshal cost at \$75 per hour and Administrative Assistant cost of \$30 per hour for a total of \$105 for each permit.

Time allocated for the fire inspection and processing of requested fire inspection takes 1.25 hours of human resources.

Jurisdictions in western Canada that charge fees for file searches include Vancouver - \$60.00, Edmonton - \$126.00, Calgary - \$66.00, Regina - \$50.00, Surrey \$121.00. The mean average is \$84.60 for each permit.

CI Recommendation 19: Pending Anticipated long term \$600**The Department will report further to Council to consider amending the Fire and Protective Services Bylaw 7990 to increase the fee for the service a file search to a cost of \$100.00 per hour.**

Fireworks Vendor Permit – Fee for Service

The Fire and Protective Services Bylaw 7990 regulates the sale of fireworks by requiring a permit to be issued for each sales outlet. An application must be submitted to the Fire Marshal for review prior to the permit being issued. The application consists of a certificate of liability insurance.

The Fire Department has issued 21 Fireworks Vendor Permit to permanent sales outlets and an average of three temporary permits to a vendor prior to Canada Day. The review of each application and issuance of the Fireworks Vendor Permit is conducted by the Fire Marshal and takes an average of 15 minutes with an average of 15 minutes for the Administrative Assistant to generate, distribute, and file application documents and permit. A fire inspector delivers each permit and then conducts a fire inspection to ensure proper display and storage of fireworks product.

Due to the increase of requests and to better manage the existing pool of vendors; Fireworks Vendor Permit will be issued annually beginning in 2015.

Direct costs for the processing for each Fireworks Vendor Permit includes the Fire Marshal cost at \$75 per hour and Administrative Assistant cost of \$30 per hour. Based on the time allotment above, the cost is a total of \$26.25 for each permit.

Time allocated for the processing of all Fireworks Vendor Permit takes 15 hours of human resources.

Jurisdictions in western Canada that charge fees for Fireworks Vendor Permit include Edmonton - \$79.00, Vancouver - \$30.00. The mean average is \$54.50 for each permit.

CI Recommendation 20: Pending Anticipated long term \$1,000

The Department will report further to Council to consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Fireworks Vendor Permit at a cost of \$75 per year.

Pyrotechnic Indoor Fireworks – Fee for Service

The Fire and Protective Services Bylaw 7990 regulates the discharge of Pyrotechnic Indoor Fireworks by requiring a permit to be issued for each shoot. An application must be submitted to the Fire Marshal for review prior to the permit being issued. The application consist of event description including a list of the size and quantity of each type of fireworks, proof of valid Special Effects Pyrotechnician status with Natural Resources Canada, a scale drawing of pyrotechnic display, written confirmation that the property owner is aware of the proposed pyrotechnics shoot, and a certificate of liability insurance.

The Fire Department issues an average of five Pyrotechnic Indoor Fireworks Permits per year primarily at Credit Union Centre and Teacher Credit Union Place. The review

of each application and issuance of the Pyrotechnic Indoor Fireworks Permit is conducted by the Fire Marshal and takes an average of 30 minutes with an average of 15 minutes for the Administrative Assistant to generate, distribute, and file application documents and permit. A fire inspector will conduct a fire inspection prior to the show when the event is scheduled on a normal working day.

Direct costs for the processing for each Pyrotechnic Indoor Fireworks Permit includes the Fire Marshal cost at \$75 per hour and Administrative Assistant cost of \$30 per hour. Based on the time allotment above, the cost is a total of \$45 for each permit.

Time allocated for the processing of all Display Fireworks Permits takes 3.75 hours of human resources.

Jurisdictions in western Canada that charge fees for Display Fireworks Permits include Winnipeg - \$150.00, Edmonton - \$79.00, Calgary, - \$51.00. The mean average is \$93.33 for each permit.

CI Recommendation 21: Pending Anticipated long term \$500
The Department will report further to Council to consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Pyrotechnics Fireworks Permit at a cost of \$100 per permit.

The Fire and Protective Services Bylaw 7990 establishes a fee for service in Schedule "A" for third party inspection requests for Provincial or Federal grant or license. These requests originate primarily from residential care home and daycare operators and to a lesser extent moving and storage companies storing the furniture of federal employees such as military and RCMP. The fee for a requested fire inspection amounts to \$55.00 for the first hour, and \$30.00 for each hour thereafter. The Fire Department conducts an average of 250-300 requested inspections per year.

A typical care home or daycare inspection will take 1 - 1.5 hours to inspect and complete a report. The clerical time to process the incoming request, book the appointment and generate formal letter is 15 minutes.

Direct costs for the inspection and processing for each requested fire inspection includes the fire inspector cost at \$60 per hour and administrative assistant cost of \$30 per hour.

Time allocated for the fire inspection and processing of requested fire inspection takes 1.25 – 1.45 hours of human resources.

Jurisdictions in western Canada that charge fees for inspections include Winnipeg - \$156.00, Edmonton - \$125.00, Calgary - \$86.00, Surrey - \$113.00. The mean average is \$120.00 for each permit.

