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**THE IMPACT OF RESIDENTIAL SPRINKLERS ON  
PUBLIC FIRE PROTECTION**

Len Garis, Assistant Fire Chief  
City of Surrey Fire Services

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# **THE IMPACT OF RESIDENTIAL SPRINKLERS ON PUBLIC FIRE PROTECTION**

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## **1.0 INTRODUCTION**

### **1.1 THE NEED FOR CHANGE**

The fire service is said to be essential to society, providing protection for life and property. Yet unlike recreational, cultural, and transportation services, the fire service can be cut only at great risk of death and property loss. It is so essential to maintaining quality of life that other public services and amenities can hardly be enjoyed without it. Thus, the necessity of the fire service translates into public support for expanding fire services to control fire incidence. The public has consistently supported rapid increases in the cost of overall fire services, which were manifested in salaries, benefits, and expensive, sophisticated facilities and equipment.

### **1.2 CHANGING PUBLIC OPINION**

Today's taxpayers, however, are not as quick to accept higher costs for any public service, including fire services. Citizens who are now confronted with rising costs and consequent tax increases are expressing concern and resentment over the cost of public safety services.

Intensified public expectation regarding the cost of fire protection will be manifested in one of three ways: radically altering public fire services in a manner that reduces costs, shifting the reliance on the public sector to deliver safety services, and/or accepting to pay more money and hiring more personnel at the expense of other public services.

### **1.3 RETHINKING TRADITIONAL METHODS**

The taxpayers are not the only ones questioning the status quo. Some fire service administrators believe the traditional, conventional methods of delivering public safety services are long overdue for examination as to their cost effectiveness and efficiency. They believe the present systems may be obsolete, even counter productive.

For example, a public administrator recently compared the fire service to the internal combustion engine. After all these years and much "tinkering," the engine is substantially less efficient than when it propelled the first Model T [1].

The fire service has had more than its share of "tinkering," allegedly in the interest of improved public safety that resulted only in increased costs. As one person put it: "It's a difficult system to dismantle and restructure. It is, to say the least, monolithic and tradition bound."

## **2.0 ALTERNATIVE SOLUTIONS**

### **2.1 SPRINKLERS ADDRESS PROBLEMS OF A GROWING POPULATION**

This section explains how sprinklers address three fire-protection problems that accompany a growing population: increased fire load, increased response times, and increased demand on personnel.

### **2.1.1 PROBLEM 1: INCREASED FIRE LOAD**

A fire department's primary and most valuable resource is its personnel. Yet no matter how well trained and well staffed, the department cannot perform effectively without the necessary physical resources.

There are three types of physical resources available to a fire department: the facilities (real estate and buildings); the apparatus; and the equipment and supplies. These resources, in addition to personnel, enable a fire department to function and fulfill its objective.

A department's overall effectiveness and the degree to which it can meet its obligation to control, extinguish fires, and help prevent fires from occurring, is greatly influenced by the management and coordination of these resources.

### **2.1.2 EXTERNAL RESOURCE ANALYSIS**

In 1984 the District of Pitt Meadows fire defenses were evaluated by Fire Underwriters Survey.<sup>3</sup> They recommended a number of changes to the fire department.

The most significant change concerned the department's water-flow capabilities, which is called "fire flow." The goal was to match the water flow capability to the existing "fire loads" (building sizes and contents). Fire Underwriters Survey recommended that Pitt Meadows increase its fire flow to 3,000 imperial gallons per minute.<sup>4</sup>

At that time, the Fire Department had two fire engines producing a maximum fire flow of 1,625 gallons per minute—roughly half the capability that the Fire Underwriters Survey recommended. In 1989, the Fire Department acted on the Fire Underwriters Survey's recommendation and purchased a third engine. This increased the total fire flow to 2,875 gallons per minute.

### **2.1.3 INTERNAL RESOURCE ANALYSIS**

Even after the purchase of a third engine, Pitt Meadows still needed to evaluate its resource needs. One of the department's pre-existing engines dated back to 1968 and only pumped 625 gallons per minute. The estimated replacement cost was \$260,000. Rather than automatically buy a new engine, the Fire Department began a study to determine under operative conditions how frequently a third engine would be required to develop maximum fire flows.

The study, which spanned a five-year period from 1985 and 1990, concluded that only 5.5 % of the total calls during this period required a third engine for fire fighting purposes. (The third engine was summoned from Maple Ridge or Port Coquitlam.)

In most cases there was not enough personnel to send or adequately operate the third engine. On average, 12 firefighters routinely attended calls. During 3 % of the calls, the crew used the engine(s) for transportation only.

