



Establishing and Operating a Fire Department

TABLE OF CONTENTS

Preface

Acknowledgments

Introduction

ESTABLISHING A FIRE DEPARTMENT	3
Definition of a Recognized Fire Department.....	3
Requirements/Considerations	3
Elected Local Officials – Fire Chief Relations	5
Major Items to be Considered.....	7
Fire Protection System Defined.....	9
Master Planning	11
Reasons for a Community Fire Protection Plan.....	11
Fire Protection Costs and Value	12
Use of Available Resources to Improve Fire Protection	14
PURCHASING FIRE APPARATUS.....	15
Competitive Bid Purchase For New Apparatus	15
Writing the Specifications.....	15
Specification Checklist	16
Awarding the Contract.....	18
Insurance Grading Recognition of Used or Rebuilt Fire Apparatus.....	19
Recommended Service Tests for Used or Modified Fire Apparatus	21
Replacement Purchase	23
FIRE STATION LOCATION AND DESIGN.....	24
ORGANIZATIONS	28
Office of the Fire Commissioner	28
Other Resources	28
Important Agencies.....	28
BASIC FIRE DEPARTMENT REQUIREMENTS	29
Communications	29

TABLE OF CONTENTS CONT'D

Mutual Aid Agreements..... 29
Operational Guidelines 30
Pre-Fire Planning 31
Records and Reports 33
Reference and Technical Library..... 33
Water Supplies 34
Wildfire Threats to Urban Interface Areas 35

APPENDIX 1

Fire Department By-laws and Orders

APPENDIX 2

References

Preface

This publication is primarily intended to act as a guide for small communities that are considering the establishment of a fire department.

It may also be of use to assist community fire departments that are reorganizing or expanding.

If you require further information please contact the Office of the Fire Commissioner at (780) 780-644-1010 or if calling long distance within Alberta call 1-866-421-6929.

You can also visit our website at <http://ofc.alberta.ca/fire-rescue-operations>

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INTRODUCTION

The need for fire protection in the province increases as new areas are developed and populated. Rural fire departments often face residential tract development and the occasional large industrial complex, instead of just scattered farm and ranch properties. This can be attributed to the shift of population from metropolitan centers to rural areas.

The shift in population often creates the need for new fire departments. Communities that have previously existed without fire protection are now considering establishing fire departments for both personal property protection and insurance premium savings. The task of establishing a fire department is not a simple one and involves a great deal of community commitment and planning. We live in an age of accountability and liability. The fire department must be properly organized and operated so that it will provide for the maximum protection of personnel and the lives and the property of the public that it serves.

The hazards of fire fighting are the same for both career and volunteer personnel and the legal system makes no distinction when determining liability. However, when a fire department is established and operated under the proper authority with sound operation and training procedures, it can provide a valuable community service.

The material in this publication is arranged by subject area, in a step by step approach toward the establishment and operation of a fire department.

It is hoped that this information will provide the necessary guidance so that a community can effectively establish, organize and operate a fire department.

ESTABLISHING A FIRE DEPARTMENT

A recognized fire department should operate as an agency of local government, through a Municipality (city/district/town/village), Regional District or Improvement District.

Definition of a Recognized Fire Department

A recognized fire department is a group of persons formally organized as an authorized service of a municipal or other local government having a sustainable source of funding, which could include taxation, fees for services provided, contracts, permit fees or other reliable sources of revenue which will support the cost of services provided. A minimum number of trained persons able and equipped to respond with motorized fire fighting apparatus to extinguish fires or to respond to other classes of circumstances which may occur within a designated geographical area.

Requirements/Considerations

Minimum requirements for a department to meet the above proposed definition should include the following:

1. Organization – Set forth the requirements for organization under the authority of the *Municipal Government Act*. It should establish requirements for the establishment of boundaries, provision of funding and for the formal appointment of a fire chief by the involved local government body.
2. Membership – Establish adequate staffing levels for a recognized fire department.
3. Training – Establish minimum training levels including required frequency of training and maintenance of training records.
4. Fire Fighting Apparatus – Specify apparatus standards and requirements to comply to ULC S515 and reference NFPA or equivalent standards for fire fighter safety.
5. Fire apparatus equipment – Outline minimum equipment requirements pursuant to ULC S515, and local needs and operating conditions.

6. Fire Station – Set forth the requirement for a well designed and located fire station to serve the department and the community.
7. Alarm Notification – Require a reliable means of providing for 24 hour receipt of alarms and the immediate notification of fire fighters required to respond to these alarms.
8. Water Supply – Require that a fire department has an adequate water supply for fire suppression purposes.

Society Act

The other alternative would be to form an association incorporated under the *Society Act*, RSA 1980. The disadvantage with this method is that the department could not meet the definition of a “recognized” fire department as it would not have local government involvement or a sustainable source of funding such as taxation, fees for services provided, contracts, permit fees or other reliable sources of revenue which will support the cost of services provided.

It is important that fire departments be organized in accordance with the laws of the province to protect the members in matters of legal responsibility. The first step therefore should be to contact any existing local government bodies providing services in the community to solicit their support in the review and establishment process.

Where fire service is being considered inside a municipality, this service would have to be undertaken as a municipal service. When fire protection is being considered outside a municipality, this type of service request would generally be unwilling to provide this service, then this service could be undertaken as an Improvement District service (either as a new service or a new Improvement District.)

- A by-law providing for the establishment, organization and regulation of a fire department within a municipality must be made up in accordance with the *Municipal Government Act*, Part 2, Section 7, Division 1.

The following steps should be undertaken in order to support a request for fire protection service establishment as a Municipal, Regional District or Improvement District responsibility:

1. Carry out an “economic and technical” feasibility study.

- This should be done as a joint exercise between the organizing committee and the local government jurisdiction being asked to take on the service.
 - This generally takes the form of a Fire Protection Survey. Assistance can be obtained from the Fire Commissioner's Office.
2. Obtain the necessary "approvals".
 - The following approvals will be necessary in order for the fire protection service to become a reality:
 - a. Elector approval
 - those expected to benefit and pay
 - b. Local Government
 - Municipal Council or Regional District/Improvement District Board
 3. Put the service in operation.