It is the recommendation that City Council amend the Fire and Protective Services Bylaw 7990 to increase the fee for the service of third party inspection requests to a cost of \$100.00 per hour and eliminate the reduction for any additional hours.

CI Recommendation 22: Pending Anticipated long term \$12,500
The Department will report further to Council to consider updating the current cost recovery values and additional services. The hourly rate suggested as per jurisdictional comparators should be increased to \$100/ hour.

CI Summary of Recommendations

Status		Description	Anticipated \$ Return	Page #
1	Implemented April 1, 2014	Staff members from Station 1 apparatus are temporarily re-assigned to passenger vehicle conduct sharps pickup	15,000	21
2	Implemented February 20, 2014	Management has implemented an MOU to allow this new overtime arrangement.	14,400	21
3	Implemented January 31, 2014	The practice of routine road tests has been stopped.	21,000	21
4	Implemented July 1, 2014	Response configuration to Alarm Bells has been changed to reflect appropriate response and will be reviewed at the end of 2015 to identify if any further changes are required.	7,000	23
5	Pending	The department should purchase a computer application, such as the 'Move Up Module' to help Fire Administration develop a relocation policy.	6,000	24
6	Implemented	To continue meeting the emergency medical needs of the citizens the department will maintain 120 Primary Care Paramedics. This has been identified to be the optimum number of pre-hospital care providers. Current staff designated as Emergency Medical Technicians will be retiring from the medical program effective December 2014.	21,500	26
7	Pending	City Council consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service that the Department charge a user fee for lift assist service to all profit oriented organizations for non-emergent incidents. Note the return value may not be sustainable	63,000	26
8	Pending	Re-staff all fire stations as per the breakdown in Table 6.	efficiency	27

#	Status	Description	Anticipated \$ Return	Page #
9	Pending	Fire Marque	250,000	28
10	Pending 2015 / 2016	Fire administration requests that Council approve the Director of the Land Branch to sell the present identified fire station location in Hampton and purchase the appropriate parcel of land located on the corner of Claypool Drive and Latrace Road in the Elk Point neighbourhood. It is also requested that the City of Saskatoon create a connector road by extending 37 th Street West to Cardinal Crescent.	5,650,000 (capital) 1,800,000 (operating)	30
11	Pending 2017/2018	Based on the deployment strategy above fire administration requests that Council approve the Director of the land branch to sell the present identified fire station location in Stonebridge and place the funds into the property realized reserves for the purchase of a suitable site in the Holmwood Suburban Area once the local road network is identified.	5,650,000 (capital) 1,800,000 (operating)	31
12	Pending 2015	Attendance Support Program that can reduce the number of sick days within the fire service	37,700	32
13	Pending	Create an MOU with Local 80 that will identify additional wage scale for Specialist Coordinators.	Working with the local	
14	Pending	Allow FSI's to work on day shifts, rather than straight days and facilitate a training mentorship program to staff in the Operations Division.	Working with the local	33
15	Pending	Explore Revenue Streams available to the SDC in the areas of SCBA training, fit testing for face masks, Fall Arrest training	Corporate efficiency	34

#	Status	Description	Anticipated \$ Return	Page #
16	Pending	Establish a methodology to involve the City bylaw inspectors with an end to relieve a portion of the 8175 workload. Increase Fire Prevention activities. Tall grass and weeds should move to a new division within Community Services.	650,000	35
17	Pending	City Council consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Display High Hazard Fireworks Permit at a cost of \$125 per permit.	1,600	37
18	Pending	City Council consider amending the Fire and Protective Services Bylaw to adopt a tiered response to add a fee for service for multiple false alarms in a twelve-month period. Note the return value may not be sustainable 1 st false alarm – no charge 2 nd false alarm - \$250.00 3 rd false alarm - \$500.00 4 th and subsequent false alarm - 750	75,000	39
19	Pending	City Council consider amending the Fire and Protective Services Bylaw 7990 to increase the fee for the service a file search to a cost of \$100.00 per hour.	15,000	39
20	Pending	City Council consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Fireworks Vendor Permit at a cost of \$75 per year.	1,500	40
21	Pending	City Council consider amending the Fire and Protective Services Bylaw 7990 to add a fee for the service of issuing a Pyrotechnics Fireworks Permit at a cost of \$100 per permit.	500	41

#	Status	Description	Anticipated \$ Return	Page #
22	Pending	A fee for service schedule is found within Bylaw 7990. These are requested to be updated to current cost recovery values and additional services are recommended to be included. The hourly rate suggested as per jurisdictional comparators should be increased to \$100/ hour.	12,500	42
--	Pending December 31, 2014	One time deferral of Capital reserve (see note below)	*600,000	No Ref
--	Pending December 31, 2014	Annual average return to general revenue due to typical operating procedures.	**179,700	No Ref
--	Pending	Expand our service into new service agreements within the mutual aid call response areas of Saskatoon	30,000	No Ref
			Total Savings	\$16,836,600.00

Table 5

*The one time deferral in Capital was made possible by consideration of apparatus service life and the change in replacement of a full areal apparatus with a smaller multi- purpose ladder unit by 2019,

**The annual average return is a result of the operating budget based on staffing allocations on an annual basis and savings in major repair expenditures

Bibliography

American Heart Association

Policy calls for minimum of four responders to administer proper Advanced Cardiac Life Support (ACLS)

American Insurance Association, “Fire Department Efficiency,” Special Interest Bulletin No. 131, December 1975

Bulletin prepared by the American Insurance Association on fire department efficiency. Emphasis is placed on the importance of staffing companies with a minimum of four personnel. The bulletin further states that if companies are staffed with two or three personnel, they cannot perform the required functions of either an engine or ladder company.