### **2.1.4 SPRINKLERS AND OTHER ALTERNATIVE SOLUTIONS TO INCREASED FIRE LOAD**

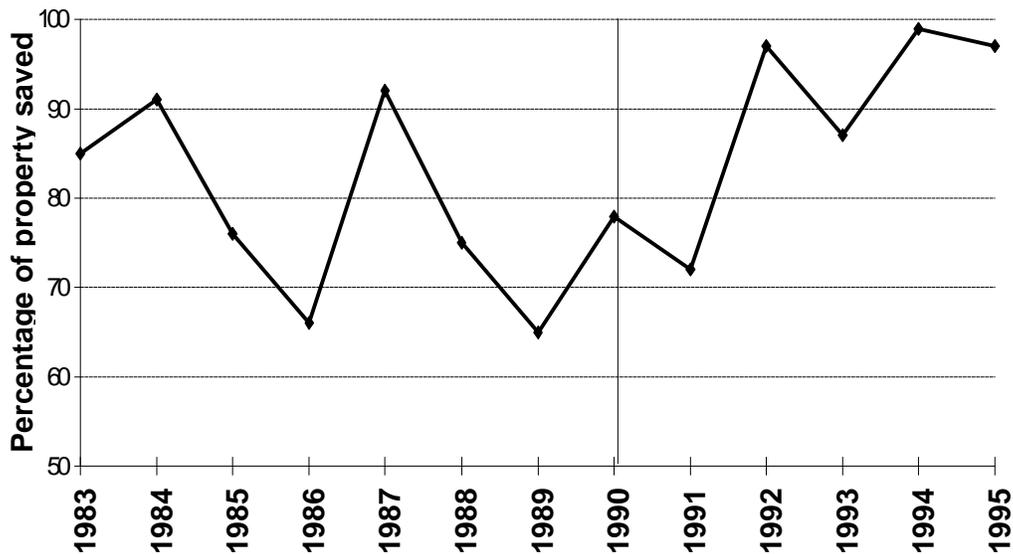
As the Pitt Meadows Fire Department revisited the Fire Underwriters' recommendations, it was able to find several alternatives to reduce the maximum fire flow requirements.<sup>5</sup> The department implemented the following alternatives: the Sprinkler Bylaw was adopted to reduce fire flow requirements by 25 to 75 %, the older, third engine was sold and replaced with a van costing \$30,000 (for transportation of firefighters to and from fires), and mutual Aid agreements were reconfirmed with Port Coquitlam and Maple Ridge.

Since 1990, the Fire Department has not had occasion to require assistance from our mutual partners. The Fire Department believes it selected a responsible alternative that has saved an estimated \$230,000. (The estimate is based on the \$260,000 replacement cost of the third engine, less \$30,000 for the purchase of the transportation van.)

### 2.1.5 REDUCED FIRE LOSSES

To be sure that the lack of equipment was not having a detrimental effect on firefighting ability, the Pitt Meadows Fire Department compared its fire losses over the last ten years. Despite the fact that most firefighting resources remained level, just as much (or more) property has been saved from fire since the sprinkler bylaw came into effect. Figure 2.2-1 indicates an improved upward trend toward the increased value saved.

**Figure 2.2-1: Percentage of Property Saved**



### 2.2.1 PROBLEM 2: INCREASED RESPONSE TIMES

As a community grows, Fire Department responses times increase due to traffic congestion, physical barriers (such as rail crossings), travel distances exceeding five miles.<sup>6</sup> The traditional reaction to these increasing response times is to build more fire stations close to the new population. However, a more thorough analysis of response times reveals that sprinklers are far more effective than speedier firefighters.

### 2.2.2 THE IMPORTANCE OF THE FIRST TEN MINUTES

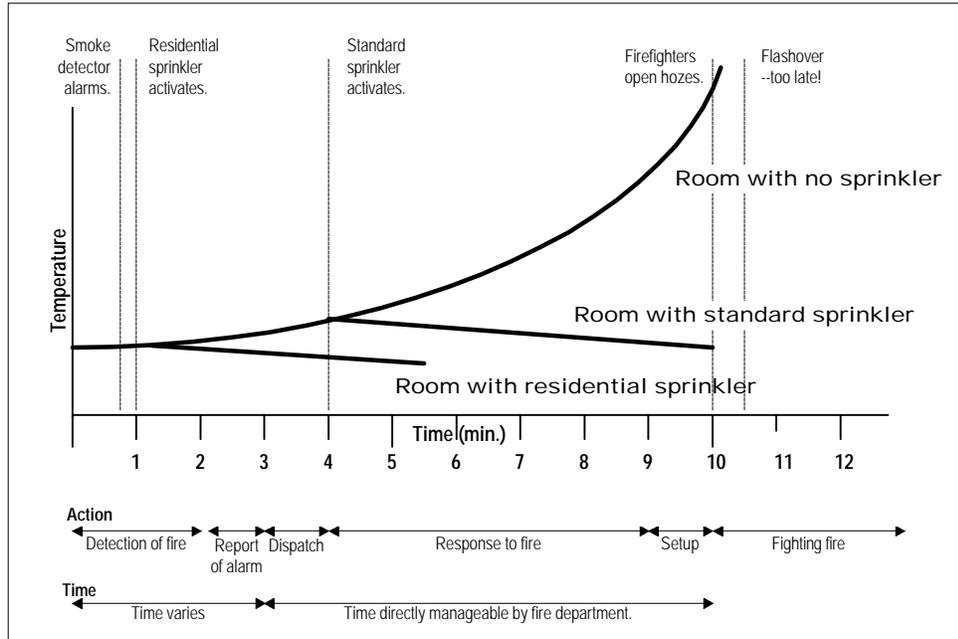
The relationship between response times and fire control is not a simple, direct association. Fires send temperatures soaring so quickly that everything in the room becomes unsalvageable within just a few minutes of the fire's ignition.

