

Surrey Fire Service

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“Fire Services Review Task Force”



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Executive Summary

Purpose of Study:

Residents of Surrey have the right to expect high-quality service, and the Surrey City Council has the obligation to provide high quality at an affordable cost.

Objective (S) of Study:

To reach a delicate balance of cost to quality, weight had to be given to the interests of the individual stakeholders against the broader interests of all the residents and taxpayers.

Recommendations:

Recommendations made through the use of charts and tables. Graphic illustrations were used to emphasize key issues. A summary of recommendations is contained in (Appendix F)

Conclusions:

The existing infrastructure was examined with a view toward improvement and weaknesses were identified, implementing, where applicable, new and safer procedures, while addressing value for money.

Mission Statement

The Surrey Fire Service is dedicated to protecting life, property and the environment by providing emergency response, regulatory compliance and community education. We do this through the involvement of employees, volunteers and the community. Our services enhance community safety for the City of Surrey.

Organizational Principles

- Maintain aggressive, offensive fire fighting tactics
- Support a safe, healthy, and diverse workplace that is open to change
- Provide emergency medical services, and environmental protection
- Establish a strong community relations program, particularly in the area of fire
- Prevention, public education, injury prevention, and emergency preparedness

City of Surrey Fire Services Review

Introduction

In January 2000, Surrey City Council requested a review of services provided by the Surrey Fire Services. The “Fire Services Review Task Force”, was established. This stakeholder group is representative of Council, City Manager, fire service administration, career, volunteer firefighters and other professional or technical advisors that were requested of the chair.

Role of The Task Force

- Identify perceived or real issues
- Address each issue and list potential solutions
- Raise profile and longevity of the volunteer component of Surrey Fire Department
- Ensure representation of the Task Force is representative of the key interest stake holders

Key Issues Identified by the Task Force

- Deployment of volunteer firefighters
- Four person staffing on pumper trucks
- Property loss in Surrey
- Analyze deployment of resources
- Analyze first responder program

Purpose

The purpose of this report is to address each of the key issues that have been identified by the Task Force. However the report would not be complete if it did not consider the benefits of automatic fire sprinklers as an alternative application to traditional Fire Services. A detailed explanation is contained in Appendix D.

City of Surrey Fire Services Review

Overview of Surrey Fire Service

The City of Surrey has a population of over 325,000 and covers 342 square kilometers or 132 square miles. The Fire Service is projecting to respond to 15,728 emergency incidents, comprising of 687 building fires, 10,716 combined motor vehicle/medical calls and 3,819 miscellaneous incidents (alarms, burning complaints etc.) in 2000. The annual operating budget for the Fire Service in 2000 is \$27,592,000.

Value of Fire Service

The provision of Fire Service within a City or Municipality is a decision of local government as is the level of service. The Municipal Act states a Council “may” provide the service, unlike pre-hospital care (Ambulance or Police) where it is established by senior governments. In jurisdictions where Fire Services are delivered, significant savings (Cost Avoidance) are realized by the taxpayer. The example below compares generally the cost avoidance in insurance savings that are realized by the taxpayer with the provision of Fire Services and without Fire Services and the difference after considering the expense of providing Fire Services to the taxpayer. This section was brought about from a query, is there a contribution to the Fire Service from the Insurance Industry? A detailed summary is contained in (Appendix E).

The costs avoided to the taxpayer through providing Fire Services in Surrey are equivalent to \$27,380,913 in insurance premiums reductions versus the premium that would be charged if no fire protection were provided.

Insurance Costs Saved With Fire Service Protection Versa No Fire Service Protection			
	With Fire Service	No Fire Service	Avoided Costs With Fire Service
Assessed Building Value	\$ 12,392,473,000	\$ 12,392,473,000	
1) Rate Increment (\$ 100,000)	\$ 123,924	\$ 123,924	\$ -
2) Rate Per Increment (See Note 2)	\$ 30,981,000	\$ 85,755,408	\$ 442
3) Fire Budget	\$ 27,394,000	N/ A	\$ -
4) Total Cost	\$ 58,375,000	\$ 85,755,913	\$ 27,380,913

Note:

- 1) Rate Increment is the assessed building value in the City of Surrey divided by \$100,000.
- 2) Rate per increment is the cost of insurance per \$ 100,000
 - \$ 250 with Fire Service
 - \$ 692 with No Fire Service
- 3) Fire Budget is the cost to provide the Fire Service in the City of Surrey
- 4) The total Value of expenditures for insurance added to the fire budget with Fire Service and with No Fire Service.

Recommendation:

Council lobby the BC Government to have 1% Tax redirected to the City to offset Fire Service expenses.

City of Surrey Fire Services Review

The Fire Service is organized into six divisions.

- Suppression Division:
This Division includes fire suppression, emergency medical response, hazardous materials, technical/rescue, staffing, and environmental protection.
- Training Services:
This Division provides program administration, program certification, and training for administrative staff, 284 career and 295 volunteer firefighters. In addition services are contracted to private industry and other Fire Services.
- Support Services:
This Division is responsible for clerical administrative support to all divisions, budget, research and development, planning, computer-aided dispatch, radio repairs and service.
- Fire Prevention:
This Division has four functions: prevention, code compliance, investigations and public education.
- Mechanical
The mechanical division is responsible for repairs and maintenance of a fleet of 3 aerial ladders, 30 pumps, 2 aerial pump ladders, 5 tankers and 20 utility/staff vehicles, and all other mechanical equipment utilized in the Fire Service. It also provides minor contracting services to two smaller GVRD Cities.
- Communications
The Dispatch Center is the first point of contact for the public when reporting an emergency. Dispatchers provide service for the Engineering Department and other Fire Services as well as address general information inquires.

City of Surrey Fire Services Review

Staffing

Administration:	2 Administration Chiefs 4 Operational Assistant Chiefs 2 Administrative Assistants
Operations:	4 Battalion Chiefs 284 Career Fire Fighters 295 Volunteer Firefighters
Communications And Technology:	12 full time radio dispatchers / call takers 8 part-time relief dispatchers / call takers 1 Computer Specialist 1 Radio Technician
Prevention:	1 Chief Fire Prevention Officer 6 Fire Inspectors 2 Public Educators
Training:	1 Manager of Training 2 Training Officers
Mechanical:	4 Mechanics
Support:	3 Full-time clerks and (2) part time clerical relief staff.

Personnel Deployment

Seventeen fire stations are strategically located throughout the City. Twelve of the seventeen stations are staffed with career firefighters on a 7-day, 24-hour per day basis, 10 are supplemented with volunteer firefighters and five stations are staffed exclusively with volunteer firefighters. All career and volunteer firefighters are trained and Provincially Certified First Medical Responders. There is a complete inventory of basic life support medical equipment on each apparatus.

City of Surrey Fire Services Review

Apparatus Deployment

Pumpers: 30

Aerial Apparatus: 3

The Service has three aerial ladders (two 100' and one 135') located at stations 1 (Bear Creek), 4 (Guildford), and 13 (Sunnyside).

Pumper Ladder 2

Two additional pump ladders (one 55' and one 50') are located at stations 5 (Fraser Heights) and 15 (East Clayton).

Rescue Equipped Apparatus: 4

These are rescue-equipped vehicles located at station 6 (Fleetwood), station 8 (Cloverdale), station 11 (Boundry Park) and station 17 (Rosemary Heights). There is one Fire Rescue Unit currently out of service. The Technical Rescue Team comprises of a pump/rescue vehicle (Fire Rescue Unit) and a pump assigned to station 6 (Fleetwood). The 2 person Fire Rescue Unit is equipped with all heavy and technical rescue, high angle and rappelling equipment. The complete team includes the four personnel who are assigned to Pump 6. These individuals receive ongoing training in all aspects of technical and heavy rescue techniques and equipment.

The Hazardous Materials Team is comprises of personnel assigned to station 17 (Rosemary Heights) where the hazardous materials vehicle (Rescue-Equipped) and equipment are located. These individuals receive ongoing training in all aspects of handling hazardous materials and containment.

KEY ISSUE 1: Deployment of Volunteer Firefighters

The City of Surrey volunteer firefighter force carries untold benefits to the city. These include but are not limited to community pride, community service, public education, public safety, and emergency incident response and fund raising events to support the community associated organizations such as the burn unit at the Vancouver General Hospital and the United Way.

The key issues brought to the task force by the volunteer firefighter representatives were:

- Meaningful or Expanded Role
 - Encourage volunteers to provide input into operational decisions, which would affect them.
- Communications Structure (Volunteer)
 - Establish an elected structure within the volunteer group
- Input into Strategic Plan, Health and Safety Committees
 - Volunteers should have input into all Fire Service Committees
- Career Hiring Policy
 - Hire qualified ratio of (100%) volunteers for career positions
- Identity of Volunteers
 - Establish a uniform committee with volunteer representation to aid in the introduction of the program Issue volunteer firefighters with uniforms
 - Develop a volunteer orientation hand book
- Recognition as Volunteer Firefighters
 - Frequency of payment for services from quarterly to monthly
 - Appreciation banquet
 - Paraphernalia provisions
- Communications Structure (Administration)
 - Stronger involvement for the Assistant Chief for Volunteers
- Relationship of Volunteer Firefighters and Career Firefighters
 - Zero tolerance for harassment
 - Implement policy for dispute resolution
 - Provide harassment training for both volunteer and career firefighters
- Volunteer Hiring
 - Hold volunteer recruitment workshops
 - Allow existing volunteers input
 - Hold annual recruitment drives

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These key issues have been, implemented, queued as ongoing for implementation or rejected by the task force.

We have recently installed volunteer firefighters in station (11) in Boundry Park and will be evaluating the feasibility of installing volunteer firefighters in station (17) Rosemary Heights and station (18) Fleetwood. Upon completion of the program all fire stations will be supplemented by volunteer firefighters if we are able to attract candidates for stations (17) and (18).

Apart from the hard dollar issues volunteer deployment anticipates one of every four volunteer firefighters will be available at any one time ($295 / 4 = 74$) or an additional 74 firefighters are an available resource on call when required. This resource provides the depth in the Fire Service's ability to meet demands for service. The value of this asset is \$ 3,700,000 per year. ($\$ 50,000 \times 74$, annual career firefighter salary = \$ 3,700,000 per year in salary cost to the City). When this asset is compared to our annual volunteer firefighter budget of about \$ 1,000,000, the real savings in salary costs after expenses is \$ 2,700,000.

Recommendation:

The key issues at the various stages of implementation identified by supported the continuation of the deployment of volunteer firefighter continue at stations 17 and 18.

KEY ISSUE 2: Four Person Staffing on Pumper Trucks

The delivery of Fire Service to the community consists of three major components: selecting the types of services to be provided; building the infrastructure (buildings and equipment); and, staffing. Of the three major components, staffing has the most impact on the delivery of services and financially, places the greatest demands on the City.

The Surrey Fire Service recently purchased a computerized deployment analysis program. The new program is a powerful tool that allows modeling of fire station locations, types of vehicles and their deployment, and the impact various staffing levels would have on the delivery of emergency services based on actual response history. An additional factor, which has been included in the deployment analysis program, is the recent implementation of Workers Compensation Board requirements governing the entry into buildings for firefighting purposes.

In 1999, Workers' Compensation Board regulations were changed to require a specific number of personnel on the fire scene prior to conducting an entry into a building that is on fire or where breathing apparatus is required. The WCB regulation does not mandate minimum staffing levels on each responding apparatus. The regulations do, however, mandate the number of staff to be arrived on scene before entry can be made into a building.

As an illustration, if the first arriving apparatus has three firefighters, no one may enter the structure until a second unit has arrived. A second unit provides the additional personnel needed in the event that firefighters need to be rescued. The WCB regulation precludes the apparatus operator from leaving the apparatus, as this firefighter is responsible for controlling the flow of water from the apparatus to the hose lines. If the first arriving unit has four firefighters, according to WCB regulations, two firefighters may enter the building because at least one firefighter will remain outside and be available for communication and conduct rescue if required. Two additional firefighters must be established as a sustained rescue team (Rapid Intervention Team) within ten minutes after the team of two firefighters has entered into the building.

