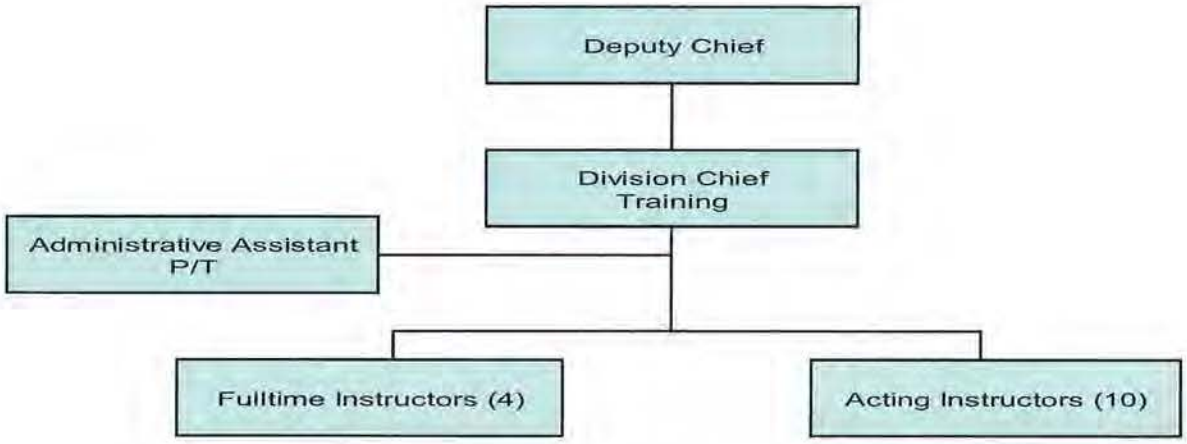
Figure 55 depicts the current training organization.

Figure 55: Organization of VFRS Training Division



The division chief is the only mid-level managerial position that remains in the union. As such he is a non-exempt position. It is the department's plan to change the position to an assistant chief, which is an exempt management position. In our opinion this is positive step because the fire chief needs the lead person for training to be part of the executive team. Although the incumbent has been an effective leader with a passion for training firefighters, there is no guarantee that the next chief would be as effective if they remained non-exempt.

As this study progressed the incumbent chief of training retired. Considering the city's financial situation, the fire chief decided not to replace the training chief but rather to consolidate the training chief's responsibilities with that of the EMS chief. The EMS chief, who is an 'exempt' assistant chief, manages several EMS instructors in addition to coordinating VFRS activities with BCAS. The decision to merge the two positions was a good one and the retirement of the division chief makes this a logical time to make the change permanent.

Recommendation 56: Merge the training division with that of the former EMS assistant chief responsibilities under one assistant chief.

In addition to the traditional fire academy functions, the chief of training is also the chairperson for the regional fireboat consortium which includes five departments in the region. These include: Vancouver; North Vancouver Fire District; North Vancouver City; Burnaby; and Port Moody. Port Moody and Burnaby share a fire boat. While the training chief is coordinator for the fire boat consortium, marine fire training for the communities outside Vancouver are contracted and not provided by the VFR. This approach is the type of regionalization that many

communities are seeking. It should continue and Vancouver is the best choice to lead the consortium.

Instructors and acting instructors are tasked with providing all of the training within the organization. They presently work four, (9.5 hour) days per week. There is little turnover among the full-time instructors, with the last vacancy occurring in 2004. Although there is great interest in becoming an acting instructor, there is not a groundswell of people looking to become full-time instructors. Much of the training occurs during the day because of the shift instructor schedule. Conducting training during evening hours would greatly benefit the department.

Recommendation 57: Change the schedule for TOs to four 12-hour days with four days off between. One possible schedule is for TOs to work 0700–1900 and 1100–2300 thus overlapping the day and evening schedule.

Challenges – The fire department faces several challenges with regards to training. First, live-fire training is conducted too infrequently. As a result, active firefighters are not keeping their skills up, which is a reflection of a good thing—decreasing fires and severity of fires, as more structures are sprinklered. Likewise, new recruits are not getting enough live-fire training during their initial training. Both situations should be considered serious and more time should be devoted to live evolutions.

Driving and operating emergency vehicles is one of the more significant areas of legal exposure for the city. Even minor accidents can be costly and the fire department has been dealing with a large number of accidents involving apparatus 'backing-up' and knocking off mirrors when vehicles hit door frames while exiting the fire halls. These problems are not unique to Vancouver. Fewer firefighters today have previous experience operating large vehicles; as a result they must be trained to do so.

In Vancouver, the driver-training program is very basic with the company officer being mostly responsible for training new drivers along with other experienced drivers. There is not a formal program to evaluate and certify new operators but there should be. There should also be periodic refresher programs and recertification should be expected every few years.

Recommendation 58: Create a formal program for driver training and emergency vehicle operation. Programs should be tailored to the various vehicle types used by VFRS.

Live-fire training continues to be a considerable challenge for the department. During our meetings numerous individuals, including some within the union, cited the lack of live-fire training as the greatest training weakness. Live fire training presents a two-fold problem, finding a place to burn and having the instructor cadre to conduct the training. In most urban communities there are abandon buildings available, but many are unsafe for training or are in neighbourhoods that balk against live burns because of safety, pollution, or aesthetic reasons.

For live burns, the department must provide instructors, safety officers, rapid intervention teams, and back-up teams in case of unexpected fire extension. The training division's goal of having every firefighter participate in a live burn exercise every three years is too long and some are not getting this type of training even in three years. The decrease over the years in the city's fire incidents has created the need to make sure firefighters replace actual experience with live exercises. As with most cities, environmental issues impact the ability to conduct such drills and those involved in environmental policymaking and the fire department will need to find reasonable solutions that allow such drills to occur.

Other Programs – In addition to driver and live-fire training, there are other areas where training can be improved.

Recruit Training: There are few provincial standards concerning recruit training. For its part VFRS requires all new hires to be certified as FFI, FFII, EMA-3, and possess a Class 3 driver's license prior to their appointment. This is a good approach that is also efficient.

Requiring new personnel to already meet the minimum training standards was implemented as efficiency and cost control measure. Most receive the required training and certifications from the Justice Institute of British Columbia.[37] However, some of the recruits also become certified at other locations in Canada and the U.S.

The decision to require pre-certification for hiring is rational from the cost perspective. However, not all of the recruits come in with the adequate skills to become qualified firefighters and their skill levels vary considerably. A major concern for programs such as those of JI and others is that they center the training on the educational portion of certification at the expense of skill development. This is a problem not only in Vancouver, but in other communities where pre-certification is required for hiring.

To address the skills issue, VFRS requires new recruits to complete four weeks of instruction. A typical class of recruits is 8 to 20 with an instructor ratio of 1:4 or 1:5, which is good. The training includes three weeks of fire training and one week of EMS training. Because of the varied skills levels for recruits, four weeks is often not enough time and some recruits were reportedly not getting enough live-fire training.

Following a six-month assignment to a fire hall where they are given additional training, recruits then return to the training division for a personal assessment. While in the field, recruits

[37] http://jibc.bc.ca/

continue their training through a regimen established by the training division and given by company officers.

Recommendation 59: Continue to require prospective firefighters to possess fire and EMS certifications prior to employment. However, when necessary modify the initial four-week training program to include additional live-fire training to ensure that all recruits are fully trained before being assigned to a fire hall. Once assigned to fire halls, the daily regimen often detracts from their ability to focus on training. Likewise, some fire halls (and officers) are also not conducive for good instructional environment.

Continuing Education: How to provide on-going continuing education is a serious challenge, in particular because firefighters must be trained in a variety of areas. British Columbia does not require one 'standardized' level of training. However, VFRS mostly follows the NFPA Firefighter I, II and EMA-3 levels standards of instruction. In addition to the CAFS training mentioned earlier, the complexity of Vancouver as a major city requires specialized training for such things as the Canada Line Training (Subway) system, incident management, and training to prepare for the 2010 Olympics.

In 2006, the last year for which annual statistics were available, the training division of VFRS delivered the following programs.

Fire Training: Includes refresher classes and live-fire exercises:

Scheduled Events	Personnel Trained	Hours
302	2238	2687

EMS Training: These programs included mandated EMA recertification and auto extrication programs. Most EMS training segments are 4 hours and held at the fire halls. Auto extrication training is a 7-hour segment held at the fire academy.

Scheduled Events	Personnel Trained	Hours
120	394	2519

Special Operations Training: These 4 to 6 hour sessions are held at the fire halls and cover topics not included in the basic fire and EMS training.

Scheduled Events	Personnel Trained	Hours
450	1350	1242

In 2006, the training division conducted 863 program events and trained almost 4,000 personnel. The combined time for this training was almost 6500 hours, on average 17 hours each day.

Fire Officer Training: In addition to fire and EMS training, fire officer training is also provided for those who wish to be promoted to lieutenant, captain, and battalion chief. Prospective officers are required to complete training programs that mirror the NFPA's 1584 Fire Officer Standards (I and II). Lieutenants and captains are required to complete Fire Officer I, and battalion chiefs Fire Officer II. These are excellent standards to set and are uncommon in Canada. For future officer development VFRS should consider Fire Officer I for lieutenants, Fire Officer II for captains, and Fire Officer III for battalion chiefs. The reason is because Fire Officer III includes management-level training such as budgeting and personnel management.

Recommendation 60: Consider increasing the officer qualifications to Fire Officer I for lieutenants, Fire Officer II for captains, and Fire Officer III for battalion chiefs.

Future Changes – To improve training and deliver the capacity needed for existing and future programs, additional instructors are needed. Merging EMS and the training division is also a good move because EMS is such a large part of the department's business portfolio. Instructors are also qualified to teach more then one topic, thus coordination of training between fire and EMS would also improve.

EMS and Training Chief: To complete the merger, it makes sense that the current assistant chief of EMS should become the executive to lead the training division. In their current capacity, the assistant chief manages a few EMS instructors and their role includes mostly policy management, particularly since BCAS is the primary medical response agency in Vancouver. BCAS also provides patient transport; therefore, the EMS chief does not have the same role for EMS management as EMS chiefs in other departments where EMS transport is provided by the fire department.

Training Administrator: The merger of training with EMS requires an additional mid-level manager between the assistant chief and instructors. This individual would coordinate day-to-day activities of the instructors. A training administrator would be able to directly supervise the instructor cadre, provide oversight of program quality management, and lead the department's increased use of on-line education. Ideally, the position would be at the captain level, with a pay stipend over and above captain. The selected individual should possess experience in training/ education, quality management, and distributive education. The administrator would work weekday schedule.

Recommendation 61: Add a training administrator position with the rank of captain. To get the right individual, the position should probably be filled outside the seniority-based promotion system. In addition to monitoring the quality of programs this individual would also be the lead for developing curricula. In the current rank structure the coordinator should probably be equivalent to a captain.

Shift Instructors: Additional fulltime instructors are also needed. The current cadre of four fulltime instructors is insufficient to handle the expected workload. And while the acting training officer program is excellent, these individuals are focused on training only part of the time and the added programs require fulltime commitment. Another problem is that acting instructors must be given 30-days notice before their shift schedule can be modified. This requirement is contractual, and can only be changed through negotiation.

On average, 40 percent of an instructor's time is spent in classrooms and 60 percent for planning activities. With four instructors this equates to about 3200 hours of potential classroom time minus time off for vacation. The available time does not cover enough time for the programs being delivered, especially if the driver training program and live-fire training programs are expanded.

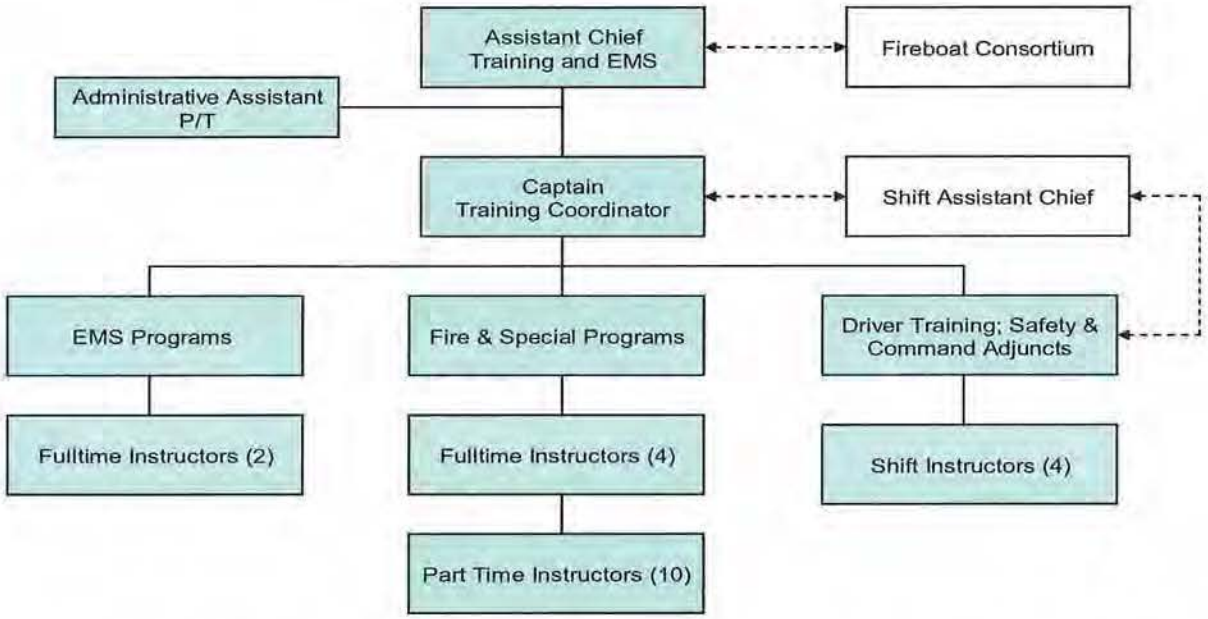
To increase capacity we recommend adding one instructor to each of the four shifts. These individuals will report to the training administrator although they will work on their respective shift (A–D). The benefit of this approach is that training can be delivered during evening and weekend hours. Training can also be decentralized. In addition to their role as instructors, these individuals could also become the shift safety officer and act as the command adjunct during a major incident. (We discussed the need for such a position earlier in this chapter).

Recommendation 62: Negotiate a change to the 30-day rule for assigning ATOs to training.

Recommendation 63: Add four shift instructors who would be the primary instructors for driver training.

If EMS and training were combined along with the proposed staffing changes, the new table of organization would be similar to that which is depicted in Figure 56.

Figure 56: Proposed Organization of Training and EMS



If fully implemented, staffing within the training division would increase by five: one coordinator and four shift instructors. One division chief position is eliminated. The four shift instructors are created from a current staffing overage in fire hall operations.

Distributive Education: The VFRS has the opportunity to increase their use of distributive education including internet-based programs, streaming, and live video education. There are also opportunities for the investment in simulation training (e.g. flashover). While not a replacement for practical training, distributive education will benefits the fire department in the following ways:

- On-line Education (E-Learn) – Computer-based education using the internet is especially useful for required training where personnel can complete training and proficiency demonstration at their own pace. EMS continuing education is particularly conducive to on-line training. It can also be completed at work or at home.
- Video Streaming – Streaming involves transmitting training material via computer network or video to fire hall locations. These allow students to complete initial or continuing education programs in real-time from remote locations. This type of training could be used to present the didactic training for upgrading to the Emergency Medical Responder (EMR) level.

- Video Conferencing – Many didactic programs can be presented from one site to remote locations such as fire halls. This method of training could reduce the number of times that units have travel to the fire academy, thereby keeping them within their first due districts. This also reduces wear and tear on engine and ladder companies.

Recommendation 64: Increase the use of distributive education for fire and EMS continuing education. Work with the city information technology department to design and implement the program.

Conclusion: We have made several major recommendations to improve VFRS training and professional development. Going forward the changing mission of the fire department is a good opportunity to retool its training programs. To do this more personnel will be needed to meet future obligations. To begin with, a shift in the fire department's core mission from primarily fire suppression to fire prevention and EMS requires that training change its focus.

As part of the emerging process, the new fire chief should commission an internal panel consisting of chief officer, company officers, fire and EMS instructors, firefighters, city agencies and community representatives to create a plan for future training needs.

Recommendation 65: The fire chief should commission an internal panel to determine the future needs for VFRS training.

VI. FIRE PREVENTION, INVESTIGATION AND PUBLIC EDUCATION

Fire prevention, public education, and fire investigation are the 'triangle' of effective fire loss reduction efforts.[38] Prevention which includes code inspections and plan reviews along with public education are geared to prevent and minimize losses. Fire investigation cause and origin, in addition to the obvious purpose of determining arson, is important because it reveals where prevention and education efforts may need to be improved or redirected. In Vancouver, prevention activities are considered to be plan review and fire inspections. Fire investigation and public education, which contribute to prevention, are separated organizationally from the rest of the prevention mission in Vancouver and treated as separate sections.

Overall, VFRS is doing a credible job in all three areas of prevention but improvements are needed. First, the functions of code enforcement, public education, fire investigation are under different areas in the table of organization, which has hindered their coordination. Secondly, data is not being collected and used as effectively as it could. As a result, the department is unable to determine details of the city's fire-problem areas, or which programs are having the best success. Data collection was a significant issue throughout this project and VFRS needs to improve its collection and be able to use it effectively. Finally, the records on the level of effort going into various prevention activities are not adequate, making it difficult to assess how many personnel are needed in each prevention program area. This will be a key ingredient for a performance measurement program, which the fire department has implemented and is currently refining.

VFRS are the best example in North America and probably the world of a large city fire service that succeeded in getting legislation passed to require residential sprinklers. The requirement went into effect in 1990, and now 19 years later many of the city's residential units are sprinklered.[39] This is an enormous achievement, because it improves a safety environment where a higher percentage of the population are likely to survive a fire. Attention is needed to maintain those systems and continue sprinklering the rest. Vancouver is being used as an example in the TriData/CDC report on Global concepts in Residential Fire Safety-Best Practices from Canada and Latin nations.

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[38] "Prevention" sometimes is used to refer only to plan review and code enforcement, and sometimes to include public education and fire investigation. We will use it in the broader sense here, but use the detailed terms when needed to clarify.

[39] The number of city residential units now protected by sprinklers is a subject of some debate. Estimates are from 10 percent to 40 percent. Data was requested so assess the impact of sprinklers on residential fires in Vancouver; however, only the number of sprinklers permits could be provided for the past several years.

Scope of Prevention Assessment

The scope of our review in prevention was limited (by the city's work statement) to assessing the staff needed to perform the required prevention activities: fire plan reviews, fire inspections during development and construction and periodic fire inspections of existing buildings by both fire prevention and fire companies.

To do so, we analyzed available data to determine the amount of work required and the level of work actually performed. We did not assess how well the major functions of the fire prevention were being performed. Where possible, the fire prevention functions were evaluated against national standards and benchmarks and fire prevention best practices.

Fire Prevention

Fire prevention activities within VFRS needs some significant changes before the primary functions of prevention are executed using best practices. Although the scope of our review was limited to assessing staffing needs, observations based on experience and knowledge of best practices are sprinkled throughout this section.

Prevention has often not been viewed as a core service nor has it been a high priority, at least for previous administrations within VFRS. The emphasis placed on fire inspections has declined since 2004 as evidenced by the decline in the number of inspections by both prevention and fire companies. Due in part to the increase in operational training, top VFRS management, fire operational officers and fire fighters are not continuously trained in fire prevention disciplines (fire inspection, public education or fire investigations) and are not required to be certified as fire inspectors, fire educators or fire investigators.

Prevention is not a sought after alternative career path to fire operations. Many enter the division because the work schedule better suits their life style, because they were injured and can not return to operations or because a promotion is available. Although there is a requirement to obtain certification, promotions are primarily based on seniority within the organization, not on seniority within prevention. This practice thwarts the development of professional expertise. It also creates a situation where fire inspectors often train those responsible for supervision.

Ideally, the top prevention officer/manager (fire marshal/fire code official) should be the fire code expert. He/she should interpret the fire code, provide expert testimony in arson cases and participate in approving construction variances. Failing this, the Fire Protection Engineer becomes indispensable as the fire code expert. The fire code expert should advocate for strong code enforcement with city management, city council, planning, zoning, building inspections, business groups and construction industry groups.

Complex issues such as a recent request by British Columbia Housing Operated SRO/SRA Hotels to consider relaxations of the Vancouver Building By-Laws (See Appendix B) accentuate the need for technical code expertise in Fire Prevention to help formulate solutions for this and other technical variances requested. A professional Fire Protection Engineer can address wide-ranging technical, code, construction and engineering problems from a fire prevention, life safety and fire suppression perspective. Ideally, joint solutions or recommendations should be developed by the fire official/Fire Protection Engineer and building official and presented to the final authority for approving such relaxations so a united code enforcement front is presented.

Public education and fire and arson investigation are not part of the fire prevention organization as they are in most departments. Public education is shown under prevention in the table of organization; however, the linkage is quite loose and not really part of prevention. Fire investigation is a completely separate division within the fire department. A best practice is to have the three core function of prevention (code enforcement, public education, fire investigation) reporting to the head of fire prevention.