Once the fire protection service has been established as a local government responsibility, the respective elected bodies will be required to pass or adopt a bylaw for the establishment, organization and regulation of a fire department within their jurisdiction as required by the *Municipal Government Act*.

A sample bylaw has been included as **Appendix 1**.

The following should be taken into consideration when considering a bylaw:

1. The existing size of your community
2. The anticipated size of your community 5 –10 years down the road
3. The type of industrial and commercial occupancy – sawmill, bulk plants, airports, etc.

Elected Local Officials – Fire Chief Relations

Modern day Councils and Boards (Regional district or Improvement District) as a result of public pressure over increasing taxes and debt, are becoming increasingly more interested in the specifics of service operations (including fire protection).

This trend may result in the following advantages or disadvantages to the appointed officers (including the fire chief).

Advantages

- A better informed group of elected officials.
- An established line of communications between the “policy makers (elected officials)” and the “policy implementer (appointed officers)”.
- A better understanding of community (local government) priorities.

Disadvantages

- An increased demand for information to be provided by the appointed officers.
- A perceived loss of authority or responsibility, by the appointed officers

If the fire protection service is to be provided efficiently and effectively, there must be dialogue and trust between the elected officials and the appointed officers. Both parties have a role to play in finding the basis for consensus and compromise. The elected officials have to balance the priorities of all the services provided to taxpayers. The Fire Chief must be prepared to document and promote the needs of the Fire Service and to function within the limit of resources provided.

The challenge for the Fire Chief is to develop and operate a fire department capable of providing a level of service which is acceptable to: the public it serves, the public officials it reports to, and those who operate the service (particularly the Fire Chief).

Guidelines for the Fire Chief:

- Leave policy-making to the elected officials but understand your role in its development.
- Develop established (documented) lines of communication between yourself and the elected officials to deal with all matters involving both groups.

- Be prepared to support your position on all service related issues in the form of reports.
- Understand the roles of elected body (Council or Board) and yourself before taking on the position.
- Be accessible.
- Be professional.
- Remember the public and elected officials are always right (it's just a matter of how right).

Major Items to be Considered

Major items which must be considered when forming a volunteer fire department are:

1. Fire Apparatus – must be compatible with water sources
2. Fire Fighting Equipment – including personal equipment
3. Fire Station – location and design
4. Staffing – as many members as possible – a minimum of 15 is recommended
5. Communication System
 - from the public to the fire department
 - from the fire department to the fire fighter
 - between fire fighters
 - between mutual aid agencies
6. Water Supplies – hydrants, standpipes, lakes, streams and other man made sources, reliability and quantity
7. Private Property – the ability of a fire department to enter onto private property to extinguish a fire which is endangering surrounding property or buildings
8. Mutual Aid – legal agreements under Part 2, Division 1, Section 7, *Municipal Government Act* with adjacent fire departments and Alberta Sustainable Resources

9. Personal Protection – compensation for the fire fighters in the event of an accident
10. Geographical Boundaries – what areas will be included in the fire protection area; - mutual aid areas; - areas where fire protection will be required in the future.
11. Population data – the total population now, projected population in 5 years and seasonal variations
12. Physical data – the road system, topography, weather conditions,
13. Land use – total area, urban, rural, residential, wild land, grasslands, commercial, industrial, agricultural
14. Legal considerations – Workers’ Compensation Board requirements and indemnification of local government and fire department members
15. Funding – Long term capital planning in place to ensure the resources are available to finance future capital improvements and to fund the day to day operations of the department.

A basic, systematic approach should result in determining the answers to the following questions (Master Planning):

- What are the real fire problems?
- Do people know how to behave in fires?
- Do we have “high risk” groups of people in the area?
- What kind of fires have occurred, and what losses have resulted from these fires?
- What specific fire risks now exist or are expected to exist in the foreseeable future?
- Is there an increase or decrease in the population?
- What is the present economic make-up?
- What are the future growth projections, land use and zoning plans?
- What is the condition of housing?

- What is the projected industrial growth?
- What are the transportation conditions?
- What plans are in existence at community, local government (municipal, regional district or improvement district) or provincial levels which could influence the planning?

Answering these questions is hard work. Community involvement is an important element in the master planning process.

Early citizen participation and support can do much to eliminate concerns and avoid misunderstanding.

Fire Protection System Defined

The community as a whole needs to understand what master planning is and what it is not. The people must not feel threatened by the planning process; they should feel that they are a part of it and have a say in what happens.

Planning will take a lot of work and some of the decisions will be difficult, but the results are well worth the effort.

When it is completed the master plan is presented for approval and adoption. Adoption of the plan is the final step of the planning phase; it is here that the community commits itself to the plan.

Commitment means that the level of fire protection service, and therefore the risk, is fully understood and accepted.

It also means that the cost and the resources needed to provide the protection are understood and accepted.

This is especially important where changes in current methods are to be made—for example, increased private sector participation through mandatory installation of smoke alarms, smoke detectors or sprinkler systems.

To better understand fire prevention and control as a workable system, consider the term “fire protection” as defined by the National Fire Protection Association:

***“Fire Protection.** The science of reducing loss of life and property by fire, including both fire prevention and fire extinguishment by public*

or private means. Also, the degree to which such protection is applied.”

This definition recognizes a collection of activities (for fire prevention and for fire control) and of system elements (public and private) as being included in the idea of fire protection.

Fire protection has long been thought of as a service that is provided by a fire department in the form of fire fighters and fire engines speeding to the scene of a fire, a rescue, and automobile accident, a drowning child trapped in a well. As far as it goes, this is an accurate view, but there is much more to fire protection than putting out fire and rescuing people.