Therefore, effective firefighting entails a brief window of opportunity. The fight against the fire must start before this window closes—or the building and its contents are unsalvageable. After that point, firefighters can put out the fire, but nothing has been saved.

## 2.2.3 EXTERNAL ANALYSIS

9.1 The National Fire Protection Association identifies this window in a graph which identifies the stages of a fire's growth over time. (See Figure 2.2-1.)

**Figure 2.1-1 Potential Fire Growth Within Residential Suites**



Firefighters are usually dispatched four minutes after a fire begins. If it takes a typical length of five minutes to get to the fire, they do not open their hoses on the blaze until ten minutes after the fire has started. Yet fires are out of control within seven to nine minutes. By the time the hoses are open, the temperature of the room is so high that flashover has either already occurred or flashover will occur anyway. Everything in the room is destroyed.

As the chart reveals, the focus should not be on the firefighters' response time. Whether they reach a fire at nine minutes or eleven minutes, destruction has already occurred. In contrast, the sprinklers have a response time that is actually effective in preventing destruction. A residential sprinkler opens one minute after the fire starts, and will often douse a fire before firefighters arrive on scene.

## 2.2.4 RESULTS OF A SPRINKLER EXPERIMENT

The powerful effect of sprinklers was reconfirmed in a recent fire experiment conducted in Pitt Meadows [2]. In October 1996, the International Association of Arson Investigators, Forinek Canada Corp. and many municipal fire departments conducted a series of fire experiments in a vacant Pitt Meadows motel. One experiment included a comparison of couch fires in non-sprinklered and sprinklered living rooms. Crumpled newspapers were ignited on top of the couches in each motel room, one with no sprinkler and one with a residential sprinkler.

As Figure 2.2-2 identifies, the sprinklers activated 45 seconds after the fire started. The sprinklered suppressed the fire in the crumpled newspaper before the fire spread to the couch. The temperature remained almost constant throughout the experiment.

In the unsprinklered unit, temperatures climbed to almost 60 ° C within two minutes of ignition. At three minutes, the temperature exceeded 120 ° C. The fire department began fighting the fire about nine minutes after it started and was able to suppress the fire within 40 seconds. However, flashover had already occurred. The fire had ignited all furniture in the living room and destroyed the walls nearby.

**Figure 2.2-2: Timeline in Pitt Meadows Sprinkler Experiment**

| Time After Ignition | Sprinklered              | Unsprinklered                 |
|---------------------|--------------------------|-------------------------------|
| 0:00                | Ignition                 | Ignition                      |
| 0:35                | Detection of smoke alarm | Detection of smoke alarm      |
| 0:45                | Sprinklers activated     | ---                           |
| 2:50                | ---                      | Window cracked in living room |
| 8:50                | ---                      | Fire department breaks window |
| 9:10                | ---                      | Flashover in living room      |
| 9:30                | ---                      | Suppression                   |

### 2.2.5 THE NEED FOR SPRINKLERS IN PITT MEADOWS' CASE

The current location of the Pitt Meadows Fire Hall provides excellent response times to the community, mainly due to the relative short distance required to travel to destinations. The average for most fire calls in Pitt Meadows is two miles.

As development spreads out from the city's core, the Fire Department can expect increased demands to provide an acceptable level of service.

In 1995, the Fire Department analyzed its response times to future neighborhoods in the community's outside fringes. The Fire Department's average response time, based on experience in 1995, is 4:40 minutes (Figure 2.2-3). However, the response time to a perimeter neighborhood was more than twice as long. The Fire Department conducted travel tests to the intersection of Neaves Road and McNeil Road. The response time to this location, which is five miles from the Pitt Meadows Fire Hall, was eleven minutes (Figure 2.2-3).

**Figure 2.2-3: Response Times in Pitt Meadows**

|  | Dispatch  | Turnout   | Travel Time | Total      |
|--|-----------|-----------|-------------|------------|
| Current average response time                      | 0:40 min. | 2:58 min. | 2:01 min.   | 4:40 min.  |
| Estimated response time to Neaves and McNeil Roads | 0:40 min. | 2:58 min. | 8:18 min.   | 11:00 min. |

As stated above, fires will be out of control between seven and nine minutes. Yet the Pitt Meadows Fire Departments cannot reach the outside fringes of the city until at least eleven minutes after the call.

### 2.2.5 SPRINKLERS AS A SOLUTION TO INCREASED RESPONSE TIMES

To address this problem of response time, Pitt Meadows has at least four options: do nothing; add a second fire station, related equipment, and volunteers, costing \$1.8 million; relocate the existing fire hall, costing \$900,000 (including proceeds from the sale of the current fire hall); or require sprinklers in all new residential buildings, costing \$2,900 per home. Looking at the future savings in terms of operating costs and capital costs, the Fire Department chose to require sprinklers in all new residential buildings.

Sprinklers turn the question of fire department response times upside down. As Figure 2.2-1 illustrates, sprinklers provide a response to a fire within 1.0 to 1.5 minutes—long before a firefighter could ever respond. They take the focus off the fire department by acting as a firefighter in the home.