American Insurance Association, “Fire Department Manning,” Special Interest Bulletin No. 319, December 1975

Bulletin prepared by the American Insurance Association on fire department staffing levels. Emphasis is placed on the importance of staffing companies with a minimum of four personnel. The bulletin further states that four personnel do not represent an adequately staffed company. It concludes with a statement that progressive fire chiefs believe a company should never respond with fewer than five or six personnel.

Brunacini, Alan V., “Shrinking Resources vs. Staffing Realities,” NFPA Journal, May/June 1992; pp. 28 & 120

Chief Alan Brunacini concluded that it is illogical to maintain that the requirements, capabilities and conditions of fire department operations differ from one place to another. Fire conducts, convects and radiates the same all over North America. As such, two fighters cannot conduct a primary search that requires six fire fighters for effective completion in a survivable time frame.

California Office of Emergency Services

Statewide Mutual Aid Agreement mandates minimum four-person staffing on all mutual aid responses (such as wildfires, floods, earthquake, etc.)

City of Long Beach Planning Department, “Long Beach General Plan Program Public Safety Element, May 1975/Reprinted in 2004.

The scope and purpose of the General Plan is defined on page 1 of the General Plan (GP). Numerous objectives are defined: Complying with State Law, assist public officials in dealing with matters of safety and emergency occurrences, provide Citizens with an increased sense of security and well-being to name just a few. According to the GP Long Beach Fire Department was rated a “Class 1” fire department and the City of Long Beach was categorized a “Class IIA” by the Insurance Services Office (ISO). The GP made “immediate action recommendations” necessary for attaining the established public safety goals set forth in the GP. The first listed goal was to “improve the insurance services rating for Long Beach, implementation of recommendations of the Insurance Services Office for improving fire protection in the City should be considered seriously.” California Government Code 65301.5 states “*The adoption of the general plan or any part or element thereof or the adoption of any amendment to such plan or any part or element thereof is a legislative act which shall be reviewable pursuant to Section 1085 of the Code of Civil Procedure.*”

Compton, Dennis and John Granito, eds., “Managing Fire and Rescue Services,” 2nd Edition, International City Management Association, Municipal Management Series, 2002.

Cushman, Jon, Seattle, WA Fire Department’s “Abstract: Report to Executive Board, Minimum Manning as Health & Safety Issue, 1981.

This study, performed by the Seattle Fire Department, analyzed the link between staffing and fire fighter injuries by reviewing the average severity of injuries suffered by engine companies of fewer than four fire fighters as compared to companies with four or more fire fighters. The study concluded that the average time per disability increased as company strength decreased for both types of companies. This analysis indicated that the rate of fire fighter injuries expressed as total hours of disability per hours of fire ground exposure were 54% greater for engine companies staffed with three personnel when compared to those staffed with four fire fighters, while companies staffed with five personnel had an injury rate that was only one-third that associated with four-person companies.

Fire Services Review 2005 (Independent Auditors hired by the City of Long Beach)

“Four-person engine companies are recommended for Long Beach. Multiple company operations are frequent in Long Beach. LBFD needs a lot of resources (firefighters) to perform fire operations. The City also has high call volume and many fire or emergency risks. While some cities are good candidates for three person staffing, Long Beach is not.”

Four-Person Staffing Facts “Two in/Two Out Rule”

“Requires that there must be two firefighters outside before two firefighters can make entry into an Immediately Dangerous to Life and Health (IDLH) atmosphere.”- OSHA Standard, - NFPA 1710

Gerard, John C. and Jacobsen, A. Terry, “Reduced Staffing: At What Cost?,” Fire Service Today, September 1981; pp. 15-21

This study concluded that an aggressive early initial interior attack on a working structural fire results in greatly reduced loss of life and property damage. Given that the progression of a structural fire to the point of flashover generally occurs in less than 10 minutes, two of the most important elements in limiting the spread of fire are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible.

International Association of Fire Chiefs (IAFC)

IAFC’s Metro Fire Chiefs’ minimum staffing position reads: “In order to permit effective operation of fire companies at the scene of a structure fire, the minimum number of personnel on both engines and ladder companies should be 5 members per unit.”

International Association of Fire Fighters, “Analysis of Fire Fighter Injuries and Minimum Staffing Per Piece of Apparatus in Cities With Populations of 150,000 or More,” December 1991.

This study was a comprehensive analysis of fire fighter injuries and minimum staffing levels in a number of cities. The study found that 69% of jurisdictions that maintained crew sizes of fewer than four fire fighters had fire fighter injury rates of 10 or more per 100 fire fighters, while only 38.3% of jurisdictions maintaining crew sizes of four or more fire fighters had comparable injury rates. In other words, jurisdictions having crew sizes of fewer than four fire fighters suffered a benchmark injury rate at nearly twice the percentage rate of jurisdictions that maintained crew sizes of four or more fire fighters.