Staffing History:

Whenever fire stations have been converted from volunteer to composite, or new fire stations have opened, not enough staff has been provided to place four firefighters on a pumper truck, when considering vacation entitlement, sickness, injuries, training and other unscheduled events. The percentage of times that a pumper has been staffed with four firefighters has, prior to 1998, occurred 50% of the time. In 1999, the hiring of additional firefighters increased the number of occurrences of four person pump crews to 65% of the time. In 2000, the hiring of additional firefighters, the removal of a two-person Fire Rescue unit from service and reassigning its staff to pumper trucks achieved further staffing improvements. This has had a further positive impact in meeting the four person goals resulting in an average \pm 87% of four persons pumpers. Changes were made in staffing protocols regarding the usage of (contractual) Staffing Pools. Staffing Pools are off duty firefighters who are called and agree to work extra shifts at straight time (As per Collective Agreement). This arrangement is unique to Surrey as other GVRD Cities are required to pay premium rates of pay when staff are called back for extra shifts (essentially “overtime”). Although this has been effective in increasing the percentage of four person pump crews, it is a short-term fix.

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Chart #1: Staffing

The following chart provides a historical overview of staffing within Surrey Fire Service.

Summary	January	February	March	April	May	June	July	August	Average
(1) Shift Assignment (number of Firefighters assigned to a shift)	70	70	70	70	70	70	71	71	
(2) Required (Number positions to staff vehicles)	59	57	57	57	57	57	57	57	
(3) Regular On Duty	56.95	54.05	54.26	52.43	52.71	52.83	53.39	54.59	53.90
(4) Staffing Pool	1.30	1.83	1.34	1.66	3.00	1.84	1.53	0.50	1.63
(5) Total On Duty	58.23	55.88	55.52	52.93	55.58	54.67	54.90	55.03	55.34
(6) % 4 Person Pumps	82.26	79.60	77.15	60.83	64.52	63.89	71.77	84.41	73.05
(7) % 4 Person Pump with SP	93.55	98.56	97.63	74.44	88.71	80.83	83.06	86.02	87.85

Notes: Fire Rescue out of service effective February 1, 2000

Either Ladder 13 or Tower 1 out of service for repairs effective May 25, 2000

Hiring in July to bring Shift assignment to 71

Analysis of Chart #1: Staffing

- 1) Shift Assignment:** the number of firefighters normally assigned to each shift. From January to May, there were 70 firefighters on shift. With the personnel hiring in May for June positions and onward, the number increased to 71.
- 2) Required:** the number of positions required to staff each vehicle to the desired staffing level. In January, the number required was 59. This dropped to 57 in February with the removal of Fire Rescue South from active service.
- 3) Regular On-Duty:** the number of firefighters that were available on shift after accounting for absences due to vacation, WCB, sickness and other causes.
- 4) Staffing Pool:** the number of off-duty firefighters called to supplement regular staff due to shortages, etc.
- 5) Total On Duty:** the total on-duty line is the regular personnel on-duty plus staffing pool personnel.
- 6) Percentage (%) 4 Person Pumps:** the percentage of times that pumps were staffed with four regular duty firefighters.
- 7) Percentage (%) 4 Person Pumps SP:** the percentage of 4 Person Pumps with SP (staffing pool) is the percentage of times that pump crews were supplemented with staffing pools to achieve four person pumps.

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Since January there have been approximately 54 firefighters available for regular duty. Based on the required number of 57, it reveals that there was an average shortage of three firefighters per shift. Contractual requirements govern when staffing pools can be utilized. For example, staffing pools can be utilized to fill sickness, but not used to fill vacancies left by personnel on WCB. Due to these restrictions, there were 1.63 vacancies per shift that were not filled using staffing pools. This has left an average shortage of 1.50 firefighters per shift after staffing pools have been utilized.

Based on a need to have 57 firefighters on shift, it would be necessary to have 74 firefighters per shift, a total of twelve more than current staffing, to adequately staff the in service first response units. To return the Fire Rescue South to service would require an additional 2 positions per shift, which would require additional 8 positions in total. The net requirement is 76 firefighters on shift for a total of twenty more firefighters.

Absenteeism:

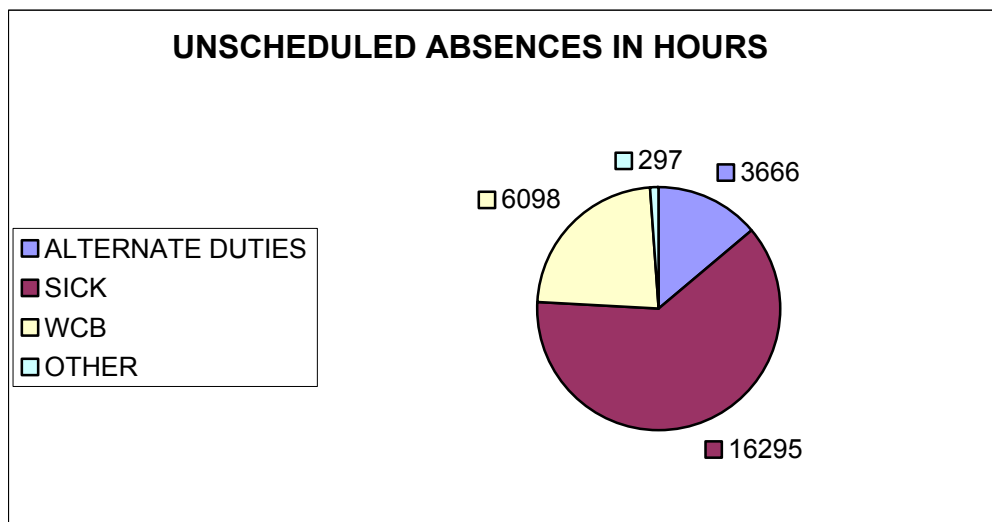
A second component of staffing is the level of absenteeism. To reduce absenteeism, the department has developed the most assertive Fire Department attendance management program in the Lower Mainland. The effectiveness of this program will need to be measured over time as it was only recently initiated. To illustrate the potential impact the program can have on staffing, a reduction of 2184 absentee hours is the equivalent of hiring one firefighter. In addition, a number of internal policy changes such as; requiring overtime hours worked to be paid out instead of taken as time off, and providing in-service training in the fire halls which allows the crews to remain available for calls. Each of these initiatives has contributed towards maintaining our staffing levels.

The Surrey Fire Service Alternate Duty Program, which was initiated 1999, has have proven effective in returning injured or ill staff to their normal positions more quickly than has occurred in the past. The program requires that absent staff take an Authorization For Return to Work Form to their physician. The form details the Alternate Duties program and the activities that they might be asked to perform. The Physician then assesses the staff members' capabilities and determines when the staff member can return to work under the Alternate Duties program and also an estimated date of return to full duties. This has placed the assessment of the staff member's capabilities in the hand of the physician rather than the staff member. The program provides value to the City by addressing a number of outstanding projects, such as pre-fire planning and emergency preparedness.

Unscheduled Absences:

Unscheduled absences from January through August totaled 26,356` hours. Unscheduled absences include sick time, WCB, banked time, alternate duties and other miscellaneous reasons. Projecting this trend to the end of the year results in a possible loss of 40,000 hours of staff time. The Surrey Fire Service is taking a proactive approach to reducing these total hours to reduce the impact it has on the Service. These programs include the Attendance Leave Program, Wellness Program, Fitness Program, and Safety Program.

Chart #2: Unscheduled Absences



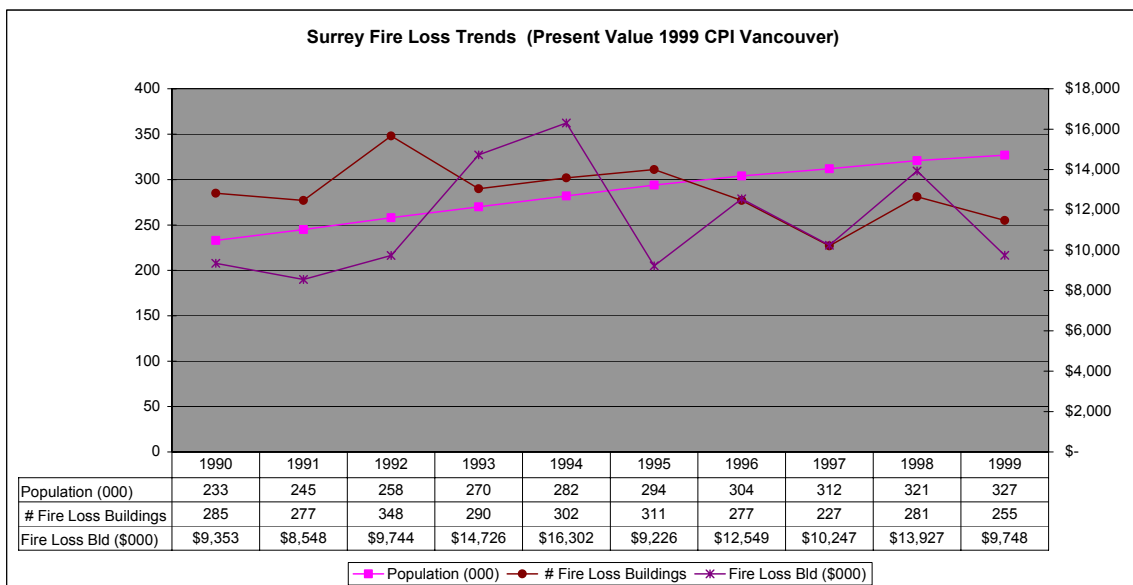
Recommendation: A Balanced Approach

The recommended approach to resolving staffing shortages is a combination of hiring 12 new staff, 8 in the year 2001 and 4 in the year 2002 and the continuation of current programs. Due to the newness of the Attendance Leave Program, it is too early to measure its effectiveness. In addition, a further refinement of the vacation and holiday schedules and/or continued cancellation of vacations when there are acute staffing shortages could even out the fluctuations of staffing demands. Further it is recommended that in 2005 additional 8 firefighters be hired (2 per shift) and placed in station 13 (Sunnyside). The Aerial Ladder be redeployed to a volunteer station yet to be determined and a Quint to be placed at Station 13. The pump and crew of station 13 moved to station 12 (Crescent Beach). Appendix C provides a detailed chart of the service level change.

KEY ISSUE 3: Property Loss in Surrey

It has long been thought that an increase in population has an increased effect on the value of fire loss and number of occurrences and that additional resources are needed to reverse this trend. (Chart #3: Surrey Fire Loss Trends) provides a historical view of fire loss and the number of fire loss buildings for the City of Surrey. The graph compares fire losses and number of fire loss buildings from 1990 to 1999 with population growth. The fire losses have been calculated using the interest rate of the year in order to account for inflation and bringing figures to present day values.¹

Chart #3: Surrey Fire Loss Trends



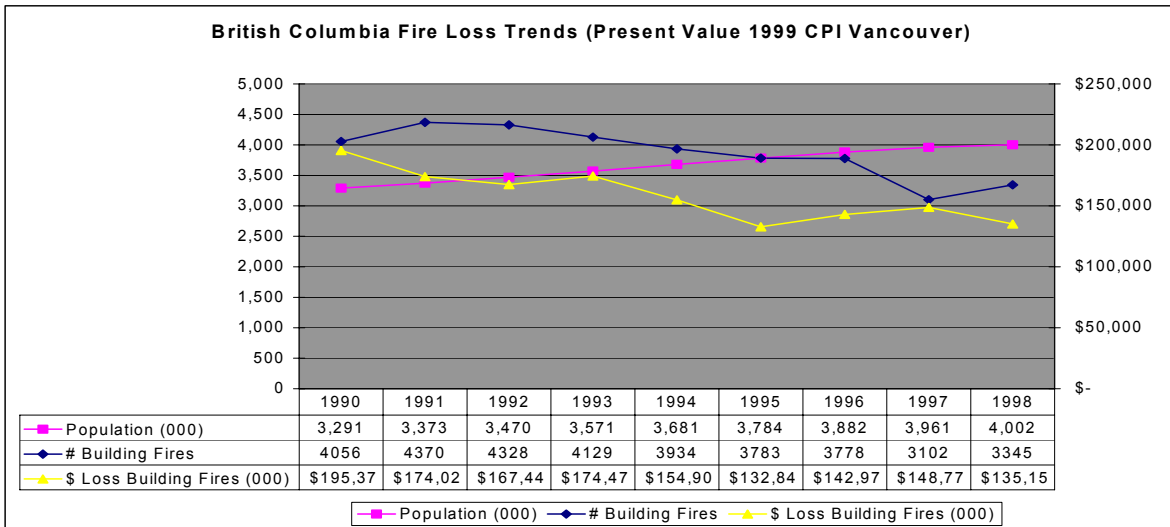
The chart illustrates a clear rise in the population growth and a reversing trend for building fire loss's and number of occurrences in relation to population. This challenges the notion that an increased population results in increased fire loss and occurrences. Appendix A illustrates the precise detail of property loss history in Surrey. The City of Surrey's trend toward lower fire loss in relation to population growth is compatible with overall Provincial trends.