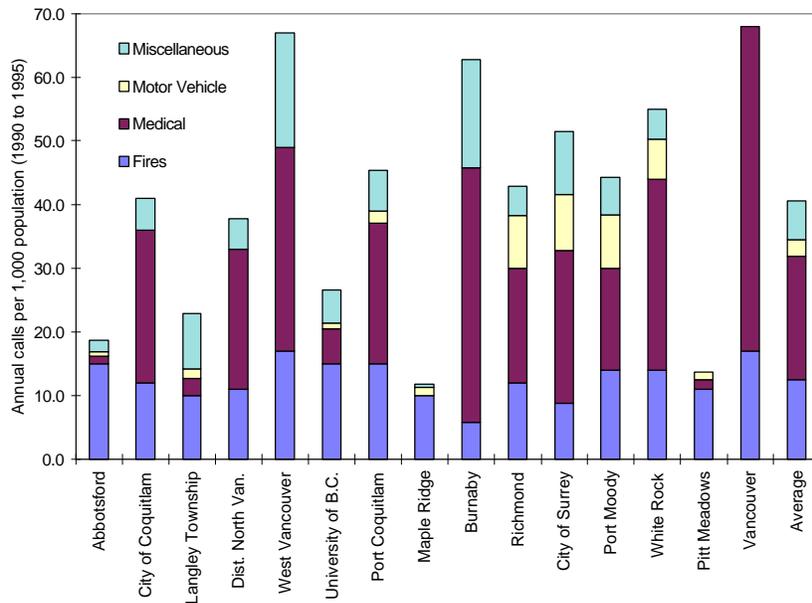
The department decided that sprinklers provided the best overall solution to providing firefighting services to a growing community such as Pitt Meadows.

### 2.3.1 PROBLEM 3: INCREASED DEMAND ON PERSONNEL

It is said that there are only three things that can start a fire: men, women and children. Thus, as a community grows, the total number of calls increases as well.

The Pitt Meadows Fire Department surveyed a number of communities to determine exactly how the increasing population affected fire calls. Call rates of many Lower Mainland communities are identified in Figure 2.3-1.

**Figure 2.3-1 Annual Fire Department Calls Per 1,000 People (1990 to 1995)**



Excluding non-fire calls, the department concluded that, in the worst-case scenario, it would see an additional 14.47 calls per 1,000 persons of increased population. This increase in call volume would be particularly critical in Pitt Meadows, because it has a volunteer fire department. There can be a time when an excess number of calls may have an adverse effect on a volunteer organization, forcing the department to provide career firefighting in place of volunteer firefighters.<sup>7</sup>

### 2.3.2 SPRINKLERS AS A SOLUTION TO INCREASED DEMAND ON PERSONNEL

Pitt Meadows Fire Department tackled the increased call volume with sprinklers. Sprinklers will not prevent fires from starting, of course. Increased population translates into increased the call volume--whether or not people have sprinklers.

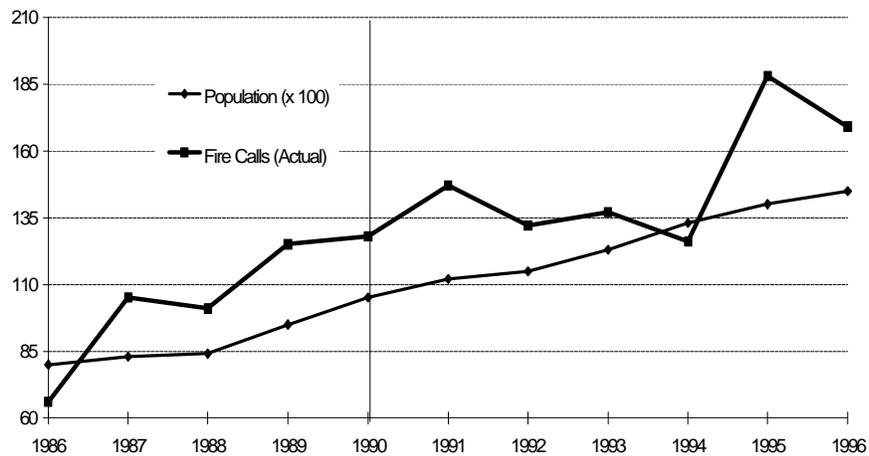
However, sprinklers will ease the impact of the increasing call volume by reducing the total amount of time spent at each fire. If a sprinkler system activates shortly after a fire starts, the fire is smaller when firefighters arrive or it is completely out already. Often, all the firefighters have to do is ensure that all hot spots are out and clean up.

This theory is demonstrated in Pitt Meadows' experience over a 10-year period surrounding the introduction of a bylaw to require sprinklers in all new buildings that housed more than two families. As Pitt Meadows' population increased, the Call volume increased, the average duration of a call decreased, and the total call hours and person hours remained steady.

### 2.3.3 CALL VOLUME

As predicted, the Pitt Meadows Fire Department had higher call volumes as population grew (see Figure 2.3-2). The total number of calls each year increased in proportion with the growing population.