Vancouver is widely recognized as a leader in instituting a mandatory fire sprinkler by-law for all new residential properties and those renovated by 50 percent or more. This is outstanding practice! The most effective use of a fire service dollar is the money spent on prevention as it results in fewer fires, less property damage, fewer injuries to both citizens and firefighters and fewer fire deaths.

Until the recent addition of a new computer system, data analysis has not been used effectively to manage the function. However, a new FDM computer system should help provide needed data after it is fully implemented. The stock of properties requiring inspections must be known and updated annually, the relative risk of each type of property should be assigned, neighbourhood risk should be evaluated annually, inspection frequencies should be assigned based on risk and inspection resources should be assigned based on workload and risk assessments.

The cost of fire prevention can be moderated by basing inspection frequencies on the relative risk of properties and neighbourhoods, the type of occupancy, the type of activities conducted on the property, and relying on professional certifications of fire systems with random periodic observation of testing of these systems and strong, consistent enforcement.

To improve fire prevention services and raise its importance within the organization, the following strategic goals should be adopted:

1. Move fire/arson investigation under the fire prevention division with fire code enforcement and public education.

2. Improve technical expertise within prevention by requiring increasing levels of NFPA or comparable certifications as technical qualifications for all positions and for promotions within fire prevention.
3. Institute fire prevention as a core service of VFRS by establishing a continuous training program for operational officers and fire fighters in fire inspection, fire education and fire and arson investigation. Require NFPA or comparable certification in these disciplines as requirements for promotion to and within the fire operational officer ranks.
4. Improve the use of data to determine code enforcement priorities, to analyze results, to establish consistent high quality standards for fire code enforcement, education and investigation efforts both within fire prevention and fire operations.
5. Reduce the cost of prevention by allowing for the hiring of both certified uniform and civilian personnel in many if not all fire prevention positions.[40]

Organization and Staffing

Prevention activities are managed by a deputy chief (AGM). Reporting to the deputy chief are one civilian fire protection engineer (currently vacant); one uniformed assistant chief; and one Acting Training Officer (vacant for the past 9 months and may not be filled in the future), one civilian administrator, and one manager (Community Services). In addition, the inspection functions also report to the deputy chief. These are managed by five captains, including one for special events, three district captains and one plan review captain.

The overall organization of prevention was not evaluated but we did assess it to define the duties performed and the workload associated with individual duties. However, several observations must be noted:

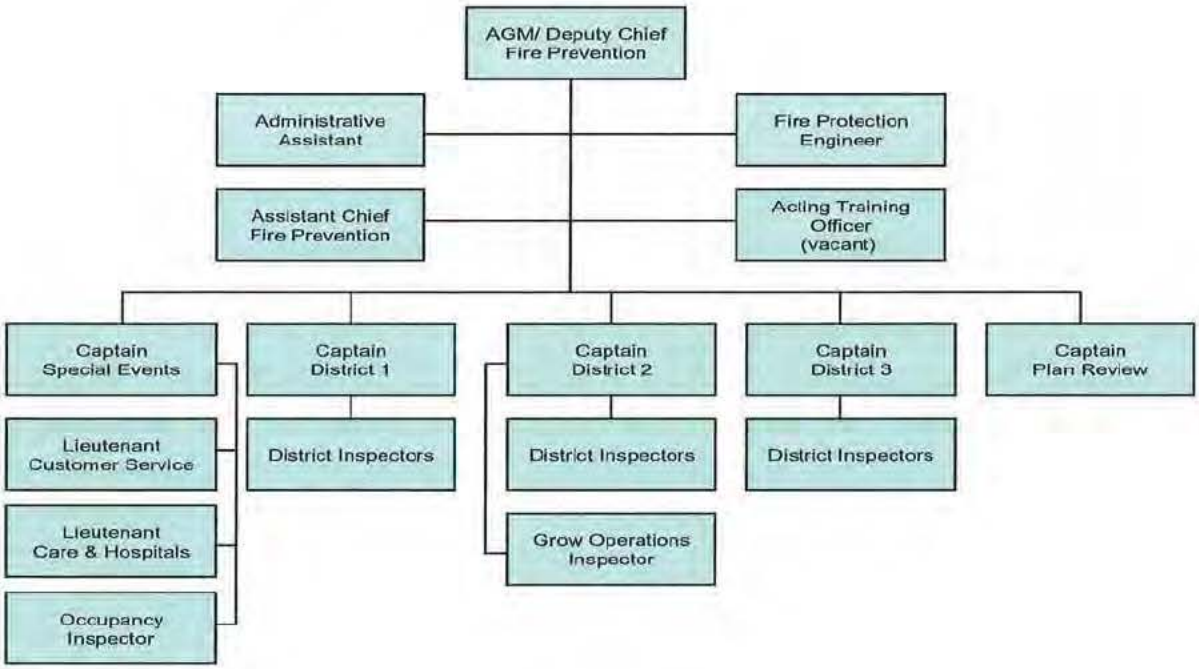
- The captain for plans review does not have any direct reports.
- Reporting to the Assistant Chief is the Captain of District 3 and 5 uniformed personnel.
- There are 5 captains for 17 uniform employees (15 inspectors and 2 lieutenants) a supervisory ratio of about 1:3 which is considerably lower than the more usual span of control of 1 supervisor to 5-8 employees (though there always are exceptions to any rule of thumb).

[40] Costs can be reduced by reducing the initial costs for inspectors and by eliminating fire suppression training and certifications. Salary costs for civilian inspector s are also typically less than for fire fighters as are pension costs.

- There is a ratio of 1:4 senior officers to total prevention employees (7 senior officers include 1 deputy chief, 1 assistant chief and 5 captains for an organization of 29 employees including 3 civilians (1 fire protection engineer and 2 clerical employees). Even when 6 to 8 modified duty staff is added to the 29 employees, the ratio of managers to staff is 1:5. A ratio of managers to staff should be closer to 1:8.

The current table of organization for prevention is depicted in Figure 57.

Figure 57: Formal Organization of Fire Prevention[41]



Staffing – Staffing of Fire Prevention has remained fairly constant since 2004 with a total 29 positions from 2005–2008 of which 26 were uniformed positions and 3 were civilian positions. Table 47 shows the FTE positions allocated for fire prevention over the past five years.

[41] During the review of this report, VFRS staff noted that the District 3 Captain and its Inspectors actually report to the A/C Fire Prevention.

Table 47: Prevention Staffing, 2004–2008

	2004	2005	2006	2007	2008	Recommended Staffing
Deputy Chief/ AGM	1	1	1	1	1	1
Assistant Chief/ Manager, Fire Protection	1	1	1	1	1	1
Acting Training Officer (Vacant 3/09)	0	0	1	1	1	0
Captain – Plan Checking	1	1	1	1	1	1
Captain – Special Events	1	1	1	1	1	1 then 0
Captain – District (1 Vacant 3/09)	3	3	3	3	3	2
Lieutenant – Customer Service	1	1	1	1	1	0
Lieutenant – Hospitals & Care Facilities	1	1	1	1	1	1
Occupancy Inspector	1	1	1	1	1	1
Problem Building Inspector	1	2	1	1	0	0
Extinguisher Maintenance / Inspector	1	0	0	0	0	0
FDM Team Leader	1	1	1	1	0	0
FDM Survey Inspectors	3	3	3	0	0	0
District Inspectors	8	9	9	12	14	14.5
Grow Buster Inspector	1	1	1	1	1	.5
Total Number of Uniformed Personnel	**25**	**26**	**26**	**26**	**26**	**23 then 22**
Fire Protection Engineer (Vacant 3/09)	1	1	1	1	1	1
Clerk IV – Supervisor	1	1	1	1	1	1
Clerk II (Vacant 3/09)	1	1	1	1	1	1
Total Number of Fire Prevention Personnel	**28**	**29**	**29**	**29**	**29**	**26 then 25**

Subsequent recommendations for changes in staffing are made based on the ratio of management to employees (officers to inspectors) and on the assigned workload.

Building Permits Activity (See Appendix C) – Between 2005 and 2008, the number of building permits issued by Vancouver Licenses & Inspections Department appears to be trending downward from the 2005/2006 levels of about 6,000 to the 2007/2008 levels averaging about 5,412 (roughly a 10 percent decline 588/6,000). Using the four-year average of 5,734permits issued, the trend appears downward (roughly a 4 percent decline 266/6,000) even with the increased construction activity associated with the 2010 Olympics.[42] With the economic downturn in 2009 possibly extending into 2010 and the Olympic construction activity coming to an end, the future trend for building permits could be downward for the next few years.

[42] The four-year average is 5,734 (6,068 in 2005; 6,043 in 2006; 5,087 in 2007, and; 5,737 in 2008).

The workload on fire plan review and fire inspection of new construction is expected to stay near its current level or decrease; therefore, additional duties are recommended for the personnel in this area.

The workload of existing buildings requiring regular periodic inspections by prevention is expected to grow at a rate which can easily be absorbed by the existing number of inspectors for a period of about 7 years. Excluding the new one and two family dwellings and demolitions, the number of permits for new structures has averaged about 100 per year over the past 4 years. Assuming that 100 new structures are added to the number of inspectable buildings for prevention per year, slightly over 1 additional inspector is needed every 7 years.[43] Further data analysis is needed to determine the actual increase before an inspector is added.

The annual increase in workload for fire companies is negligible over the 4-year period (2004-2008) as an average of 12 inspectable apartments added per year (47/4).

With Vancouver being relatively 'built out', construction activity may shift to a mix of demolitions, renovations and new construction. Construction trends should be monitored for the level of construction and shifts in the type of construction activity and adjust workload accordingly. Additional workload created on prevention and fire companies should be evaluated in view of the number of inspectable properties being added annually, inspection frequency for each occupancy type based on risk and the use of inspection minimizing techniques such as self-inspections, public education and required annual certifications by licensed professionals of fire suppression systems.

Plan Review & Construction Inspection – Two positions are assigned to the plan review function: one civilian fire protection engineer (presently vacant) and one captain for plan reviews. Another fire inspector, the Occupancy Inspector, makes construction related inspections on commercial and multiple-family residential properties and performs final occupancy inspections for fire.

This is a most important function that should be performed by fire prevention. As noted earlier, the fire protection engineer is crucial to provide the fire by-law, engineering and construction expertise needed for strong fire by-law enforcement and approval of variances to by-laws. Active inspection by fire throughout all development and construction phases is essential to insure fire department assess and water availability during and after construction; fire safety aspects for egress, exiting, common area integrity, fire systems integrity; storage and

[43] 100 building added per year for 7 years = 700 buildings / 623 average inspections per inspector (see discussion under the heading Standard Number of Inspections Per Year) = 1.12 inspectors.

venting of hazardous material, etc. within structures during and after construction. Problems caught during construction can be readily corrected at minimal cost and minimize future problems which can not economically be corrected after construction is complete.

Plans Review Workload – The impact of flat to decreasing building permit activity will be reflected in flat to decreasing fire permit and plans review activity. (See Appendix C for the number of building permits issued from 2005–2008.)

The actual fire plan review workload can not be accurately assessed because of several steps taken since 2006 which artificially reduce this workload.

1. In 2006 the Fire Protection Engineer's (FPE) duties were realigned to provide the Fire Department review of the "Canada Line" Rapid Transit Rail System and its infrastructure and to update the Vancouver Fire By-Law.
2. At the same time, the Development Services Processing Centre – Building (PCB) began evaluating permit/development applications for Fire Department concerns and performing the 'sign-off' for Fire. This new review group was created in 2006 and was made up of existing development services staff. If submissions met the prescriptive requirements in the building code the application was approved by this group. If alternate solutions (equivalencies) were required the submission was forwarded to the Plans Review Captain.[44]
3. The 2007 workload was artificially low due to an 11 week civic strike in the summer of 2007.
4. The 2008 workload was made artificially low due to inspectors entering property data into a new field collection computer system, FDM.

Following are four tables of data obtained on the current workload of fire plan review. The Fire workload performed by the PCB Fire review group is not reflected in these tables. As recommended below, the workload performed by PCB should be moved back to the Fire Prevention plan review function.

[44] Mike Knapp, "Permit Review Data," e-mail message from mike.knapp@vancouver.ca to Martha Word Haley, 25 February 2009.

Table 48: Total Permits & Applications for Fire Review

Duties Performed	2004	2005	2006	2007	2008
Building Permit Apps. (BU)	412	318	179	143	242
Development Permit Apps. (DE)	163	116	26	19	0
Development / Building Permit Apps. (DB)	93	107	35	38	204
Sprinkler Permit Apps. (SP)	22	60	33	0	0
Occupant Load Permit Applications (FI)	123	123	110	99	115
Rezoning / Subdivision Applications [3]	20	14	Not Reported	Not Reported	Not Reported
Total Permits & Applications for Fire Review	**833**	**738**	**383**	**299**	**561**

Of the total workload, the captain of plan checking currently performs most of the work.

Table 49: Captain, Plan Checking – Permits & Applications Processed

Duties Performed	2004	2005	2006	2007	2008
Building Permits	247	198	173	131	217
Development Permits	88	92	22	15	Not Reported
Development/Building Permits	77	83	35	34	189
Sprinkler Permits	9	49	23	0	0
Occupant Load Permits	123	123	110	99	115
Rezoning / Subdivision Applications	0	0	Not Reported	Not Reported	Not Reported
Total Permits Processed by Uniformed Staff	**544**	**545**	**363**	**279**	**521**
% of Total Permits & Apps. for Fire Review	**65%**	**74%**	**95%**	**93%**	**93%**

Table 50: Fire Protection Engineer – Permits & Applications Processed[45]

Duties Performed	2004	2005	2006	2007	2008
Building Permits	154	70	Not Reported	1	2
Development Permits	71	16	Not Reported	2	Not Reported
Development/Building Permits	12	9	Not Reported	Not Reported	Not Reported
Sprinkler Permits	13	4	Not Reported	Not Reported	Not Reported
Occupant Load Permits	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Rezoning / Subdivision Applications	20	14	Not Reported	Not Reported	Not Reported
Total Permits Processed by FPE	**270**	**113**	**Not Reported**	**3**	**2**

[45] Mike Knapp, "Permit Review Data," e-mail message from mike.knapp@vancouver.ca to Martha Word Haley, 25 February 2009.

Table 51: Development Services – Permits Processed[46]

Duties Performed	2004	2005	2006	2007	2008
Building Permits	11	50	6	11	23
Development Permits	4	8	4	2	0
Development/Building Permits	4	15	Not Reported	4	15
Sprinkler Permits	Not Reported	7	10	Not Reported	Not Reported
Occupant Load Permits (FI)	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Total Permits Processed Community Services Group	**19**	**80**	**20**	**17**	**38**

Although the fire plan review workload appears to have declined over the past 5 years from a high of 833 permits and applications in 2004 to 561 in 2008, a 33 percent decline, the actual workload was not available and may be closer to about 700 plans per year.

While the 521 plan review workload only supports one plan review position the following recommendations are made to shift work from other positions to justify the need for both a fire protection engineer and a captain (plan review) because it is not advisable to have only one person available to perform this essential task.

We believe a fire protection engineer should work actively with developers, the building department and city hall to establish an understanding of the importance of fire and life safety by-laws. A strong working relationship with the development community should be established to provide the basis for consistent application and strong voluntary compliance with fire by-laws.

The complexity of fire bylaws and their impact on public protection is important. For example, there are concerns about a recent bylaw to allow for a "relaxations to the Vancouver Building By-Laws that require smoke alarms in single room accommodation (SRA) suites with local alarms sounding in individual suites to instead signal an alert system on an enunciator".[47] This is red flag area that is of concern and one for which a fire protection engineer is needed.

Recommendations include:

[46] Mike Knapp, "Permit Review Data," e-mail message from mike.knapp@vancouver.ca to Martha Word Haley, 25 February 2009.
47 Appendix B: Request For Relaxations Of By-Laws

1. Hire a fire protection engineer and eliminate the training officer.[48] This is a best practice and crucial to establishing a strong, well-respected, professional fire by-law enforcement program. The fire protection engineer should be self-funding from the fees collected from plans review performed by the engineer.

2. Move responsibilities for training on the by-laws and inspection techniques to the FPE. This should include training for fire prevention and fire company personnel. The FPE can develop training curricular and materials if direct training of uniform personnel is not done by non-uniform personnel. If this is the case, a train-the-trainer approach could be used using the captain of plan review.

3. Return back to fire prevention the plan review workload that had been moved in 2006 from fire to the development services staff review group (PCB Fire). This is a fire 'sign-off' function and should be performed by fire prevention as it will provide a feedback loop from fire prevention field staff to establish accountability and continuous improvement in inspection procedures.

4. Move the review of all plans for fire alarms, fire sprinklers, fire pumps, standpipes, cooking hoods and other fire-related (e.g., smoke evacuation systems) and suppression systems to fire. Increase in the plan review workload must be monitored and predicted to determine when the workload becomes too great for the current staffing. On a similar study for the Long Beach, CA Fire Department, we found that plans reviewers examined an average of 527 per reviewer. With the addition of a Fire Protection Engineer, about 500 more plans can be reviewed by fire.

5. Create a new function, Fire Plan Review & Construction Inspection, headed by the fire protection engineer with the captain for plan reviews and the occupancy inspector assigned. The uniformed personnel could jointly report to the FPE for day to day technical by-law, plan review and construction inspection supervision and to the assistant chief for uniformed supervision. Consider elevating the occupancy inspector to a lieutenant position. The occupancy inspector is not indicated as a lieutenant in the staffing recommendation above.

6. Eliminate the lieutenant customer service position and move the associated permit and inspection workload for fire works, tank removals and other permits issued by this position to the Fire Plan Review & Construction Inspection function. Potentially

[48] During the review of the draft report, it was noted that the training officer is not a numbered position but rather an acting position that is staffed internally through existing personnel.

move order search requests and possibly complaints to this function also. If complaints can not be handled satisfactorily by this function, move complaints to the district captains.

In making these recommendations we considered the following best practices:

- Active involvement of fire department review throughout the entire development process to ensure fire equipment access, ample water supply and water location and access throughout construction and upon completion.
- Fire prevention review of plans should be required of all fire alarm, fire sprinkler, fire pumps, standpipe, hood suppression and all other fire related (smoke evacuation systems, etc.) suppression systems as well as other fire hazards such as hazardous material and fuel tank storage.
- Prevention inspectors must be in structures under construction to insure working standpipes during construction and other fire safety measures are enforced throughout construction.
- Prevention inspections should be required of all structures requiring fire suppression systems (minimally all commercial and 3 or more storey residential structures) throughout all construction phases to identify problems needing fire input to obtain the best solutions, to prevent costly renovations and/or costly delays and reworks due to fire disapproval at final occupancy inspection. This excludes one and two-family stand alone residential structures.
- Obtain temporary assistance from the building inspection or contracting with an external firm for workload increases beyond the capability of the staff should be considered. All this work should be under the supervision of fire plan review. When the increase in workload is determined to be permanent, additional fire plan review staffing should be added.

In light of the above, the current plan review workload and foreseeable workload for several years (possibly until 2012 to 2015) probably can be met by three positions: one Fire Protection Engineer, one Captain Plan Review and one Occupancy inspector. The workload should be continually assessed and regular inspections should be shifted to the Captain and Occupancy inspector when construction workload does not fully occupy these positions.

Fire Inspections During Construction & Occupancy Inspections – Best practice includes fire inspections in all structures, except one and two-family dwellings, during construction, renovation and tenant build-outs and renovations in mixed use structures. Best

practice also dictates that a final fire inspection is performed prior to issuing a Certificate of Occupancy, which is the practice in Vancouver.

Although we are not recommending that Vancouver have fire inspectors review construction-in-progress of one and two-family dwellings some cities are beginning to require this when separation between structures is very narrow and/or when fire stopping is required in two-story construction. Other cities require fire inspections for residential fire sprinkler systems in very large homes (perhaps over 5,000) and in homes with very large roof expanses over gyms, pools and so on.[49]

Occupancy Inspector – Currently, the Occupancy Inspector performs all fire inspections done during construction, renovations and tenant building outs and provides 'fire sign-off' approval for License & Inspections to issue the Certificate of Occupancy. He also reviews most if not all of the Fire Safety Plans and performs occupancy load calculations. The current workload depicted in the table below fully occupies one position.

Table 52: Duties Performed by Occupancy Inspector

Type of Inspection Performed	2004[50]	2005[51]	2006[52]	2007[53]	2008[54]
New Occupancies Inspections	768	789	770	632	810
Regular Maintenance Inspections	119	28	24	Not Reported	Not Reported
Special Inspections	22	23	20	6	0
Occupant Load Inspections	20	4	5	Not Reported	Not Reported
Recheck Inspections	Not Reported	Not Reported	Not Reported	Not Reported	Not Reported
Total Inspections Performed by Occupancy Inspector	**929**	**844**	**819**	**632**	**810**

[49] Reportedly, the Vancouver Building By-law, Part 3, contain these requirements. These by-laws should be reviewed to determine if Vancouver Fire Prevention should inspect certain residential occupancies routinely, on a sample basis.

[50] VFRS Fire Prevention Division Annual Report 2004; Duties Performed by Occupancy Inspector, p 10.

[51] VFRS Fire Prevention Division Annual Report 2005; Duties Performed by Occupancy Inspector, p 7.

[52] VFRS Fire Prevention Division Annual Report 2006; Fire Prevention Stats, p 7.