Although not generally recognized as such, perhaps a more important part of fire protection is a system where people and equipment work together to prevent fires. For example, if there were no fire prevention oriented building codes and if people were not reasonably aware of fire danger, fire losses would be immeasurably greater and fire suppression forces would be overwhelmed.

In a typical community each of the following organizations is a part of the protection system:

Fire Department – Performs rescue, fire extinguishment, fire cause determination, emergency medical services, routine fire prevention activities such as inspection and code enforcement as per the Safety Codes Act.

The **Fire Chief** – may be appointed as a Safety Codes Officer to enforce the Safety Codes Act and pursuant regulations.

Building Department – Administers and enforces the Building Regulations of the Alberta Building Code in new construction and old construction undergoing remodeling.

Road/Street Department (Public Works) – Constructs, marks and maintains traffic corridors (roads, bridges, access design) for motor vehicle use, including fire apparatus. Rural property identification and numbering along with a detailed map of area to be protected.

These departments are a source for bulldozers, road graders, water tanks, and other heavy equipment useful in times of major fires.

Law Enforcement Agencies – Function in arson investigation, arrests, prosecution, traffic control, and other police action necessary in times of major fires.

Water Purveyor of Water District – Supplies and distributes water for fire protection.

Emergency Health Services – Administers emergency medical care and transports fire and accident victims.

Public Schools and Community Colleges – Sponsors public awareness programs in fire prevention and control to education children and adults.

Planning Commission – Determines zoning which influences the spread of fire.

Citizens – A personal concern and responsibility for themselves and their neighbors.

Master Planning

Fire protection generally has not been considered as a system which can be defined, directed and controlled. Many communities have applied master planning to fire protection.

Planning is the key to adequate fire protection, but the planning must be done at the local level. Identify the community's fire situation and the factors influencing it. This is done for the present and the future.

Establish goals and objectives, determine what fire protection is needed now and what will be needed at the end of the period for which you are planning.

Communities are being challenged to control or reduce costs and yet maintain or improve – herein lies the challenge facing master planning.

Reasons for a Community Fire Protection Plan

- to reduce life and property loss
- to improve fire protection services, especially fire prevention
- to involve non-traditional agencies and groups in fire protection
- to control fire protection expenditures
- to identify community fire protection goals

- to document current and future fire protection environment
- to document current and planned fire services
- to identify current and future fire protection resources
- to establish inter-agency fire protection policies, procedures and responsibilities
- to establish fire protection requirements in community development plans
- to evaluate innovative methods of fire protection

Community growth will have a great impact on planning. If there is a great influx of people and services into your area, there will be a need to re-assess the capital items that would be required to accommodate that growth. The following areas will require careful consideration:

- Replacement of worn out or inadequate equipment.
- The type of development, whether residential, commercial or industrial, and the implications for equipment because of taller buildings or toxic material storage or manufacture.
- Demands on staffing due to increased calls, inspections and education.
- The distance development is occurring from existing or proposed fire stations, satellite halls may be required.
- Water requirements with systems having adequate fire flows or alternate sources of water.
- Establishing guidelines with regards to accessibility, road grades, sprinklers in commercial buildings and the location of hydrants.

Fire Protection Costs and Value

Whenever a movement is begun either to establish fire protection or to improve the existing services, voices may be raised in alarm. Often the citizens express the feeling that the proposed changes are too costly. Similar exclamations are frequently heard about the costs of maintaining the existing levels of protection.

One reason for the belief that fire protection may be too costly is that people may not understand what fire protection really is. They are not sure whether the protection they pay for is the protection they need or whether they are paying more than their fair share.

Careful planning offers the best approach toward balancing costs with fire protection needs as reflected by the thoughtful desires of local citizens. Involving citizens in the planning process provides the opportunity to inform them regarding fire protection costs, benefits and risks and thereby gain their support for implementing a fire protection system of known performance and cost.

This matter of cost and value is no small problem, but it is the basis for justifying the expense of needed fire protection.

Determining the cost and value of fire protection has been traditionally difficult. Few communities actually try to measure such things, consequently few know the true costs of operating a fire protection system. The expenses of funding an organized fire department are regularly calculated, but they are by no means all the costs of fire protection. Here are a few of these “other” costs:

- Water distribution and maintenance costs for pipes, hydrants and plant capacity and operations used for fire protection
- Fire insurance costs
- Costs for built-in fire protection such as sprinkler systems and smoke and heat detectors
- Private fire brigade

In addition, the costs of administering building and fire codes, building permit and inspection programs, and other similarly oriented fire protection programs, must be included.

There are also benefits to these costs which are important, such as:

- Life safety, which is applicable to anyone
- Fire loss, the reduction in dollar losses to property as a result of fire
- Job loss, the reduction in the number of jobs, or the dollar value of those jobs, lost to fire

- Community tax loss, the reduction of loss of revenue to the area due to loss of property and jobs due to fire
- Fire insurance premiums, the reduction in insurance costs
- An organized body of trained individuals that can be called upon in a community emergency
- Peace of mind

Use of Available Resources to Improve Fire Protection

Some ways fire protection can be improved, even if resources are relatively scarce, include inexpensive programs of action to raise everyone's level of fire awareness and reduce the number of existing hazards.

In communities where public funds can be made available, you may wish to consider the value of expanding fire programs to include:

- The Fire Department objectives of preventing fires from starting; of preventing loss of life and property when a fire starts; of confining a fire to the place where it starts; and of putting out the fire.
- Public education programs designed to reach all citizens in your community through regular classroom instruction, group lectures and demonstrations.
- An active and constructive fire inspection program, coupled with the public education program, organized with the intent to remove common and not-so-common fire hazards.
- An active fire cause investigation program
- A smoke alarm installation and maintenance program
- A fire extinguisher program designed to put portable extinguishers into homes and places of business and to teach everyone how to use them.
- Encouraging the development of better water supply and distribution systems.