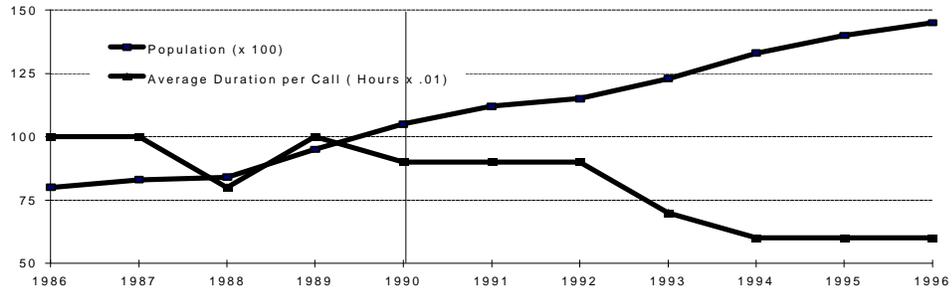
**Figure 2.3-2: Population and Volume of Fire Calls**



### 2.3.4 CALL DURATION

However, after sprinklers were required in 1990, the duration of an average call decreased dramatically (see Figure 2.3-3). In 1986, calls lasted an average of one hour. By 1996, calls lasted an average of thirty-six minutes. The Pitt Meadows Fire Department believes that sprinklers reduced the average duration of a fire call. While this may appear to be insignificant, the accumulative resource demands effect costs. As the Pitt Meadows population grows, sprinklers will enable the Fire Department to further reduce its duration at fire calls while managing with its existing resources.

**Figure 2.3-3: Population and Average Duration of a Fire Call**

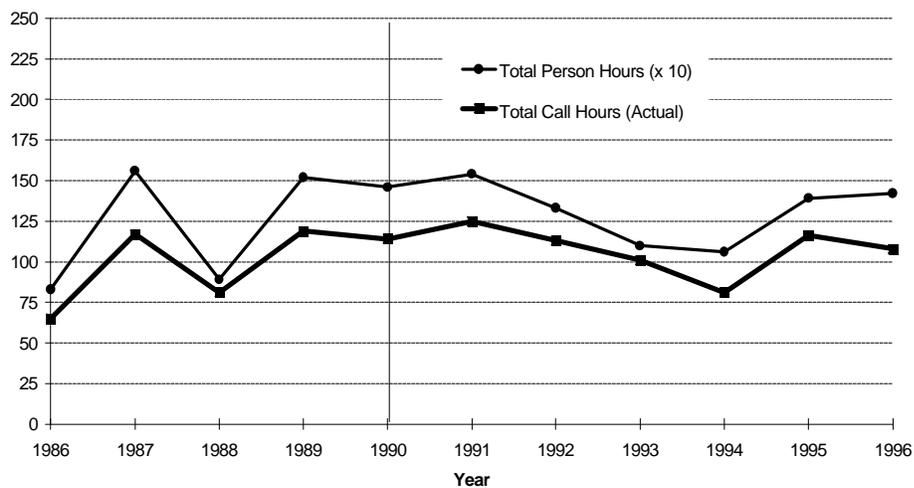


The effect is further demonstrated as the Fire Department tracked the total duration of fire calls each year, and the person-hours spent at fire calls each year. These numbers remained relatively stable even though population (and volume of fire calls) grew.

### 2.3.5 TOTAL CALL HOURS

By cutting call duration, sprinklers effectively offset the impact of increasing call volume. As Figure 2.3-4 demonstrates, the total call hours that the department spends at a fire has remained relatively constant over the last 10 years, despite the growing population. Similarly, the total person hours spent at fires each year has remained relatively constant.

**Figure 2.3-4: Total Person Hours and Call Hours at Fires**



Since 1990, when sprinklers were introduced, about 41 % of the population has installed sprinklers or is currently protected by sprinklers.

The Fire Department concludes that sprinklers helped it tackle increased call volumes without increasing resources. The department can “do more with less.”

## 3.0 COSTS AND BENEFITS

### 3.1 SPRINKLERS CUT FIRE PROTECTION COSTS

It is not easy to analyze the benefits of sprinklers, or to evaluate the levels of service that various fire departments provide. Service levels for fire protection are without a standard. The standards that the Pitt Meadows Fire Department comply

with are set by the elected officials of the community. Service levels should also meet Insurance Underwriters' requirements to ensure that residents can enjoy protected insurance rates.<sup>8</sup>

However, certain conclusions can be drawn by a) comparing the cost of providing fire protection in Pitt Meadow and other B.C. communities to evaluate whether a sprinklered community costs less to protect, and b) estimating the costs of sprinklers to the homeowner, and then comparing the total cost of fire protection (including sprinklers and the fire department) in Pitt Meadows with other B.C. communities.

### 3.2 AVERAGE FIRE PROTECTION COSTS

To determine average fire-protection costs, one can compare provincially or regionally. One can also look at two types of comparisons: per capita costs of fire protection and how much of the total municipal budget is spent on fire protection.

#### 3.2.1 PROVINCIAL AVERAGES

Robert Bish [3] reported per capita and percentage of total municipal expenditures for 1988. As Figure 3.2-1 outlines, he found that the average cost of fire protection in B.C. was about \$64 per person, or 9 % of total municipal budgets.