[53] VFRS Fire Prevention Division Annual Report 2007; Fire Prevention Stats, p 13.

[54] VFRS Fire Prevention Division Annual Report 2008; Fire Prevention Inspections p 8; Permits Issued, p 9.

Type of Inspection Performed	2004[50]	2005[51]	2006[52]	2007[53]	2008[54]
Fire Safety Plans Reviewed	146	168	205	111	215*
Occupant Load Calculation (Plan Reviews)	123*	123*	111	97	146*
Order Search Requests			213*	236*	330*
Total Permits Order Searches Issued	**269**	**291**	**529**	**544**	**691**

*These numbers were added or changed by Vancouver Prevention during the report review process and the totals were adjusted.

Fire Inspections of Existing Structures

Fire prevention and fire companies share responsibility for conducting various inspections on the existing stock of inspectable properties in Vancouver. As is customary in many fire departments, fire company personnel perform periodic inspections on the less complex occupancies, apartment occupancies less than four stories and small and commercial occupancies.

Best practice includes inspecting high risk properties more frequently than lower risk properties; however, few if any fire departments are able to inspect all inspectable properties annually. A reasonable goal is to inspect all properties every two to three years and to inspect higher risk and problem properties annually or more often if needed. For Vancouver where a large percentage of existing structures are sprinklered, inspection frequencies for those properties could potentially be extended beyond three years so long as annual professional certifications are reviewed and recorded by fire prevention.

Fire Company Inspections – By policy, fire companies inspect buildings that are less than four-stories in height within their first response districts. When a 'Notice of Violation' is written, the officer of the first shift on duty after the recheck becomes due is responsible for ensuring rechecks are made regardless of the shift or individual who wrote the violation. When the violation is for a defective fire alarm system, the officer in charge notifies the occupant to repair the alarm system immediately and to provide a 24-hour fire watch until the repair is made by an authorized service agent. Violations not corrected by the recheck inspection are immediately sent to the Fire Prevention office via a contravention e-mail for follow-up.[55]

[55] *VFRS Policies and Procedures*, "Inspections-Fire Company Policy," 5 pages.

Table 53: Fire Company Inspections, 2004–2008

Inspection Type	2004	2005	2006	2007	2008
Regular Inspections Assigned	12,025	Not Reported	Not Reported	Not Reported	Not Reported
Inspections Completed	10,858	8,500	7,950	9,025	6,242[56]
Percentage of Assigned Properties Inspected [57]	90%	71%	65%	75%	52%
Number of Inspections Performed Compared to 2004	N/A	(2,358)	(2,908)	(1,833)	(4,616)
Percentage (Decrease) from 2004	**N/A**	**(22%)**	**(27%)**	**(17%)**	**(43%)**
# of Notice of Violations Issued	885	689	Not Reported	Not Reported	Not Reported

Note: Data was unavailable on the number of regular inspections assigned (2005-2008) and notice of violations issued (2006-2008).

The number of properties requiring inspections should have risen slightly over this time period, yet data was not available to determine the amount of increase. The actual number of inspections performed decreased from 2004 to 2008 by 43 percent. This decrease is due in part to the increase in operational training which has limited the amount of time fire companies can schedule inspections.

If the number of inspections completed (6,242) in 2008 represents unique properties and does not include re-checks, 6,000 inspections per year may be an appropriate initial inspection goal. However, properties should be assigned inspection frequencies based on risk and history of problems and re-inspections should be reported separately from initial inspections.

Fire Prevention Inspections of Existing Structures – Fire Prevention inspects all existing buildings of four-stories or more and the most complex occupancies of less than four-stories. Of the inspector cadre, 15 are assigned to 3 geographical districts which are supervised by 3 district captains. District inspectors inspect all occupancies within their district including schools except group care facilities and hospitals which are inspected by a lieutenant specializing in institutional occupancies.

Recommendation 66: Eliminate one district captain (currently vacant). The number of inspectors does not justify three captains for supervision. The current Captain to inspector ratio is 1:5. The elimination of 1 district captain increases the ratio to 1:7.5 which is a more appropriate span of control for permanent staff.

[56] VFRS Fire Prevention Annual Report 2008, Fire Inspections – 2008 table, p 9.

[57] The number of regular inspections assigned in 2004 is used to calculate the percentage of properties inspected.

Note: In its review of this report, VFRS staff commented that field personnel on modified duty are often used to augment prevention staff and make inspections, thus the ratio of supervisors to inspectors is actually higher. It is our opinion that using modified duty personnel as inspectors should is not a good practice and should be avoided because these individuals typically do not have the requisite training for required for inspectors.

Standard Time Per Inspection – The amount of time required to conduct an inspection can vary greatly from several hours (or days on campus type properties such as hospitals) to less than an hour. (An inspection is defined as a single trip to a property during which an inspection is performed.) Several inspections may be required to bring a property into compliance. The amount of time required to travel to the inspect site can also vary greatly from no travel time between inspections when inspections are clustered to considerable travel time during heavy traffic periods. So an average inspection time or an average number of inspections per day is a gross estimate that should average out over a period of time such as a year, perhaps over a quarter but not over a month. However, an average should be used as an estimating and planning tool.

Experience has shown that inspectors using manual inspection recording and filing systems should be able, on an overall average, to perform between four to six inspections during an eight-hour day, an average of one inspection every 1.3 to 2 hours. Data is not available on inspectors using automated systems that capture field inspection results. The goal of inspection services simply stated is to maximize field time and minimize office time.

Standard Number of Inspections Per Year – The number of inspections that can be performed in a year is dependent on the amount of time available for productive work. As depicted in Appendix D, the time available for productive work in Vancouver's fire prevention is between 1,577 and 1,060 hours per year per inspector (depending on the amount of time-off earned), an average of 1,318 hours.[58]

This does not but should exclude time for annual training, divisional meetings and office time. Allowing 40 hours per year for training, 1,537 to 1,020 hours (an average of 1,279 hours) or 44 to 29 weeks (an average of 36 weeks) out of 52 weeks are available per inspector each year for productive work. If 2 hours per day (23 percent[59] of the work week) is spent as office time,

[58] Based on an 8.75 actual work hours per day exclusive of a meal break and 4 work days per week, the actual work hours per week is 35 hours and per year is 1,820 hours. After time off is allowed for standard types of leave (vacation, supplementary vacation, holiday, sick and gratuity), between 1,577 to 1,060 hours per year is available for productivity work per employee.

[59] 2 hours per day x 4 day work week =8 hours per week / 35-hour work week = 23%

time available for productive work per inspector per year is reduced to 1,185 hours for employees with minimum time off, 788 hours for employees with maximum time off, and 991 hours on average.[60]

Therefore, an inspector with minimum time off should perform between 593 to 911 inspections per year, an average of 742. An inspector with maximum time off should perform between 394 to 606 inspections per year, an average of 500. An inspector with average time off should perform between 495 to 762 inspections per year, an average of 628.[61] So inspectors should perform an average of about 623 inspections per year. When inspector work time is diverted to one time special projects such as United Way Giving Campaign, the new FDM record management system or other commitments, the time available to conduct inspections is decreased thereby reducing the number of inspections completed per year. If all 14 district inspectors performed the average of 623 inspections per year, 8,722 inspections could be performed.

Re-inspection rates in other cities suggest that between 30 percent and 50 percent of initial inspections require rechecks. If this holds true for Vancouver, then between 2,617 (8,722 x 30 percent) and 4,361 (8,722 x 50 percent) of these inspections would be rechecks and between 6,105 and 4,361 inspections would be performed on unique buildings.

If the 21,806 existing buildings in Vancouver identified in Appendix C, accurately reflects the number of inspectable properties, 14 inspectors performing between 6,105 and 4,361 inspections annually on unique buildings would result in properties being inspected every 3.6 years to 5 years.

Best practices suggest inspecting most properties every three years or so. In Vancouver, the inspection frequency could be reduced to perhaps every four to five years because of the high number of sprinklered multi-family, high-rise and commercial properties. However, annual third party testing certifications should be verified and periodic testing of fire sprinkler system should be observed by fire personnel.

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[60] Minimum time off employees work 1,577 hours per year less (40 training hours per year) = 1,537 / 35 hours per week = 44 work week per year x 8 hours of office time / week = 352 hours per year. Minimum time off employees have 1,185 field time available for productive work per year, (1,537 – 352 = 1,185). Maximum time off employees work 1,060 hours per year less (40 hour training per year) = 1,020 / 35 hours per week = 29 work week per year x 8 hours of office time / week (232 hours per year) or 788 hours (1,020 – 232) available for field time per year. The average is 1,279 hours less 40 hours for training per year = 1,239 hours or 36 weeks per years x 8 hours = 288 hours per year for office time which leaves 991 hours per year for productive field time on the average.

[61] 593 2-hour inspections can be done in 1,183 hours per year for minimum time off employees. 911 1.3-hour inspections can be done in 1,183. 394 2-hour inspections and 606 1.3-hour inspections can be done can be done in 788 hours per year for employees with maximum time off. For employees with average time off, 495 2-hour inspections and 762 1.3 hour inspection can be done per year in 991 hours.

Below are data on the actual number of inspections performed by district inspectors.

There are many inconsistencies in the data collected due to changes in the level of detail collected, due to the inability to retrieve data from a old computer system and due to the implementation of a new computer system. Additionally, the number of inspections performed in 2007 and 2008 are low due to a labour strike in 2007 and the introduction of a new computer system, FDM, in 2008. Data previously collected in earlier years are no longer collected at the same level of detail. For data to be an effective management tool, it must be accurate, consistent over people and time, and collected at a sufficient level of detail to provide explanations of changes to procedures and workload over time.

Table 54: Fire Prevention Inspections Performed, 2004–2008

Type of Inspection Performed	2004	2005	2006	2007	2008[62]
Regular Inspections	2,546	4,250	3,750	2,779	2,758
Rechecks	975	1,073	1,073	1,397	1,096
Regular Night Inspections	24	Not Reported[63]	Not Reported	Not Reported	Not Reported
Contravention (Referrals from Fire Companies)	27	Not Reported	Not Reported	Not Reported	Not Reported
Fire By-law Complaints	198	365	282	1,040	287
Coordinated Inspections	29	Not Reported	Not Reported	Not Reported	Not Reported
Fire Inspections	19	Not Reported	Not Reported	Not Reported	Not Reported
Special Inspections	120	Not Reported	Not Reported	Not Reported	Not Reported
Unclassified Inspections	49	Not Reported	Not Reported	Not Reported	Not Reported
Total Fire Prevention Inspections Performed	**3,987**	**5,688**	**5,105**	**5,216**	**4,141**
# of Notice of Violations Issued[64]	1,368	904	1,073	1,397	527
# of Notice to Prosecute Issued[65]	18	29	Not Reported	1	9

Our review shows that the existing district inspectors (14) using available data should be able to perform the needed inspections if their time in the field is maximized.

[62] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Inspections-2008 table (p 8), Fire Inspections–2008 table (p 9).
[63] Data is not available.
[64] Chris Short, "Answers to 1, 2, and 3" e-mail message from chris.short@vancouver.ca to Martha Word Haley, 31 March 2009, 3:36PM.
[65] Chris Short, "Answers to 1, 2, and 3" e-mail message from chris.short@vancouver.ca to Martha Word Haley, 31 March 2009, 3:36PM.

Lieutenant Care and Hospitals – A lieutenant specializes in inspecting hospital and care facilities. This is standard practice as most prevention bureaus assign these specialized occupancies to a single inspector. The lieutenant inspects 9 major hospital facilities, some of which have multiple building campuses and 118 senior care facilities in which there are 4,394 patients.

These facilities are not licensed by the city of Vancouver as the larger facilities are licensed by the provincial regional health regions, Vancouver Coastal, and the smaller by Vancouver Health Society. The smaller 593 child care facilities with a maximum of 9,601 children were identified during this study as facilities which should be inspected but had not been because a separate agency licensed these facilities. Therefore, these facilities are not included in the Vancouver building stock of inspectable properties.

Table 55: Existing Stock of Senior and Child-Care Facilities[66]

Type of Care Facility	No. of Facilities	No. of Patients\Children
Senior Care:		
Private Hospitals/Elder Care	5	346
Long Term Care	27	2,935
Alcohol & Drug SFR[67]	5	137
Residential Care for Children	12	69
Group Homes – Mental Health	12	129
Group Homes – Special Needs	45	610
Specialized Residential Care	12	168
Total Senior Care	**118**	**4,394**
Child Care:		
Child Minding	4	12-16
Family Childcare SFR	217	Up to 7
Group Childcare	84	Up to 25
Group Childcare	37	20-70
Group Childcare	40	12
In-home Multi-age	7	Up to 8
Multi-age	4	Up to 8
Occasional Child Care	8	15-16
Out of/After School	58	36
Preschool	131	20
Specialized	3	21
Total Child Care	**593**	**9,601**
Total Number of Care Facilities	**1186**	**13,995**

[66] Chris Short, "Interviews" and Vancouver Care Facilities.doc attachment e-mail message from chris.short@vancouver.ca to Martha Word Haley, 3/20/2009.

[67] SFR means smaller facilities in a single family residence or house.

This occupancy type require inspections every six months which equates to a minimum of 1,422 inspections per year, a very heavy load fully occupying at least one full time equivalent employee. When an estimate of rechecks inspections (30 percent or 427 inspections) is added, the total annual inspection workload is 1,849 or the equivalent of three inspectors (1,849 / 628 average inspections per year). To compensate for this overload, the smaller properties should be assigned to district inspectors and/or to the captain for plan review and the occupancy inspector as their workload allows. Other techniques such as self-inspection reporting could be tried on the smaller properties after an initial inspection.

As evidenced in the previous table, the actual workload apparently addresses only the 118, Senior-Care properties. It also appears that it does not include rechecks.

Table 56: Inspections by Care & Hospital Inspector

Type of Duty Performed	2004[68]	2005[69]	2006[70]	2007[71]	2008[72]
Hospital and Care Facility Inspections	9	158	147	125	171
Number of Complaints		0	14	25	11
Total Number of Inspections Performed	**9**	**180**	**181**	**125**	**182**
Number of Notice of Violations Issued		22	20	15	17
Percent of Inspections Resulting in Violations Issued		**14%**	**14%**	**12%**	**9%**

According to these data, one inspector should be able to handle the total workload including the 593 smaller properties recently identified. However, there is a large discrepancy between the estimated inspections represented by this occupancy type compared to the actual number of inspections performed. This discrepancy should be evaluated further based on data from the new FDM system.

Grow Buster Team – Two fire inspectors are being provided one day each week to search occupancies suspected of housing grow operations. These inspectors are assigned to a city-wide team headed by the police and along with staff inspectors from electrical, licensing, and health inspectors. After obtaining the necessary search warrant, teams search for grow-up operations.

[68] VFRS Fire Prevention Division Annual Report for 2004, Fire Prevention Districts-2004 table, District #3 section, p 11.
[69] VFRS Fire Prevention Division Annual Report for 2005, Lieutenant, Hospitals & Care Facilities section, p 5.
[70] VFRS Fire Prevention Division Annual Report for 2006, Lieutenant, Hospitals & Care Facilities section, p 6, and Fire Prevention Stats-2006 table, p 7.
[71] VFRS Fire Prevention Division Annual Report for 2007, Lieutenant, Hospitals & Care Facilities section, p 11.
[72] VFRS Fire Prevention Division Annual Report for 2008, Lieutenant, Hospitals & Care Facilities section, p 7.

From the beginning of the program in 1999 through 2007, two fire inspectors were assigned 2 days a week to the program. In 2008, two fire inspectors were assigned to this program for only 1 day a week. As of January 2005, it was estimated that between 2,500 and 4,500 grow-ops were currently in operation. By the end of 2005, 1,788 grow-op houses had been dismantled, $1,074,410 cash seized and 546.5 million worth of marijuana impounded. About 5 houses per day can be shut down by the team.

Primarily the fire inspectors provide safety to the team to guard against hazards associated with these operations such as taps into furnaces and hot water heaters for electricity, use of propane cylinders and butane canister and stoves, 600 to 700 volt lights that are fire hazards and can explode. The fire inspectors also provide first aid to the team members if needed. A Do Not Occupy Notice is posted and the License and Inspection Department notifies the owner and works to have the building made safe for occupancy.

Grow operations are often found in multi-family residential occupancies including high-rise buildings. These add to the already high risk for these types of properties and to risks for firefighters. In the 2004 annual report it was noted that the number of fires related to grow-ops has decreased from about 24 in 1999 per year to 6 in 2004. No data was available for 2004 through 2008 due to computer system changes and shortcomings. In the future, any impediment to collecting automated data should be resolved by manually collecting and reporting data. Each inspector should collect and analyze their workload and efficiency data and managers should compile other data.

Table 57: Grow Buster team Operations by VFRS, 2004–2008

Number of Operations Performed	2004[73]	2005[74]	2006[75]	2007[76]	2008[77]
Number of Grow Operations Dismantled	360	181	187	176	80
Number of Fires Related to Grow-ops	6	78	13	6	1

The workload assigned to the Grow Buster Team is measured as two inspectors dedicated to this program for one day each week, the equivalent of one-half inspector. The chart of the number of employees shows one inspector assigned to Grow Buster. Therefore, one-half of an

[73] VFRS Fire Prevention Division Annual Report for 2004, Grow Busters Team section, p 3.
[74] VFRS Fire Prevention Division Annual Report for 2005, Grow Busters Team section, p 3.
[75] VFRS Fire Prevention Division Annual Report for 2006, Grow Busters Team section, p 3.
[76] VFRS Fire Prevention Division Annual Report for 2007, Fire Prevention Stats-2007 table, p 13.
[77] VFRS Fire Prevention Division Annual Report for 2008, Grow Busters Team section, p 4.
[78] Data was not available.

inspector should be available to perform district or smaller child care facility inspections. As the focus on meth lab inspections increase, inspection workloads should be reassessed.

Lieutenant Customer Service – One lieutenant is assigned to receive complaint calls and issue permits for tank removals and family fire-works use. Also performed are all activities associated with maintaining the daily log, daily attendance, staffing for sick, overtime, acting and other absences and completing the forms (FD81 & 69) necessary to report these actions. The responsibilities for daily attendance were performed by the clerical staff at one time, but did not prove satisfactory. Additionally, 'order search' requests from attorneys and potential buyers are performed, primarily by the clerical staff, to determine if there are notices of violations on the building.

The actual permitting and inspection workload performed by the lieutenant is depicted in the two tables below. The discrepancy in the number of tank inspections is apparently due to how inspections were classified.

Table 58: Customer Service Inspections, 2004–2008

Number of Inspections Performed	2004[79]	2005[80]	2006[81]	2007[82]	2008[83]
Total Tank Inspections Performed	750	860	697	570	906
Estimated # of Calls Received/Day	15	Not Reported	Not Reported	Not Reported	Not Reported

[79] VFRS Fire Prevention Division Annual Report for 2005, Lieutenant, Customer Service section, p 9.
[80] VFRS Fire Prevention Division Annual Report for 2005, Lieutenant, Customer Service section, p 6.
[81] VFRS Fire Prevention Division Annual Report for 2006, Fire Prevention Stats, p 7.
[82] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Stats, p 13.
[83] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Inspections, p 8.

Table 59: Customer Service Permits

Number of Permits Issued	2004[84]	2005[85]	2006[86]	2007[87]	2008[88]
Lock Box/New Permits	Not Reported[89]	181	Not Reported	50	118
Lock Box Relocations	Not Reported	3	Not Reported	Not Reported	Not Reported
Total Permits Issued	**Not Reported**	**184**	**Not Reported**	**50**	**118**
Order Search Requests	365[90]	432	424	340	320

Based on the review VFRS should consider:

- Moving the permit request process for tank removal and lock boxes and tank inspections to the Plans Review & Construction Inspection function. This will consolidate all permit related functions to Plans Review & Construction Inspection and to concentrate the effort of the captains on the existing structure inspections.[91]
- Moving the complaint calls to the captain, plan review, captain special events or the district captains. The impact of the new 3-1-1 system on the complaint call workload can not be anticipated at this time as calls may initially rise yet ultimately fall as 3-1-1 operators gain experience with handling calls. The workload associated with tank removals has declined and is expected to cease or be minimal as the use of fuel oil has been discontinued. We were told this may take years as there are still thousands of tanks in the City.
- Moving attendance reporting to captain special events or to the district captains.
- Moving order searches, which are mostly completed by the clerical staff to the Plans Review & Construction Inspection function or to the captain in-charge of special events.

[84] VFRS Fire Prevention Division Annual Report for 2005, Lieutenant, Customer Service section, p 9.
[85] VFRS Fire Prevention Division Annual Report for 2005, Lieutenant, Customer Service section, p 6.
[86] VFRS Fire Prevention Division Annual Report for 2006, Fire Prevention Stats, p 7.
[87] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Stats, p 13.
[88] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Inspections, p 8.
[89] Data was not available.
[90] In the 2004 data, there are discrepancies in the order search requests numbers between the 365 reported in the customer service section on page 9, the 327 reported in the Fire Prevention Inspections-2004 table on page 12 and the district numbers of 184 for district #2 and 112 for district #3 reported in the Fire Prevention Districts-2004 table on page 11.
[91] Reportedly, the captain responsible for preplanning activities is spending 20 percent of his time on lock-box issues. Likewise, there are concerns about the logistics of this move. Both are legitimate concerns that should be considered before making the move.