¹ Fire loss values have been calculated using inflation rates (CPI changes for the Vancouver Metropolitan Area) compounded each year to bring the loss values to present day values, assumption that the value of goods and services have risen by the applicable inflation rate. Rates used and application of concept by: Ms. Nancy Gomerich C.A. Vice President Government Financial Officers Association British Columbia. Rates used 1990 @ 5.5%, 1991 @ 5.2%, 1992 @ 3%, 1993 @ 3.6%, 1994 @ 2%, 1995 @ 2.6%, 1996 @ .8%, 1997 @ .6%, 1998 @ .5%, and 1999 @ .53 %.

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(Chart #4: British Columbia Fire Loss Trends) provides an overview of BC fire loss trends in buildings. The values are recalculated to bring values of loss to present day (1999). Again it would appear that there is a significant downward trend in occurrences and loss values.

Chart #4: British Columbia Fire Loss Trends



In summary, the City of Surrey's fire loss and number of fires are declining, a trend which is also reflected across the Province of British Columbia.

Recommendation:

Continued assertive fire prevention, code enforcement, public education and suppression activities will reflect further advances in a positive trend.

KEY ISSUE 4: Analyze Deployment of Resources

Surrey Fire Service undertook a comprehensive study utilizing state-of-the art computer-mapping tools to measure resource deployment to determine levels of service. Dr. Raj Nagaraj, Ph.D., an expert in industrial engineering and modeling, developed the software tools utilized by the Surrey Fire Service. Our historical response computer aided dispatch data was used exclusively for this study.

The Fire Service was specifically interested in measures of fire service workloads, average performance and percentage of times that apparatus are able to meet arrival time targets. Approximately 15,500 incidents were examined to determine their impact on current deployment and resources. Cad Analyst (the pictorial process developed by Dr. Nagaraj for analysis of workload and response times) provides pictorial map views. "Good performance" is dark green, green, yellow; "poor performance" is orange and red.

An interesting feature of the system, is it's ability to create actual scenarios, of moving equipment from one fire station to another. Through these scenarios, equipment was intentionally "moved" so that the effect of these changes can be measured.

It is important to note that currently there is no standard in place that can be used as a measure of response time and deployment. The National Fire Protection Association is in the process of developing such a standard, but is not expected to be voted on by the association until May 2001. The proposed standard has been met with a great deal of general debate and may not achieve a consensus. In the absence of an NFPA standard, a total response time of 7 minutes, 9 minutes, 11 minutes and 12 minutes was used in the modeling process that represents the specific targets for our modeling purposes.

The Surrey Fire Service human resources is it's most valuable resource. There are three distinct components. These are; exclusive volunteer staffed stations, volunteer / career staffed stations (composite) and career exclusive staffed stations. The successful delivery of services within the City relies on these three components to provide a strong initial and sustained force. The combination of resources insures competing calls for service are consistently met within each station response area.

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The first aspect of the study, shown below in Chart #5; 1999 Incident Distribution, evaluated each station's incident demand to determine the distribution of calls per station by area and type.

Chart #5: 1999 Incident Distribution

1999 Incident Distribution

	All Incidents	% All	Structure Fires	% Fires	Rescue	Rescue Arrived	% Rescue	Fire / Rescue	% Fire / Rescue	Medical	% Medical
Station 1	1913	0.12	76	0.12	40	12	0.09	116	0.11	1312	0.13
Station 2	2318	0.15	100	0.16	54	14	0.13	154	0.15	1506	0.15
Station 3	363	0.02	15	0.02	14	3	0.03	29	0.03	232	0.02
Station 4	2038	0.13	101	0.17	41	16	0.10	142	0.14	1247	0.13
Station 5	461	0.03	10	0.02	36	13	0.08	46	0.04	251	0.03
Station 6	1305	0.08	53	0.09	31	21	0.07	84	0.08	899	0.09
Station 7	183	0.01	7	0.01	16	3	0.04	23	0.02	85	0.01
Station 8	492	0.03	18	0.03	14	5	0.03	32	0.03	309	0.03
Station 9	417	0.03	15	0.02	28	14	0.07	43	0.04	216	0.02
Station 10	2103	0.14	75	0.12	43	13	0.10	118	0.11	1472	0.15
Station 11	575	0.04	21	0.03	13	13	0.03	34	0.03	357	0.04
Station 12	396	0.03	17	0.03	0	0	0.00	17	0.02	232	0.02
Station 13	1104	0.07	23	0.04	9	4	0.02	32	0.03	813	0.08
Station 14	317	0.02	10	0.02	24	7	0.06	34	0.03	156	0.02
Station 15	588	0.04	27	0.04	21	9	0.05	48	0.05	337	0.03
Station 17	502	0.03	17	0.03	35	28	0.08	52	0.05	263	0.03
Station 18	439	0.03	24	0.04	9	3	0.02	33	0.03	260	0.03
Total	15514	100.00	609	100	428	178	100	1037	100%	9947	100

It is apparent by the 1999 Incident Distribution that structure fires, rescue and medical responses make up the largest demands for service.

In consideration of deployment, fire stations generally are evenly placed throughout the City to provide even geographic distribution so resources can arrive within a given time. Two methods of measure are typically used, percent and average measure. Percent measure is the number of total incidents divided by 100 that meets the goal or target, while average measure is the number of total incidents and response time divided by the number of incidents measured. The performance or response times are a function of a number of benchmark criteria. The overall total response time is a combination of several specific benchmarks:

- **Dispatch Time:** The time for the dispatcher to determine from the caller the location and nature of the emergency and alert the appropriate station. In 1999, with a target time of 50 seconds, 83% of all calls dispatched were equal to or less than 50 seconds with an average dispatch time of 38 seconds.
- **Turn Out Time:** The time for crews to assemble on the apparatus after receiving the alert from dispatch. In 1999, with a career firefighter target time of 2 minutes, 83% of calls were equal to or less than 2 minutes with an average turnout time of 1 minute and 31 seconds. For volunteers, at a target time of 4 minutes, 76% of calls were equal to or less than 4 minutes with the average turnout time being 2 minutes and 44 seconds.

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- **Travel Time:** The en route time the apparatus takes to arrive on scene. In 1999, with a target time of 4 minutes, 79% of calls were equal to or less than 4 minutes with the average travel time being 3 minutes and 4 seconds.
- **Response Time:** The total time (Dispatch, Turnout, and Travel). In 1999, with a target time of 7 minutes, 83% of all calls were equal to or less than 7 minutes with the average response time being 5 minutes and 27 seconds.

Chart #6: 1999 Incident Performance

(Chart 6: 1999 Incident Performance) provides a review of the demand and performance of total response times in 1999 for all incidents

The following resources are required for each incident type:

- Structure Fires: 2 Pumps, 1 Ladder, 1 Rescue (assumes 12 firefighters);
- Rescue: 1 Pump, 1 Rescue, or 1 Rescue Equipped Pump (assumes 4 firefighters-pump, 2 firefighters rescue); and,
- Medical: 1 Pump or 1 Rescue (assumes 4 firefighters-pump, 2 firefighters-rescue).

1999 Incident Performance																						
	All Incidents			Structure Fires			First Unit		Second Pump		Ladder		2 P-1L-1R-R		2 P-1L-1R-C		Rescue		First Rescue Unit		Rescue	
	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.	%	Avg.
Station 1	1913	91	5:06	76	81	5:30	80	7:29	73	8:06	71	10:39	71	10:39	47	85	9:40	83	7:54			
Station 2	2318	87	5:11	100	89	5:24	86	7:13	70	8:11	78	10:50	78	10:50	55	84	10:00	50	13:09			
Station 3	363	84	5:50	15	87	5:45	83	7:33	57	8:39	100	11:05	100	11:05	6	83	12:01	33	14:42			
Station 4	2038	90	5:07	101	98	5:04	87	7:14	83	7:08	83	9:23	83	9:23	76	93	8:24	81	8:12			
Station 5	461	65	6:31	10	80	5:44	100	7:39	100	5:48	100	8:35	100	8:35	3	100	8:35	85	9:25			
Station 6	1305	88	5:09	53	87	5:31	85	7:22	71	8:20	86	9:09	86	9:09	45	96	6:56	100	4:37			
Station 7	183	48	7:40	7	43	7:59	33	9:57	67	7:36	50	12:01	0	0:00	2	50	12:01	100	9:29			
Station 8	492	73	6:15	18	83	6:04	79	8:55	85	8:08	78	9:45	0	0:00	13	85	9:00	80	8:34			
Station 9	417	78	5:44	15	87	5:33	50	8:54	0	0:00	0	0:00	0	0:00	12	67	9:42	93	6:45			
Station 10	2103	89	5:05	75	96	5:00	95	6:41	70	8:23	88	9:26	88	9:26	52	96	7:44	92	7:05			
Station 11	575	86	5:27	21	71	6:10	65	8:35	44	11:42	57	11:49	57	11:49	20	100	6:11	92	5:52			
Station 12	396	48	8:05	17	41	7:13	41	9:23	50	10:37	0	0:00	0	0:00	5	20	11:33	0	0			
Station 13	1104	78	5:00	23	96	4:44	94	7:04	100	5:39	100	8:24	100	8:24	9	100	7:56	100	7:57			
Station 14	317	39	7:56	10	30	8:15	11	11:03	14	11:27	25	14:42	25	14:42	5	40	12:53	71	10:11			
Station 15	588	83	5:36	27	56	6:18	25	10:12	86	6:49	75	12:01	0	0:00	10	80	11:10	85	8:53			
Station 17	502	72	6:21	17	69	6:32	82	7:42	33	11:35	50	13:36	50	11:35	6	83	7:52	75	9:31			
Station 18	439	90	5:09	24	95	5:23	82	7:24	9	11:34	70	11:48	67	11:48	14	86	8:00	67	13:30			
All	15514	83%	5:27	609	85%	5:33	79%	7:38	70%	8:12	77%	10:33	74%	10:31	380	88%	8:43	83%	8:25			

Notes: Intervals @ 90% Confidence Level
 % = the value of incidents that meet the target - typical goal is 90%
 Avg. = the sum of all response times divided by the number of responses.
 Target All Incidents First Unit @ 7 min.
 Target Fire Incidents First Unit @ 7 min.
 Target Fire Incidents Second Pump @ 9 min.
 Target Fire Incidents Any Ladder @ 9 min.
 Target Fire Incidents Initial Attack Force 2 Pumps, 1 Ladder, 1 Rescue - Residential @ 12 min.
 Target Fire Incidents Initial Attack Force 2 Pumps, 1 Ladder 75 +, 1 Rescue - Commercial @ 12 Min.
 Target Rescue First Unit Structure Fires @ 12 min.
 Target Rescue Equipped Rescue Responses @ 11 min.

Percentage of Incidents that meet the target.

% Performance	
90% - 100%	Green
80% - 90%	Yellow
70% - 80%	Orange
50% - 70%	Red
0% - 50%	Black

Target times were selected in order for the modeling tool to provide a view of high and low performance. It is apparent by the illustration that above percentage performance and average response times per station are significantly varied. The primary first unit performances and average times in stations 7, 12 and 14 are low,

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probably due to the time it takes volunteers to respond or turnout to the station, typically between 3 to 4 minutes. The volunteer performance at Station 3 and 8 is better. Ladder and rescue responses are lower due to the additional distance required to travel beyond its primary response areas to arrive at their destination.

Recommendation:

A number of strategies become apparent from the study that can be utilized to improve response times, specifically dispatch times and turn out times, which would decrease total response time. They include:

1. Implementation of call taker interrogation system and training program;
2. Implementation of training and policy to improve turn out times for both career and volunteer firefighters; and,
3. Realignment of some fire stations boundary areas thereby decreasing response distances (see Appendix B: Fire Station Boundary Change Proposal).