PURCHASING FIRE APPARATUS

Purchasing the correct apparatus that is capable of doing the best job for the least amount of money is a tremendous responsibility for fire department officers. As these vehicles involve an investment of thousands of dollars, caution must be exercised when writing specifications, evaluating bids, and awarding the contracts.

Competitive Bid Purchase For New Apparatus

Generally, purchases are made by specifying the features desired in a fire apparatus and asking for bids. This method is known as purchasing by competitive bids based on adequate specifications. It is designed to eliminate favoritism or personal influence, ensure delivery of equipment that will perform satisfactorily and provide the purchaser with maximum utility and economy.

However, such benefits are only realized through the use of proper standards, the apparatus will be no better than the specifications. Few are able to employ personnel with qualifications and ability to draw up specifications that will adequately cover all phases of construction and performance of fire apparatus.

Frequently, in attempting to draw up adequate specifications, the result becomes so excessive or restrictive in some requirements that it increases the cost unnecessarily or prohibits bidding entirely. Often important requirements are omitted and irrelevant and unduly costly provisions are included.

In order to provide uniformity and ensure basic essentials are included, this office suggests that fire apparatus be designed to ULC S515 Standard for Automobile Fire Fighting Apparatus. The specific sections to meet your needs are explained in this guide.

Writing the Specifications

Determining exactly what type, size, and model to purchase is the first step in writing specifications for fire department apparatus.

As the department will probably be either blessed or stuck with this equipment for 20 or more years, a great amount of thought must be devoted to acquiring the best vehicle for the job.

Consideration should be given to the fire hazards, terrain, roads and highways, weather and climatic conditions, building heights and areas,

water supply, fire station location, mutual aid arrangements, and every other character of the response area that this apparatus will be expected to protect.

Growth possibilities of the area should also be considered.

Higher structures and larger buildings may be constructed.

Unprotected areas may be annexed. After all of these variables are analyzed, then a definite idea can be formed of what size and type of apparatus will do the best task.

A department that has to primarily protect rural areas must be concerned about not ordering a vehicle that is too heavy for the unimproved roads.

Highly maneuverable apparatus are needed in areas with narrow and winding streets. Areas with large industrial factories may require an engine with 6800 litres per minute (1500 IGPM) capacity and a 2300 litre (500 gallon) water tank, while a rural department may be better served with a 2840 litre per minute (625 IGPM) engine with a 4500 litre (1000 gallon) water tank.

It is best to order by performance specifications as detailed in ULC S515. They allow the manufacturer greater latitude in selecting the best and most modern components and equipment for the vehicle. A deviation from this principle may be to designate a diesel engine over gasoline powered, an automatic instead of a manual transmission, a certain model of chassis because of the availability of repair facilities, or other definite preferences.

Specification Checklist

This list of questions is designed to assist you when reviewing your specifications prior to sending them out.

Is year of chassis shown?

If gas engine, is the carburetor 2 or 4 BBL?

What size of engine?

What type of engine, gas or diesel?

What size of pump?

What type of transmission – manual or automatic?

Are rear end ratios given?

Are the springs and axles adequate for the anticipated gross vehicle weight?

Is the tire size adequate for the gross vehicle weight?

Are the tires readily available commercially?

What capacity in C.F.M. is compressor rated?

Is an electric compressor included?

Is air dryer included?

Are batteries in parallel and if dual battery system is used is cut off switch on dash?

What is fuel tank capacity?

Do West Coast Mirrors include amber lights?

What alternator amperage capacity is shown?

Is block heater included, if so what type?

Is unit equipped with back up alarm?

What gauges are listed on pump operator's panel?

Is booster tank water gauge specified?

Do compartments have full adjustable door catches?

On lower compartments are all floors raised for easier cleaning?

Are compartment door seals replaceable?

Are all ladder and suction hose brackets adjustable?

Do upper compartments have swing up doors c/w lights and gas cylinders?

Is rear step supported by 4" channel iron from main frame?

Is tank under warranty for 15 years?

If unit is equipped with transverse hose beds are rollers and spools supplied?

Does pump panel have lights?

Is unit equipped with suction hoses and screen?

Is hot water heater and fan installed behind operator's gauge panel to prevent freezing of instruments?

Does pump have auto lube system?

On pump spec sheet, is pump rated and tested to 600 p.s.i.(4100 Kpa) hydrostatically and hydrodynamically?

What type of fire fighting equipment is included on quote specs?

If booster reels are requested, are rollers, hose and nozzle included on quote specs?

Is unit lettered and painted?

Is firm delivery date shown on quote?

Are ladders and extinguishers included in spec sheet?

If unit is equipped with automatic radiator shutters, is manual override included?

On units equipped with transverse hose beds, are hose beds equipped with 1-1/2 Chicksan Swivel joints?

Does the vehicle comply with W.C.B. requirements?

Awarding the Contract

Most governmental agencies have established policies when writing specifications, advertising for bids, and awarding the contracts for any purchase of a substantial amount. Because these are primarily legal processes, local laws play a fundamental role in the apparatus and equipment acquisition process.

If the estimated amount of the contract exceeds a certain specified sum of money, sealed bids must be solicited by public notice in the particular manner and subject to the requirements of the law.

When any agency calls for bids for the purchase of apparatus or equipment, specifications should not be prepared so as to exclude all but one type or kind, but should include competitive supplies and equipment.

Writing specifications with the intent of securing one certain model and make of apparatus is discouraged. Fire department officers occasionally are so convinced that one manufacturer builds better equipment, they will use the product's advertising specifications to write the bid specifications. This practice smothers competition.

The underlying principle of the bidding process is that the governmental body awards the contract to the best competitor meeting the terms and conditions of the bid invitation.

To determine if a bidder is truly responsible and capable of fully performing the desired services or furnishing the wanted equipment or vehicle, it is a legitimate obligation of the agency to investigate the bidders to determine that they do have the skills, abilities, and record of past performances to ensure that the specified item will be delivered at the correct time.