Recommendation 67: Eliminate the lieutenant position in customer service and reassign his duties to other individuals.

Captain Special Events – One captain is assigned to perform all the duties associated with special events such as issuing permits for film shoots, professional pyrotechnic displays, special festivals, retail fire works, blasting and open air burning and receiving money for all these permits. This position also coordinates street and bridge closings and insuring routes are available for fire truck access to affected areas.

Table 60: Special Event Permits

Permits Issued	2004[92]	2005[93]	2006[94]	2007[95]	2008[96]
Retail Sale/Fireworks Permits	105	119	90	111	83
Fireworks/Non-Profit Permits	97	Not Reported	Not Reported	5	Not Reported
Explosives (Pyrotechnics / Fireworks) Permits	101	137	202	49	63
Temporary Activity Permits	Not Reported	33	23	Not Reported	Not Reported
Blasting & Demolition Permits	Not Reported	Not Reported	Not Reported	3	3
Burning Permits	Not Reported	Not Reported	Not Reported	44	42
Permit Inspections	319[98]	Not Reported	Not Reported	Not Reported	Not Reported
Raves (LNDE)	N/A	10	13	14	14
Total Retail Permits Issued	**525**	**299**	**328s**	**193**	**205**
Family Fireworks Permits (issued on-line by citizen) New in 2008	N/A	N/A	N/A	N/A	7,200

The captain performed 33 fire watches in 2008. He also serves as liaison to the police department to work on the Multiple-Agency Inspection Task Force responsible for inspecting night clubs after hours and RAVE parties for over crowding. Allocation of staffing and overtime dollars apparently is not sufficient to perform many after hour inspections. As the 2010

[92] VFRS Fire Prevention Division Annual Report for 2004, Captain, Special Events, permits issued section, p 8.
[93] VFRS Fire Prevention Division Annual Report for 2005, Captain, Special Events section, p 5.
[94] VFRS Fire Prevention Division Annual Report for 2006, Captain, Special Events section, p 6.
[95] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Inspections-2008 table and Fire Inspections–2007 table, p 13.
[96] VFRS Fire Prevention Division Annual Report for 2008, Fire Prevention Inspections-2008 table (p 8), Fire Inspections–2008 table (p 9).
[97] Data was not available.
[98] Chris Short, "Answers to 1, 2, and 3" e-mail message from chris.short@vancouver.ca to Martha Word Haley, 31 March 2009, 3:36PM. The 319 permit inspections from the 2004 annual report could be tank, special events, fireworks or occupancy loads; therefore, they were categorized as inspections done by Captain Special Events. They could alternatively be categorized under the occupancy inspector.

Olympics approach, the need for over crowding and safety inspections of clubs after hours becomes even more important as clubs expect to be open 24/7 for special parties.

Most prevention bureaus have a specialized position for this function as the type of work can not be performed during routine hours. The workload of this position can not be accurately be depicted by number of inspections performed or permits issued. The amount of time required for each special event is based on the size and the complexity of the event. However, there does not appear to be enough work to justify this as a fulltime position, particularly after the Olympics.

Recommendation 68: Staff schedules should be adjusted to allow for non-overtime inspections of late night, week end and after hour club fire inspections. Lower risk property inspections may need to be curtailed to allow this shift of resources to address a temporary possibly six-months peak need. On a permanent basis, staff should rotate to cover these most important inspections of high risk areas. The city of Miami Beach instituted permanent two-person inspection teams to check for the use of flammable materials as well as overcrowding throughout the hours of club operation. These teams have the authority to immediately close the business when safety violations are found.

Recommendation 69: Move the responsibility for issuing most if not all permits to the plan review and construction inspection section. Permits for blasting, demolition, open air burning, and retail fire works are good candidates to move. Festivals and movie shoots should stay with special events. Shifting most of the permit issuing responsibilities could free up time to conduct RAVE and night club over crowding and safety inspections.

Recommendation 70: Reconsider the need for the captain, special events, after the 2010 Olympics. Either eliminate the position, add new duties (some previously done by the Lieutenant Customer Service and others), or add responsibilities for working with the police to inspect after hour clubs for overcrowding, use of fire resistant materials and proper exiting. Based on the duties assigned, the position could be downgraded to Lieutenant or inspector.

The current workload does not justify this as a full time position. However, there will be a surge of activity for the Olympics so it should be retained through those events, then reconsidered for additional duties or elimination. An alternative is to reclassify the captain position into an inspector position and spread the special events duties among the district captains.

Fire Investigation

The job of investigating the origin and cause of fires and developing cases of incendiary fires for prosecution in Vancouver is carried out by the VFRS's fire investigation section in concert with the Vancouver Police Department. There are four sections of the Canadian Criminal Code that define arson (s.433 to 436 inclusive). Fire-setters can be charged with:

- Intentionally or recklessly causing fire or smoke damage to property with disregard for human life
- Damaging property owned by another person or by the offender (with or without the intent to defraud)
- Arson by negligence
- Possession of incendiary material

When a higher level crime is committed in combination with arson, the arson is not counted as the offense. Incidents are typed and counted according to the most serious offense (the same is true in the United States).

The fire investigation unit is lead by a captain, who is an experienced fire investigator and who reports to the assistant chief/manager of communications. Four investigators are attached to the shifts while the captain works a Monday-Thursday day schedule, for a total of five uniformed fire personnel in investigations. Each of the shift investigators works two days and two nights on and four off. Days are divided into two segments equalling 24 hours: 10-hour days (8-6); and 14-hour nights (6 p.m. – 8 a.m.). There is one back up investigator who is being trained and there are plans to add two more back up investigators in the future.

Investigators are paid at the level of a lieutenant. Call backs qualify for double time. When they join the unit, investigators are asked to commit to five years in the position. This is a good stipulation because it takes time to develop a fully-qualified investigator. First, there is the range of required training to be obtained, and second, it can take six months or more for an investigator to acquire enough experience to handle the responsibilities of the job and be able to work fully independently with successful results. There are many nuances of law, scene processing, pursuing leads, interviewing, and collecting information that take time to master.

The fire investigation captain responds automatically on all third alarm fires and fire deaths. He also processes all the freedom of information act requests – about 100-150 requests per year. He estimates that it takes about two hours per request for a total of 200-300 hours per year, or about 1 ½ – 2 months of time. This captain also does quality control on all incident reports, an important practice.

Fire investigation is not part of the prevention division like it is in most communities. Fire investigation should not be a separate function (under communications) where it is disconnected from code enforcement and public education. Even more disconcerting is that fire investigation is not even appear as an activity (under communication) on the current organization chart; neither is it mentioned in the fire department's most recent (2007) annual report.

Recommendation 71: Move investigations into the same section with inspection and public education, which is typically where departments place this function. Its location under communication is not logical.

Police Department Involvement – The fire department investigators work closely with two designated Vancouver Police Department investigators who get involved when a fire may be incendiary. Both assigned detectives have several years of experience in major case investigations. The working relationship between police and fire is excellent and supportive. Often, the investigators from both departments work as a team on the fire scene, especially on fires involving deaths or explosions. Fire investigators report that many set fires are connected to gang activity where members will use fire as a weapon for retaliation. In these instances, the gang squad may take an arson case. Fire and Police create and file their own, separate reports, however, and the data from those records needs to be aggregated into a common database for statistical analysis and evaluation of trends.

The fire investigators from the Police Department (whose caseloads include CBRN post blast, robbery, and assault), report that they received 56 calls for fire investigations over a period of three years, as follows:

Police Arson Investigation Calls

2005 - 21
2006 - 15
2007 - 20

The Vancouver Police Department crime scene investigators handle evidence collection and photographing the scene. The crime scene investigators collect samples for accelerant testing and handle fingerprint and DNA evidence as well. Evidence is sent to the Royal Canadian Mounted Police laboratory in Edmonton, Alberta. The turnaround time for lab reports can be long, because 36 jurisdictions use the RCMP lab, which receives over 100,000 requests per year for DNA evaluation alone. Arson scene evidence typically involves a turnaround time of three to six months.

The Fire Commissioner of British Columbia requires that an incident report be submitted to the Province within 72 hours of each fire. The city is reimbursed $3.00 for each such report. Reports include basic information on the fire and are not full-blown investigation reports which should document detailed procedures and findings of the investigation. The captain has developed an internal training course on procedures and regulations for investigators and conducts the training.

The captain of fire investigation reports that, on average, about 700 of the 1,500 fires per year in Vancouver are investigated. Of these 700, approximately 38-42 percent, or 300 fires

annually are found to be incendiary. On average, the per-investigator caseload is 117 investigations (all causes) per year. Since the captain has other duties related to managing the section, his caseload should be less than the other investigators, meaning that the caseload among the other 5 investigators might actually be closer to an average of 125 or 130 cases per year. There were no hard numbers available so our findings here are simply estimates based on the average total of 700 investigations per year.

The imputed caseloads carried by the investigators are very high compared to the experience in comparable Canadian and United States cities. Generally, a caseload of 60-70 investigations per year is considered reasonable to allow for proper investigation. If case loads exceed that number then the accuracy, timeliness, and quality of investigations all suffer, unless most cases are minor and the investigators are only doing origin and cause.

In the recent past there were up to four more investigators in the unit, however, those personnel moved out of the unit in order to qualify for promotion, and the slots have not been filled. By comparison to the VFRS's six-person unit, the city of Edmonton, with a population of 750,000, has 13 staff assigned to investigations (2007-2008 data). There is a Chief of Investigations, four Captain Investigators, five Lieutenant Investigators, and three entry-level investigators. Calgary, with a population of approximately 900,000, has a complement of 10 personnel assigned to investigations; 1 Assistant Fire Marshal and 9 investigators (including 3 police investigators).

Vancouver appears to have a shortage of investigators judging by the average number of cases per investigator and caseloads should be brought into line with more acceptable levels. However, since very little data on investigations is collected, it is difficult to ascertain exactly how many investigators are needed. The scope of work for this project expressed the desire to determine staffing for all fire divisions. However, the absence of usable data on fire investigation workloads makes this impossible.

To determine the precise degree of the shortage requires more data on the nature of the workload because there is a wide range of factors that influence what the ideal number of investigators in any given city should be. First is the actual number of investigated fires per year. Second, some fire department investigation personnel handle only origin and cause and leave the criminal fire cases and follow-up entirely to police. As a result, their labour hour investment per investigation can be less. Third, some cities experience a large percentage of juvenile-caused incendiary fires. Typically, these can be cleared more easily and quickly than fires set by adults (adolescents brag about their exploits and a good interviewer can obtain confessions from juveniles more quickly than from adults, in general). Conversely, investigators in cities where there is a large number of arson fraud fires will end up investing many hours tracking down and

analyzing financial data in order to make their cases. A few large dollar loss fires or fires where deaths and injuries resulted take longer to investigate, and the incidences of these fluctuate from year to year. In summary, the targets of set fires, the profile of losses, and the scope of the investigators' duties are factors that should be weighed in evaluating staffing levels and workload in an investigation unit.

Also on the issue of staffing, staffing needs should be evaluated with data on the number of investigations (all categories) and status of ongoing cases of each investigator. Questions such as: On average, how long is it taking to complete most investigations? Are the investigation reports complete? When (time of day and day of week) are most fires occurring and being investigated? Is the workload divided fairly evenly among investigators, or are some investigators regularly busier than others? How much is being spent on call-backs? Answers to these questions will help in analyzing the required number of investigators required to get the job done, and what type of schedule is best suited.

Notwithstanding the preceding, and given the need for more information, it is reasonable to say that the unit would benefit from the addition of at least two and perhaps three investigators, though additional research is necessary before committing additional staff.

Unfortunately, comparatively little fire and almost no investigation data is collected and maintained in Vancouver. Without good data it becomes challenging to evaluate workload and understand trends in the city's fire experience—the true impact of prevention and investigations, and the best priorities for training and public education. For example, is the juvenile fire-setter program making a difference? What aspects of the program seem to have the most effect and are there ways in which it could be improved? How many cases proceed to prosecution and what percentage of persons charged are found guilty? What or who is causing the majority of outdoors fires and how can those be prevented? What days of the week and hours of the day are the most common for accidental and incendiary fires and does that information suggest the need to adjust the schedule and shifts of investigators? These are just a few of the issues where better data is essential to determine strategies for the future—whether more investigation or more public education or other approaches.

Recommendation 72: Improve documentation and collect data on investigation unit activity levels and on the incidents that are investigated including the actual time spent on investigations, the time of day and days of the week when most investigations occur, the degree of fire extension upon arrival, modus operandi, motives, victims, use of accelerants, and so forth. Then, calculate the number of investigators needed and the preferred work schedule. Case outcomes also need to be followed up and documented.

Police Arson Squad Outreach – Vancouver experienced 10 garage and vehicle fires over a two-month period in late 2008, which police believe may be the work of a serial arsonist. One of the reasons why it is so important to have a joint fire-police investigation unit is that police have access to their whole network of law enforcement officers, surveillance operations, and other resources that can be valuable co-assets to identifying arsonists. In this case, the police prepared a large and colourful 'Special Patrol Request' that they distributed throughout the department. The request shows a map of the garage and vehicle fire incidents, describes the targets, modus operandi, time of day, and a summary of each fire. A picture of the possible suspect holding and paying for a can of gasoline is included.

Arson cases are reported to Crown Council for prosecution. Administrative Crown reportedly is typically willing to go to trial and assigns cases to a prosecutor for preliminary hearing. The only available information on cases, however, indicate that from 2006-2008 there were 31 chargeable juvenile arson cases, but only 8 juveniles were charged. During that same time period there were 38 adult chargeable fires, but only two adults were actually charged: one for "arson and property" and the other for "disregard of human life". We requested but did not receive information on case outcomes and penalties from the cases where charges were brought over that three-year period.

The fire investigation section is not producing the bottom-line results of cleared arson cases. The number of persons charged, especially adults, is extremely low. A more detailed review of the fire investigation section and a discussion with the prosecutor's office is required to ascertain the reasons for this. If there are an average 300 cases per year that are ruled incendiary, then for the three years 2006, 2007, and 2008 there would have been approximately 900 incendiary fires. For there to be only 10 cases of the 900 taken forward with criminal charges is hard to understand; it is also ineffective performance. There probably are several reasons for this record, possibly including:

1. Lack of time to develop cases adequately due to the high number of investigations each investigator is handling
2. Insufficient detail in the fire investigation reports for Crown Council to proceed
3. Slow response by the laboratory on evidence samples
4. Low interest in arson cases by Crown Council
5. Insufficient training for the fire department investigators
6. Time lag in follow up investigation work due to investigators working on shift and loss of momentum in information collecting

Recommendation 73: Hire an outside consultant to look into the reason for the low number of cases being brought to trial. This is a serious question which deserves priority attention.

Tools and Training – In addition to the standard scene processing tools, there is a fire investigation van that carries special equipment and provides space for investigators to document the scene, prepare reports, and talk to bystanders and witnesses. The investigators interviewed seemed satisfied with the equipment provided to them to do their job.

Vancouver has had discussions about sharing with the City of Richmond an accelerant detection canine trained by the U.S. Bureau of Alcohol, Tobacco, Firearms, and Explosives The Greater Vancouver Regional District has a K-9, but Vancouver is billed $1,000 every time the Police or Fire Department borrows it. Canines can be a great addition to a fire investigation tool kit, and sharing the cost and use of a canine with another city is a good approach. Factors to be considered are the on-going training and veterinary costs of a canine program and the fact that one of the investigators would have to be assigned exclusively to the dog, which can reduce the availability of that investigator to assist at investigations where the canine is not needed. On the other hand, canines make the task of selecting samples much faster and help the investigator more easily locate the materials containing the highest concentration of accelerants.

Another question to consider is how many cases are failing to be cleared or successfully prosecuted because the physical evidence is lacking—evidence that having a canine would help to correct. How often would a canine be used and to what overall advantage, considering the investment? Since police and fire work fire scenes together, Vancouver's share of a canine with Richmond could be split between the Vancouver Police and Fire Departments.

Regarding training, the lead investigator and several other investigators indicated the need for more training so that they can qualify for certification as a fire investigator (CFI). An online course for CFI qualification is available and costs $1,500 per person. The advantage to the online course is that the investigators would not need to travel to a different location for the training, allowing them to be available for investigations while at the same time working toward the certification. Moreover, the training is important to have as a basis for developing the needed skills to do the job, not just for certification. Investigating fires requires capabilities in specific technical skills and knowledge of the law and the criminal justice system. As one of the investigators correctly noted, "We take the job very seriously. It is critical that in making the 'cause and origin' (C&O) determination that the call be made correctly because it triggers the possible loss of liberty of someone." Training is a key prerequisite to accurate decision-making. Investigators need both the knowledge and the time to research their fires and to draw the proper conclusions concerning how and why a fire started.

Currently, new recruits have to take the Level 1 Fire Investigator training and the Local Assistant to the Fire Commissioner Fire Service Action course to become peace officers. New investigators have to work 20 shifts and then are permitted to work alone. At a ***minimum*** all investigators should be provided training through Level 2 and after a certain amount of time on the job, Level 3. Training to only Level 1 is not adequate. We were not provided with a synopsis of the training history of each investigator, but Level 1 is all that is required to join the unit.

- Level 1 – Fire Investigator (mostly an awareness level)
- Level 2 – Origin and Cause
- Level 3 – Includes law enforcement presentations on expert witness; span of control, interagency coordination, etc.

Investigators also noted a need for learning more about three specific subjects: electrical and small appliance fires, explosions, and the psychological aspects of fire-setting. Vancouver investigators stated that many of the fire-setters they have seen have mental health issues. Typically, perpetrators are between the ages of 28 and mid-50's. Motivations are typically spite or revenge against a particular person or against society in general. Training on evaluating electrical and small appliance fires does appear to be needed. On the one full case report we reviewed, the post fire inspection of and conclusions about the electrical system in the house that was involved was conducted and photographed by personnel from the city's electrical department.

Recommendation 74: Increase the training effort such that all investigators meet Level 2 with advancement to Level 3.

Public Education

The Community Services Division has responsibility for public education. It is also responsible for pre-fire plan reviews and the department's audio\visual\graphic services. In addition to the fulltime manager, who is a civilian, one captain and two educators are budgeted for public education. The two 'educator' positions are currently filled from a pool of qualified members who are seconded for three month periods. Other modified duty firefighters are sometimes assigned for one or two shifts when workloads are high. As it stands now, there are not enough personnel assigned to public education to meet the city's current and future needs.

Background – Vancouver has earned international distinction for its strong automatic sprinkler provisions in the Vancouver Fire By-law and the unparalleled success of that By-law in significantly reducing fire injuries and deaths in homes and places of public assembly. From the late 1960's and through the 1970's, Vancouver experienced a high fire death rate, 5 deaths per

100,000 population, which was nearly double the average death rate for Canada as a whole. The number of fire deaths peaked at 40 in 1973.

For more than a decade, fire officials worked hard to convince legislators and other appointed and elected officials that the city needed to require sprinklers as a solution to the high fire death rate and to protect the city and its tax base into the future. After convincing the chief building officials, the fire department celebrated legislation that went into effect in 1990 which requires all new residential properties, and all residential properties that are upgraded to more than 50 percent of appraised value, to have built-in sprinkler protection. That legislation, along with a strong smoke alarm program, contributed to a steep drop in fire deaths. The rate fell to .5 deaths per 100,000 population, half the national rate, which also has fallen since the mid-1970's. For two years in the past decade, 1998 and 2004, there were zero fire deaths in the city. The Yaletown and Coal Harbour areas are almost 100 percent sprinklered, and there have been no accidental fire deaths in sprinklered properties citywide.

Of course, sprinklers do not prevent fires, even though they stop fires in the early stage and prevent them from becoming hugely destructive. Public fire education continues to be needed, since over half of the population does not live in sprinklered residences. And even in sprinklered residences, small fires can cause burn injuries and dollar loss. Fire safety should be a basic part of anyone's education, with applications at the workplace, home, car, outdoor venues, and elsewhere. Sprinklers do not prevent a person from a burn injury if they improperly use flammable liquids, fall asleep and drop a lighted cigarette onto their clothing, or are otherwise careless with fire. Fireworks have been the source of many injuries and fires, and the fire department has taken steps to control the private use of fireworks.

Programs – Public education programs are focused in nine key areas. Like most communities, public fire education is the most efficient means of reducing the city's fire losses. The reason is because of the target audience since most fires in Vancouver occur in residential properties.

Prevention and fire safety is being taught to roughly 5,000 students each year but only about 300 households are actually visited. The current public education staff is doing the best it can but it is too small to reach the desired target audiences. Although properly targeted to children and residential households, the number of educators is too small to be effective and additional staffing should a high priority.

A rule of thumb for the number for public educators is one per hundred thousand population, which would be about five or six for a city the size of Vancouver. Because half of the city's residential units are protected by sprinklers, a reasonable number would be four to five,

supplemented by line firefighters for the school and home-visit programs. Going forward, the fire department should set a goal to visit every home without a sprinkler at least every two years.

Recommendation 75: Increase the number of fulltime public educators to four or five.

Recommendation 76: If not already done, whenever there is a change in ownership or occupancy in the households reached through home-safety visits, it would be a good idea to update the database periodically, and revisit the properties if new occupants move in.