Proposal:

The Surrey Fire Service is recommending the purchase of 3 Quints, approved in the 2000 budget. Quints are a combination pump/rescue/ladder. With the placement of the Quints at existing stations, utilizing existing staffing levels, performance capabilities significantly improve.

The proposal:

	Previous	Proposed
• Station 1:	Pump, Tower	Pump, Fire Rescue Unit
• Station 2:	Pump	Pump, Tower
• Station 3:	Pump	Pump
• Station 4:	Pump, Aerial	Quint, Fire Rescue Unit
• Station 5:	Telesquirt	Telesquirt, Tanker (8a)
• Station 6:	Pump, Fire Rescue Unit	Pump, POD Truck
• Station 7:	Pump, Tanker	Pump, Tanker
• Station 8:	Pump, Rescue, 2 Tankers	Pump, Rescue, 2 Tankers
• Station 9:	Pump, Tanker, Air Unit	Pump, Tanker
• Station 10:	Pump, Clothing Truck	Quint, HazUnit, Clothing
• Station 11:	Pump (Rescue Equipped)	Pump – Decon Station
• Station 12:	Pump, Boats	Pump, Boats
• Station 13:	Pump, Aerial	Pump, Aerial
• Station 14:	Pump, Tanker	Pump, Tanker
• Station 15:	Telesquirt	Telesquirt
• Station 17:	Pump, Haz Unit	Pump(Rescue)
• Station 18:	Pump, POD Truck	Quint

Associated Affects/Benefits:

- Stations 1 and 4 will now have dedicated first response to medical calls by our two person Fire Rescue Units. CAD will also expand area coverage for this service outside of these areas within recommended time frames subject to analysis.
- This reduces the size of the units and manpower responding to medical calls and eliminates the depletion of resources in these stations by not having to respond to numerous medical calls.
- City Center will receive a 135' Tower service at Station 2 with the other North Surrey Station (4) receiving a 75' Quint Unit. This increases ladder coverage in North Surrey significantly.
- Stations 10 and 18 also receive a 75' Quint ladder service to these areas where there had been previous gaps in service.
- Stations 4, 10 and 18 also receive rescue capability due to capability provided by Quint service.
- Rescue capability added to Station 17 to provide this service in South Surrey.
- HazMat response relocated to Station 10 (Newton) to place these Units in a more strategic location with respect to its response requirements.
- Station 11 now established as the Decon Station to support the Haz Unit. Located closer together to provide for better and more coordinated training.
- Tanker placed on north side of Freeway (Station 5) to facilitate water needs north of the highway in case of major disaster, earthquake, etc. and also provides firefighting service in case of blocked roads, bridges, broken waterlines, etc. Also enhances volunteer involvement with additional specialized unit in their station.
- Station 8 receives a tanker from Station 9, which eliminates previous concern with efficiency of Tanker Operations due to limited pump size of tanker currently stationed at station 8.

Note: Implementation of these recommendations is contingent on two initiatives:

- Receipt of three Quints: funding for this was approved in the Fire Service 2000 capital budget.
- Relocation of fire Station # 10: Council deferred this project in the year 2000, but is included on the 2001 budget for Council consideration.

Summary and General Improvements:

- First Responder Medical response – dedicated units stationed in heaviest concentration of medical calls. Reduced staff responding to these calls. Other equipment and staff resources available for first response to other emergencies.
- Aerial ladder and Rescue capability expanded in the areas of the city where most incidents occur. This service will be increased significantly.
- Able to remove an aerial device from service with no loss of staff by placing staff on the Fire Rescue Unit previously taken out of service due to staffing needs.

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- The currently staffed Fire Rescue Unit has been placed in to service in the North End for initial medical response.
- Both Fire Rescue Units will also provide additional staff and firefighting capabilities for other major incidents.

Chart #7: Response Time Performance (Existing vs. Proposed)

Chart 7 provides a pictorial view of existing (Left) of initial attack performance and the proposed (Right).

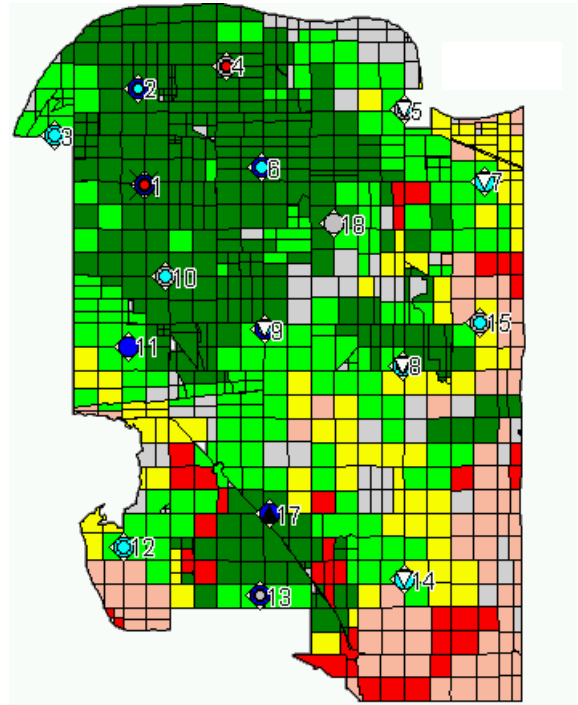
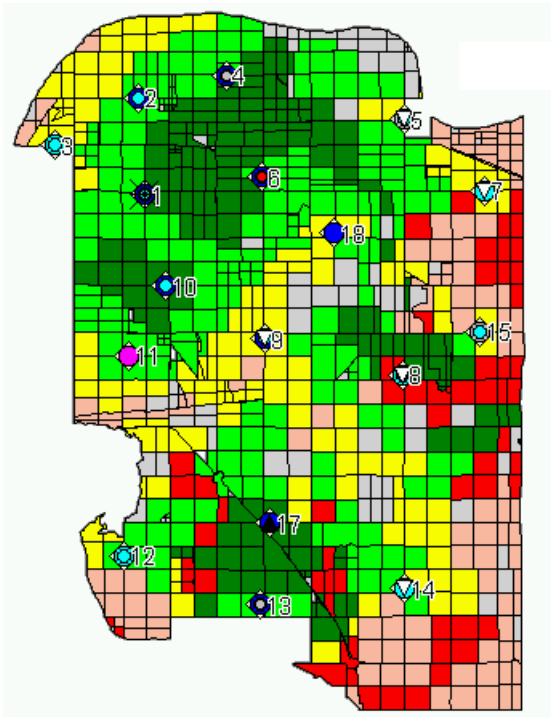


Chart #8: Summary of Initial Attack force Structure Fires

The following chart describes the performance improvements geographically within the response areas. For analysis purposes, the City is divided into 813 polygons (Grids). Each polygon represents about 0.16 square miles, or 0.42 square kilometers. The initial attach force improves 18% in 145 polygons with the reassignment of apparatus and staff as previously outlined.

Initial Attack Force Structure Fires (Summary of Change)

1999 Existing	Grids	%	1999 New	Grids	%	Change	% Change
% Performance			% Performance				
90 % - 100%	174	21%	90 % - 100%	319	39%	145	18%
80 % - 90 %	225	28%	80 % - 90 %	193	24%	32	-4%
70 % - 80 %	144	18%	70 % - 80 %	95	12%	49	-6%
50 % - 70 %	119	15%	50 % - 70 %	79	10%	40	-5%
0 % - 50 %	64	8%	0 % - 50 %	40	5%	24	-3%
No Access	87	11%	No Access	87	11%	87	0%
Total	813	100%		813	100%	145	18%

Chart #9: Summary (Incident & Coverage) Performance

Chart 9 provides mathematical performance predictions of the proposed new deployment using retrospective performance data and applying it to the purposed changes. It is apparent in incidents analyzed that an overall 6% improvement is predicted in the initial attack force, a 2% improvement in medical response, and a 4% improvement in rescue response.

Summary (Incident) Performance						
1999 Existing	%	Avg.	1999 New	%	Avg.	% Change
Initial Attack	85	9:58	Initial Attack	91	8:46	6
First Pump	88	5:56	First Pump	88	5:56	0
Second Pump	84	7:20	Second Pump	80	7:32	-4
First Ladder	72	8:03	First Ladder	80	7:07	8
First Rescue	87	8:33	First Rescue	93	7:01	6
Medical	89	5:01	Medical	91	5:06	2
Rescue	86	8:42	Rescue	90	7:34	4
Summary (Coverage) Performance 113 Sq. Miles Analysed						
1999 Existing	%	Avg.	1999 New	%	Avg.	% Change
Initial Attack	76	11:40	Initial Attack	82	10:38	6
First Pump	73	7:01	First Pump	73	7:05	0
Second Pump	70	8:39	Second Pump	66	8:47	-4
First Ladder	54	10:01	First Ladder	61	9:12	7
First Rescue	79	9:16	First Rescue	82	8:46	3
Medical	74	6:15	Medical	74	6:18	0
Rescue	82	9:18	Rescue	84	8:52	2

- Notes:
- Target First Pump @ 7:00 Min.
 - Target Second Pump @ 9:00 Min.
 - Target First Ladder @ 9:00 Min.
 - Target First Rescue (Fires) @ 12:00 Min.
 - Target First Rescue (Rescue) @ 11:00 Min.
 - Target Initial Attack Force @ 12:00 Min.

Note: The second pump performance decreases slightly. Initial attack force was historically comprised of 4 apparatus responding and with the Quint proposal; this is now being met predominantly with 3 apparatus.

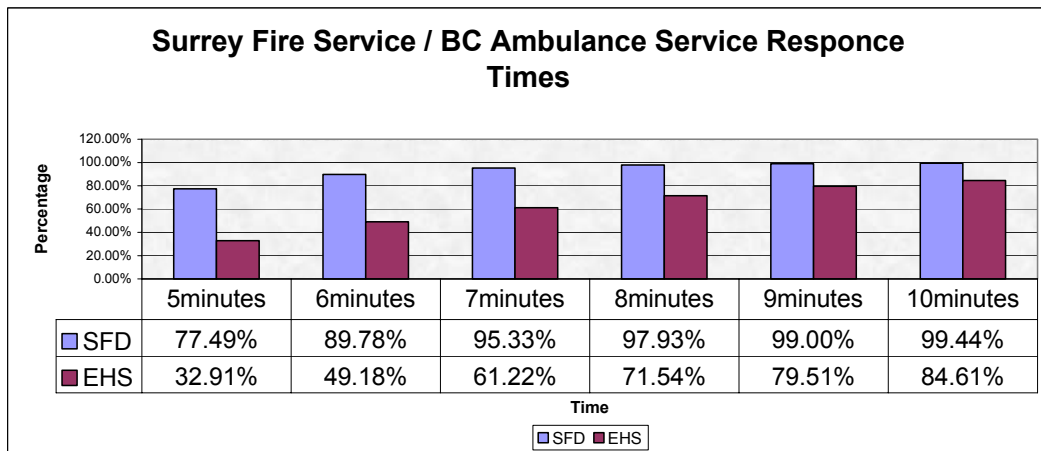
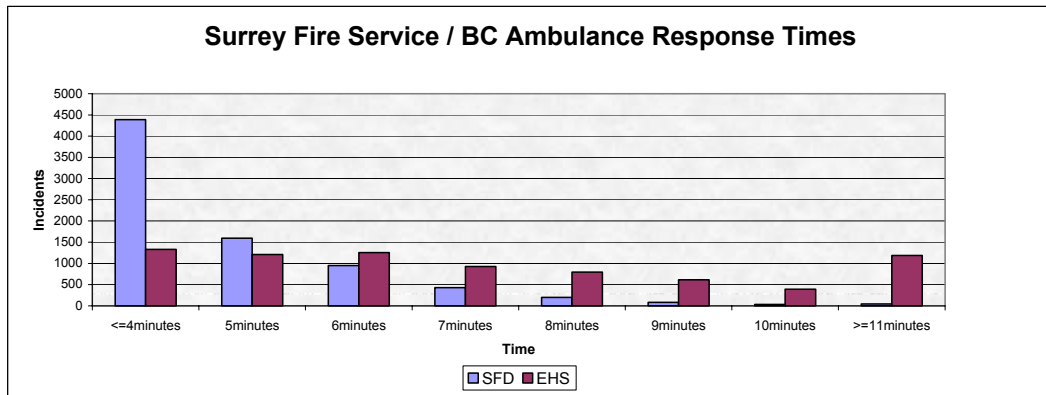
Recommendation:

The Quint and redeployment proposal be supported that effectively increases the overall coverage in the City for Aerial capabilities from three Aerial Ladders and two Pumper Ladders to Two Aerial Ladders, two Pumper Ladders and three Quints and from four rescue-equipped apparatus to six. Performance improvements are significant.