The low bid does not have to be accepted if it can be clearly shown that a higher priced apparatus is a better buy for the money. There are many legitimate questions that should be answered before a bid is awarded.

Only after the correct type and size of apparatus has been decided on, proper specifications written, bids solicited from a reasonable number of manufacturers and the bids are analyzed can the contract be awarded.

Supervision during construction may be required. A thorough inspection and testing period should be conducted upon delivery of the equipment or vehicle. This way the department has the certainty they have selected the apparatus that will do the best job for the best price.

Insurance Grading Recognition of Used or Rebuilt Fire Apparatus

The performance ability and overall acceptability of older apparatus has been debated between municipal administrations, the public fire service and many others for many years. The Fire Underwriters Survey (F.U.S.) have addressed this question as follows:

“The public fire service is unique. It is probably the only emergency service whose vehicles are not continuously in use. However, when in use the apparatus is subject to considerable mechanical stress due to the nature of its function. This stress does not normally manifest itself on the exterior of the equipment. It is effectively masked in most departments by

a high standard of aesthetic care and maintenance. Truck and pump manufacturer maintain a parts inventory for each model year for a finite time. After that period, obtaining necessary parts may be difficult. This parts shortage is particularly acute with fire apparatus due to the narrow market conditions for these devices.

F.U.S.'s lengthy experience in evaluating fire apparatus indicates that apparatus should be designed to an acceptable standard. We recommend Underwriter's Laboratories of Canada, (U.L.C.) Standard S515 "Standard for Automobile Fire Fighting Apparatus."

Fire apparatus should be built by recognized manufacturers. Fire apparatus should respond to first alarms for the first fifteen years of service. For the next five years it should be held in reserve for use at major fires or used as a replacement for out-of-service first line apparatus. Apparatus should be retired from service at twenty years of age.

Present practice indicates that the recommended service periods are usually followed by the first purchaser. However, at the end of that period the apparatus is either traded in on new apparatus or sold to another fire department. At this juncture, the unit may have one or more faults which precludes effective use for emergency service. These deficiencies may include:

- 1) inadequate braking system
- 2) slow pick-up and acceleration
- 3) structurally weakened chassis due to overloading
- 4) pump wear

Insurance Grading Recognition of Used or Rebuilt Fire Apparatus F.U.S. has modified its application of the age requirement for used or rebuilt apparatus. Due to municipal budget constraints they have continued to recognize apparatus over twenty years of age, providing the truck successfully meets the recommended annual tests.

If the apparatus does not pass the recommended tests or experiences long periods of "down time", F.U.S. may request the municipal authority to replace the equipment with new or newer apparatus. If replacement occurs, continued fire insurance grading recognition would be ensured.

Fire Underwriters' Survey is a national organization, financed and directed by the Insurance Bureau of Canada (I.B.C.), a national association representing 80 percent of the private sector property and casualty insurers in Canada.

Recommended Service Tests for Used or Modified Fire Apparatus

Introduction

The intent of this section is to ensure that all used or modified fire apparatus, equipped with a pump or used for tanker service, essentially meets the requirements of Underwriters' Laboratories of Canada "Standard for Automobile Fire Fighting Apparatus" – S515, or subsequent current editions of the Standard. Full adherence with the following specified tests is recommended.

1. Weight Tests

- 1.1 Load Balance Test: When fully laden (including a 460 kg (1,000 pounds) personnel weight, full fuel and water tanks, specified load of hose and miscellaneous equipment), the vehicle shall have a load balance of 22% to 50% of total vehicle mass on the front axle and 50% to 78% of this mass on the rear axle.

Distribution of mass of 33% and 67% respectively on the front and rear axles is preferable for a vehicle having dual rear tires, or tandem rear axles.

For a vehicle having tandem rear axles and dual tires on each axle, a loading of between 18% and 25% on the front axle with a balance of mass on the rear axles is permissible.

2. Road Tests

2.1 Acceleration Tests:

- 2.1.1 From a standing start, the apparatus shall attain a true speed of 55 km/h (35 mph) within 25 seconds for pumpers carrying up to 3,150 litres (700 gallons) of water.

For apparatus carrying in excess of 3150 litres (700 gallons) or apparatus equipped with aerial ladders or elevating platforms, a true speed of 55 km/h (35 mph) in 30 seconds should be attained.

- 2.1.2 The vehicle should attain a top speed of at least 80 km/h (50 mph).

- 2.2 Braking Test: The service brakes shall be capable of bringing the fully-laden apparatus to a complete stop from an initial speed of 30 km/h (20 mph) in a distance not exceeding 9 meters (30 ft) on a dry, hard surfaced road that is free of loose material, oil or grease.

3. Pump Performance Tests

3.1 Hydrostatic Test – Recent evidence of hydrostatic testing of pump for 10 minutes at a minimum pressure of 3,400 Kpa (500 p.s.i.).
APPLICABLE TO NEW OR REBUILT PUMPS ONLY.

3.2 Priming and Suction Capability Tests

3.2.1 Vacuum Test: The pump priming device, with a capped suction at least six metres (20 ft) long, shall develop 75 Kpa (22 inches of mercury) at altitudes up to 300 metres (1,000 ft) and hold the vacuum with a drop of not in excess of 34 Kpa (10 inches of mercury) in ten minutes.

For every 300 metres (1,000 ft) of elevation, the required vacuum shall be reduced 3.4 Kpa (1 inch of mercury).

The primer shall not be used after the 10 minute test period has been started. Tests shall be made with discharge outlets uncapped.

3.2.2 Suction Capability Test: The pump (in parallel or series) when dry, shall be capable of taking suction and discharging water with a lift of not more than 3 metres (10 ft) through six metres (20 ft) of suction hose of appropriate size, in not more than 30 seconds, and not over 45 seconds for 6,000 L/min (1320 Igpm) or larger capacity pumps. Where front or rear suction is provided on midship pumps, an additional 10 seconds priming time will be allowed. The test will be conducted with all discharge caps removed.