A recent TriData report, Global Concepts in Residential Fire Safety, Part III-Best Practices from Canada, Puerto Rico, Mexico and Dominican Republic, describes the many outstanding public education programs across Canada, especially home visits, and how they are feasibly implemented. While Vancouver is the shining light in residential sprinklering in North America, it is considerably short of having the best public education programs found in comparable cities across Canada, largely because the unit is understaffed.

Understaffing public education is all too common. It has been demonstrated to be the most cost effective section of a fire department in terms of impact per employee on property and a life saved, but is not a squeaky wheel, and rarely gets proper staffing. Enlightened fire departments in many cities and nations now are making sure public education is fully staffed even if line firefighters must be transferred to prevention. One engine position staffed round the clock is enough to staff the entire missing increment in public education, and would have negligible effect on the overall complement sent to a fire.

Fireworks: Statistics show that two thirds of burn injuries from fireworks occur west of the Rocky Mountains in Canada, and that 90 percent percent of those injuries occur during Halloween week when fireworks are most common. Monitoring the size and amount of permissible fireworks used privately and educating the public about important safety precautions are a high priority for the prevention section.

In Vancouver, small-scale fireworks can only be sold around Halloween, the traditional day for fireworks, and require a special permit to purchase. To receive a permit, an applicant must pass a 10-question test which can be taken on-line or in person. Fireworks safety information is included in the on-line process, and is a useful tool for supporting fire safety education. The test raises awareness of firework dangers, and one must get a perfect score to qualify for the permit. Alternatively, one can go to the prevention office and apply for the permit there. The use of on-line questions is innovative. While the test is easy, and the applicant can repeat it until they pass, it does ensure that the applicant knows 10 points about fireworks safety before purchasing fireworks.

Vendors are supposed to check that fireworks purchasers have the permit before selling them fireworks. The fire department has conducted a sting operation with fireworks vendors to determine if they were in fact requiring that buyers have a permit. That level of follow up to ensure the law is being obeyed is an excellent example of enforcement. The exceptions to the fireworks restriction are the First Nations, which can sell fireworks 365 days a year.

Open Fires: Special permits are required for open burning or open fires. Here, cultural issues come into play and require some accommodation. For example, many religions use fire in their religious ceremonies like the Indian celebration of Diwali that involves clay pots with oil and wicks that are lighted throughout the house as well as fireworks, which are a big part of the Chinese New Year celebration as well.

Home Safety Visits: About 3,000 residential units of highest risk are targeted each year for door to door visits. Residents are provided with home fire safety information and fire safety inspections to check for frayed cords, overloaded circuits, working smoke detectors, and so forth, are offered. Once visited, the address is maintained on a database that is checked whenever there is a fire to see whether any of the properties visited had any fire incidents afterward. This is a very good way of determining the value of the safety visits and, if compared against a norm for the number or percent of these households that otherwise could have been expected to experience a fire, supports the argument in favour of continuing and expanding the home safety visits.

There are on the order of 100,000 households (approximately 40 percent of all residential occupancies) in Vancouver that are sprinklered. It would be good strategy in keeping with the latest best practices to try to reach the 50,000 or so not sprinklered over the course of five years, or about 5,000 per year, using line firefighters as is done in increasing numbers of cities the size of Vancouver in Canada. It is excellent public relations, too. The implementation alternatives are described in our previously cited report on Global Concepts in Residential Fire Safety, Part 3, on Canada.

The downtown East Side, a low-income and high-crime area with a high rate of alcoholism, is one neighbourhood targeted for prevention and public education efforts. There is little if any fire separation between many of the structures in the East Side, and the area has a disproportionate number of fires.

Recommendation 77: Expand the home safety program and target the effort to visit every un-sprinkled residential property over a five year period, using line firefighters and neighbourhood volunteers to delivery fire safety message, test smoke alarms.

Recommendation 78: Consider setting up a 'fire-safe home' request hotline where needy residents could call in their request for a smoke alarm, which would then be followed up by the fire hall closest to the residence.

Open Fires: Special permits also are required for open burning or open fires. Here, cultural issues come into play and require some accommodations. For example, many religions use fire in their religious ceremonies like the Indian celebration of Diwali that involves clay pots with oil and wicks that are lighted throughout the house as well as fireworks, which are a big part of the Chinese New Year celebration as well.

Post-Fire Neighbourhood Targeting: If a major fire occurs in a residence, fire prevention personnel sometimes go to the neighbourhood where the fire occurred and conduct a residential fire safety program. This is a good time to capture the public's attention to the subject of fire hazards and escape planning, and maximizes the impact of the information that is provided. Key lessons are that residents need to test their sprinkler systems, have working smoke alarms, use care with smoking materials, and know how to escape from fire. It is also a good time to distribute smoke alarms.

Recommendation 79: Provide free 10-year tamper proof smoke alarms where the occupant cannot afford them or is unlikely or unable to install them. Often the alarms can be funded through donations such as those already received from Home Depot and World Bank. Also, provide free batteries and install them where smoke alarms are not working.

Fire Prevention Lessons in Schools: About 5,000 students in 114 schools are taught fire safety in Vancouver. The Fire Department has constructed its own mobile safety house to use in the program and raised money to pay for the safety house. It obtained $60,000 of the $100,000 needed from Home Depot, the Royal bank, and others; and another $30,000 to develop a professionally produced fire safety video. The program reaches teachers and some parents in addition to the students. Lessons focus on making an escape plan and practicing how to escape.

Figure 58: Fire Safety House

The Vancouver school board participated in the development of the program and the detailed lesson plan meets the planning and safety portion of the education requirement, making

it more attractive to the schools. Each class spends approximately an hour and 20 minutes at the house. Vancouver has found a way to attract the involvement and cooperation of schools in this important program and they did so through community partnerships that involved donors and the school board. Again, this is an excellent practice.

Two firefighters deliver each class lesson. They are selected from a pool of 45 trained firefighters who volunteer for the assignment. Where possible, they match the ethnicity of at least of one the firefighters to that of the school's neighbourhood. The public education officer goes if needed to fill in. There is a script that can be read by a firefighter if they are not comfortable working from the lesson plan. A video that cost $60,000 called "The Fire Safety Challenge" is shown at the beginning of each class. Following the class, each student is asked to complete an escape plan and safety checklist with their family. If they do, they receive a sticker indicating successful completion. The percent of students who get a sticker is one measure of the program's impact.

The fire department and Union #18 have worked closely together on teaching cardio pulmonary resuscitation to a sixth grade class, and they want to expand the training to all 6th grade classes. At the high school level, 40 instructors conduct a 3-8 hour CPR and first aid course (depending on the class) in mostly health and physical education classes, reaching about 3,000 students per year. The instructors receive an honorarium of $20.00 per student per course and the provincial government provides $10,000 per year for the program. They want to incorporate this into other classes, too, such as chemistry, cooking, and shop/auto mechanics. It is admirable that Vancouver has not stopped fire and life safety education at the elementary school level, but has worked to continue bringing important lessons to high school-age students as well. It represents a commitment to preventing fires and injuries from burns that extends to older students.

Neighbourhood Outreach: In partnership with the University of British Columbia , the Fire Department and Union #18 partners who teach the high school CRP and first aid course, also help promote health and fire safety at a neighbourhood health clinic on the East side at no cost to the clinic. The Clinic is run by Vancouver Coastal Health and is located in one of the higher risk areas of the city.

Language Support to Prevention Efforts: Vancouver is home to a broad array of Asian cultures including Southeast Asian and Indian populations, with many eastern Europeans too. Almost half of the population is what is referred to as visible minorities. There are 27 recognized minority communities. The Vancouver firefighters' union maintains a list of firefighters who speak a language other than English. They are called upon when needed for translating materials,

or for interpretation in prevention programs or other purposes. The foreign languages most commonly utilized are Cantonese, Mandarin, Hindi, and Punjabi.

British Columbia Professional Fire Fighters' Burn Fund: This association has been in business for 30 years, and conducts numerous research and education programs throughout British Columbia. Firefighters donate their time to the Fund. As a case in point, the Local #18 contributes about 4,500 hours every year. Their fire and burn prevention programs contribute to public fire prevention education in Vancouver. The Burn Fund educates new parents on the right water temperature for babies and provides a card that can be inserted in the water to read the temperature. For students in grades 1-7, including kids who are home-schooled and in private schools, the Burn Fund operates a poster contest on fire safety. Winners receive $1,000 which is donated to the schools. The Burn Fund also has an interactive program that kids can pull up on the screen and look for fire and burn risks in each room of a house.

Another major project of the Burn Fund is a 3-story, $25 million building under development that will provide accommodations for the families of burn victims who are undergoing treatment and a whole floor devoted to medical research and a laboratory for reviving scar tissue. "Preventing Victims" and "Empowering Survivors" are the themes.

The union should be commended for this outstanding program, and its initiative in running it.

Global Best Practice Concepts

As part of this project we provided the fire department's management team with a presentation on global concepts in fire protection—the best practices we found from studying other countries.

One of the most successful practices and a radical change from the past is in the United Kingdom. Previously, the UK's approach to fire protection included a very prescriptive approach where each community organized its fire services using standards of cover where the number and response time of fire units were specified by the risk level of each area. The focus of fire prevention in the UK was mostly on supposedly high-hazard occupancies such as hospitals, schools, and other target hazards. However, these structures had very few fires and those that did occur were relatively minor.

Most fire losses in the UK, including civilian deaths and injuries, did not occur in high-risk occupancies, but rather in residential structures—the same as in the Canada. The UK then changed its strategy and it now focuses its attention on the reduction of residential fires and the losses they create. The UK still considers the inspections of hospitals and other high occupancy

properties to be important, however, most local fire departments now focus most of their attention on residential fire safety.

Vancouver has already adopted the best fire safety program of all—requiring all new residential structures to be fully sprinklered. Going forward the fire department might follow the lead of the UK and now many cities in Canada to have firefighters make home fire safety visits and generally participate more in prevention activities, in their first due area. The first priority should be those homes without sprinklers, e.g. those constructed before 1990.

VII. FIRE APPARATUS AND FACILITY ASSESSMENT

The city is currently facing a situation of having to replace large portions of the fire department fleet, including all of its rescue units. At the same time, a majority of the city's fire halls have reached the end of their useful life span. This section reviews the current situation regarding fire apparatus and fire hall facilities, and proposes strategies to address them. These include:

Apparatus

- Reducing the initial cost of apparatus through less detailed specifications for engines, ladders, rescues, and quints
- Reducing the number of quints in the fleet
- Using smaller vehicles for medical rescue calls
- Extending the current vehicle replacement timeline for several years beyond 2013 for rescues and quints

Facilities

- Increasing apparatus floor space to accommodate larger apparatus and the possibility of apparatus relocations; also storing reserve apparatus
- Replacing the two most critical fire halls (17, 20) within the next two capital planning periods (2012 to 2014 and 2015 to 2017)
- Replacing Fire Hall 9 in the next two or three capital planning periods (2015 to 2017 or 2018 to 2020)
- Developing plans to renovate Fire Halls 1 and 2 within the two or three capital planning periods (2015 to 2017 or 2018 to 2020)
- Developing plans to replace Fire Hall 6 and renovate Fire Halls 8 and 22 within the next three or four capital planning periods (2018 to 2020 or 2021 to 2023)

Fire Apparatus

Vancouver is facing an expensive situation as it considers replacing a large number of fire units over the next few years. In general, the fleet is in good condition and the situation has not yet reached a critical situation. In the past the city replaced a large portion of the fire fleet at one time. This is not a particularly good practice because the units must be replaced at the same time again, in 15 years or so. Problems also arise when large batches of apparatus purchased

simultaneously have warranty issues which preclude their use short term. A better approach is to replace portions of the fleet gradually, albeit the fiscal situation in given years can sometimes make this difficult to achieve.

The assessment of apparatus conducted by TriData focused on the vehicle types and number of units deployed by VFRS. In parallel, Mercury Associates, Inc. (MAI) conducted an operational efficiency review of the fire department's fleet maintenance program and the feasibility of possible consolidation of the fire department's fleet maintenance operation with that of the city's central fleet maintenance operation. TriData provided its findings and recommendations concerning future apparatus requirements to MAI, which used the information to determine fleet maintenance staffing requirements.

Fire suppression and rescue vehicles are replaced on a 15-year cycle, which is reasonable given their use pattern. However, time is fast approaching when major portions of the fleet must be replaced. Fortunately, apparatus maintenance is very good and the city has some available options instead of continuing to bulk purchase.

City administrators sometimes question the policy of maintaining reserve or spare units as an unnecessary expense. An adequate reserve fleet is essential if the city wants to maintain its services at the prescribed level. Reserve units in Vancouver, as elsewhere, replace 'first-line' units when they are unavailable because of preventative maintenance or other problems. Unquestionably, reserve units are as important as first-line units and they often get more use than first-line units. Because they rotate to various halls, reserve units are also used by a greater number of drivers and maintaining them in good condition is paramount. Presently there are insufficient reserves in some vehicle types, notably rescues.

Age of the Current Fleet – Communities vary in their replacement cycle for fire apparatus. A good average is 10–18 years for total service time, which includes both first-line and reserve. Guidelines such as those of the National Fire Protection Association (NFPA) suggest the following:

> "The normal life expectancy for frontline fire apparatus will vary from city to city…In general, a 10 to 15 year life expectancy is considered normal for a first-line pumper. However, in areas where there are a high number of responses, a life expectancy of only 7 to 9 years can be expected. First line aerial fire apparatus should have a normal life expectancy of at least 12 to 15 years. *…obsolescence will make older apparatus less desirable, even if it is mechanically functional." (Italics added)*

The current fleet includes 57 major fire suppression, rescue, and support vehicles.

Table 61: VFRS Fleet, 2009[99, 100]

Unit Type	Make	Capacity	Year/ Age	Projected Replacement
First-Line Engines				
Engine 1	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 3	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 5	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 6	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 7	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 8	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 10	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 12	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 14	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 15	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 17	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 18	Spartan/ Smeal	8,000 L/m	2007/2	2022
Engine 22	Spartan/ Smeal	8,000 L/m	2007/2	2022
Average Age	-	-	**2.0**	-
First-Line Ladders/ Towers				
Ladder 1	Spartan/Smeal	8,000 L/m 38m	2007/2	2022
Ladder 5	Pierce-Smeal	7,000 L/m 32m	1991/18	2006
Ladder 7	Spartan/Smeal	8,000 L/m 38m	2007/2	2022
Ladder 10	Simon Duplex	7,000 L/m 32m	1996/13	2011
Ladder 18	Simon Duplex-LTI	7,000 L/m 30m	1994/15	2009
Average Age	-	-	**10.0**	-
First-Line Quints				
Quint 2	Spartan	7,000 L/m 23m	1998/11	2013
Quint 3	Spartan	7,000 L/m 23m	1998/11	2013
Quint 4	Spartan	7,000 L/m 23m	1998/11	2013
Quint 6	Spartan	7,000 L/m 23m	1998/11	2013
Quint 9	Spartan	7,000 L/m 23m	1998/11	2013

[99] VFRS fleet services reported that most of the engines purchased in 2007 did not actually go into service until 2008. The same may be the case for other units. To determine average age we considered the year purchased.
[100] Throughout this project VFRS made many changes to its fleet and the assignment of some vehicles have changed. The information in this table is reflective of the information provided to TriData in October 2008.

Unit Type	Make	Capacity	Year/ Age	Projected Replacement
Quint 12	Spartan	7,000 L/m 23m	1998/11	2013
Quint 13	Spartan	7,000 L/m 23m	1998/11	2013
Quint 15[101]	Spartan	7,000 L/m 23m	1998/11	2013
Quint 19	Spartan	7,000 L/m 23m	1998/11	2013
Quint 20	Spartan	7,000 L/m 23m	1998/11	2013
Quint 21	Spartan	7,000 L/m 23m	1998/11	2013
Average Age	-	-	**11.0**	-
First-Line Rescues				
Rescue 2	Freightliner	1,150 L/m	1998/11	2013
Rescue 4	Freightliner	1,150 L/m	1998/11	2013
Rescue 8	Freightliner	1,150 L/m	1998/11	2013
Rescue 9	Freightliner	1,150 L/m	1998/11	2013
Rescue 17	Freightliner	1,150 L/m	1998/11	2013
Rescue 21	Freightliner	1,150 L/m	1998/11	2013
Rescue 22	Freightliner	1,150 L/m	1998/11	2013
Average Age	-	-	**11.0**	-
Reserve Engines				
N/A	Simon Duplex	7,000 L/m	1991/18	2006
N/A	Simon Duplex	7,000 L/m	1991/18	2006
N/A	Simon Duplex	7,000 L/m	1994/15	2009
N/A	Simon Duplex	7,000 L/m	1994/15	2009
N/A	Simon Duplex	7,000 L/m	1994/15	2009
Average Age	-	-	**16.2**	-
Reserve Quints/ Ladders				
Ladder	Pierce-Smeal	7,000 L/m 32m	1991/18	2006
Ladder	Simon Duplex/ LTI	7,000 L/m 30m	1994/15	2009
Quint	Spartan	7,000 L/m 23m	1998/11	2013
Quint	Spartan	7,000 L/m 23m	1998/11	2013
Quint	Spartan	7,000 L/m 23m	1998/11	2013
Tower	Spartan	8,000 L/m 30m	2000/9	2015
Average Age	-	-	**12.5**	-

[101] During its temporary move to Fire Hall 14, Quint 15 was replaced with a ladder.

Unit Type	Make	Capacity	Year/ Age	Projected Replacement
Reserve Rescues				
N/A	Freightliner	1,150 L/m	1998	2013
Average Age	-	-	**11.0**	-
Other Apparatus				
Hazmat Support Unit – 10	GMC	-	1991/18	2006
Hazmat Support Unit – 4	International	-	1991/18	2006
Command Unit – 9	Grumman	-	1992/18	2007
Hose Tender – 18	Freightliner	-	1995/14	2010
Technical Rescue – 7	International	-	1997/12	2012
Hazmat Support Unit – 3	Ford	-	2001/8	2016
Hazmat Unit – 3	Spartan	-	2007/2	2022
Hazmat Unit – 10	Spartan	-	2007/2	2022
Air/Light Unit – 22	Spartan	-	2007/2	2022
Average Age	-	-	**10.4**	-

The average age of first-line engines is excellent, but quints and ladders are approaching the 15-year period for replacement as are the rescues. Sixty-five percent of the current fleet is due for replacement within the next five years (2014). This is depicted by the orange coloured cells in the last column.

Five of the of the department's 18 engines, all 14 of its quints, and 5 of 8 ladders are in need of replacement if the replacement schedule is adhered to. Likewise, 5 of 8 support units for hazmat and technical rescue are between 11 and 20 years old. Seven units, including two spare engines, one spare ladder and three support units are past the 15 year replacement cycle. These units should be the first priority for replacement followed by the 28 fire units in the 11–15 year category. Fortunately there are no units above 20-years of age.

Table 62 shows the breakout of the VFRS fleet by unit type.

Table 62: VFRS Fleet by Unit/Age

Unity Type	0–5 Years	6–10 Years	11–15 Years	16–20 Years	>20 Years	Total
Engines	13	0	3	2	0	18
Quints	O	0	14	0	0	14
Ladders/ Towers	2	1	3	2	0	8
Rescues	0	0	8	0	0	8
Technical Rescue/ Hazmat/ Support Units	3	1	2	3	0	9
Totals	18/57	2/57	30/57	7/57	0/57	57
Percent	32	3	53	12	0	100

There is also a shortage of reserve rescues with only one reserve rescue to replace the seven units in first-line service. This is creating a problem for fire maintenance because they are unable to keep up with the preventive maintenance of first-line rescues.

There are no hard and fast rules of how many spare units to maintain. The condition of the fleet overall is one factor. If the first-line fleet is older and repairs occur more frequently, more spares are needed. As rule, one reserve unit for every four first-line units is satisfactory. With five spare engines, three spare quints, and three spare ladders/ towers, there are usually enough reserve fire units, but not by a large margin.

The proposed unit location plan we propose includes several changes on the number and type of units deployed throughout the city. In Chapter V, Fire Operations, we discussed the need to add three peak-load rescues and three suppression units (two engines and one quint) to cover the high EMS demand during weekdays and fire units unavailable because of secondary response status.[102]

Table 63 shows the units proposed for each fire hall and the spares necessary to effectively support the proposed first-line fleet.

Table 63: Proposed Apparatus Roster by Fire Hall

Fire Hall	Engine	Ladder	Quint	Rescue 24-7/ Peak
1	1	1		0/ 1
2	1			1/ 1
3	1		1	
4	1			1/0
5			1	
6	1		1	
7	1	1		0/1
8	1			1
9			1	1
10	1	1		
12	1		1	
13			1	
14	1			
15	1	1		
17	1			1
18	1	1		

[102] The fire department refers to units that are unavailable because of training commitments as being in 'secondary response'. This means they do not respond initially to a call, however they are available if a large incident occurs. On a typical day, up to four fire units are removed from the halls for training and these are backfilled by units from other halls.