International City Managers Association (ICMA)

In a report "Managing Fire Services" ICMA recommends 5 per engine for municipal fire administration.

International City Managers Association, Municipal Fire Administration (Chicago, IL:ICMA) 1967; pp. 161-162

The ICMA concluded that there must be enough personnel to put fire apparatus into effective use. It determined that a minimum of five personnel are required for engine (pumper) companies, three personnel are needed to place a single line of 2 ½ -inch hose in service, and one additional person, plus a foreperson, is needed to operate a pump.

International Organization for Standardization (ISO)

Insurance industry risk assessment calls for six-person response on initial fire attack (four firefighters plus two medics)

Kimball, Warren Y., Manning for Fire Attack (Boston, MA: NFPA) 1969.

This book thoroughly covers staffing of fire companies. In summary, effective fire ground staffing was demonstrated to involve two fundamentals; first, carefully engineered equipment components designed to deliver specified fire extinguishing capacity under stated conditions and second, personnel assigned and used to deliver specified fire attack capabilities. In other words the fire firefighting capability of a fire department ultimately depends upon a complete systems approach and not a mere massing of random forces when an emergency occurs.

McManis Associates and John T. O'Hagan and Associates, "Dallas Fire Department Staffing Level Study," June 1984; pp. 1-2 & II-1 through II-7.

The Dallas Study is a benchmark study of the link between crew size and fire suppression effectiveness. This study was performed as a series of controlled evolutions on a specified set of fire situations using different components in the range of four to six people. Significantly, the study found that "fatigue was a serious problem for smaller groups." Indeed, the author of a 1993 memorandum concluded that this finding was relevant because it highlights the link between staffing and fire fighter deaths and injuries.

Metro Chiefs/International Association of Fire Chiefs," Metro Fire Chiefs-Minimum Staffing Position," May 1992.

In 1992, the Metro Fire Chiefs Division of the ICHIEFS not only endorsed assembling at least four fire fighters before initiating an interior attack, but went a step further stating: In order to permit the effective operation of fire companies at the scene of a structure fire, the minimum number of personnel on both engine and ladder companies should be five members per unit. This firm position was taken by the Metro Fire Chiefs solely in the interest of the safety of both the citizens we serve and our nation's fire fighters.

Morrison, Richard C., "Manning Levels for Engine and Ladder Companies in Small Fire Departments," 1990.

The conclusions reached in the Dallas study were confirmed for small fire departments by the Westerville, Ohio Fire Department. Using standard fire fighting tactics, the results of the Westerville Fire Department report showed that four fire fighters could perform rescue of potential victims 80% faster than a three fire fighter crew.

National Fire Academy, Executive Development Program III, “Fire Engines are Becoming Expensive Taxi Cabs:

Inadequate Manning, “ February 1981; pp. 2 & 4.

This NFA report summarizes a 1977 test conducted by the Dallas Fire Department which consisted of a simulated fire involving several rooms at the rear of the third floor of an old school. This simulation was conducted to determine how long it took a three, four, or five-person team to advance its line to this area and get water on the fire. Immediately following those tasks, each individual’s physical condition was assessed. Timing began as each engine company entered the schoolyard. The average time for the engine companies to complete the tasks is revealing. The three-person team average was 18.8 minutes. All personnel were exhausted, rubber legged, had difficulty standing up and were unfit for further fire fighting.

The four-person team, conducting the very same test, averaged 10.29 minutes and upon completion, were nearing exhaustion. The five-person team averaged 6.15 minutes, and showed little evidence of fatigue at the end of the exercise.

National Fire Protection Association, “Decision of the Standards Council on the Complaint of M.E. Hines, Texas Commission on Fire Protection, concerning a Formal Interpretation of NFPA 1500, Standard on Fire Department Occupational Safety and Health Program,” April 6, 1994.

In 1993, the NFPA included in its NFPA 1500 Consensus Standard on Fire Department Occupational Safety and Health a requirement addressing the minimum number of fire fighters necessary to initiate an offensive interior attack on structural fire. This Tentative Interim Agreement (TIA) to the fire fighter safety standard states:

“At least four members shall be assembled before initiating interior fire fighting operations at a working structural fire.” Consequently, in 1994, Mr. M.E. Hines, Director of the Texas Commission on Fire Protection, sought formal clarification from the NFPA on this issue. NFPA’s formal interpretation of how the four fire fighters should be assembled is as follows: *“...when a company is dispatched from a fire station together as a unit (which includes both personnel responding on or arriving with apparatus) rather than from various locations, the standard recommends that the company should contain a minimum of 4 fire fighters.”*

National Fire Protection Association, NFPA 1410 Training Standard on Initial Fire Attack, 2000.

The NFPA 1410 Standard contains the minimum requirements for evaluating training for initial fire suppression and rescue procedures used by fire department personnel engaged in emergency scene operations. This standard specifies basic evolutions that can be adapted to local conditions and serves as a standard mechanism for the evaluation of minimum acceptable performance during training for initial fire suppression and rescue activities.