3.3 Pump Performance

3.3.1 Capacity Test: Consists of drafting water (preferably with a 3 metre (10 ft lift)) and pumping the rated capacity at 1,000 Kpa (150 psi) net pump pressure for a continuous period of at least one hour.

3.3.2 Pressure Test: Under the same conditions as in 3.3.1 above, pumping 50% of the rated capacity at 1700 Kpa (250 psi) net pump pressure for at least ½ hour.

For additional information on the above noted tests and the test procedures, the following documents provide useful data:

1. Underwriters' Laboratories of Canada, Standard S515, "Standard for Automobile Fire Fighting Apparatus"
2. Fire Underwriters' Survey publication entitled "Fire Stream Tables and Testing Data"
3. International Fire Service Training Association, "Fire Department Pumping Apparatus (7th edition)"
4. National Fire Protection Association (NFPA) Standards 1901, 1902, 1903, 1911.

Replacement Purchase

It is wasteful economy for a municipality not to provide apparatus and equipment of the best and most dependable type. The largest expense for a fire department is the cost of maintenance of the fire apparatus and equipment, self contained breathing apparatus, fire hall, licenses, insurances, heat and light.

The initial cost of apparatus which has a service life of at least 20 years is proportionally small in the overall budget.

The number of miles traveled and hours of pumping operation do not normally provide a basis for determining the need for replacement. Many other factors limit the effective and economical life of an apparatus and make replacement desirable: advancements in design of fire fighting equipment; inadequate protection for driver and fire fighters; structurally weakened chassis because of overloading; increased maintenance costs; parts replacement difficulties with old apparatus; and lack of reliability under the stress of emergency service.

Some of these drawbacks increase the dangers to the public and to fire fighters because of the increased chance of accidents.

Apparatus relieved from first-line service may be retained as reserve equipment; this should also be considered when assessing replacement costs.

Reserve funds should be in place so that a fire department is not left in the situation of shutting down because there are no funds available to continue due to broken down equipment that cannot meet the certification.

FIRE STATION LOCATION AND DESIGN

The functional worth of a fire station is established in the planning stages. In these days of high construction costs the expenditure of public funds must be carefully considered to avoid serious and costly mistakes.

The area to be protected is a determining factor in planning the location, type and size of the station – whether it be residential, urban, suburban, rural, mercantile or industrial; congested, high hazard, open, zoned or unrestricted.

The proximity of schools, hospitals, theatres or other places of public assembly; also the geographical and topographical relationship to other stations if any; existence of permanent traffic obstructions such as rail road tracks must also be taken into account.

Other fundamental considerations are the number and types of apparatus to be quartered and whether or not a chief officer or officers will be headquartered there.

Fire stations should not be located on heavily traveled roads, or one-way streets. The street should be of good width, perhaps a secondary arterial which could provide a clear fire lane across the protection area. There should be a minimum of traffic congestion in the area.

The site should be level, never on a hillside and when possible one or more rear doors provided for the apparatus room for drive-through traffic. If the station is in a residential area it should be on a sufficiently large plot to allow for attractive landscaping. In such locations it is essential to conform the design to the architecture of the locale.

The problem of locating a fire station has probably caused more debate than anything else affecting the fire service. Fire chiefs who encounter the opposition of taxpayers, real estate and other groups in selecting a site for a fire station in a residential area should be able to prove that locating a modern fire station in any residential area does not decrease property values, but tends rather to increase it.

The apparatus room is the heart of every fire station; its location, size, shape, layout and provision for easy, quick access from all areas are factors that establish good functional design. In determining size and layout the planning committee must consider both immediate and future needs of the fire fighters that may occupy the station.

Apparatus Room doors should be at least 3.6 meters (12 ft) wide and 4.3 meters (14ft) high, and when possible each piece of apparatus should have direct access to the street. Single truck stations should be at least 7.5 meters (25 ft) wide whereas multi truck stations require a minimum width of 6 meters (20 ft) per truck.

Depth is dependent upon the number of pieces of apparatus to be housed. Ample space must be provided at the front, sides and rear of apparatus to permit routine maintenance, ease of response and repacking of hose.

Apparatus room floors should be of concrete slab construction with care taken to avoid a slick finish. The floor should be pitched for adequate drainage, but not so steeply that the apparatus will roll toward the doors when the brakes are off.

Suggested ceiling height for the room is 5 meters (16 ft). Overhead, counterbalanced, electrically operated doors with controls either at the alarm room or apparatus room are recommended, however, provision should be made for manual operation in case of power failure.

Other equipment in the apparatus room should include a battery charger, water taps, cleanup tools and maintenance equipment.

Electric or gas fire hose draying equipment is now available which can effectively replace the hose tower of days gone by. Several of the advantages of this modern equipment include reduced construction costs and energy efficiency.

Fire hose washing machines along with dryers and storage racks properly belong in the apparatus area unless a special hose-servicing room is provided.

The mobile type of hose rack, equipped with locking casters and a rotating table for reloading apparatus, is very popular and offers several advantages over the old type racks which were made of pipe and wood.

The Alarm Room is the nerve center of the station, where supervision is maintained over all communications. The old time watch desk, formerly located on the apparatus floor, has given way to a separate room where all alarm communications and controls are centered.

Tack boards, bulletins, radio consoles, telephones, enunciators, speakers and all other signaling and alarm equipment should be arranged in a compact orderly manner and conveniently located.

Ready access to the concealed wiring and cables should be provided and station-wide public address system is desirable.

A minimum of two showers, two water closets, two urinals and two wash basins should be provided for the male personnel and the equivalent for the female personnel.