KEY ISSUE 5: Analyze First Responder Program

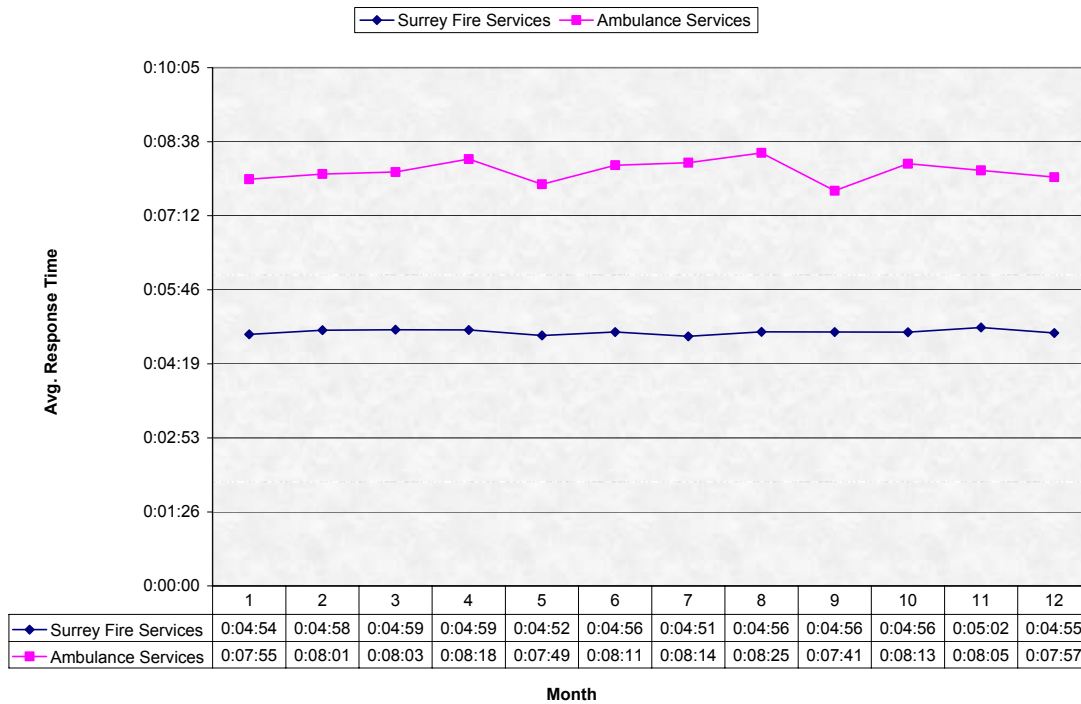
The aspect of the City’s Fire Service participation in the pre-hospital care system was a subject of the task force. The Fire Services participation is tasked in a first responder role to provide medical intervention until a more advanced service arrives, BC Ambulance Service who render advanced care and transportation. Performance comparisons of the two services in terms of response times extracted from our Computer Aided Dispatch Records indicates a significantly better service is provided by the City Fire Service. If the Fire Service was to withdraw from the provision of the service a significant reduction of service would be realized as shown in chart # 10.

Chart # 10: Response Times Surrey Fire Service / BC Ambulance



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Surrey Fire Service vs BC Ambulance Service Avg Response Times



New Surrey Fire Service / British Columbia Dispatch and Response Protocol

Historical Review:

In 1989, the Chief Coroner Mr. Vince Cain reviewed the collaboration between the three major emergency services and submitted a series of recommendations. One of these recommendations described the development of a first responder program that would enhance cooperation between the services when treating the sick and injured and emphasized the need for a continuum of care beginning with first responders working with ambulance paramedics and culminating at the hospital emergency department. The concept of “First Responder” refers to those people, such as members of the Municipal police and fire services, who provide care to the public prior to ambulance arrival. Members of the RCMP receive basic first aid training using the St. John’s Ambulance curriculum.

The program provides for a standardized method for patient assessment and the management of life threatening conditions. Specific management methods for traumatic, medical, and environmental emergencies are covered in classroom and practical “hands-on” formats. Program graduates receive a Provincial Emergency Medical Assistant FR designation under the Health Emergency Act and regulations.

The addition of two endorsement programs significantly altered the role of the First Responder. In 1994, early defibrillation was identified as a key in the chain of survival for pre-hospital cardiac arrest and this skill was added as an endorsement to

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the First Responder Program. The Surrey Fire Service, with the support of the North Surrey Lions and City Council, acquired and deployed automatic external defibrillation units on all first line career and volunteer fire apparatus.

The second endorsement, management of spinal injuries, was developed for First Responders who are the only ones capable of reaching patients so that BCAS Paramedics may transport them to safe places for treatment. Personnel stationed to Surrey's high angle rescue units have received this training.

Problem Statement:

The First Responder Program is based on the idea of the continuum of care where First Responders will be able to provide a “value added” service prior to the arrival of BCAS Paramedics. Due to complexities often associated with traumatic and environmental emergencies, Police and Fire First Responders can provide value added services. These services involve the recognition of hazards, prevention of further harm, containment of hazards, rescue, apprehension and arrest, and/or identification and preservation of evidence.

Consequently, it is the “medical emergency” that should be given consideration and a determination made as to the “value added” by First Responders. Should a First Responder unit arrive at the same time or after the arrival of paramedics, it is likely that no value can be added for the conscious medical patient. One must also consider whether or not a “value added” service can be provided when a patient is already under medical care such as in a community care facility, a doctor's office, recreational facility or place of business with Occupational First Aid Attendant. For some medical patients however, (e.g. Cardiac arrest patient), treatment is labour intensive and First Responders are frequently asked to provide assistance on route to the hospital. Therefore, a deliberate review of each type of “medical call” is required to determine if value can be added. The next section of this report describes the methodology used in this review.

Methodology:

The Medical Priority Dispatch System Resource Allocation (MPDS) is a list of medical, traumatic and environmental emergencies with accompanying signs and symptoms such as whether or not the patient has an altered level of consciousness, respiratory difficulty, hemorrhaging or if dangers are still present. This list is used by BCAS Dispatchers to assign response priorities (routine or emergency), to assign the appropriate qualified level of paramedic staff and to determine if it is appropriate to notify a First Responder agency.

The MPDS identifies a total of 32 call types such as abdominal pain, allergies, animal attacks, assault, back pain, breathing problems etc. The call types are accompanied by 228 signs, symptoms and environmental conditions that help to further define the emergency event. Terms like “abnormal breathing”, “condition

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worsening”, “multiple victims” and “unknown status” are used. For BCAS statistical purposes, each call type is assigned an alphanumeric identification and description. For example, a choking patient who is not alert is assigned the code 11-D-1 and a choking patient with abnormal breathing is assigned the code 11-D-2.

Based on BCAS call taker assessments, the call type and other information is gathered and an emergency code is assigned (e.g. Code 2 routine or code 3 emergency) based on BCAS response policy. The MPDS identifies the appropriate ambulance resource (Highest Level Available being Advanced Life Support or Emergency Medical Assistant 2 Paramedics) and whether or not it is appropriate to notify the First Responder service.

A review* was undertaken to determine if Surrey’s First Responders would be able to provide a value added service for each of the listed call types. This review examined each of the 32 call types and accompanying 228 signs, symptoms and environmental conditions. In each case a determination was made as to whether or not First Responders had the skills and training necessary to intervene successfully and whether or not the call type was severe enough to warrant notification of First Responders. For example, First Responders are notified in the event of “Pregnancy/Childbirth/Miscarriage – breach or cord – 3rd Trimester hemorrhage” but the skills and interventions to deal with these emergencies are not taught in the First Responder curriculum. Additionally, a “value added” service could not be justified where medical attention is already being provided by a Physician, Registered Nurse or a First Aid Attendant. This may be the case in Community Care Facilities and Physicians Offices. . The review resulted in a recommendation to delete 17 types of First Responder notifications and add 3 notifications. The net result was a reduction of 14 types of calls and more substantially, for all calls where a patient is being treated for the condition by a Physician, Registered Nurse or a First Aid Attendant.

The deletion of the following calls from First Responder notification is recommended:

CALL TYPE		Alpha-numeric id. SIGN/SYMPTOM/ENVIRONMENTAL CONDITION		
1	Abdominal Pain	C	1	Fainting or near fainting > 50 years
		C	2	Female fainting or near fainting 12-50 years
2	Allergies/Hives/Stings etc.	D	4	Snake Bite
		C	2	Special medications or injections used
5	Back Pain (Non-Trauma)	C	1	Fainting or near fainting >50
1	Chest Pain	C	3	Cocaine
0		C	4	Breathing normally
1	Diabetic	C	2	Abnormal behavior
3				

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1 8	Headache	C	6	Change in behavior (< 3 hours)
2 1	Hemorrhage	B	3	Bleeding disorder or blood thinners
2 3	Overdose/Ingestion	C	4	Antidepressants (tricyclic)
		C	6	Narcotics (Heroin)
2 4	Pregnancy/Childbirth/ Miscarriage	D	3	Breech or cord
		D	5	3 rd Trimester hemorrhage
		D	6	Special birth situation
3 1	Unconscious fainting	C	4	Single or near fainting episode and alert > 35
		C	5	Females 12-50 with abdominal pain

The review determined that there were instances where notification of First Responders should take place but this was not indicated on the MPDS allocation. These are:

3	Animal Bites/Attacks	B	2	Serious hemorrhage
4	Assault/Sexual Assault	B	2	Serious hemorrhage
2 1	Hemorrhage	B	2	Serious hemorrhage

The review further examined “value added” opportunities and concluded that a response to locations that had a medically trained staff and equipment was outside the original philosophy of the First Responder Program. Therefore, a category 33 should be added to include Physicians’ Offices, Industrial Locations with Occupational First Aid Attendants, Community Care Facilities and Recreational Facilities with Life Guards. Additional BCAS Dispatcher questioning should determine that relevant equipment is available and in use with the result that a First Responder service is not required.

If these recommendations are implemented, the reduction in the exact number of First Responder calls cannot be determined. Call coding differences will not permit an analysis of call types and present practices. However, the review concluded that a reduction in call volume is logical given the removal of First Responder call types from the MPDS allocation list.

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Recommendation:

It is recommended that Surrey specific changes to the Medical Priority Dispatch System Allocation list be made.

It is further recommended that call type #33 be added to include Physicians' Offices, Industrial Locations with Occupational First Aid Attendants, Community Care Facilities and Recreational Facilities with Life Guards.

It is further recommended that BCAS Dispatcher questioning determine that relevant equipment is available and in use and that First Responder assistance is not required.

It is further recommended that Unit Chief Garth Dinsmore and Assistant Chief J. Bond participate in an observational "ride-along" (G. Dinsmore on fire apparatus, J. Bond on ambulance within the same district.) Their goal will be to examine dispatch policies with the view toward incremental dispatch changes that will further reduce the number of responses by the Surrey Fire Service where the "value added" component of pre-hospital care does not exist.

*The reviewers were BCAS Unit Chief Garth Dinsmore and Assistant Chief Jim Bond. The review took place on October 13, 2000.

Fire Services Review Conclusion

The acceptance of this report and subsequent policy direction implemented by Council will provide the framework and direction required to move the fire service forward into the new millennium.

Several areas that have been identified that the fire service can provide service level improvements and not increase operating or capital costs outside of the normal incremental increases such as contractual or material and supplies.

The recommendations contained within this report confirm an overall service level improvement of the initial attack force by 6%, a 2% improvement in medical response, and a 4% improvement in rescue response at no increased cost. This service level improvement is unprecedented in the Fire Service.

It also noted that adoption of new programs and additional requests for service of either an emergency or non-emergency basis will wear away at the effectiveness and efficiencies outlined in this report.

We are pleased to provide this quantitative report to Council so that they can establish policy to assist the Surrey Fire Service to obtain the overall objectives of the City.