**Figure 3.2-1: Fire budgets as a percent of municipal budgets in B.C. [3]**

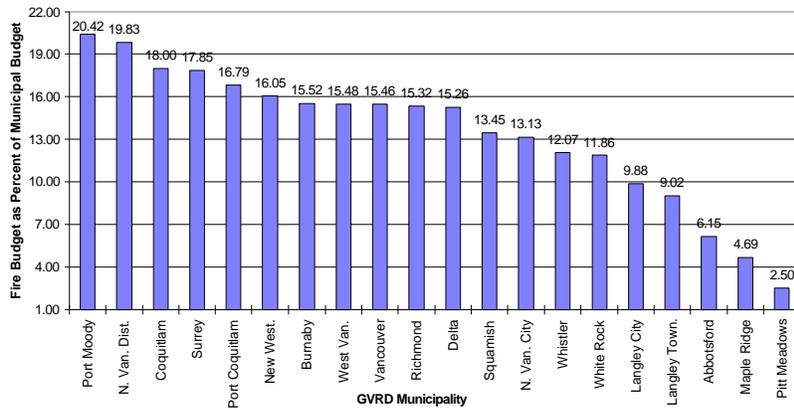
|                         | Population | Cost per capita | Percentage of municipal expenditures |
|-------------------------|------------|-----------------|--------------------------------------|
| Vancouver               | 443,092    | \$93.75         | 9.00%                                |
| Cities                  | 714,356    | \$66.21         | 9.65%                                |
| Towns                   | 56,854     | \$23.18         | 4.39%                                |
| Villages                | 52,854     | \$20.18         | 3.24%                                |
| All B.C. municipalities | 2,569,081  | \$63.94         | 9.28%                                |

#### 3.2.2 REGIONAL AVERAGES

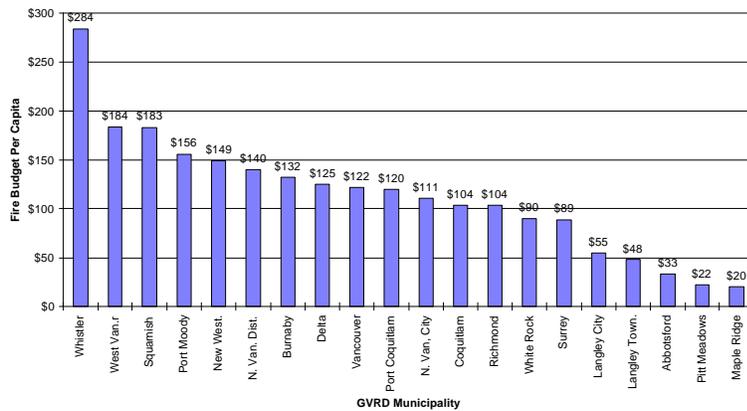
Looking at more recent figures for the local region, the numbers are higher. Pitt Meadows belongs to a regional government called the Greater Vancouver Regional District, made up of twenty Lower Mainland municipalities.

The regional district's 1994 statistics are identified in Figure 3.2-2 and Figure 3.2-3 [4]. The average fire budget consumed 13.4 % of the total municipal budget, and \$114 per capita.

**Figure 3.2-2: Fire Budgets As a Percent of Municipal Budgets in the GVRD**



**Figure 3.2-3: Fire Budget Per Capita in the GVRD**



### 3.2.3 PITT MEADOWS COMPARISON

The Pitt Meadows Fire Department consumes significantly less resources than other fire departments, whether you look at per capita measurement or by a percentage of municipal tax dollars. The District of Pitt Meadows has an annual budget of \$12.75 million. Approximately 2.5 % of that budget is currently allocated to the Fire Department, totaling \$319,185 or \$22 per capita.

As Figure 10 reveals, Pitt Meadows takes up smaller percentage of the municipal budget than any other municipality in the GVRD. As Figure 11 identifies, Pitt Meadows has the second lowest per capita cost for fire protection services in the GVRD.

Figure 3.2-4 summarizes the averages provincially, and regionally. Clearly, Pitt Meadows taxpayers are spending far less than average on fire protection services.

**Figure 3.2-4: Summary of Fire Protection Costs Comparison**

|                           | Cost per capita | Percentage of municipal expenditures |
|---------------------------|-----------------|--------------------------------------|
| GVRD Average              | \$114           | 13.4 %                               |
| Provincial average (Bish) | \$64            | 9.3 %                                |
| Pitt Meadows              | \$22            | 2.5 %                                |

### **3.3 SAVINGS IN PITT MEADOWS**

#### **3.3.1 REGIONAL COMPARISON**

Exactly how much are Pitt Meadows taxpayers saving on fire services?

If Pitt Meadows were to follow the regional average, it would spend 13.4 % of its budget on the Fire Department, or \$114 per capita. But because the Pitt Meadows Fire Department is not spending the average per capita cost or the average percentage of total municipal expenditures, taxpayers experience significant savings. Since the Fire Department consumes only 2.5 % of the total municipal budget, it allows the municipality 10.9 % on other services.<sup>9</sup> The 10.9 % savings on the \$12.75 million budget equals \$1.4 million annually.

The same calculation done on a per-capita basis reveals a \$1.3 million savings. Pitt Meadows Fire Department spends \$22 per capita, which is \$92 less than the \$114 average for the GVRD. Multiplied by the 14,500 population, the \$92 less in Pitt Meadows works out to a \$1.3 million savings annually. Thus, the Pitt Meadows Fire Department saves from \$1.3 million to \$1.4 million compared to the average fire department in the GVRD.