The electrical system should be surveyed and determined by a qualified electrical engineer. There should be plenty of service outlets for cooking, air conditioning, radio, television, battery charges, electric portable tools, projection and sound equipment, etc.

Fluorescent lighting fixtures are recommended in all areas with possible exceptions of closets, storage rooms and basements. Exterior floodlights are advisable for drives and parking areas.

Ample window, providing plenty of daylight, eases the demand on lighting circuits.

A clean, soundproof room dedicated to self-contained breathing apparatus air filling can be incorporated into the design. The compressor and air bank can be located for easy access. All breathing air must comply with WCB Regulation 14.25.

A well-equipped lecture and reading room with good chairs, convenient tables, television, VCR, radio, and a library with books and subscriptions to leading Fire Trade periodicals is desirable.

While the requirements considered above are common to both volunteer and paid departments, there are some differences in station design. Because the volunteer station may be used for other functions, they are equipped with kitchens, sometimes meeting rooms which can be divided into several smaller rooms as the occasions require by means of folding partitions. A separate entrance will help alleviate traffic through the fire station.

Because the fire protection needs of jurisdictions are always changing, a fire station which is adequate today may require extensive expansion or modification in just a few years. It is necessary for local fire stations to be designed and constructed to accommodate anticipated changes to their staff, equipment and services.

Only when they have been designed for flexibility and adaptability to change can these essential facilities expand and adjust to meet new demands with the cost effective alterations.

There are many fire stations located within each region. It would be wise for any department contemplating a new station to look at other existing stations. Other fire departments can state what they like and don't like about their own fire station.

ORGANIZATIONS

Office of the Fire Commissioner

The goal of the Fire Commissioner's Office is to minimize the loss of life and property from fire.

Advice and recommendations in the development of by-laws with assistance in ways of achieving this goal.

The Fire Commissioner's Office is not a funding source for fire departments, however, from time to time the Provincial Government makes grants available through the Fire Commissioner's Office for training initiatives.

The Fire Commissioner's Office can assist in determining the needs of equipment, apparatus, water supplies, and staffing of fire departments.

The Fire Commissioner's Office can assist in the provision of fire prevention programs and materials.

The Fire Commissioner's Office can assist/advise with regard to fire cause determination.

The Fire Commissioner's Office collects, stores and analyzes fire protection data and disseminates information and statistics based upon such data.

The Fire Commissioner's holds joint certification with the Alberta Fire Training School and is directly involved in the planning and delivery of training courses and curriculum.

The Fire Commissioner's Office partners with the Alberta Fire Chiefs Association and together strives to improve the fire and life safety in the province and reduce the loss of life and property from the devastating impact of fire.

Other Resources

Refer to the Fire Chief's Handbook.

Important Agencies

NFPA – National Fire Protection Association
IAO – Insurance Advisory Organization
WCB – Worker's Compensation Board

BASIC FIRE DEPARTMENT REQUIREMENTS

Communications

There will be a need for public reporting, dispatching, telephone and two way radio systems that will fulfill the following functions:

- receiving the fire alarm or emergency call from the public,
- notifying fire fighters and other interested agencies of an incident,
- communication on the fireground between fire fighters and or the dispatch center.

The alarm should be received on a dedicated line for fire emergencies only.

The alarm can be received at a central 24 hour answering service, or through radio telephones carried by fire fighters.

The department must quickly dispatch fire fighters and apparatus by using the following methods:

- sirens
- air horns
- telephone fan-out system; or
- pagers

Once at the scene, fire fighters may need to talk to each other, the fire apparatus or the dispatch center. There will be a need for portable radios and mobile radios in apparatus.

A radio frequency will be required from Communications Canada for the fire department use.

Mutual Aid Agreements

Legal mutual aid agreements should be entered into with neighboring communities and with the appropriate government agencies. This can provide additional resources in the event of a major emergency.

Mutual aid plans establish procedures for requesting and dispatching help between fire departments so that each party will know what is expected.

Mutual aid plans may include the following functions:

- immediate joint response of several fire departments to high risk properties
- joint response to alarms adjacent to the boundaries between fire department areas
- coverage of vacated territories by outside departments when the resources of the local department are engaged
- provision of additional units to assist at major fires that may be too large for the local department to handle
- provision of specialized types of fire fighting equipment not available locally in adequate quantity for the particular incident

Mutual aid plans should also include Operational Guidelines, interdepartmental communications, common terminology, maps and other considerations that directly affect the department's ability to operate effectively.

It is essential that inter-agency training is done to familiarize each participant with equipment compatibility and how each organization functions. This will ensure smoother operation in an emergency operation.

Command responsibility, jurisdictional questions, insurance coverage and legal constraints should be covered in written agreements supported by enabling legislation to properly establish mutual aid systems for the participating department and agencies.

Adequate manpower and equipment are needed in order for any department to help and support another jurisdiction.

Operational Guidelines

In order for a fire department to function effectively it must be organized so that all members are working in a coordinated effort to accomplish the objectives and requirements of the department.

The fire department should develop and implement an Operational Guidelines Manual which should include but not be limited to the following procedures:

- training
- safety
- operations
- personal protective equipment
- equipment safety and maintenance
- special operations
- dangerous goods
- work site safety
- respiratory protection program

The Regional Offices of the Fire Commissioner can supply Operational Guideline samples of pre-written guidelines that will aid any department in forming their own set of guidelines.

These procedures will enhance employee safety, minimize public risk from fire department operations, increase operational effectiveness and protect fire department assets from possible loss.

The Operational Guidelines should be kept in a binder readily available for each member to read.

Maintaining a very comprehensive Operational Guidelines Manual will reduce the risk of liability claims against the fire department.

Pre-Fire Planning

Pre-fire planning is preparing a course of action to follow against a possible fire. This process will prepare a fire department for an emergency before it happens, by providing basic information about specific areas and or buildings.

Pre-planning may involve generalized planning or disaster planning for fire, transportation or medical emergencies that may occur in the fire protection service area.