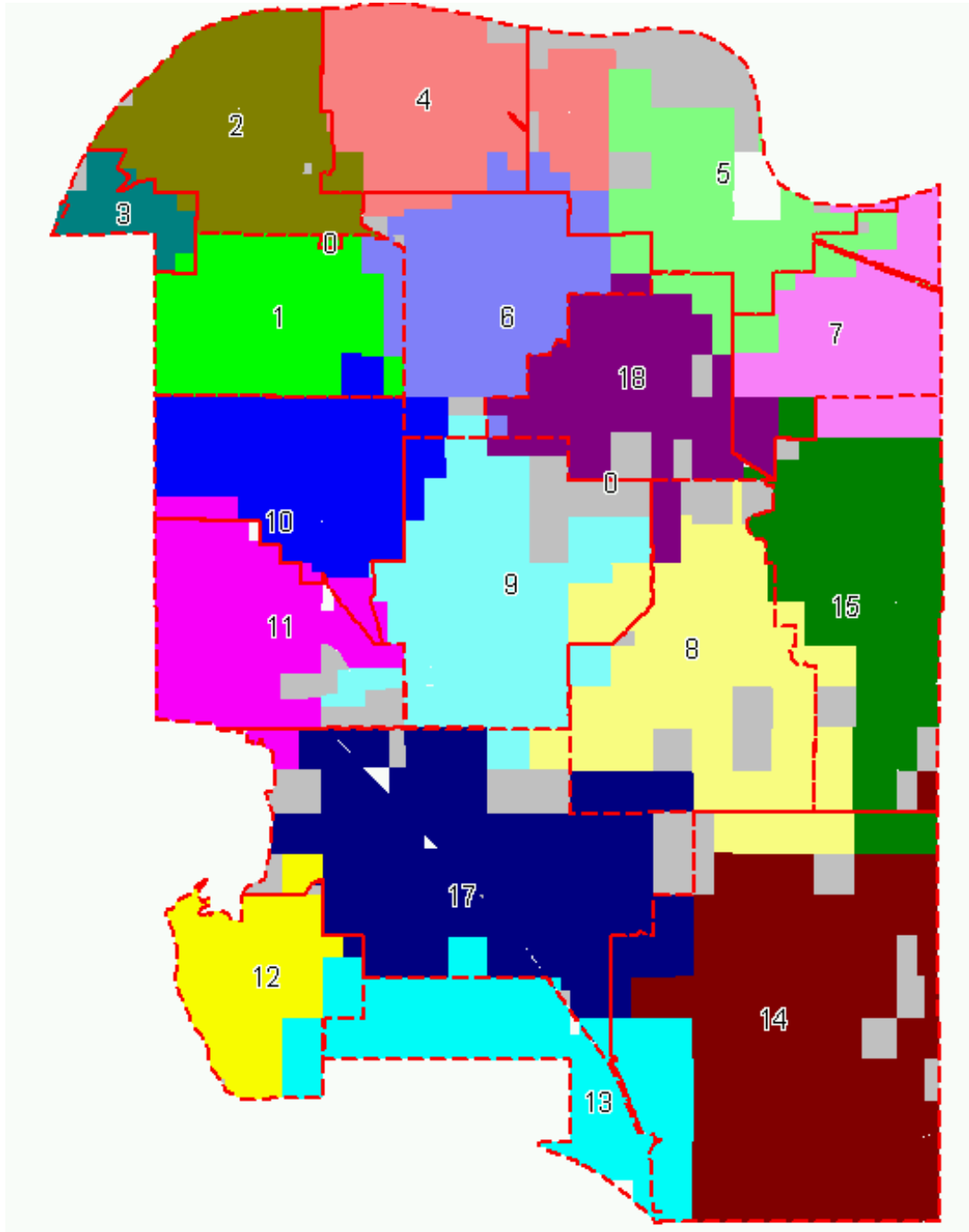
City of Surrey Fire Services Review

Appendix A

City of Surrey Fire Loss 1990 - 1999

Year	Property Type	Number Fires	Value / Loss	Present Value / CPI	Per Incident / Loss CPI
1990	Buildings	285	\$ 7,366,030.00	\$ 9,353,334.00	\$ 46,303.63
	Vehicles	202	\$ 935,510.00	\$ 1,187,906.00	\$ 2,439.23
	Total	487	\$ 8,301,540.00	\$ 10,541,240.00	\$ 38,055.02
1991	Buildings	277	\$ 7,102,381.00	\$ 8,548,392.00	\$ 30,860.62
	Vehicles	196	\$ 1,123,854.00	\$ 1,352,664.00	\$ 6,901.35
	Total	473	\$ 8,226,235.00	\$ 9,901,056.00	\$ 20,932.47
1992	Buildings	348	\$ 8,517,136.00	\$ 9,744,471.00	\$ 28,001.35
	Vehicles	299	\$ 1,371,950.00	\$ 1,569,652.00	\$ 5,249.67
	Total	647	\$ 9,889,086.00	\$ 11,314,123.00	\$ 17,487.05
1993	Buildings	290	\$ 13,257,603.00	\$ 14,726,265.00	\$ 50,780.22
	Vehicles	318	\$ 1,468,322.00	\$ 1,630,983.00	\$ 5,128.88
	Total	608	\$ 14,725,925.00	\$ 16,357,248.00	\$ 26,903.37
1994	Buildings	302	\$ 15,205,370.00	\$ 16,302,896.00	\$ 53,983.10
	Vehicles	278	\$ 1,077,988.00	\$ 1,155,797.00	\$ 4,157.54
	Total	580	\$ 16,283,358.00	\$ 17,458,693.00	\$ 30,101.19
1995	Buildings	311	\$ 8,777,264.00	\$ 9,226,284.00	\$ 29,666.51
	Vehicles	348	\$ 1,515,160.00	\$ 1,592,671.00	\$ 4,576.64
	Total	659	\$ 10,292,424.00	\$ 10,818,955.00	\$ 16,417.23
1996	Buildings	277	\$ 12,248,876.00	\$ 12,549,213.00	\$ 45,304.02
	Vehicles	348	\$ 1,521,764.00	\$ 1,559,078.00	\$ 4,480.11
	Total	625	\$ 13,770,640.00	\$ 14,108,291.00	\$ 22,573.27
1997	Buildings	227	\$ 10,082,642.00	\$ 10,247,881.00	\$ 45,144.85
	Vehicles	278	\$ 1,371,950.00	\$ 1,394,435.00	\$ 5,015.95
	Total	505	\$ 11,454,592.00	\$ 11,642,316.00	\$ 23,054.09
1998	Buildings	281	\$ 13,784,895.00	\$ 13,927,244.00	\$ 49,563.15
	Vehicles	350	\$ 1,407,451.00	\$ 1,414,488.00	\$ 4,041.39
	Total	631	\$ 15,192,346.00	\$ 15,341,732.00	\$ 24,313.36
1999	Buildings	255	\$ 9,697,454.00	\$ 9,748,851.00	\$ 38,230.79
	Vehicles	364	\$ 2,061,200.00	\$ 2,072,124.00	\$ 5,692.65
	Total	619	\$ 11,758,654.00	\$ 11,820,975.00	\$ 19,096.89

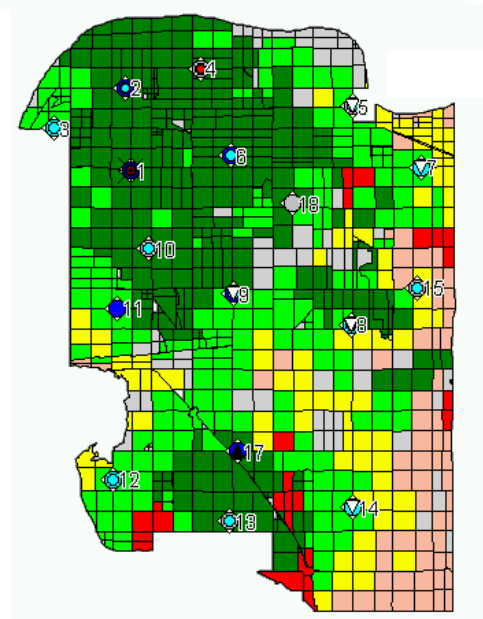
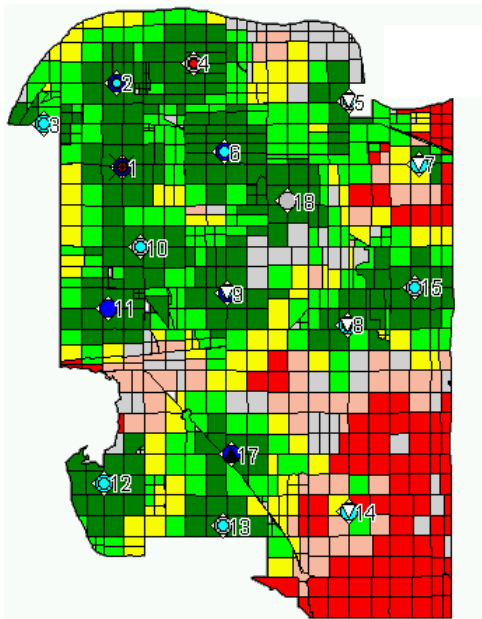
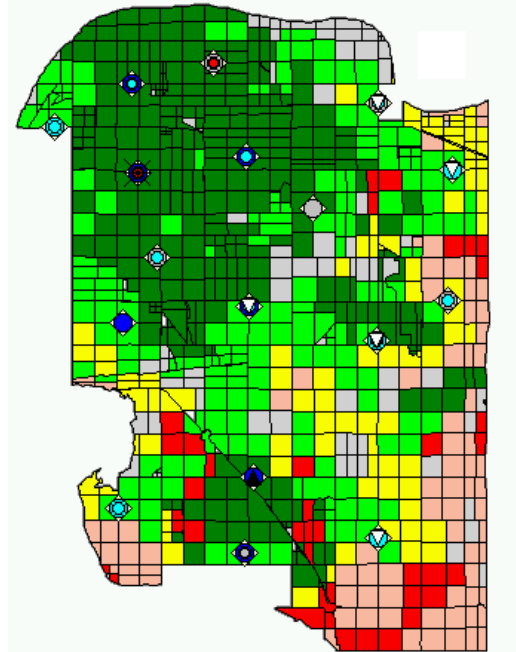
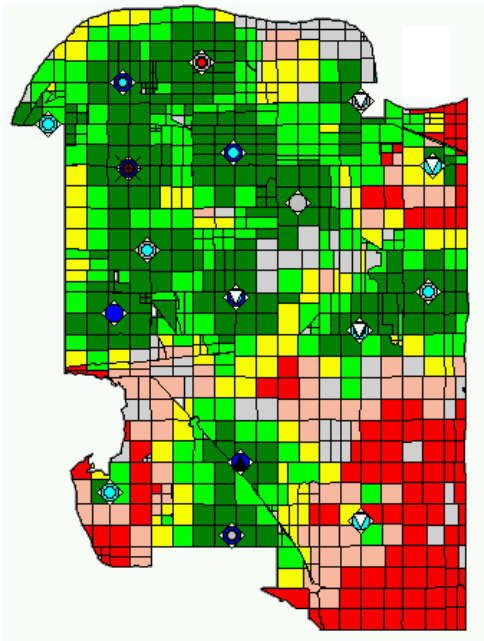
Appendix B



Appendix C

Recommendation: in 2005 additional 8 firefighters be hired (2 per shift) and placed in station 13 (Sunnyside). The Aerial Ladder be redeployed to a volunteer station yet to be determined and a Quint to be placed at Station 13. The pump and crew of station 13 moved to station 12 (Crescent Beach).

The top left graph illustrates the existing single unit response performance and on the top right Initial attack force response performance. The lower left graph illustrates the proposed single unit response performance and the lower right initial attack force response performance.