The following are pertinent excerpts from NFPA 1410:

3-2.2 In addition to the requirements set forth in 3-2.1, the company officer shall ensure that the following are accomplished in interior structural fires: (1) At least two fire fighters enter the immediately dangerous to life and health (IDLH) atmosphere and remain in visual or voice contact with each other at all time. (2) At least two fire fighters are located outside the IDLH atmosphere. (3) All fire fighters engaged in interior structural fire fighting use SCBA.

A-3-2.2 One of the two individuals located outside the IDLH atmosphere could be assigned an additional role, such as incident commander in charge of the emergency, or safety officer, as long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Nevada Occupational Safety and Health Review Board, Administrator of the Division of Occupational Safety & Health v. Clark County Fire Department (Statement of Position and Stipulation), Docket No. 89-385, October 1990.

Citing that the Clark County Fire Department had prior knowledge that units staffed with three personnel were unsafe, the Nevada Department of Occupational Safety and Health issued a complaint that the Fire Department had willfully violated the industry standards relating to fire fighter safety. In the late 1990, the NDOSH agreed to vacate the violation when the Clark County Fire Department stipulated that it would immediately “*maintain minimum staffing levels at each fire station so that no engine or ladder truck shall be dispatched from a fire station, staffed with less than four person.*” In addition, the stipulation entered into the NDOSH and the Fire Department stated that: “*Any engine or ladder truck manned with less than four persons shall be defined to be “unsafely manned.”*”

**NIST (National Institute of Standards and Technology)
Report on Residential Fire Ground Field Experiments 4/2010**

The four-person crews completed the same number of fire ground tasks (on average) 5.1 minutes faster —nearly 25% faster — than the three-person crew.

- Additional 6% (13 seconds with 2nd engine less than 1 minute away) difference in the “water on fire time” between the three- and four-person crews.
- The four-person crew operating on a low-hazard structure fire can complete laddering and ventilation (for life safety and rescue) 25% faster than the three-person crew.
- NFPA 1710 requires 15-17 FFs on scene in 8 minutes. The three-person crews were unable to assemble enough personnel to meet this standard. Four-person response time was 5:02 minutes.

Onieal, Denis G., “In Response to the Demand for Fire Department Cutbacks,” Ed.D, Fire Engineering, August 1993.

This study concludes that the only reliable available research data obtained under fire conditions indicate that four is the minimum staffing level for a fire fighting engine or ladder company. Cited research firmly and unequivocally concludes that for an engine company or ladder company, the minimum acceptable staffing level is four. That number of fire fighters is the minimum number required to successfully accomplish the fireground tasks required within an acceptable time period. Four is not the number at which negotiations begin, but it is the absolute bare minimum required for an effective and efficient fire company.

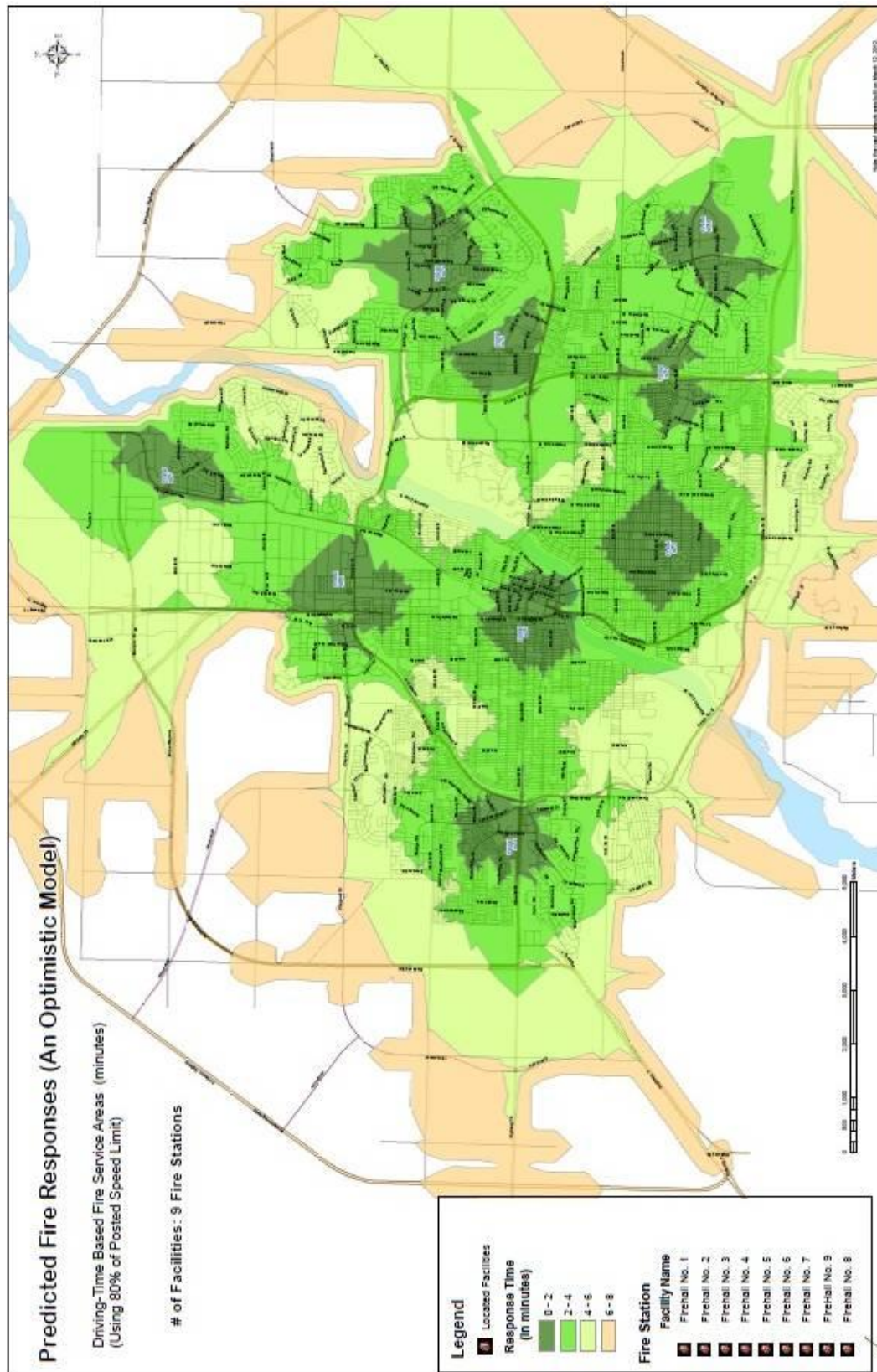
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Roberts, Bill, Fire Chief, City of Austin, “The Austin Fire Department Staffing Study,” March 1993.