Any building or area with a high risk to life or property should be pre-planned.

Consideration should also be given to properties with particular problems of exposures, such as large structures with little or no fire resistive properties, lack of water and poor fire department access particularly in the winter and the spring.

Fuel storage and propane storage tanks present special hazards in a rural setting.

A common format for pre-plans is an 8.5 x 11 inch sheet with a scale drawing of the building. The following information is then collected:

- exposure hazards
- water main sizes
- hydrant location
- alternate source of water supply
- total water available
- street name, address
- location of power lines
- location of utilities shut-offs – power, gas, water
- name, telephone number of owner/occupier
- storage of hazardous materials
- location and type of fire protection equipment
- fire safety plans
- fire department access

The drawing should include wall and roof construction, stairwells, elevators, sprinkler systems, alarm systems, door and window locations.

Ultimately the plan is used to assist the fire department to safely address an incident.

The plan should indicate general initial attack positions of responding apparatus, highlighted water sources and necessary hose evolutions.

Complete plans must be available to those who will use them on the fireground. The plans are a great training tool. All plans should be kept current. It is good practice to keep copies of pre-plans in all first line apparatus and in the fire station.

Records and Reports

A record system should be established to provide the fire chief and officers with accurate, up-to-date information of all fire department activities including:

- financial
- general
- personnel
- water supplies
- training
- attendance
- apparatus maintenance
- equipment maintenance
- public relations and education
- fire prevention and inspections
- fire incidents and investigations
- operational guidelines

Reference and Technical Library

An up-to-date library with reference materials and Codes, can provide guidance and knowledge to fire department personnel.

The following current manuals should be included:

- Safety Codes Act
- Alberta Fire Code
- Alberta Building Code
- W.C.B. Industrial Health and Safety Regulations
- NFPA Fire Protection Handbook
- applicable NFPA Standards
- Alberta Fire Training School course schedule
- assorted fire trade periodicals
- International Fire Service Training Association (IFSTA) manuals

Water Supplies

A reliable and adequate water supply for firefighting is an essential part of the fire protection system.

Water must be available to replenish water tank trucks during and after training and/or at fires.

This supply can come from hydrants in the community or from natural or man-made sources.

A study should be undertaken to determine the reliability of these water supplies during dry periods and cold weather.

Methods should be devised wherein all natural water sources in the fire protection area can be used at any time of the year. This would entail providing year round access with secure right-of-ways and providing dry hydrants.

A formal agreement for the maintenance and upkeep of fire hydrants on the water system should be in place between the fire and water authority (Appendix 4 is a sample of a Fire Hydrant Maintenance Agreement).

The agreement is based on the principal that the local government agency responsible for the water system should retain responsibility for maintaining the hydrants. There are reasons that the local fire authority might be willing to pay all or part of the cost for maintaining them.

The reasoning behind this principle, is that the water authority:

1. Owns the entire water system on which the hydrants are located;
2. Controls the design of the water system and the location of hydrants;
3. Has the regulations requiring developers to install hydrants;
4. Has the staff who is knowledgeable about maintaining water system components and the necessary equipment;
5. Also uses the hydrants to flush their water mains.

The fire department wants assurances that the hydrants will be in proper operating order when they are needed in an emergency.

Upgrades or replacements are generally picked up as part of the water authority's annual upgrading and maintenance program in conjunction with the Fire Department's recommendations, but within the financial capacity of the community.

A written agreement should be drawn up for maintenance and use of any private water systems.

Wildfire Threats to Urban Interface Areas

Rural areas are becoming increasingly popular as outstanding locations for both seasonal and permanent residences.

A bylaw should be established to control vegetation and construction methods in urban interface areas. Alberta Sustainable Resources has a manual called "Fire Smart: Protecting your Home from Wildfire". This manual can assist residents in the interface area with many good recommendations on safety.

Public and private education will lessen the risk of wildland/urban interface fires. An increased awareness and homeowner involvement will ensure greater safety in this area (see Appendix 3 references).

APPENDIX 1

Fire Department Bylaws and Orders

The fire bylaw is an enabling piece of legislation which gives the local government elected body (Council or Board) the authority to create a fire department, and gives the authority for the fire department to function under.

One area covered under this bylaw is the authority to enter a premises; there are a number of fire departments in Alberta that do not have this identified in their bylaws and if a legal entanglement were to evolve out of a fire incident the fire department could theoretically be charged with trespass, and possible subrogation by an insurance company for damage.

The bylaw gives the authority for the Fire Chief to set out the rules, regulations and orders for the organization, administration and operation of the fire department. These are normally referred to as Fire Department Standing Orders.

Although all the functions outlines are necessary for the efficient operation of a large fire department, the same number of divisions may not be required to carry out the efficient operation of smaller or volunteer fire department.

Some of the functions, therefore, may be deleted or consolidated according to the requirements of the particular local government body.

The bylaw has been designed essentially for enactment by incorporated local government bodies. With the agreement of their legal advisor, it may be equally applied to any areas or fire districts as defined by the appropriate bylaws or legislation.

APPENDIX 2

Reference Materials

National Fire Protection Association standards:

- 299 Protection of Life and Property from Wildfire
- 1231 Water Supplies for Suburban and Rural Fire Fighting
- 1500 Fire Department Occupational Health & Safety
- 1901 Pumper Fire Apparatus
- 1902 Initial Attack Fire Apparatus
- 1903 Mobile Water Supply Fire Apparatus
- 1911 Service Tests of Pumps on Fire Department Apparatus

Fire Underwriters Survey:

- Water Supply for Public Fire Protection
- Dwelling Protection Grades

Office of the Fire Commissioner:

- Fire Department Operational Guidelines
- Establishment and operation of Fire Departments

Province of Alberta Water Management Branch:

- Design guidelines for rural residential community water systems

ULC-S515:

- Standard for Automobile Fire Fighting Apparatus