Appendix D

Impact on Life Risk and Installation of Residential Fire Sprinklers & Smoke Alarms as a function of Fire Service Response Time

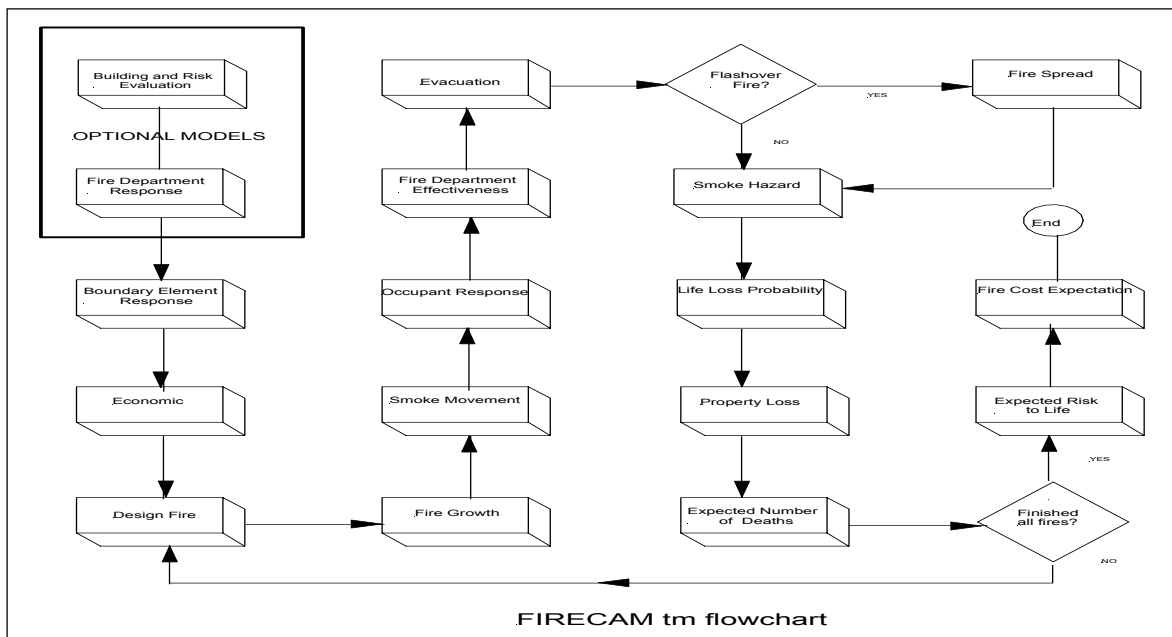
The fundamental issues presented within this report deal with deployment of resources in a timely manner. Considering this, it would not be responsible if proven non-traditional alternatives were not also considered by the Fire Services Review Task Force.

In August of 1998 the National Research Council of Canada (NRC) in co-operation with Canada Mortgage and Housing Corporation (CMHC) completed a study that analyzed whether sprinklering of buildings in a new development areas, coupled with a reduced level of fire protection from the Fire Service, would adversely effect life safety and whether there are economic benefits to a community.

The National Research Council over the past ten years, in its Fire Risk Management Program at the Institute for Research Construction, NRC, has been developing a computer risk-cost assessment model called FiRECAM (Fire Risk Evaluation and Cost Model). The model was used to assess the expected risk to life to the occupants and the expected costs associated with any particular fire design in a building.

The model in this study was used to determine if a building with sprinkler protection but a reduced level of service (Longer Response Times) provides the equivalent level of fire safety to the occupants, to that of a building without sprinkler protection but the current level of service by the Fire Service.

CHART # 11: FiRECAM Model

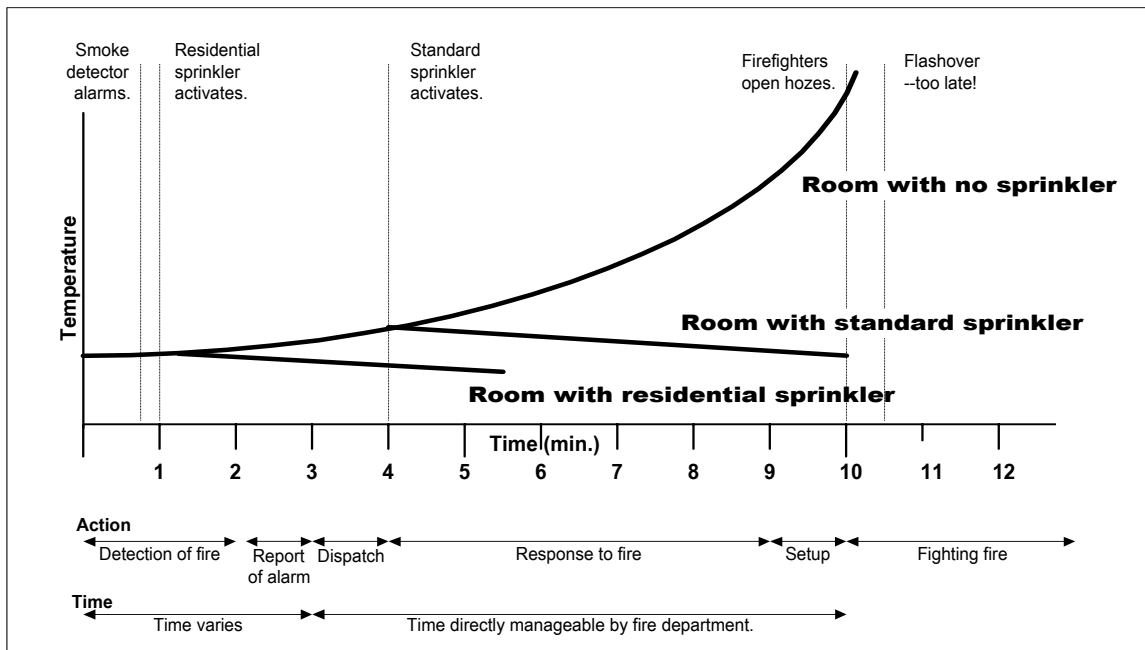


Appendix D Cont'd.,

The FiFRECAM model assess the expected risk to life and the fire cost in a building based on the dynamic interaction of fire and smoke spread, occupant evacuation and fire department response.

Chart # 12: Fire Growth Model

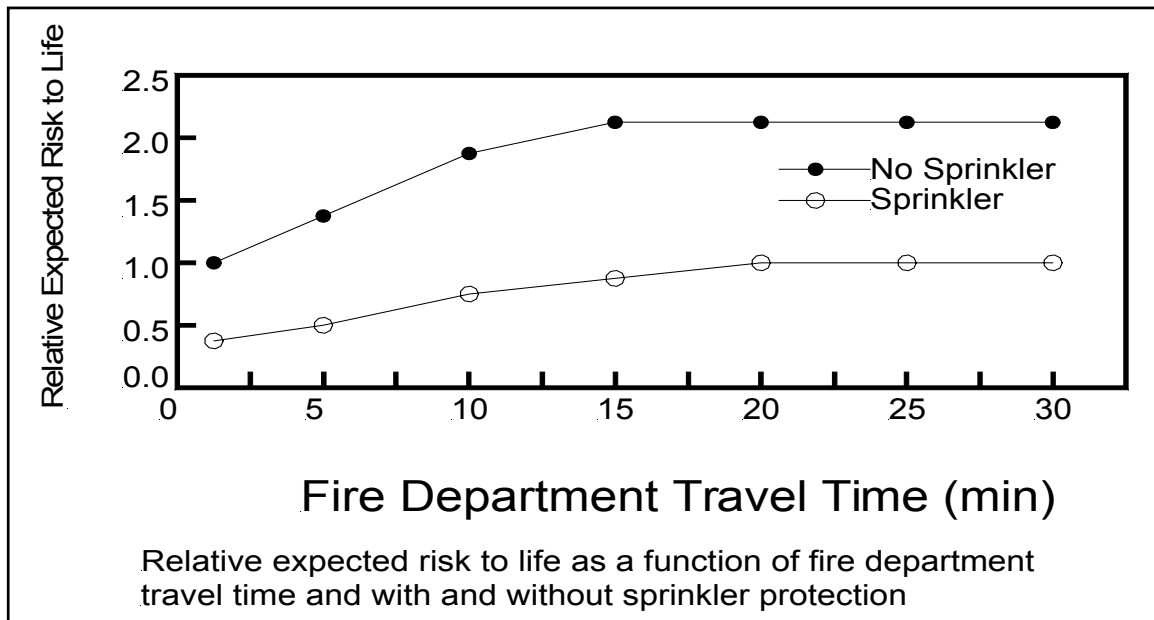
The Fire Growth model provides a view of the typical expectation of the growth of a fire in a residential setting.



Appendix D Cont'd.,

Chart # 13: Expected Risk to Life With and Without Sprinklers

In Chart # 13 calculated expected risk to life value plotted as a function of fire service travel time and with or without sprinkler protection. In this chart, considering the case without sprinkler protection and a fire service travel time of 1- minute and sprinkler protection normalizes the expected risk to life values. It is apparent that the expected risk to life to be approximately 60% lower with sprinkler protection at the 1- minute interval. Even with a longer Fire Service response time, sprinkler protection provides a level of fire safety better than the case without sprinkler protection even with a very short fire service travel time of 1 minute.



City of Surrey Fire Services Review

Appendix D Cont'd.,

Legal Aspects:

The sprinkler regulation exceeds the current British Columbia Building Code by application of a permissive section of the Municipal Act.

“The council may, for health and property, and subject to the Health Act and the Fire Services Act and their regulations, by bylaw... establish areas to be known as fire limit areas and regulate the construction of the buildings in the specific area for precautions against fire, and discriminate and differentiate between areas in the character of the buildings permitted.”

To expand the a sprinkler bylaw, the City of Surrey Council could:

- amend the bylaw to include all new construction; and/or
- create an additional fire limit area for developing parts of the municipality where new subdivisions occur.

Lorena P.D. Staples² said that whatever option was chosen, the bylaw should contain a requirement that the owner of the property is required to contain a sprinkler system under the fire limit area regulations and maintain the system in accordance with the manufacturers' requirements.

The policy of the district not to enforce this requirement had to be expressed as a policy of the council based upon an economic rational in order to legally characterize it as the district's policy rather than an operational policy.

In other words, council needed to adopt a policy that the City does not have the resources to enforce the maintenance requirement of the sprinkler regulation and therefore will not be inspecting or performing any other enforcement function, but instead will be placing that responsibility upon the property owners.

The policy can:

- be contained in the bylaw
- be folded into the bylaw enforcement policy or
- be a stand-alone resolution of council.

Conclusion:

The National Research Council determined a building with sprinkler protection and a longer fire service response time provides a level of fire safety for occupants to that of a building without sprinkler protection and a typical response time.

² Opinion(s) supplied by Staples McDannold Stewart, Barristers & Solicitors, Lorena P.D. Staples (1997)

Appendix D Cont'd.,

City of Edmonton, Alberta participated in the study. The results indicated that sprinkler protection, even with a longer fire service response, provides a significantly lower risk to life than the case without sprinkler protection and a faster fire service response time. Using the travel time of 6.6 minutes, based on a new station in a new development area and 90% probability, the results indicated that the relative expected risk to life without sprinkler protection is approximately 1.6. The expected risk to life for the case with sprinkler protection and a longer travel time of 11.3 minutes, based on existing fire stations, is much lower, approximately 0.7.

The application of fire sprinklers in the City of Surrey to augment its fire services should not be overlooked nor discarded. The obvious benefits allow for longer travel times that can be considered when faced with determining service levels and how to deliver them.

Recommendation:

Council direct Fire Service and Planning staff to bring a detailed strategy forward amended the fire limits bylaw as follows:

Sprinkler all new Buildings except:

- I. Detached single-family dwellings.
- II. Portable classrooms.
- III. Construction site offices, tool sheds and similar structures during the period of construction on any particular site.
- IV. Detached buildings under 50 m² in area and 140 m³ in volume.
- V. Detached gasoline service station canopies.
- VI. Greenhouses.
- VII. Riding Arenas if of non-combustible construction.
- VIII. Farm Buildings defined by the British Columbia Building Code Regulations conforming with the following:
 - a) Under 2000 m² in floor area.
 - b) Over 2000 m² in floor area and of non-combustible construction.
- IX. Any other building that in the opinion of the Fire Chief is similar to a building referred to in Subsections I through VIII in terms of its fire safety characteristics.

All renovated, repaired or altered buildings except those exempted in Subsections I through IX above where such renovations, repairs or alterations exceed 75% of the building's assessed value above the foundation.

Appendix D Cont'd.,

The intent of these proposed amendments would accommodate increased response coverage in areas that sprinklers were installed in buildings; no additional resources would be required to deliver services and these buildings would experience an improved level of safety. The intent of these amendments would also insure a balance between service and increases in both operating and capital costs.

Smoke Alarms – Background:

Bill 50-1990 received Royal Assent on July 27, 1990 and resulted in an amendment to Section 734 of the Municipal Act that enabled local governments to pass a by-law requiring smoke alarms in existing buildings. The Fire Department submitted a Corporate Report to Mayor and Council on May 4, 1993 recommending that Council authorize the preparation of a By-law requiring smoke alarms in all residential buildings, with the intent to improve life safety in Surrey by:

1. Requiring the installation of smoke alarms in residential buildings constructed before smoke alarms were required by the Building Code, and
2. Placing the responsibility for the installation and maintenance of smoke alarms on building owners.