#### **3.3.2 PROVINCIAL COMPARISON**

The figures in a provincial comparison are less dramatic but just as significant. If Pitt Meadows were to follow the provincial average, it would spend 9.3 % of its budget on the Fire Department, or \$64 per capita.

Since the Fire Department consumes only 2.5 % of the total municipal budget, it allows the municipality to spend 6.8 % on other services.<sup>10</sup> The 6.8 % savings on the \$12.75 million budget equals \$870,000 annually.

The same calculation done on a per-capita basis reveals a \$600,000 savings. Pitt Meadows Fire Department spends \$22 per capita, which is \$42 less than the \$64 average for the GVRD. Multiplied by the 14,500 population, the \$42 less in Pitt Meadows works out to a \$600,000 savings annually.

Thus, the Pitt Meadows Fire Department saves from \$870,000 to \$600,000 compared to the average fire department in the province.

#### **3.2.4 CONCLUSION**

The Pitt Meadows Fire Department cannot give recognition to sprinklers for the entire savings of cost to the community, moreover the taxpayers. The department does suggest that sound fire prevention, ample resources and a dedicated volunteer force—combined with sprinklers—have attributed to reduced costs.

### **3.5 SPRINKLER COSTS**

10.1 take the cost of the sprinklers into account.

### 3.5.1 INSTALLATION COST OF SPRINKLERS

The Fire Chiefs Association of British Columbia surveyed the cost of installing sprinklers in a few of its member municipalities. The average price per foot was \$1.16. (See Figure 3.5-1.)

**Figure 3.5-1: Sprinkler Costs**

| City                    | Cost per square foot |
|-------------------------|----------------------|
| City of North Vancouver | \$1.33               |
| City of Langley         | \$1.20               |
| City of Peachland       | \$0.95               |
| Average                 | \$1.16               |

Assuming the average single-family dwelling is 2,500 square feet, the cost would be \$2,900. The Pitt Meadows Development Services Department estimates that housing stock may grow in the future in proportion to the available land that may be developed.<sup>11</sup> Figure 3.5-2 shows that homeowners could pay \$14.5 million in sprinkler installation costs if the maximum 5,000 homes are built.

**Figure 3.5-1: Extrapolated Sprinkler Costs**

| Number of Dwellings | Total Cost of Sprinklers |
|---------------------|--------------------------|
| 1,000               | \$2,900,000              |
| 3,000               | \$8,700,000              |
| 5,000               | \$14,500,000             |

### 3.5.2 ANNUAL COST OF SPRINKLERS

Assuming that the average house will last an estimated 60 years [5] before replacement, the cost to install sprinklers in a dwelling is \$48 each year over the life of the dwelling.<sup>12</sup> Based on 3.1 persons per dwelling, the annual cost of installing sprinklers is \$15.50 per capita.<sup>13</sup>

## 3.6 TOTAL COST OF FIRE PROTECTION IN PITT MEADOWS

The total cost of fire protection includes both the sprinklers and the fire department. The Pitt Meadows Fire Department costs \$22.00 per capita per year. Add the \$15.50 per capita per year for sprinklers, and the total fire protection price tag is \$37.50 per capita per year.

## 3.7 SAVINGS IN PITT MEADOWS

Even with the cost of sprinklers, the annual Pitt Meadows' cost of \$37.50 per capita is still well below the average for the region and for the province. The total Pitt Meadows cost of \$37.50 is \$76.50 less than the regional district average of \$114 per capita. Likewise, the total Pitt Meadows cost of \$37.50 is \$26.50 lower than the provincial average of \$64.

To restate, even though Pitt Meadows homeowners have to install sprinkler systems, each resident still saves between \$26.50 and \$76.50 in fire protection costs annually. These per capita savings add up to significant resources at a municipal level. By multiplying the per capita savings by a population of 14,500, it's apparent that the District of Pitt Meadows saves between \$380,000 and \$1.1 million each year by requiring sprinklers.

### **3.8 CONCLUSIONS**

Pitt Meadows residents appear to realize they're getting good service out of their local Fire Department. In a November 1995 survey, 86 % of residents said they were satisfied with the district's fire protection [6]. More than one-half of residents are "very satisfied" with the service. The Pitt Meadows Fire Department believes that much of this satisfaction can be attributed to the cost-effective nature of its pioneering sprinkler program.

Sprinklers have helped Pitt Meadows in four ways. First, high "save ratios" have been achieved during fires, despite the service having less equipment than it would traditionally have had. Second, a new fire hall need not be built near the fringes of the community without worrying that response times would be compromised. Third, average duration of a fire call reduced while population grew. Even though the number of calls increased, the total call hours remained steady, allowing the Fire Department to remain a volunteer force. And fourth, a smaller percentage of the municipal budget has been used—less than any other municipality in the GVRD—this is the second lowest per capita cost for fire protection services in the GVRD; costs are far below the provincial average.