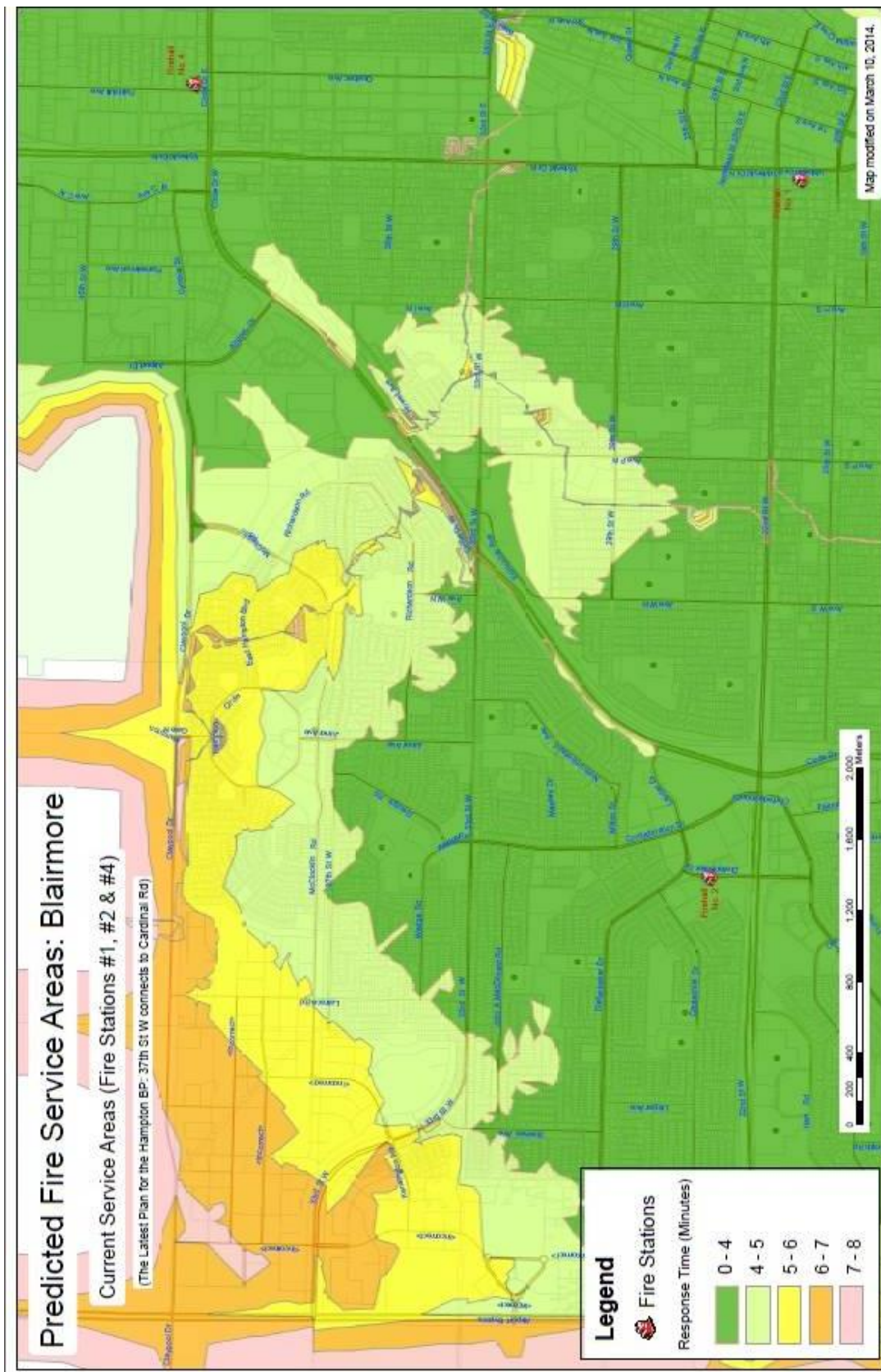
In 1993, the Austin Fire Department conducted a study to determine whether companies staffed with four fire fighters were safer and more effective than the three-person companies the department was currently deploying. In order to compare the effectiveness of fire companies, the physiological impact on fire fighters and Austin fire department injury rates at various staffing levels, the Fire Department conducted drills consisting of a series of common fireground tasks divided into three scenarios: a simulated two-story residential fire; a simulated aerial ladder evolution; and a simulated engine company high-rise fire. These simulations revealed that regardless of the experience, preparation or the training of fire fighters, loss of life and property increases when a sufficient number of personnel are not available to conduct the tasks required