Fire Hall	Engine	Ladder	Quint	Rescue 24-7/ Peak
19	1			
20	1			
21			1	1
22	1			1
First-Line	16	5	7	7
Peak-Load Units	2	0	1	3
Reserves	5	2	2	3
Total	23	7	10	13
Currently Available	18	8	14	8
Increase/ (Decease)	5	(1)	(4)	5

Not including nine special response vehicles such as hazmat and technical rescue, the proposed fleet is increased by five units from 48 to 53. The number of engines, including reserves increases by five units. Five rescues are also added; however, there is one less ladder in the inventory. The proposed schedule includes three peak-load rescues and three suppression units (two engines and one quint). The engines and quint are created by discontinuing the greater alarm units because these are rarely used by the department.

Capital Replacement Strategy – Instead of a bulk replacement of units, such as the quints which are all due for replacement, we suggest that the fleet be upgraded over the next five to six years. Two engines and two ladders have already been approved for replacement and other units could be spread out after these units are replaced. Spreading out the purchases will help to alleviate the problem we discussed earlier of bulk purchasing again in 15 years.

The replacement schedule we propose addresses the most critical needs in 2011, then gradually adds the other units over the next four years. Within the context of current budgeting, several of the units may be replaced in 2010, thus the schedule we propose may need to be modified slightly.

Per units coats were estimates based on our knowledge of industry pricing. Quoted prices do not include equipment. A three percent annual inflation factor is included.

Table 64: Fleet Replacement Schedule, FY2011–2015

	Currently Approved	FY11	FY12	FY13	FY14	FY15	Total
Fleet Replacement Estimated Cost/ Unit[103]	Units	Units	Units	Units	Units	Units	-
Engines $725k	2	1 $725k	0 $0	1 $769k	0 $0	1 $816k	5 $2.3M
Ladders/ Towers $950k	2	0 $0	1 $979k	0 $0	1 $1.03M	0 $0	4 $2.0m
Quints $825k	0	2 $1.65m	2 $1.7m	2 $1.75m	2 $1.80m	2 $1.86m	10 $8.76m
Rescues $200k	0	3 $600k	2 $412k	3 $637k	2 $437k	3 $675k	13 $2.76m
Technical Rescue Unit	0	1 $450k	0 $0	0 $0	O $0	0 $0	0 $0
Total Units Purchased	4	7	5	6	5	6	33
Estimated Cost		$3.4m	$3.1m	$3.2m	$3.3m	$3.4m	$16.4m

The cost to upgrade the fleet to provide the recommended first-line units and reserves is approximately $16.0m. The largest expense is the replacement of 10 quints. However, apparatus replacement costs have been reduced because engines are being purchased in lieu of some quints.

Cost for New Apparatus – Recent fire apparatus purchases were at the high end of vehicle prices and some modifications in vehicle specifications and purchasing are likely needed to control future costs. Realistically, the fire department could spend less on fire apparatus and still get quality equipment. In years past (before EMS calls were made by fire departments) fire apparatus often lasted 20–25 years, or more. However, changing technology and the length of time vehicle bodies last make the shorter 15-year replacement cycle appropriate. As a result, since vehicles are replaced earlier, a reasonable attempt should be made to purchase less expensive units on the front end.

Such a strategy is possible if there is less vehicle customization, typically the single largest price escalator. Lowering the initial cost by just 10 percent will provide substantial savings.

Recommendation 80: Review the specifications for each type of apparatus being purchased and try to adjust or eliminate vehicle features that require excessive customization or eliminate vendors that might otherwise be competitive.

[103] The estimated cost for each vehicle includes vehicle standard changes required by NFPA beginning in 2009.

Another area where less expensive apparatus can be purchased is rescues. The current rescue fleet is due for replacement and these units have been upgraded considerably from the original concept of a 'light-duty' medical response unit. Rescues are now equipped with pumps, a small tank and hose, all of which are almost never used. Additionally, the current fleet of rescues has oversized cabs to accommodate up to five personnel, which they rarely carry.

Going forward, medical rescue units should be downsized and they should not be equipped with pumps, water tank, or hose. Equipping rescue units with heavy extrication equipment should also be discontinued. As an alternative, we recommend equipping five ladders as heavy rescue units with quints equipped for routine extrication calls but not with air bags and other heavy rescue which only ladders would carry.

Located strategically throughout the city, the location of Ladders 1, 7, 10, 15, and 18 provide sufficient coverage for heavy rescue capabilities. Providing quints with basic extrication equipment will provide a quick response for routine rescue calls with heavy rescue equipment being provided by the heavy rescue-equipped ladders.

We discussed this change in concept with the fire department and they generally agree with the rescue ladder concept. As an alternative, administrators suggested that engines should be rescue equipped instead of the quints.

Recommendation 81: Replace the current rescues with smaller vehicles equipped for their primary mission, which is medical response. Sufficient space should be available for some small tools, turnout equipment, and SCBA; however, the vehicles should not be equipped for extrication or heavy rescue.

Following are two examples of smaller medical response units.

Figure 59: Example 1 – Medical Response Unit[104]

[104] http://lifestarrescue.com/RS128_Demo/RM128_W.jpg

Figure 60: Example 2 – Medical Response Unit[105]

VFRS has two vehicle types capable of deploying an aerial ladder. The current ladders range from 38M (125ft) to 30M (100ft) and these are the primary aerial ladders used by the fire department. Other vehicles provided with aerial ladders include quints which have 23M (75ft) ladders.

Figure 61 shows the latest version of an aerial ladder.

Figure 61: VFRS Ladder 7 (2007)

One problem with the quints can be their long wheel base which makes them less maneuverable. The long wheel base is due to the tandem axle to carry the extra weight of the aerial ladder, pump, water tank and hose. Improvements in technology for aerial ladder construction and single-stage pumps have led to a notable decrease in the weight of quints and many are now available with single axles and thus are shorter and more maneuverable. The weight restrictions for vehicles to be single-axle also require pumps and water tank capacities to be smaller.

[105] http://www.swabwagon.com/home.html

Figure 62: Example of a Single-Axle Quint

Recommendation 82: Continue to purchase single-axle quints.

Vehicle Standardization – VFRS has done an excellent job in standardizing the apparatus fleet. Standardization is particularly important for large departments where vehicles get operated by many operators. It also improves vehicle maintenance efficiency because mechanics have fewer vehicles to learn and parts inventories can be smaller.

On the negative side requiring every vehicle to be exactly the same (too much customization) can compromise the competitive bid process and raise the cost of vehicles. Vehicle standardization is also related to the specifications process we described earlier. Standardization which mandates the exact size and layout of compartments is one area where vendors must often 'take exceptions' and this can be used to disqualify otherwise acceptable bidders. For new vehicles being purchases the fire department should work to a balance between standardization and eliminating possible alternatives. For example, many apparatus manufactures provide different options for major components such as engine, drive train, pump and aerial ladder. Where standardization becomes a problem is when manufacturers are unable to make chassis changes or when compartments must be constructed to exact specifications.

Recommendation 83: Consider other vehicle options when the cost of standardization becomes disproportionate to the benefit gained. Obviously this is a judgment call but it can be done without compromising effectiveness or efficiency.

Fire Hall Facilities

The current state of facilities can be described as 'fair'. Most of the city's 20 fire halls are in excellent locations response-time wise; however, many have outlived their useful lifespan. Most of the city's fire halls also have very small apparatus bay areas and thus are sometimes unable to accommodate larger fire apparatus. For example, a recent engine purchased by VFRS required a structural modification to Fire Hall 6 to allow the apparatus to fit into the station. Even

when changes in apparatus locations make sense strategically, fire officials have been unable to make moves because apparatus cannot be moved to some stations.

The purpose of this study was to analyze the deployment of fire resources and recommend a plan of action to meet future demand. To accomplish this we reviewed fire hall facilities for their overall adequacy to meet the city's future needs and to accommodate the resources recommended by this plan. Therefore, the intended purpose of this section is to overview the current situation regarding VFRS facilities. It is not intended to be an engineering-level review.

Current Situation

Of the city's 20 fire halls, 10 are over 30 years old and only 3 are between 6 and 10 years old. Fire Hall 15, located at 3003 E. 22nd Avenue (Renfrew), is currently being replaced. In addition, Fire Hall 5, located at 3090 E. 54th Avenue (Champlain), is scheduled for a major renovation in the current 2009-2011 capital plan. Fire Hall 15 is proposed as a three-bay station with a projected cost of $9.1-$10.3M, depending on the design option chosen by Council. Other than these two facilities, there is no funding to replace or upgrade any other stations.

A review of fire facilities conducted in 2005 summarized the overall situation of fire halls this way:

> "Seven fire halls are in poor condition due primarily to their age (+40 years), compromised functionality, and seismic deficiencies for post-disaster facilities. Two fire halls (3 and 18) were replaced in the 2000-2002 Capital Plan. Three fire halls (9, 15, and 17) have reached the end of their useful lives and should be replaced in the next three plans. Six fire halls ranging in age from 25–35 years are in the fair category and should be considered for major renovations or replacement."[106]

Following is the age breakdown of fire halls. Because they were being addressed at the time of this study, Fire Hall 15 is considered as a new station.

[106] City of Vancouver, *Facilities Strategic Plan*, Update for 2003-2005 Capital Plan, Volume 1.

Age	Fire Hall
0–5	15
6–10	3, 13, 18
11–15	None
16–20	4, 6, 12
21–25	21
26–30	10, 14, 22
31–35	2, 8, 19
36–40	1, 7, 20
>40	5, 9, 17

The median age of all stations is 27 years and 45 percent of the current facilities, not including Fire Hall 15, are above the median age.

Following are brief descriptions of each facility and the recommendations for deployment modifications recommended by this study. A suggested schedule to renovate or replace those halls which are getting beyond their useful life span is presented at the end of this section.

Fire Hall 1: 900 Heatley Avenue

Constructed: 1973

Current Resources: Engine; Ladder; Battalion Chief; Clothing Wagon; 9 personnel

Proposed Resources: Engine; Ladder, Battalion Chief; Safety/ Training Officer; Peak Rescue; Personnel - 12 weekdays; 10 nights/ weekends

Facility: Adequate; Renovation within the next two or three capital planning periods (2015 to 2017 or 2018 to 2020)

Fire Hall 2: 199 Main Street

Constructed: 1975

Current Resources: Quint; Rescue; 6 personnel

Proposed Resources: Engine; Rescue 24/7; Rescue weekdays; Personnel - 8 weekdays; 6 nights/ weekends

Facility: Adequate; Renovation within the two or three capital planning periods (2015 to 2017 or 2018 to 2020)

Fire Hall 3: 2801 Quebec Street

Constructed: 2000

Current Resources: Engine; Quint; Hazmat; 8 personnel

Proposed Resources: Engine; Quint; Hazmat; Personnel - 8

Facility: Adequate

Fire Hall 4: 1475 W. 10th Avenue

Constructed: 1992

Current Resources: Quint; Rescue; Reserve Hazmat; Personnel - 6

Proposed Resources: Engine; Rescue; Hazmat; Personnel - 6

Facility: Adequate

Fire Hall 5: 3090 E. 54th Avenue

Constructed: 1949

Current Resources: Engine; Ladder; Wild-land; Personnel - 8

Proposed Resources: Quint; Wild-land; Personnel - 4

Facility: Inadequate - Proposed by VFRS for renovation in 2009-2011

Fire Hall 6: 1001 Nicola Street

Constructed: 1912 (renovated 1990)

Current Resources: Engine; Quint; Personnel - 8

Proposed Resources: Engine; Quint; Personnel - 8

Facility: Fair; Replacement in next three or four capital planning periods (2018 to 2020 or 2021 to 2023)

Fire Hall 7: 1090 Haro Street

Constructed: 1973

Current Resources: Engine; Ladder; Technical Rescue; Personnel - 8

Proposed Resources: Engine; Ladder; Peak Rescue; Personnel - 10 weekdays; 8 nights/ weekends

Facility: Adequate

Fire Hall 8: 895 Hamilton Street

Constructed: 1974

Current Resources: Engine; Rescue; Wild-land; Personnel - 6

Proposed Resources: Engine; Rescue; Wild-land; Personnel - 6

Facility: Adequate; Renovation in next three or four capital planning periods (2018 to 2020 or 2021 to 2023)

Fire Hall 9: 1805 Victoria Drive

Constructed: 1959

Current Resources: Quint; Rescue; Command Unit; Personnel - 6

Proposed Resources: Quint; Rescue; Command Unit; Personnel - 6

Facility: Poor; Consider for replacement in next two or three capital planning periods (2015 to 2017 or 2018 to 2020)

Fire Hall 10: 2992 Wesbrook Mall (UBC)

Constructed: 1983

Current Resources: Engine; Tower; Ambulance; Hazmat; Personnel - 8

Proposed Resources: Engine; Tower; Ambulance; Hazmat; Personnel - 8

Facility: Adequate

Fire Hall 12: 2460 Balaclava Street

Constructed: 1989

Current Resources: Engine; Quint; Personnel - 8

Proposed Resources: Engine; Quint; Personnel - 8

Facility: Adequate

Fire Hall 13: 4013 Prince Albert

Constructed: 2002

Current Resources: Quint; Personnel - 4

Proposed Resources: Quint; Personnel - 4

Facility: Very Good

Fire Hall 14: 2804 Venables Street

Constructed: 1982

Current Resources: Engine; Personnel - 4

Proposed Resources: Engine; Quint weekdays; Personnel - 4 nights/ weekends; 8 weekdays

Facility: Adequate

Note: The quint located at Fire Hall 14 is assigned here administratively; however, the unit may not be located here most of the time.

Fire Hall 15: 3003 E. 22nd Avenue

Constructed: 1913

Current Resources: Engine; Quint; Personnel - 8

Proposed Resources: Engine; Ladder; Personnel - 8

Facility: Poor; new station being built on the present site at a projected cost of $9M - $10M

Fire Hall 17: 7070 Knight Street

Constructed: 1954

Current Resources: Engine; Rescue; Personnel - 6

Proposed Resources: Engine; Rescue; Engine weekdays; Personnel - 6 nights/ weekends; 10 weekdays

Facility: Inadequate; high priority for replacement within the next two capital planning periods (2012 to 2014 or 2015 to 2017)

Note: The weekday engine at Fire Hall 17, like the quint at 14, is assigned here administratively. However, the engine is expected to be used to fill in at other stations most of the time.

Fire Hall 18: 1375 W. 38th Avenue

Constructed: 1999

Current Resources: Engine; Ladder; Battalion Chief; Personnel - 9

Proposed Resources: Engine; Ladder; Technical Rescue; Battalion Chief; Personnel - 9

Facility: Excellent

Fire Hall 19: 4396 W. 12th Avenue

Constructed: 1978

Current Resources: Quint; Wild-land; Personnel - 4

Proposed Resources: Engine; Wild-land; Personnel - 4

Facility: Fair

Fire Hall 20: 5402 Victoria Drive

Constructed: 1961

Current Resources: Quint; Battalion Chief; Personnel - 5

Proposed Resources: Engine; Battalion Chief; Personnel - 5

Facility: Poor; high priority for replacement within the next two capital planning periods (2012 to 2014 or 2015 to 2017)

Fire Hall 21: 5425 Carnarvon Street

Constructed: 1984

Current Resources: Quint; Rescue; Personnel - 6

Proposed Resources: Quint; Rescue; Personnel - 6

Facility: Adequate

Fire Hall 22: 1005 W. 59th Avenue

Constructed: 1981

Current Resources: Engine; Rescue; Air-Light Unit; Personnel - 6

Proposed Resources: Engine; Rescue; Air-Light Unit; Engine weekdays; Personnel - 6 nights/ weekend; 10 weekdays

Facility: Fair; renovation next three or four capital planning periods (2018 to 2020 or 2021 to 2023)

Following is a suggested schedule to replace or upgrade eight facilities requiring the most attention. Of these, Fire Halls, 17, 20, and 9 are the ones needing the most immediate attention, although Fire Hall 9 is less urgent than 17 and 20.

For the distinction between whether a facility should be renovated or replaced, we considered its age, overall condition, and size. Other factors such as the cost of renovation versus the cost for new construction should be considered before making the final decision.

Table 65: Facility Improvement Schedule

Facility	2012–2017	2015–2020	2018–2023
Immediate Priorities			
Fire Hall 17 Replacement High Priority	*		
Fire Hall 20 Replacement High Priority	*		
Fire Hall 9 Replacement Moderate Priority		*	
Other Needs			
Fire Hall 1 Renovation		*	
Fire Hall 2 – Renovation		*	
Fire Hall 6 – Replacement			*
Fire Hall 8 – Renovation			*
Fire Hall 22 – Renovation			*

Older fire halls and even a few newer ones are small and there is little room to maneuver newer fire apparatus which tend to be larger anyway. Even if the city buys smaller apparatus, which it should, current halls have very little extra floor space. Obviously, the density of the city's building stock makes space a premium.

New stations and those being renovated should be built such that flexibility is considered in the plans. Whenever possible, new stations should have at least two bays with a depth large enough to accommodate at least one aerial ladder. Even if an aerial ladder is not assigned there initially, it may be in the future or there may be the need to place one there temporarily or as a reserve. As it stands now, there is very little flexibility on where apparatus can be located. Although drive-through bays are not possible in most areas of the city, particularly downtown, making stations larger even without drive-through bays is a cost efficient in the long run.

Recommendation 84: Begin preparations to replace Fire Halls 17 and 20 at or near their present sites within 5 years and Fire Hall 9 within 10 years.

Recommendation 85: Begin preparations to add extra weekday rescue staffing at Fire Halls 1, 2, and 7. At the same time, prepare for extra weekday crews at Fire Halls 14, 17, and 22.

Recommendation 86: Begin preparations to relocate technical rescue from Fire Hall 7 to 18.

VIII. PRIORITY AND COST OF RECOMMENDATIONS

To assist the fire department with its assessment of this study, we present the goals and recommendations in a table where each is evaluated against the same criteria. The criteria used are as follows:

1. What is the overall value of the goal or recommendation to the community? Does it improve the level of fire or emergency medical service provided to the community? Is it likely to reduce dollar losses, deaths or injuries significantly?
2. What is the overall value of the goal or recommendation to the VFRS as an organization? For example, does it contribute to organizational or operational effectiveness, firefighter safety, or employee welfare? Unless these contribute significantly to deaths, injuries, or dollar loss directly or indirectly, they are generally less important than those above.
3. What is the overall level of difficulty to implement the goal or recommendation? Can it be implemented quickly, or is there a long and difficult planning process involved? A goal or recommendation may be very important to do even if difficult, so again importance is paramount.
4. What is the overall cost to implement the goal or recommendation? Is the cost a one-time expenditure, or does it require repeated funding? The costs should be interpreted as cost-efficiency or value for money. Of course some ideas may not be feasible if the absolute dollar cost is too high.

It is useful to go through this exercise of valuations even if not perfect. Ultimately good judgment is needed as to the most important and most feasible recommendations. As such, one should not be a prisoner of these rating scales.

Criteria Defined

The scale used to rate each criterion is 1–5, with 5 the best. More specifically, the definition for each criterion is as follows:

Value of Recommendation to the Community – Strategic goals or recommendations with very high values to the community would be those with the potential to significantly improve service delivery such as adding a new service or improving an existing one that improves public safety in terms of reduced deaths, injuries, or dollar loss. An example may be a recommendation that has the potential to significantly reduce response time. A value judgment score of five means the recommendation has very high potential to improve

community safety and emergency service delivery. Conversely, a judgment value of zero means the goal or recommendation will have no impact on community safety.

Value of Recommendation to the VFRS – Strategic goals or recommendations with a very high value to the VFRS are those that improve daily operations, improve efficiency and effectiveness, or change the department's culture and management in a positive way. These can also be recommendations that are perceived by firefighters as improving their quality of work life or that improve their safety and health. A value judgment score of five means the goal or recommendation has the highest potential to improve the VFRS organization; a score of zero means the recommendation will have no impact on the department.

Level of Difficulty to Implement – Strategic goals or recommendations with a high level of difficulty to implement are those that have long planning cycles, require significant changes to infrastructure, changes to codes or labour agreements, or require major policy changes. Goals or recommendations with a judgment value score of zero means the recommendation has an extreme level of difficulty to implement; a score of five means there is no difficulty.

Cost of Implementation – Strategic goals or recommendations with high implementation costs are those requiring significant capital outlays like new fire halls, land purchases, or large recurring general fund costs such as additional personnel. A recommendation that requires only a minor change in VFRS policy, for example, would likely have a low cost of implementation. Goals or recommendations with a judgment value score of five means that it has no implementation cost; a score of zero means that it has an extremely high cost to implement.

Scoring – For each goal or recommendation a value judgment was made using the four evaluation criteria above and a numerical score was assigned. The score ranges are shown in Table 66.

Table 66: Criteria Scoring Range

Criteria	Low Score (Poorest)	High Score (Best)
Value to the Community	No Value = 0	Extreme Value = 5
Value to the VFRS Organization	No Value = 0	Extreme Value = 5
Level of Difficulty to Implement	Extreme Difficulty = 0	No Difficulty = 5
Cost of Implementation	Extreme Cost = 0	No Cost = 5

For example, a recommendation with the highest possible value to VFRS and to the community would have a combined score of 10.0 for benchmarks 1 and 2. If the same recommendation had the lowest "level of difficulty to implement", and it also had little (or no) cost to implement, its total score would be 20 points. Divided by the four benchmarks, the

recommendation would be assigned a relative composite score (average) of five. Such a recommendation would be considered to be the highest priority because it could be implemented easily and economically; it would also be of significant to the community and to the fire department.