The Corporate Report indicated that:

- Smoke alarms have proven to be an effective means of reducing fire deaths and injuries,
- The March 1992 issue of *Fire Engineering* reported that "Installing and properly maintaining a single smoke alarm in a home can double the chances for surviving a fire",
- A report from the B.C. Fire Commissioner's Office finds that the death rate for fires in buildings constructed after smoke alarms were required was 12 per 1,000 vs a death rate of 16 per 1,000 for buildings constructed in 1978 and earlier, and
- While it is estimated that 90 percent of residential occupancies in B.C. have smoke alarms, 55 percent of fire fatalities occurred in residential buildings with no smoke alarms.

By-law Adoption & Enforcement:

On January 17, 1994 Surrey Smoke Alarm By-law #12136 was adopted. In essence it requires that all homes have a reliable early warning system that will detect the presence of smoke, consisting of at least one smoke alarm installed at a reasonable cost for both private and rental homeowners, and that smoke alarms are maintained in working order. It is understood through discussions with the City Solicitor that enforcement of the By-law is upon receipt of a complaint and that there is no active enforcement such as door-to-door inspections.

City of Surrey Fire Services Review

Appendix D Cont'd.,

Level of Protection:

The By-law requirement for *at least one smoke alarm* may not provide the equivalent level of protection provided by a smoke alarm installation conforming to the Provincial Building Code. For example, the Provincial Building Code requires a hard-wired, interconnected smoke alarm on each floor of a home; whereas the City's Smoke Alarm By-law requires only one smoke alarm in a home, and permits the alarm to be battery operated in certain circumstances. Many older homes in the City were constructed at a time when the Provincial Building Code did not require smoke alarms. To install smoke alarms in accordance with the present Provincial Building Code can be costly – Smoke Alarms installed in accordance with the City's Smoke Alarm By-law increase occupant safety at a reasonable cost.

Conclusion:

The By-law should be reviewed regularly to ensure that smoke alarms installed in accordance with the By-law are *reasonable early warning systems for the detection of smoke*. Determining whether they are effective and justified is difficult for several reasons, the major being that statistics are rarely obtained that can support the claim. Statistics are obtained after a fire has occurred; however, smoke alarms often work before damage has occurred and therefore no record of their "success" is reported. Further to this, there is no differentiation between smoke alarms installed to Building Code or Surrey's By-law. For this reason it may be best to continue to enforce the By-law based on the concept that a single smoke alarm is inexpensively installed and maintained, whether battery operated or hard-wired as this small cost provides a potential for saving a life.

Recommendation:

Council reaffirm support for the Cities smoke alarm bylaw in support of its proven contribution to the early detection of fires and the obvious benefits to life safety.

Appendix E

The fire service linkage to the insurance industry in the form of contributions dates back to 1920. In 1920 the Fire Services Act (Section 48, 50) made a direct connection between the taxes collected under the Act and the cost to deliver the services of The Office of the Fire Commissioner. Although there have been editorial changes to these sections over the years, it would appear that the intent of those changes have not changed (until recently) since the Act came into force in the early 1920's.

The original tax was 1% of the fire premium portion of property tax and automobile insurance, with the proviso that a further levy could be collected if the tax was not sufficient to cover the salaries and expenses of the Office of the Fire Commissioner. The Fire Commissioner stated there has never been an occasion where there was a need to increase the 1% provision due to the revenue not meeting the expenses.

On January 1, 1983, as part of the governments updating of it's financial controls, the Fire Services Act was amended to remove the connection between the operating expenses of the Office of the Fire Commissioner and the tax collected. The Act also changed the tax levy to apply to the entire property insurance premium rather than to only the fire premium portion and removed the application of the Act to automobile insurance. The amendment made the calculation of the Fires Services Act Insurance Premium Tax consistent with the *Insurance Premium Tax Act*, which imposes a tax of 3% on property and liability insurance premiums.

The most recent developments occurred on January 1, 2000, which deleted all reference to the 1% tax from the Fire Services Act and shifted the 1% tax to the *Insurance Premium Tax Act* for a total of 4%.

Conclusion:

The insurance industry makes substantial contributions to BC Government through the *Insurance Premium Tax Act* based on the value of premiums collected. In discussion with the Fire Commissioner, he has confirmed that in 1999 a total of \$1.46 billion was collected by the insurance industry, this translated into \$ 58.4 million in contributions to the BC Government. A Summary of revenue and expense of the Fire Commissioners Office is detailed below and a legal opinion is attached for examination, courtesy of the Greater Vancouver Fire Chiefs Association.

Office of the Fire Commissioner Accounting of Fire Services Act 1 % Tax Collected			
<i>Fiscal Year</i>	<i>Budget Fire Commissioner</i>	<i>Tax Collected From Insurance Industry</i>	<i>Surplus General Revenue</i>
1990/91	\$ 3,022,193.00	\$ 5,800,000.00	\$ 2,777,807.00
1991/92	\$ 3,280,473.00	\$ 6,000,000.00	\$ 2,719,527.00
1992/93	\$ 3,023,506.00	\$ 7,200,000.00	\$ 4,176,494.00
1993/94	\$ 3,274,780.00	\$ 7,000,000.00	\$ 3,725,220.00
1994/95	\$ 3,320,000.00	\$ 8,300,000.00	\$ 4,980,000.00
1995/96	\$ 3,240,896.00	\$ 8,500,000.00	\$ 5,259,104.00
1996/97	\$ 3,228,287.00	\$ 11,000,000.00	\$ 7,771,713.00

City of Surrey Fire Services Review

Appendix E Cont'd.,

Recommendation:

Council lobby the BC Government to have 1% Tax redirected to the City to offset Fire Service expenses.

Appendix F ***Summary of Recommendations & Initiatives***

1. Deployment of volunteer firefighters

The City of Surrey volunteer firefighter force carries untold benefits to the city. These include but are not limited to community pride, community service, public education, public safety, and emergency incident response and fund raising events to support the community associated organizations such as the burn unit at the Vancouver General Hospital and the United Way.

- Meaningful or Expanded Role
 - Encourage volunteers to provide input into operational decisions, which would affect them.

- Communications Structure (Volunteer)
 - Establish an elected structure within the volunteer group

- Input into Strategic Plan, Health and Safety Committees
 - Volunteers should have input into all Fire Service Committees

- Career Hiring Policy
 - Hire qualified ratio of (100%) volunteers for career positions

- Identity of Volunteers
 - Establish a uniform committee with volunteer representation to aid in the introduction of the program Issue volunteer firefighters with uniforms
 - Develop a volunteer orientation hand book

- Recognition as Volunteer Firefighters
 - Frequency of payment for services from quarterly to monthly
 - Appreciation banquet
 - Paraphernalia provisions

- Communications Structure (Administration)
 - Stronger involvement for the Assistant Chief for Volunteers

- Relationship of Volunteer Firefighters and Career Firefighters
 - Zero tolerance for harassment
 - Implement policy for dispute resolution
 - Provide harassment training for both volunteer and career firefighters

City of Surrey Fire Services Review

Appendix F Cont'd.,

- Volunteer Hiring
 - Hold volunteer recruitment workshops
 - Allow existing volunteers input
 - Hold annual recruitment drives

The key issues brought to the task force are at the various stages of implementation, and need to be supported.

We have recently installed volunteer firefighters in station (11) in Boundry Park and will be evaluating the feasibility of installing volunteer firefighters in station (17) Rosemary Heights and station (18) Fleetwood. Upon completion of the program all fire stations will be supplemented by volunteer firefighters if we are able to attract candidates for stations (17) and (18).

2. Four person staffing on pumper trucks

The recommended approach to resolving staffing shortages is a combination of hiring 12 new staff, 8 in the year 2001 and 4 in the year 2002 and the continuation of current programs. Further it is recommended that in 2005 additional 8 firefighters be hired (2 per shift) and placed in station 13 (Sunnyside). The Aerial Ladder be redeployed to a volunteer station yet to be determined and a Quint to be placed at Station 13. The pump and crew of station 13 relocated to station 12 (Crescent Beach).

3. Property loss in Surrey

Support continued assertive fire prevention; code enforcement, public education and suppression activities will reflect further advances in a positive fire loss trend.

Council direct Fire Service and Planning staff to bring a detailed strategy forward amended the fire limits bylaw as follows:

Sprinkler all new Buildings except:

- X. Detached single-family dwellings.
- XI. Portable classrooms.
- XII. Construction site offices, tool sheds and similar structures during the period of construction on any particular site.
- XIII. Detached buildings under 50 m² in area and 140 m³ in volume.
- XIV. Detached gasoline service station canopies.
- XV. Greenhouses.
- XVI. Riding Arenas if of non-combustible construction.
- XVII. Farm Buildings defined by the British Columbia Building Code Regulations conforming with the following:
 - c) Under 2000 m² in floor area.

City of Surrey Fire Services Review

Appendix F Cont'd.,

- d) Over 2000 m² in floor area and of non-combustible construction.
- XVIII. Any other building that in the opinion of the Fire Chief is similar to a building referred to in Subsections I through VIII in terms of its fire safety characteristics.
- A. All renovated, repaired or altered buildings except those exempted in Subsections I through IX above where such renovations, repairs or alterations exceed 75% of the building's assessed value above the foundation.

The intent of these proposed amendments would accommodate increased response coverage in areas that sprinklers were installed in buildings; no additional resources would be required to deliver services and these buildings would experience an improved level of safety. The intent of these amendments would also insure a balance between service and increases in both operating and capital costs.

We have reviewed the City's fire loss experiences in 10-year windows and the trend line indicates consistencies in our losses year to year. It is our intent to reduce these loss experiences through implementation of technologies and/or early detection systems that not only support early detection but also incipient extinguishment. The intended purpose of this initiative is to curtail the need for additional future fire stations beyond our existing inventory; with full implementation of these programs the future view could include a reduction in the current number of fire stations.

The reduction of property loss from fire not only benefits the occupant; it also creates a cost avoidance to the insurance carriers, who in essence are the indirect users of our service, and discussions should be initiated between the B.C. Government and the insurance carriers to have the *Insurance Premium Tax* redirected to the City of offset Surrey Fire Service expenses.

Council reaffirm support for the Cities smoke alarm bylaw in support if it's proven contribution to the early detection of fires and the obvious benefits to life safety.

4. Analyze deployment of resources

Support the strategies that have become apparent from the study that can be utilized to improve response times, specifically dispatch times and turn out times, which would decrease total response time. They include:

- Implementation of call taker interrogation system and training program;
- Implementation of training and policy to improve turn out times for both career and volunteer firefighters; and,
- Realignment of some fire stations boundary areas thereby decreasing response distances.

City of Surrey Fire Services Review

Appendix F Cont'd.,

Support the redeployment proposal that effectively increases the overall coverage in the City for Aerial capabilities from three Aerial Ladders and two Pumper Ladders to Two Aerial Ladders, two Pumper Ladders and three Quints and from four rescue-equipped apparatus to six.

Support for review, including external participants, to achieve deployment of “Shared Resources” for optimal operational and cost effectiveness.

Examine the synergies or potential opportunities in the future to develop Public Safety (Multi Agency) use buildings or facilities.

5. Analyze first responder program

It is recommended that Surrey specific changes to the Medical Priority Dispatch System Allocation list be made.

It is further recommended that call type #33 be added to include Physicians' Offices, Industrial Locations with Occupational First Aid Attendants, Community Care Facilities and Recreational Facilities with Life Guards.

It is further recommended that BCAS Dispatcher questioning determine that relevant equipment is available and in use and that First Responder assistance is not required.

It is further recommended that Unit Chief Garth Dinsmore and Assistant Chief J. Bond participate in an observational “ride-along” (G. Dinsmore on fire apparatus, J. Bond on ambulance within the same district.) Their goal will be to examine dispatch policies with the view toward incremental dispatch changes that will further reduce the number of responses by the Surrey Fire Service where the “value added” component of pre-hospital care does not exist.

6. General

This document undergoes an annual review for revisions and updates to be provided to the Public Safety Committee.

The Fire Services Review Task Force will meet twice annually.