All of these accomplishments were achieved within a few years of the 1990 introduction of a sprinkler bylaw . Since that time, many more communities have developed their own sprinkler programs.<sup>14</sup> However, Pitt Meadows took another pioneering step in the fall of 1996 by requiring sprinklers in single-family homes. Only a handful of other communities have done this in B.C. Under the new bylaw, the accomplishments noted above should be even more significant.

The challenge for the Pitt Meadows Fire Department is to sustain this momentum in the face of adversarial forces. It will continue to emphasize that sprinklers save lives, reduce costs and contribute to the welfare of Pitt Meadows.

Other fast-growing communities should consider this proactive step. Although the homeowner pays a higher initial cost, Pitt Meadows has proven that the homeowner could save as much as \$76.50 every year in reduced fire service costs. The potential savings across the province are staggering.

### **APPENDIX 1: LEGAL ASPECTS**

In the fall of 1996, the District of Pitt Meadows considered expanding its sprinkler bylaw to include single-family homes and duplexes.

The sprinkler regulation exceeds the current British Columbia Building Code by application of a permissive section of the Municipal Act, 734.(1):

"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 existing bylaw, the Pitt Meadows council could amend the exiting 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. Staples 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 rationale 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 district 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.

## **APPENDIX 2: TESTIMONIAL OF ACTUAL EXPERIENCE**

The Pitt Meadows Fire Department believes that smoke alarms and sprinklers will not only ensure an occupant will escape safely, but will reduce the overall fire damage. The Fire Department has, over the past five years, experienced dramatic evidence that has proven the effectiveness of sprinklers.

The Fire Department attended 12020 Harris Road to an apartment fire on January 16, 1992, at 01:15 hours. The occupant and his son had gone to bed at about 11:00 hours and left a large ham simmering on the stove. At 01:00 hours the pot boiled dry and the grease from the ham ignited and flashed over the ceiling of the kitchen, activating the sprinkler which in turn extinguished the fire. The sprinkler system not only alerted the residents of the suite, it activated fire alarm bells to ring throughout the building alerting all other tenants. The sprinkler system also summoned the Fire Department. The Fire Department arrived with twenty-two firefighters to find the fire extinguished; all that was required for them to do was to shut off the sprinkler system and vacuum the water from the suite. (An interesting point in this incident is that the smoke alarm in the suite of the fire had been disconnected by the occupant as he frequently had false alarms due to his cooking habits.) The Fire Department was able to return 18 firefighters within eighteen minutes after arriving to the fire, while another four firefighters stayed for restoration purposes for another two hours. Typically, this type of incident would have taken all night, leaving the occupants without a home and possibly without life.

The Fire Department believes that the effectiveness of sprinklers in terms of the life safety (for civilians and firefighters), reduced manpower requirements, apparatus, and fire department growth, more than justifies the cost of installation of sprinklers.

## NOTES

1. Fire Department resources are personnel, apparatus, facility, tools, material, training and experience.
2. The Planning Department projected new development of 1,000 dwellings within the Highland area of Pitt Meadows and 2,000 to 4,000 dwellings in the northeast sector of Pitt Meadows.
3. Fire Underwriters Survey is an organization finance by the Insurance Bureau of Canada using technical staff of Insurers' Advisory Organization. Its purpose is to survey fire protection conditions in Canadian cities and towns, providing data and advisory services to fire insurance underwriters and public officials concerned.
4. Water supply systems are designed to control major fires, the bigger the building, the more water required to control the fire. The Fire Department's engine pumping capacity should meet this requirement.
5. The maximum fire flow requirement was based on the official community plan (buildings not yet constructed).
6. Most insurance companies consider buildings unprotected if they are located beyond five miles of a Fire Station. Insurance rates will dramatically increase if a building is located beyond this perimeter. Recently, some insurers have given protected rates to their clients up to eight miles from a Fire Station.
7. The City of Surrey Fire Department has converted a number of its volunteer stations and members to career stations and members when calls reach approximately 800 per year.
8. Protected insurance rates are within five miles of a fire station, within 1,000 feet of a fire hydrant and ample resources to combat the risk. Protected rates are \$300 per \$100,000 of insured value versus an unprotected rate of \$834 per \$100,000 of insured value. Net savings to the taxpayer based on property assessments of 1996, minus the cost of fire protection services equal \$2.1 million.
9. 13.4 % average for the GVRD - 2.5 % for Pitt Meadows
10. 9.3 % average for the province - 2.5 % for Pitt Meadows
11. Development Services indicated a potential 650 new homes in the Highland area of Pitt Meadows and 2,000 to 4,000 new homes in the northeast sector of Pitt Meadows.
12. \$2,900 for installing sprinklers once time / 60 years in the life of a building = \$48 per year in the life of a building
13. \$48 each year per building / 3.1 people per building = \$15.50 per person
14. Vancouver City, West Vancouver, Port Coquitlam, Sidney, Oak Bay, New Westminster, Langley City, North Vancouver City, North Vancouver District, Gibsons, Langley Township, Surrey, City of Abbotsford, Campbell River, Colwood, Courtenay, Esquimalt, Ladysmith, Merritt, Nanaimo, Parksville, Peachland, Penticon, Sechelt Township, Sechelt Indian Government and Salmon Arm either have some form of sprinkler bylaw or are in the process of passing one.

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## BIOGRAPHY

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