The information in Table 67 includes the strategic goals and recommendations listed by the chapters of the report. For ease of reference, recommendations are also numbered the same in this section as they are in the report.

Table 67: Strategic Goals and Recommendations – Priority Ranking for VFRS Consideration

Administration and Support	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
Strategic Goals						
1. Expand the training for senior fire managers to include topics such as finance and budget, human resource management, data analysis and the use of computer systems.	19	3	5	4	4	4.0 High Priority
2. Cooperatively, management and labour should evaluate the promotional process, which at some point should be adjusted to include college-level coursework as part of career development.	19	3	4	2	4	3.3 Moderate Priority
3. Transition management accountability such that senior fire leaders assume more responsibility for managing their respective budgets, personnel, and line items; also realign the budget to reflect the table of organization.	19	3	4	3	5	3.8 Moderate Priority
4. Improve the flow of information within the organization; top-down and bottom-up.	19	4	3	4	5	4.0 High Priority
5. Reorganize the IT function internally and establish an IT plan to monitor major activities. At the same time, improve incident data analysis, and adopt performance measures for the same activities.	20	3	4	3	4	3.5 Moderate Priority
6. Reorganize the fire department, including the functions within administration and support.	20	2	4	3	3	3.0 Moderate Priority
Recommendations						
1. Fill the vacancies for Clerk II and Clerk Typist II.	22	1	4	5	2	3.0 Moderate Priority
2. Through attrition, replace the current fire captain in charge of facilities with a civilian.	22	0	2	3	5	2.5 Low Priority
3. Include deputy chiefs in the budget development process by having them prepare (and defend) budgets for their respective divisions.	23	2	4	4	5	3.8 Moderate Priority

Administration and Support	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
4. Revise the organization of the operating budget so that funding levels for each function are reflective of what is needed to provide the desired level of service, rather than having overtime, say, for one function in another program budget. At the same time, realign the operating budget such that it includes the specific programs within each cost center.	24	3	4	4	4	4.0 High Priority
5. Evaluate (and purchase) available software products for time and attendance reporting and scheduling specifically designed for fire departments.	25	1	3	5	4	3.5 Moderate Priority
6. Establish an Information Technology Steering Committee made up of top officers and managers from all departmental functions to develop a long range IT plan, establish IT priorities and monitor IT activities.	25	2	5	5	5	4.3 High Priority
7. Incorporate, as a first step in planning new software systems for use in VFRS, evaluation of the potentially suitable computer systems already used (or planned) in other city departments.	25	2	4	4	4	3.5 Moderate Priority
8. Create a planning section under Support Services. This section should include the current IT staff, a GIS analyst, and a staff analyst.	26	4	5	3	4	4.0 High Priority
9. Reorganize HR under Support Services with the individual responsible for HR activities reporting to the AGM.	26	1	5	4	5	3.8 Moderate Priority
10. Fire management should create direct channels of communication to firefighters through monthly news letters and impromptu visits to fire halls where they meet informally to discuss topics of interest to firefighters.	27	2	5	5	4	4.0 High Priority
11. Have managers of each function and other individuals involved in the SP process develop possible performance metrics and best practices for their area.	36	2	3	4	4	3.3 Moderate Priority
12. Use the CPSE guidebook as part of the SP process.	36	1	2	1	5	2.3 Low Priority

Response Time, Fire Hall and Apparatus Location Analysis	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
Strategic Goals						
1. Discuss with community leaders and local government officials the desired performance measures for fire and EMS response times.	79	5	5	5	5	5.0 Highest Priority
2. Implement a method for tracking unit reliability.	80	4	5	3	5	4.3 High Priority
3. Prepare a monthly response time report and distribute the report department wide.	80	4	5	4	4	4.3 High Priority
4. Conduct an annual performance review for entire system and each planning area.	80	5	5	5	5	5.0 Highest Priority
Recommendations						
13: Expand the data transmitted and analyzed to include other activities, e.g., primary search complete; ventilation completed; extinguishment started (complete) and begin tracking vertical response time as part of incident data collection, especially for medical calls.	84	4	4	3	5	4.0 High Priority
14: Revisit the analysis of dispatch and turnout times and take the necessary steps to improve them where possible. At the same time, establish a performance goal for each time segment and assess them monthly. For turnout times, evaluate the performance by fire hall (and shift).	89	4	3	4	5	4.0 High Priority
15: Use NFPA 1710 (and other standards) to develop performance goals, but consider each planning area on the merits of its particular situation.	95	3	2	4	5	3.5 Moderate Priority
16: Relocate Fire Hall 17 slightly north and west of its present location.	118	5	3	3	2	3.3 Moderate Priority
17: Evaluate whether Fire Hall 5's area can be extended to improve performance in 15's area since Fire Hall 15 is already being renovated on its present site.	118	5	4	5	5	4.8 Highest Priority

Response Time, Fire Hall and Apparatus Location Analysis	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
18: If future demand warrants, consider adding a new station (23) west of Fire Hall 21.	118	5	3	2	2	3.0 Moderate Priority
19: Deploy five aerial ladders city-wide, one each at Fire Halls 1,7,18, 19, and 20. Until Fire Hall 20 is rebuilt, maintain the aerial ladder at Fire Hall 5.	121	4	4	5	5	4.5 Highest Priority
20: Deploy seven rescues 24/7 at Fire Halls 2, 4, 8, 9, 17, 21, and 22. For weekday periods add three rescues, one each at Fire Halls 1, 2 and 7. As an alternative, the rescue at 1 might be located at 3.	124	5	5	4	3	4.3 High Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
Strategic Goals						
1. Improve the organizational structure by realigning the command structure of operations and modify the budget to reflect actual costs.	137	3	5	5	5	4.5 Highest Priority
2. Add rescues during weekdays to handle the growing number of medical calls and add fire units to replace those that are unavailable because of training.	137	5	5	3	5	4.5 Highest Priority
3. Improve incident command, incident-scene safety, and increase the response complements sent on high-risk hazards.	137	4	5	5	5	4.8 Highest Priority
4. Improve hands-on and live-fire training and increase the capacity to conduct training on each of the four shifts.	137	2	4	3	4	3.3 Moderate Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
5. Reorganize the training division to include EMS and fire training programs.	137	2	5	3	5	3.8 Moderate Priority
6. Strengthen emergency preparedness, USAR, and special operations by reorganizing the management structure; at the same time change the fire hall responsible for technical rescue and expand technical rescue capabilities to include confined space and collapse rescue.	137	5	5	3	4	4.3 High Priority
Recommendations						
21: Eliminate quints and replace them with engines in some halls throughout the city.	147	0	1	5	5	2.8 Low Priority
22: Consider revising the vacation and leave selection policy to provide greater flexibility for shift personnel as a way to reduce sick leave use.	152	0	4	3	4	2.8 Low Priority
23: Evaluate the cause of the high sick leave use.	152	0	5	4	5	2.8 Low Priority
24: Consider 5.47 to be the department's staffing factor until such time as updated leave data is available, then revise the factor accordingly.	154	0	4	5	5	3.5 Moderate Priority
25: Increase the value and contribution of battalion chiefs and have them become the risk managers for their geographical area.	155	3	4	4	5	4.0 High Priority
26: Consider reassigning four assistant chief positions from their weekday assignments to command each of the four shifts.	156	2	5	4	5	4.0 High Priority
27: Create a safety/ command adjunct position for each of the four shifts.	157	3	5	4	3	3.8 Moderate Priority
28: Develop and implement a standardized preplan policy that is available electronically, and train all personnel on its use.	157	4	5	4	4	4.3 High Priority
29: Increase the weight of response for confirmed incidents at high-hazard occupancies; also when the incident requires a second or greater alarm.	159	4	5	4	4	4.3 High Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
30: Revise the policy-writing and review process. Assign battalion chiefs and even captains to coordinate the review and update of some policies; also include the union in the review process.	160	1	4	3	5	3.3 Moderate Priority
31: Develop a comprehensive move-up system for each department in the region. Consider renumbering apparatus in the region so operations can easily be integrated without confusion.	160	5	4	2	5	4.0 High Priority
32: Work toward eliminating the duplication of special services in the region. Develop a plan for certain cities to provide the nucleus of hazmat and technical rescue services to other communities.	161	2	4	1	4	2.8 Low Priority
33: Modify the fire suppression resources to include 16 engines, 7 quints, and 5 ladders (This is a change from the current deployment of 13 engines, 10 quints and six ladders).	164	3	3	4	4	3.5 Moderate Priority
34: Change the responsibility for vehicle extrication and heavy rescue from the rescues to the ladders and quints.	165	5	5	4	4	4.5 Highest Priority
35: For calls with confirmed patient entrapments, a minimum response should be three units including one engine (or quint), one ladder, and one rescue.	165	5	3	3	5	4.0 High Priority
36: Consider adding a weekday 'peak-load shift' with a five-shift configuration.	167	5	5	2	5	4.3 High Priority
37: Reorganize special operations and USAR under one of the deputy chiefs, with an assistant chief being responsible for both functions. Include other related functions such as the DFPS and emergency preparedness, which are mostly planning and education.	171	2	5	3	5	3.8 Moderate Priority
38: Conduct a full review of the USAR program, including its total cost, with an eye on having more of the cost transferred to the federal government and Province.	171	2	4	3	5	3.5 Moderate Priority
39: Transfer the responsibility for technical rescue from Fire Hall 7 to a less busy and more centrally located hall.	173	3	5	2	4	3.5 Moderate Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
40: Assign each of the five ladders to be a technical rescue satellite company and dispatch them with 18 on the appropriate calls.	173	5	5	4	4	4.5 Highest Priority
41: Review whether Emergency Management should be reorganized, possible under the mayor's office.	175	3	1	4	5	3.3 Moderate Priority
42: Consider consolidating the grant-writing process under one agency in central government.	175	0	2	3	4	2.3 Low Priority
43: Maintain the hazmat deployment model used now but keep the units at the specialty fire halls together whenever possible.	175	0	3	3	5	2.8 Low Priority
44: Conduct a thorough review of all special operations/ USAR procedures.	175	2	4	4	5	3.8 Moderate Priority
45: Identify a backup person for the special operations chief. Preferably, this individual should be a chief officer; however, a captain could also 'act' in the capacity when the battalion chief is unavailable.	175	0	2	4	5	2.8 Low Priority
46: Replace the current technical rescue vehicle.	175	4	4	5	3	4.0 High Priority
47: Consider replacing the current DFPS coordinator, who is a lieutenant, with a civilian position when the incumbent retires.	177	1	1	5	5	3.0 Moderate Priority
48: VFRS should continue its active involvement with the management of the province MPDS program.	180	3	4	5	5	4.3 High Priority
49: Combine the EMS chief and training chief into one assistant fire chief for Training and EMS.	181	2	5	5	5	4.3 High Priority
50: Continue the excellent citizen CPR program already in place and collect data on its overall success.	182	5	5	5	5	5.0 Highest Priority
51: Upgrade the current scope of EMS practice to include blood pressure assessment, administration of inhaled bronchodilators, aspirin, and sublingual nitroglycerin.	182	5	4	3	3	3.8 Moderate Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
52: Consider upgrading rescue lieutenants from EMA-3 to EMR providers.	183	0	3	3	4	2.5 Low Priority
53: VFRS should work with the Ministry to combine the basic EMA and modular written recertification exam into a single examination.	184	0	4	4	4	3.0 Moderate Priority
54: When peak-load rescues are added to high-demand areas downtown, consider using a "rescue first" policy for MPDS Level C and D calls.	185	4	4	3	5	4.0 High Priority
55: Initiate a future study to determine the full cost of delivering medical service by the city's seven rescues and the extent to which VFRS services would need to be altered if rescues were eliminated.	185	3	5	4	4	4.0 High Priority
56: Merge the training division with that of the former EMS assistant chief responsibilities under one assistant chief.	187	2	5	5	5	4.3 High Priority
57: Change the schedule for TOs to four 12-hour days with four days off between.	188	0	1	3	4	2.0 Low Priority
58: Create a formal program for driver training and emergency vehicle operation.	188	5	4	5	4	4.5 Highest Priority
59: Continue to require prospective firefighters to possess fire and EMS certifications prior to employment.	190	0	5	5	5	3.8 Moderate Priority
60: Consider increasing the officer qualifications to Fire Officer I for lieutenants, Fire Officer II for captains, and Fire Officer III for battalion chiefs.	191	2	4	5	4	3.8 Moderate Priority
61: Add a training administrator position with the rank of captain. To get the right individual, the position should probably be filled outside the seniority-based promotion system.	192	1	4	4	4	3.3 Moderate Priority
62: Negotiate a change to the 30-day rule for assigning ATOs to training.	192	0	5	4	5	3.5 Moderate Priority
63: Add four shift instructors who would be the primary instructors for driver training.	192	3	5	5	4	4.3 High Priority

Fire Operations, EMS, and Training	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
64: Increase the use of distributive education for fire and EMS continuing education.	194	0	5	3	4	3.0 Moderate Priority
65: The fire chief should commission an internal panel to determine the future needs for VFRS training.	194	0	4	5	5	3.5 Moderate Priority

Fire Prevention, Investigation, and Public Education	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
Strategic Goals						
1. Move fire/arson investigation under the fire prevention division with fire code enforcement and public education.	197	3	5	5	5	4.5 Highest Priority
2. Improve technical expertise within prevention by requiring increasing levels of NFPA or comparable certifications as technical qualifications for all positions and for promotions within fire prevention.	198	3	5	3	4	3.8 Moderate Priority
3. Institute fire prevention as a core service of VFRS by establishing a continuous training program for operational officers and fire fighters in fire inspection, fire education and fire and arson investigation. Require NFPA or comparable certification in these disciplines as requirements for promotion to and within the fire operational officer ranks.	198	5	5	5	4	4.8 Highest Priority
4. Improve the use of data to determine code enforcement priorities, to analyze results, to establish consistent high quality standards for fire code enforcement, education and investigation efforts both within fire prevention and fire operations.	198	5	5	4	4	4.5 Highest Priority

Fire Prevention, Investigation, and Public Education	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
5. Reduce the cost of prevention by allowing for the hiring of both certified uniform and civilian personnel in many if not all fire prevention positions.	198	5	5	3	4	4.3 High Priority
Recommendations						
Hire a fire protection engineer and eliminate the training officer.	205	5	5	5	4	4.8 Highest Priority
Move responsibilities for training on the by-laws and inspection techniques to the FPE.	205	2	4	4	5	3.8 Moderate Priority
Return back to fire prevention the plan review workload that had been moved in 2006 from fire to the development services staff review group (PCB Fire).	205	4	4	4	5	4.3 High Priority
Move the review of all plans for fire alarms, fire sprinklers, fire pumps, standpipes, cooking hoods and other fire-related (e.g., smoke evacuation systems) and suppression systems to fire.	205	4	4	4	5	4.3 High Priority
Create a new function, Fire Plan Review & Construction Inspection, headed by the fire protection engineer with the captain for plan reviews and the occupancy inspector assigned.	205	4	5	4	5	4.5 Highest Priority
66: Eliminate one district captain (currently vacant). The number of inspectors does not justify three captains for supervision.	209	2	4	4	5	3.8 Moderate Priority
67: Eliminate the lieutenant position in customer service and reassign his duties to other individuals.	218	2	4	3	5	3.5 Moderate Priority
68: Staff schedules should be adjusted to allow for non-overtime inspections of late night, week end and after hour club fire inspections.	219	4	4	4	5	4.3 High Priority
69: Move the responsibility for issuing most if not all permits to the plan review and construction inspection section.	219	4	2	3	5	3.5 Moderate Priority

Fire Prevention, Investigation, and Public Education	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
70: Reconsider the need for the captain, special events, after the 2010 Olympics.	219	3	2	5	5	3.8 Moderate Priority
71: Move investigations into the same section with inspection and public education, which is typically where departments place this function.	221	3	3	4	5	3.8 Moderate Priority
72: Improve documentation and collect data on investigation unit activity levels and on the incidents that are investigated including the actual time spent on investigations, the time of day and days of the week when most investigations occur, the degree of fire extension upon arrival, modus operandi, motives, victims, use of accelerants, and so forth.	223	4	4	3	5	4.0 High Priority
73: Hire an outside consultant to look into the reason for the low number of cases being brought to trial.	225	2	4	5	4	4.0 High Priority
74: Increase the training effort such that all investigators meet Level 2 with advancement to Level 3.	226	3	5	4	4	4.0 High Priority
75: Increase the number of fulltime public educators to four or five.	228	5	5	5	4	4.8 Highest Priority
76: If not already done, whenever there is a change in ownership or occupancy in the households reached through home-safety visits, it would be a good idea to update the database periodically, and revisit the properties if new occupants move in.	228	5	2	5	5	4.3 High Priority
77: Expand the home safety program and target the effort to visit every un-sprinkled residential property over a five year period, using line firefighters and neighbourhood volunteers to delivery fire safety message, test smoke alarms.	229	5	4	5	5	4.8 Highest Priority
78: Consider setting up a 'fire-safe home' request hotline where needy residents could call in their request for a smoke alarm, which would then be followed up by the fire hall closest to the residence.	229	5	4	5	5	4.8 Highest Priority
79: Provide free 10-year tamper proof smoke alarms where the occupant cannot afford them or is unlikely or unable to install them.	230	5	2	5	5	4.8 Highest Priority

Fire Apparatus and Facilities Assessment	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
Strategic Goals						
Reduce the initial cost of apparatus through less detailed specifications for engines, ladders, rescues, and quints.	234	4	3	3	4	3.5 Moderate Priority
Reduce the number of quints in the fleet.	234	1	2	4	5	3.0 Moderate Priority
Use smaller vehicles for medical rescue calls.	234	3	5	4	5	4.8 Highest Priority
Extend the current vehicle replacement timeline for several years beyond 2013 for rescues and quints.	234	3	0	3	5	2.8 Low Priority
Increase apparatus floor space to accommodate larger apparatus and the possibility of apparatus relocations; also storing reserve apparatus.	234	0	5	1	3	2.3 Low Priority
Replace the two most critical fire halls (17, 20) within the next two capital planning periods (2012 to 2014 and 2015 to 2017).	234	4	4	4	2	3.5 Moderate Priority
Replace Fire Hall 9 in the next two or three capital planning periods (2015 to 2017 or 2018 to 2020)	234	4	4	4	2	3.5 Moderate Priority
Develop plans to renovate Fire Halls 1 and 2 within the two or three capital planning periods (2015 to 2017 or 2018 to 2020).	234	4	4	4	2	3.5 Moderate Priority
Develop plans to replace Fire Hall 6 and renovate Fire Halls 8 and 22 within the next three or four capital planning periods (2018 to 2020 or 2021 to 2023).	234	4	4	4	2	3.5 Moderate Priority
Recommendations						
80: Review the specifications for each type of apparatus being purchased and try to adjust or eliminate vehicle features that require excessive customization or eliminate vendors that might otherwise be competitive.	241	3	4	5	5	4.3 High Priority

Fire Apparatus and Facilities Assessment	Page No.	Community Value	VFRS Value	Implementation Difficulty	Cost to Implement	Composite Scores/ Priority
81: Replace the current rescues with smaller vehicles equipped for their primary mission, which is medical response.	242	3	4	5	5	4.3 High Priority
82: Continue to purchase single-axle quints.	244	3	5	5	5	4.5 Highest Priority
83: Consider other vehicle options when the cost of standardization becomes disproportionate to the benefit gained.	244	3	3	4	4	3.5 Moderate Priority
84: Begin preparations to replace Fire Halls 17 and 20 at or near their present sites within 5 years and Fire Hall 9 within 10 years.	256	4	4	4	2	3.5 Moderate Priority
85: Begin preparations to add extra weekday rescue staffing at Fire Halls 1, 2, and 7. At the same time, prepare for extra weekday crews at Fire Halls 14, 17, and 22.	256	5	5	3	4	4.3 High Priority
86: Begin preparations to relocate technical rescue from Fire Hall 7 to 18.	256	3	4	3	3	3.3 Moderate Priority

Composite Scores and Implementation Priority – Deciding which recommendation to implement first is an important consideration. One way is to separate the average judgment value scores into ranges as follows:

- Low Priority – 0 to 3.0
- Moderate Priority – 3.0 to 3.9
- High Priority – 4.0 to 4.4
- Highest Priority – 4.5 to 5.0

For VFRS which plans to initiate a strategic planning process following this study, the same evaluation process can be used by the planning group members with individuals scoring each goal and recommendation independently. Following that process, scores would be calculated to determine the overall group ranking. Because planning group members have a unique knowledge of the particular situations evaluated in this study, the ranking by planning group members is probably better than the rankings made by the study team. The group should also consider new goals and recommendations they think important.

Staffing Comparison and Cost Estimate of Recommendations – The following table shows the FTE staffing of VFRS at its present authorized strength as compared to the proposed staffing changes recommended by this study.