in an efficient manner. The severity and the degree of hazard increases until controlled or the fire passes the critical point. Consequently, the Austin Fire Department concluded that fire fighter effectiveness significantly improves when a company is increased from three to four personnel. In the two-story residential fire, the efficiency or time improvement between the three-person and four-person crew was 73% in the aerial ladder evolution, the efficiency improvement between the three-person and four-person crews was 66%. In the high-rise fire, the efficiency improvement between the three-person and four-person engine company crew was 35%. In addition to the fireground simulation, the Austin Fire Department also reviewed injury reports involving 136 emergency incidents from 1989 to 1992 to which 1,938 fire fighters responded. The analysis revealed that the injury rate for four or five-person crews was 5.3 per 100 fire fighters while the three-person companies experienced an injury rate of 7.77 injuries per 100 fire fighters. The injury rate for the three-person companies was 46% higher than the rate for larger crews.

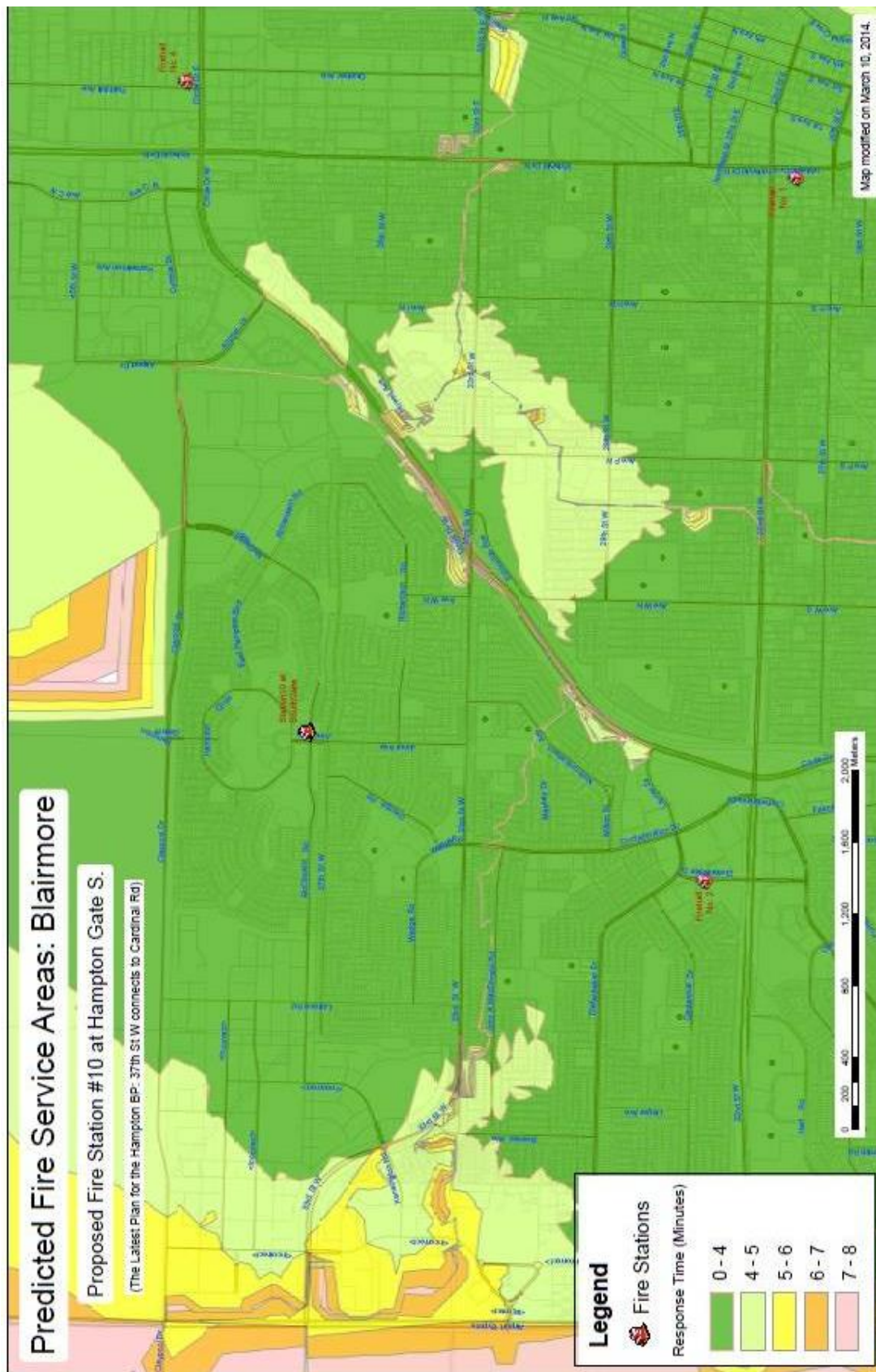
Appendix 1a: Predicted Fire Response



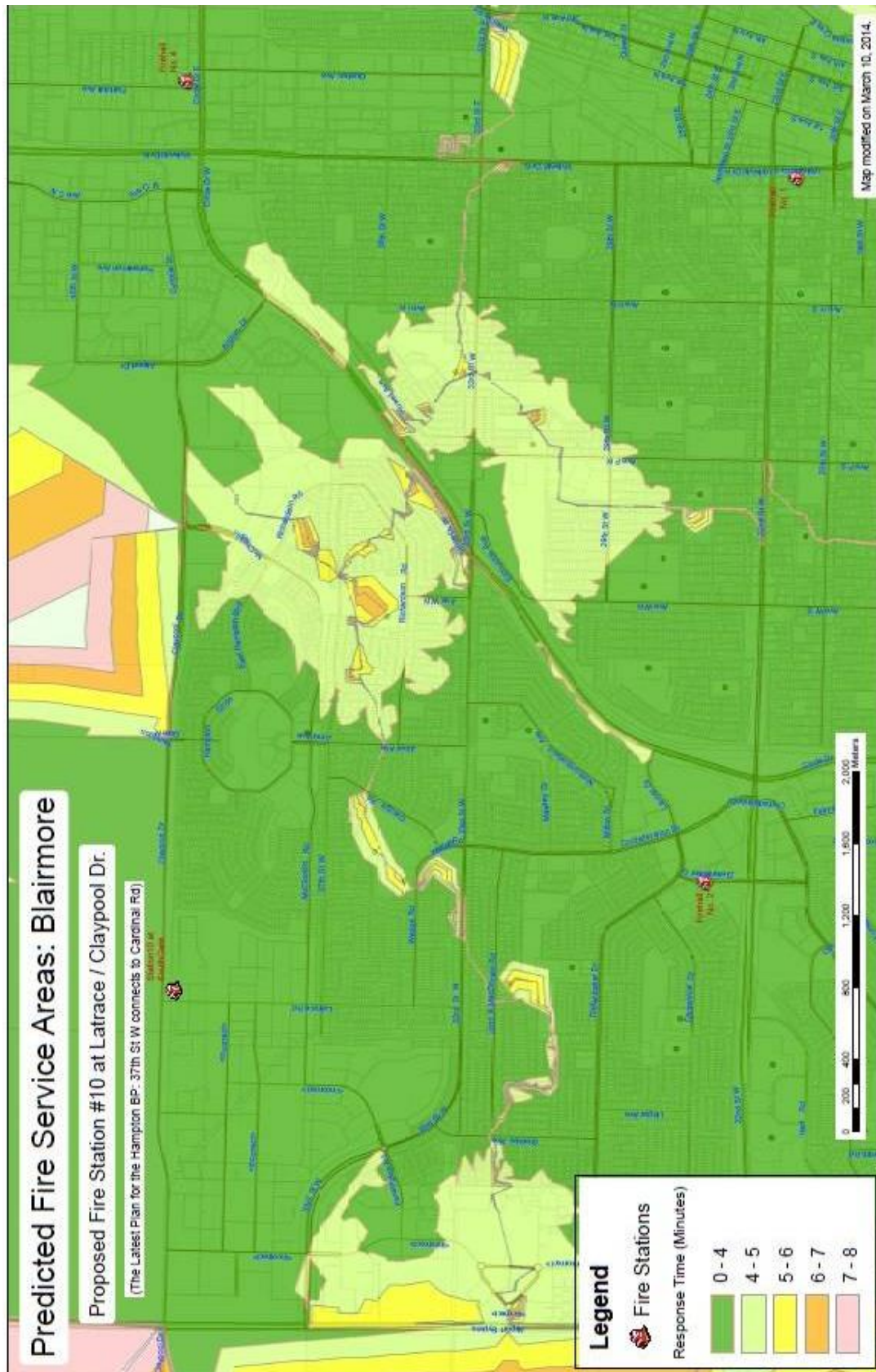
Appendix 1b: Predicted Service Area Blairmore



Appendix 1c: Fire Station 10 at Hampton Gate S.



Appendix 1d: Fire Station 10 at Claypool Dr.



Appendix 1e: Fire Station 3, 6, 8 Response Times

