

# Fire Protection Choices for Rural Oregon Communities



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# Fire Protection Choices for Rural Oregon Communities

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# Fire Protection Choices for Rural Oregon Communities

## Rural Fire Protection—The Problem

*Maggie and Jim live in a sparsely populated rural Oregon community. Last week the entire family stood huddled together on the front lawn and watched helplessly as their home burned to the ground. They were fortunate; no one in the family was injured by the fire, but their family possessions were lost forever.*

Sound familiar? Fire protection is a continuing problem in the United States. According to the recent national study *America Burning*:

During the next hour there is a statistical likelihood that more than 300 destructive fires will rage somewhere in this nation. When they are extinguished, more than \$300,000 worth of property will have been ruined. At least one person will have died. Thirty-four will be injured, some of them crippled or disfigured for life.

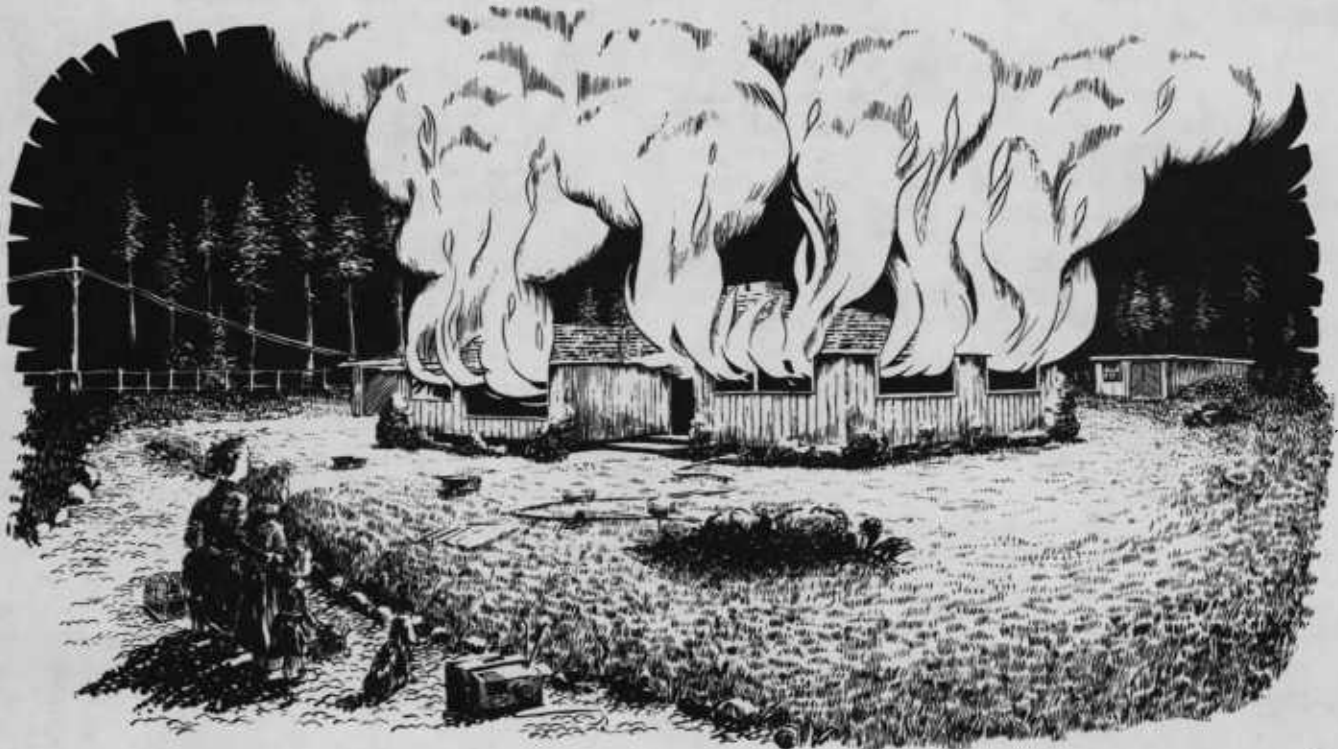
The report estimates that each year in the United States at least \$11 billion dollars in property damage will result from fires. More than 12,000 lives will be lost; 300,000 people will be injured; and 50,000 will lie in hospitals from 6 weeks to 2 years recovering from burn injuries.