Table 68: VFRS Staffing Comparison

Division/ Section	FTE's Authorized	FTE's Proposed
Administration (Exempt)		
Fire Chief	1	1
Deputy Fire Chief (AGM)	4	3
Assistant Fire Chief	6	5
Assistant General Manager	1	1
Emergency Manager	1	1
Manager/ Finance	1	1
Manager/ Community Services	1	1
Fire Protection Engineer	0 (Vacant)	1
Administrative Assistant	2	2
Sub-total	17	16
Finance & Administration (CUPE 15)		
Payroll Supervisor	1	1
Storekeeper	3	3
Account Clerk II	1	1
Payroll Clerk II	1	1
Clerk III	2	2
Clerk/ Steno IV	1	1
Clerk Typist III	1	1
Clerk II	1 (vacant)	1
Clerk Typist II	2 (1vacant)	2
Clerk IV	1	1

Division/ Section	FTE's Authorized	FTE's Proposed
Driver/ Stores Worker	1	1
Sub-Total	15	15
Group 2 Fire Prevention		
Captain	5 (1 vacant)	4
Lieutenant	2	1
Inspector	17	17
Emergency Preparedness	2	2
Lieutenant		
Training	1 (Vacant)	0
Division Chief	4	4
Fire Instructor	1	1
EMS Instructor		
Pre-Planning		
Captain	1	1
Lieutenant	1	1
Building Maintenance		
Captain	1	1
Fleet Maintenance		
Assistant Master Mechanic	1	1[107]
Lead Mechanic	1	1[108]
Machinist Mechanic	5	6[109]
Fleet Analyst	0	1[110]
Public Education		
Captain	1	1
Firefighter	2 (2 vacant)	4[111]
Fire Investigation		
Captain	1	1
Recruitment	1	1
Lieutenant		
Sub-Total	47	48
Emergency Services (Group 1)		
Battalion Chief	12	12
Captain	80	80
Lieutenant	60	66
Rescue Officer	28	31
Firefighter	555	566

[107] Proposed staffing is based on a study conducted by Mercury Associates, Inc. which analyzed the fleet maintenance operation of VFRS. A copy of the report is available from the fire department.
[108] Ibid.
[109] Ibid.
[110] Ibid.
[111] Positions may be civilian.

Division/ Section	FTE's Authorized	FTE's Proposed
Fire Investigator	4	4
Sub-Total	739	759
New Positions		
GIS Technician	0	1
Staff Analyst	0	1
Shift Safety/ Training Officer	0	4
Training Coordinator (Captain)	0	1
Fleet Analyst	0	1
Sub-Total	0	8
Total FTE's	818	846

Many of the recommendations in this study can be implemented at little or no cost. However, recommendations such as building a new fire hall have significant cost implications. In the following section we provide the estimated cost for the most pressing capital facility projects and the cost (or savings) for the suggested personnel changes.

Table 69: Capital Facilities Project Cost Estimates and Suggested Planning Schedule

Project	Estimated Cost	Suggested Planning Period
Replace Fire Hall 17	$13,000,000	2012 to 2017
Replace Fire Hall 20	$9,000,000	2012 to 2017
Replace Fire Hall 9	$9,000,000	2015 to 2020
Renovate Fire Halls 1	$1,000,000	2015 to 2020
Renovate Fire Hall 2	$1,000,000	2015 to 2020
Replace Fire Hall 6	$1,000,000	2018 to 2023
Renovate Fire Hall 8	$1,000,000	2018 to 2023
Renovate Fire Hall 22	$1,000,000	2018 to 2023
Total Capital Cost	$34,000,000	-

The higher cost for replacing Fire Hall 17 ($4.0M) includes monies for land acquisition since we recommend the station be relocated to provide better overall coverage.

Table 70: Personnel (Operating) Cost Estimates[112]

Position	Cost Estimates
Administration (Exempt)	
Elimination of one deputy chief position	($176,000)
Elimination of one assistant chief position	($139,000)
Addition of one fire protection engineer position	$127,000
Addition of one GIS Technician	$99,700
Addition of one staff analyst	$112,000
Addition of one fleet analyst[113]	$112,000
Sub-Total	$135,000
Group 2	
Elimination of one captain position (fire prevention)	($119,000)
Elimination of one lieutenant position (fire prevention)	($109,000)
Elimination of one division chief position (training)	($143,000)
Addition of one machinist mechanic position[114]	$106,000
Addition of two public educator specialist positions	$206,000
Sub-Total	($59,000)
Emergency Services (Group 1)	
Addition of 20 firefighters for fifth shift	$1,450,000
Pay difference for promotion of six firefighters to lieutenant to implement fifth shift	$60,000
Pay difference for promotion of three firefighters to rescue officer to implement fifth shift	$45,000
Addition of four firefighters to implement shift training/ safety officer positions	$290,000
Pay difference for promotion of four personnel to shift training/ safety officer positions (firefighter to lieutenant)	$40,000
Addition of one training coordinator (captain)	$119,000
Sub-Total	$2,004,000
Grand Total	**$2,080,000**

If the entire slate of personnel changes were made, the additional cost would represent a 2.6 percent increase in the fire department's annual budget. A largest portion of the increase is $1.45M to add 20 personnel for three additional rescues and three fire units during weekdays.

[112] Includes salary and benefits only.
[113] Ibid.
[114] As recommended by Mercury Associates, Inc in its study of VFRS fleet maintenance.

APPENDIX A: RESPONSE TIME PERFORMANCE REPORT

Example Monthly Report

prepared by TriData

1 Memo

This is an example of a monthly report that could be distributed throughout the fire department. At the chief level, this report can be used to monitor performance and aid in decision making. The report is also useful at the company officer and firefighter level. By providing detailed breakdown of the number and types of emergency incidents for each unit, individual companies can tailor their training to the types of incidents they most commonly respond to. The turnout time results often lead to a healthy competition between units to improve times. Finally, it is important to provide some information back to those who collect the data to reinforce the importance of collecting accurate data.

1

2 Example Workload Analysis

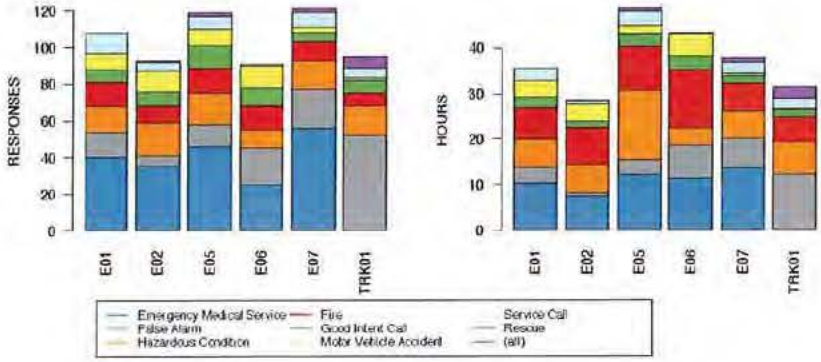

Figure 1: Responses by Unit

	E01	E02	E05	E06	E07	TRK01	(all)
Emergency Medical Service	40	35	46	25	56	0	202
False Alarm	14	6	12	20	21	52	125
Hazardous Condition	14	18	17	10	16	16	91
Fire	13	9	14	13	10	7	66
Good Intent Call	7	8	12	10	5	7	49
Motor Vehicle Accident	9	11	9	12	3	1	45
Service Call	11	5	7	1	8	6	38
Rescue	0	1	2	0	2	6	11
Other	1	0	0	2	2	1	6
(all)	109	93	119	93	123	96	633

Table 1: Unit Responses

	E01	E02	E05	E06	E07	TRK01	(all)
Emergency Medical Service	10.30	7.60	12.14	11.28	13.55	0.00	54.97
False Alarm	3.49	0.66	3.36	7.34	6.36	12.08	33.29
Hazardous Condition	6.13	6.34	15.29	3.88	6.04	7.27	44.95
Fire	6.94	8.03	9.49	12.85	6.16	5.38	48.85
Good Intent Call	2.41	1.34	2.95	2.81	1.63	1.60	12.74
Motor Vehicle Accident	3.65	3.78	1.84	5.10	0.50	0.15	15.02
Service Call	2.77	0.82	2.99	0.17	2.62	2.49	11.86
Rescue	0.00	0.07	0.70	0.00	0.95	2.46	4.18
Other	0.23	0.00	0.00	0.81	1.35	0.16	2.55
(all)	35.92	28.64	48.76	44.24	39.26	31.59	228.41

Table 2: Unit Hours

3 Example Turnout Analysis

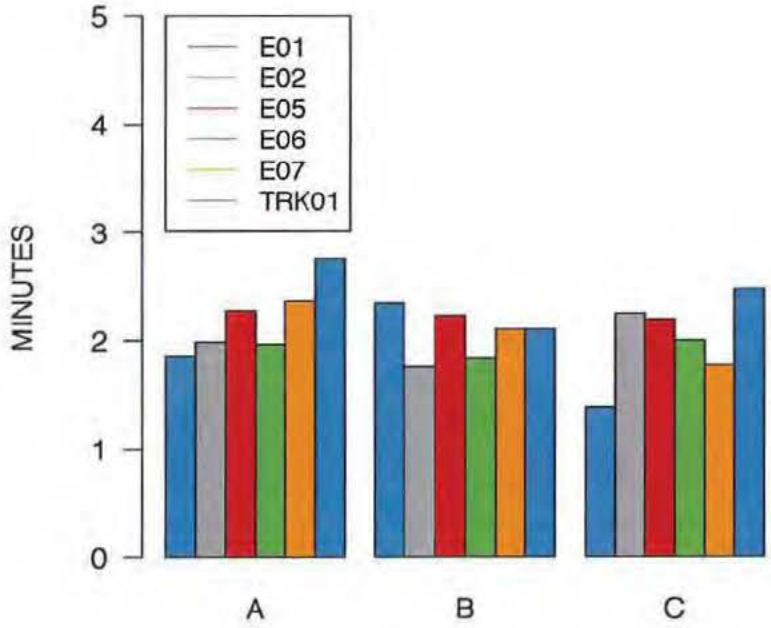

Figure 2: 80th Percentile Turnout Time by Shift and Unit

	E01	E02	E05	E06	E07	TRK01	(all)
A	1.85	1.99	2.28	1.97	2.37	2.76	2.20
B	2.35	1.76	2.23	1.83	2.10	2.10	2.06
C	1.39	2.25	2.20	2.00	1.77	2.48	2.02
(all)	1.86	2.00	2.23	1.93	2.08	2.45	2.09

Table 3: 80th Percentile Turnout Time by Shift and Unit

4 Example Response Time Analysis by Planning Area

	Call Processing	Turnout	Travel	Total Reflex	Complement
10th & Page	01:56	01:35	03:02	04:27	
Barracks Road	01:36	01:36	04:31	06:23	
Barracks/Rugby	01:36	01:24	05:13	05:58	
Belmont	00:56	02:20	04:09	05:59	06:26
Fifevile	00:52	02:14	04:02	05:36	08:57
Fry's Spring	01:01	02:12	05:02	07:04	
Greenbrier	00:45	01:26	06:01	06:27	
Jefferson Park Avenue	01:03	02:20	04:17	06:03	06:47
Johnson Village	00:56	01:31	04:24	05:37	
Lewis Mountain	01:02	01:24	04:08	05:25	07:31
Locust Grove	00:39	01:52	04:49	06:38	06:43
Martha Jefferson	00:49	01:55	03:57	05:50	06:31
North Downtown	01:05	01:57	02:43	05:03	06:48
Ridge Street	00:41	02:30	02:21	04:30	
Rose Hill	00:40	01:47	03:20	04:48	
Starr Hill	00:47	01:39	02:44	04:48	
The Meadows	01:04	01:36	03:46	04:53	
UVA	01:02	02:08	04:50	06:40	
Venable	00:59	02:24	04:34	06:27	07:31
Woolen MIlls	01:10	02:33	04:54	07:21	09:11
Goal @ 80th Percentile	1:00	1:00	4:00	6:00	10:00

Table 4: 80th Percentile Response Times by Planning Area

5 Example Response Time Analysis by Incident Type

	Call Processing	Turnout	Travel	Total Reflex	Complement
Emergency Medical Service	00:53	01:49	04:40	06:08	
False Alarm	01:03	02:22	04:21	06:07	07:02
Fire	00:55	01:56	04:24	05:48	08:34
Good Intent Call	01:09	02:11	03:53	05:33	07:08
Hazardous Condition	01:04	02:09	04:04	05:53	07:02
Motor Vehicle Accident	01:02	01:42	03:19	05:13	
Other	01:19	01:47	04:42	06:08	
Rescue	01:09	02:55	03:52	06:57	
Service Call	01:11	01:52	04:11	06:16	07:45
Goal @ 80th Percentile	1:00	1:00	4:00	6:00	10:00

Table 5: 80th Percentile Response Times by Planning Area

APPENDIX B: REQUEST FOR RELAXATIONS OF BY-LAWS

Vancouver is considering a request for relaxations to the Vancouver Building By-Laws that require smoke alarms in single room accommodation (SRA) suites with local alarms sounding in individual suites to instead signal an alert system on an enunciator panel that is dependent on supervisory personnel to hear, respond to and investigate prior to notifying VFRS of a problem.

In a report prepared by CFT Engineering, A Request for Building Law Relaxation for Replacement of Smoke Alarms with Combined Smoke/Heat Detectors in British Columbia Housing Operated SRO/SRA Hotels Vancouver, British Columbia, dated May 28, 2008, C5843, requests are made for a "relaxation to the Vancouver Building By-Law to allow smoke alarms required within single room accommodation (SRA) suites, to be replaced with a combined smoke/heat detector and sounder base which will be connected to the building's fire detection and alarm system." This request is being made because of the concern of the owner (the provincial government) "that the reliability of the smoke alarms installed within residential suites cannot be reasonably assured through regular inspection, testing and maintenance procedures required by the Vancouver Fire By-Law, due to the frequent severe damage and obstruction of smoke alarms by suite occupants."[115]

An additional relaxation is proposed that activation of the smoke detector within the suite would not sound a local alarm but would signal an alert at the supervisory fire enunciator (LCD display panel) which would trigger a response to the suite by supervisory personnel within 5 minutes. This requires approval from VFRS and a commitment letter indicating that a minimum of 2 staff would be onsite at all hours in order to respond to suites within 5 minutes of silenced smoke detector activation.[116]

The use classification of these buildings also deserves future scrutiny as they are currently classified as Group C major occupancy (residential), the same as a typical apartment, condominium, motel or hotel, yet the occupants are not typical of residential occupants. The occupants may more appropriately fall under either Group B, Division 1 occupancies (jail and detention quarters) with respect to vandalism or to Group B, Division 2 occupancies (care

[115] CFT Engineering, *A Request for Building Law Relaxation for Replacement of Smoke Alarms with Combined Smoke/Heat Detectors in BC Housisng Operated SRO/SRA Hotels Vancouver, British Columbia*, dated May 28, 2008, C5843, Introduction.
[116] CFT Engineering, *A Request for Building Law Relaxation for Replacement of Smoke Alarms with Combined Smoke/Heat Detectors in BC Housisng Operated SRO/SRA Hotels Vancouver, British Columbia*, dated May 28, 2008, C5843, Introduction.

facilities) for occupants with mental illnesses and drug additions.[117] If the use is determined to be Group B instead of Group C residential, the fire protection systems may be inadequate.

[117] CFT Engineering, *A Request for Building Law Relaxation for Replacement of Smoke Alarms with Combined Smoke/Heat Detectors in BC Housing Operated SRO/SRA Hotels Vancouver, British Columbia*, dated May 28, 2008, C5843, p. 5.

APPENDIX C: NUMBER OF BUILDING PERMITS ISSUED (VALUE IN MILLIONS)

Occupancy Group	2005	Value	2006	Value	2007	Value	2008	Value
Occupancy Groups Inspected by Fire								
Assembly – New	13	123	7	52	7	259	8	50
Assembly – Additions	4	10	1		1		8	38
Assembly – Alterations	241	62	252	81	208	85	312	160
Assembly Sub-Total	258	195	260	113	216	344	328	248
Institutional – New			2	1	1	3	2	9
Institutional – Additions					1	1	1	5
Institutional – Alterations	39	21	58	39	44	9	51	23
Institutional Sub-Total	39	21	60	40	46	13	54	37
Residential – Apartments – 3 storeys –New	9	6	12	12	5	2	8	9
Residential – Apartments – > 3 storeys – New	1	3	9	37	0	0	3	2
Residential Apartments Sub-Total	10	9	21	49	5	2	11	11
Business & Personal Services – New	9	144	5	47	2		4	27
Business & Personal Services – Additions					2	40	7	6
Business & Personal Services – Alterations	1267	120	1,289	109	1,022	120	1,009	166
Business Sub-Total	1,276	264	1,294	156	1,026	160	1,020	199
Mercantile – New	4	2	6	16	7	101	1	
Mercantile – Additions	4	2	0	0	0	0	4	4
Mercantile – Alterations	401	64	435	33	325	35	386	56
Mercantile Sub-Total	409	68	441	49	332	136	391	60
Industrial – New	32	80	10	27	7	43	5	5
Industrial – Additions							6	4
Industrial – Alterations	238	22	147	15	138	21	119	13
Industrial Sub-Total	270	102	157	42	145	64	130	22
Occupancy Groups Not Inspected by Fire								
Residential – One Family Dwellings – New	701	207	696	205	647	217	702	203
Residential – Two Family Dwellings – New	70	23	78	23	54	16	104	14
Others – New	63	868	68	692	86	1,453	56	506

Occupancy Group	2005	Value	2006	Value	2007	Value	2008	Value
Others – Additions	413	153	427	57	339	49	289	75
Others – Alterations	1,056	90	1,092	109	934	105	1,294	169
Sub-Total	2,303	1,340	2,361	1,086	2,060	1,839	2,445	966
Miscellaneous & Signs – New	644	23	671	22	497	19	745	21
Sub-Total	644	23	671	22	497	19	745	21
Demolitions	834	20	803	17	760	13	715	12
Sub-Total	834	20	803	17	760	13	715	12
Total Permits and Values	6,043	2,044	6,068	1,574	5,087	2,590	5,839	1,576
% Increase (Decrease) from Prior Yr.			0%	(23%)	(16%)	65%	15%	(39%)
% Increase (Decrease) from 2005			0%	(23%)	(16%)	57%	(3%)	(23%)
Number of New Prevention Inspectable Properties	121		98		110		76	

APPENDIX D: COMPUTATION OF AVAILABLE TIME FOR PRODUCTIVE WORK FOR FIRE PREVENTION UNIFORM EMPLOYEES

The Vancouver Firefighters' Union, Local 18 Group II – Fire Prevention

(Fire Prevention Inspectors, Officers, Training Officers, Asst. Training Officers & Division Chief Logistics and Safety)

Description of Activities:	Hours per Year Available for Productive Tasks
Local 18 Group II employees who work a 4-day 9.25 hours inclusive of a 30 minute lunch break (8.75 actual work hours per day * 4 work days per week = 35 work hours per week * 52 weeks per year = 1,820 work hours per year)	
Actual Work Hours per Year	1,820
(Less Hours of Approved Leave per Year)	
Vacation for 2 years of service through 24 and more years of service (15 days per year – 36 days per year @ 8.75 hours per day)	(131.25 – 315)
Supplementary Vacation (After 20 years of service, 28 additional calendar days are granted at each subsequent 5 year period. An average of 5.60 days per year or 53.20 hours per year was used.)	(0 – 53.20)
Holidays – 11 days per year (11 day/yr. 7 of hours worked per day)	(77)
Sick Leave (10 days is granted semi-annually after the 1st 6 months of employment. Used 8.75 hours * 20 days for maximum = 190.00)	(0 – 175)
Gratuity Leave (Effective Jan 1, 2005, 3 days per annum are granted for each year of service and may be accumulated up to 120 days. Only 1 gratuity leave may be taken annually of a minimum of 5 days and maximum of 20 days.)	(35 – 140)
Total Work Hours Available for Productive Work per Employee	1,576.75 – 1,059.8
% of Employee Available for Productive Work	87% – 58%
(Less Annual Training Hours Required for Fire Inspector Certification)	
Fire Inspector CEU (20 CEU hours per year)	
Firefighter CEU (if applicable)	
Other Training (if applicable) – Please specify	
Sub-Total of Work Hours for Fire Inspector	

APPENDIX E: EXISTING STOCK OF PREVENTION INSPECTIBLE STRUCTURES

Occupancy Classification	No. of Structures
Residential Occupancies	
Apartment Buildings	2,485
Hotels/Motels	119
Total Residential Occupancies	2,604
Restaurants & Entertainment Occupancies	
Restaurants with or without alcohol	1,539
Cafes (< 16 seats)	1,268
Restaurants with dancing	19
Total Restaurants & Entertainment Occupancies	2,826
Business Occupancies	
General Business/Office	7,973
Dentists	449
Laboratory	110
Total Business Occupancies	8,532
Mercantile Occupancies	
Retail Dealer with or without Food	4,613
Retail Dealer – Market Outlet	12
Repair Services	468
Food Retail – Supermarkets	44
Hardware/Building Materials	n/a
Wholesale	1,413
Total Mercantile Occupancies	6,550
Industrial Occupancies	
Warehouse	n/a
Manufacturing	686
Gasoline Sales – Service stations	89
Total Industrial Occupancies	775
Other Occupancies	
Private Schools	62
Private Hospitals	7
Schools	450
Total Other Occupancies	519
Total Prevention Inspectable Structures	21,806