The fire problem is even greater for one-third of the nation's rural population. The hard facts are:

- National fatality rates for rural people are almost *double* the rates for urban residents. (Non-white rural residents have even a higher rate.)
- Property damage is *three to six* times greater in rural communities.
- Response time of fire fighting equipment to rural fires is *15 to 30* minutes. (It takes only 5 minutes for a fire to develop deadly conditions and 20 minutes to rage into a major blaze.)

Some Oregon residents are fortunate to have modern and progressive fire fighting and protection systems. In contrast, many rural Oregonians go without or receive only minimal fire protection.

According to the State Fire Marshal's *Annual Statistical Report*, 18,378 fires occurred in Oregon during 1976 (figures do not include forest or wild-land fires). Approximately 40 percent of these fires are in rural areas. An average 50 fires occur somewhere in Oregon each and every day of the week. These fires accounted for more than \$26 million dollars in lost property value that year, but more tragically took the lives of 95 people.



## Rural Fire Protection—The Issues

Several concerns about fire problems are expressed by citizens in rural areas.

- Insurance premiums for unprotected rural communities are substantially higher than those in urban areas. Costs vary by community and type of insurance policy, but estimates show that fire premiums can easily be *two* or *three* times as expensive in a rural area, particularly if the community has no organized fire protection.

- Many rural citizens feel uncomfortable and even threatened by the thought of having no formal fire protection. This is particularly true for people who have recently taken residence in rural communities. Many have moved to rural areas from urban communities where adequate fire services are usually available. Long-term rural Oregon residents usually provide their own fire protection. Newer residents often do not feel this self sufficient and expect some organized level of fire service to be provided for them.

- Some rural Oregon communities unprotected by a formal fire service may also experience a sudden surge of interest immediately after a tragic fire incident occurs. A local family may lose their home in a fire, or someone may be killed.

Whatever the issue, most rural citizens concerned with fire problems think first about providing some organized level of fire service. They want to obtain some fire trucks, equipment, a fire station, and train local residents to become fire-fighters.

Merely providing an organized form of fire suppression in the way of equipment and manpower may not solve a community's fire problem. Many fire service officials believe that fire prevention education programs and the stronger enforcement of building and development codes are also important.

It is difficult to convince some rural residents that they should become active in fire prevention education programs, since doing so will have little impact on lowering costly fire insurance rates. Insurance agencies, while recognizing the importance of fire safety, education, and training programs, do not now offer reduced fire insurance rates to communities participating in public fire prevention education programs.

The only avenue available to reduce fire insurance premiums is to increase suppression by providing an organized fire service. Consequently, this alternative is emphasized throughout this publication.

## Estimating a Need for Rural Fire Protection

### Information collection

A sound information base on the community fire problem is extremely helpful in determining the need for fire protection. A history of fires in the community is a good place to start. Information collected should contain the location, types, and dollar amounts of damage sustained in previous fires.

Organizing the information collection effort can speed up the process and result in a better information base. Normally, a committee can be formally or informally appointed, and each member given an assignment or task to complete. Dividing the workload up and allowing all committee members to contribute to the effort should help encourage enthusiasm.

Appointing someone to chair the committee is always a good idea. The chairperson can then monitor progress on the fire problem effort, appoint new tasks and assignments as the need arises, and call periodic meetings.

### Sources of information

A number of organizations and sources of information on fire exist in Oregon. They include the following. See Appendix A for addresses of all organizations listed.

1. Fire Standards and Accreditation Board
2. State Fire Marshal
3. Oregon Fire Chiefs' Association
4. Oregon Rural Fire District Directors' Association
5. Oregon Volunteer Firemen's Association
6. State Department of Forestry
7. Oregon State Fire Fighters' Council
8. Insurance Services Office of Oregon
9. Oregon Fire Equipment Dealers' Association
10. U.S. Forest Service
11. U.S. Bureau of Land Management

Each one of these organizations is concerned with some aspect of the fire problem in Oregon. They may all provide some useful information.

Generally, in small rural communities a good source of local information on fires may be the offices of a land management agency such as the federal Bureau of Land Management or Forest Service, the Oregon State Forestry Department, a nearby Fire Protection District, or the fire chief from a city near the community. Other sources might include a local fire insurance office or the County Planning Department.

## State fire marshal report

Undoubtedly, one of the best sources of data on fires in Oregon comes from the *Annual Statistical Report* of the State Fire Marshal's office in Salem (see Appendix A for address). Single copies are available upon request and should be obtained by anyone considering a fire service for their community.

## Obtain maps

A usable base map of the community is particularly important for understanding the community fire protection needs. Maps can be obtained from state forestry offices or county planning departments for most communities throughout Oregon.

A good map can serve many useful purposes, such as the plotting of homes, businesses, water supplies, and public facilities (schools, churches, community centers). The same map can be used for recording the location of fires in the community over several years. This information, displayed visually on a map, will help others understand the fire problem more completely. Information collected on fires also can be used to complete Table 1.

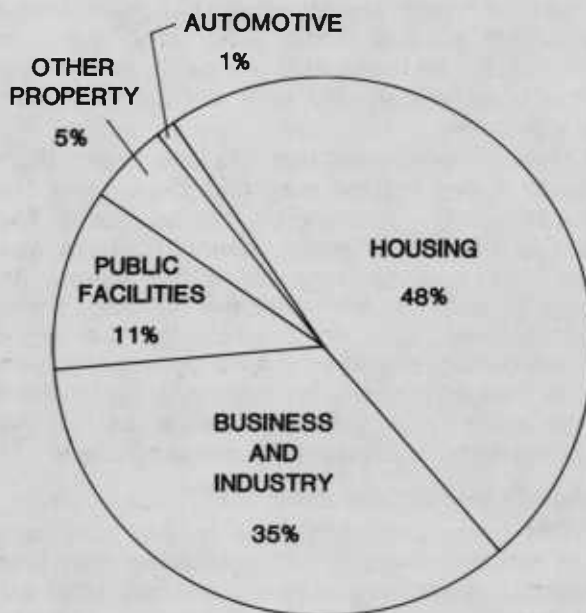
Once the location of potential and actual fires is known, a set of boundaries can be drawn for the area to be protected by the proposed fire service. There may be disagreement among community members as to where the lines of the study area should be drawn. Some boundaries should be proposed, however, to provide everyone with a common idea of the community under consideration for the fire service.

## Estimating number of fires and average loss per fire

A table similar to Table 1 can be constructed to put the community fire problem into perspective. No formal reporting system is usually available for communities unprotected by an organized fire service. Data needed to complete Table 1 can be obtained through surveys or fire incidents reported in local newspapers.

This table can be constructed for one or several years, depending on the amount of information available on fires in the community. Generally, it should provide a brief but accurate picture of the fire problem. Information used to create Table 1 as presented here was obtained from the Oregon State Fire Marshal's annual report. Similar types of data should be available for individual communities.

Figures from the table can be used to construct additional graphs or charts to illustrate where fires are occurring and where the greatest losses occur. Graphs and charts summarize numerical information in a way which allows the viewer to quickly grasp the major dimensions and trends of a problem. A pie chart such as the following could be useful for those needing a quick perspective on a community fire problem.



Insured Fire Loss  
in Oregon, 1976

Table 1. Number and Average Loss Per Insured Fire Claim in Oregon, 1976—  
from Oregon State Fire Marshal Report.

Type of fire	No. of claims	Percent of claims	Estimated insured loss	Average loss <sup>1</sup>	Percent of total loss <sup>2</sup>
Housing .....	3,210	73%	\$12,486,000	\$ 3,890	48%
Business & industry .....	445	10%	9,104,000	20,460	35%
Automotive .....	531	12%	260,000	490	1%
Other property .....	193	4%	1,301,000	6,740	5%
Public facilities <sup>3</sup> .....	48	1%	2,861,000	59,600	11%
State totals .....	4,427	100%	\$26,012,000	\$ 5,876	100%

<sup>1</sup> Divide estimated total loss by number of fires to obtain Average Loss.

<sup>2</sup> Divide estimated insured loss of category by state total.

<sup>3</sup> Public facilities might include church, auditorium, theater, school, bridge or assembly hall fires.



## Estimating Costs for Rural Fire Systems

To determine whether a community can afford an organized fire suppression service, it is necessary to estimate the cost of purchasing and operating such a system. These costs can be outlined in a budget. For budgeting purposes, the costs of rural fire service can be identified as either *capital* costs or *operating* costs.

- *Capital* costs are the large costs that immediately come to mind when considering a fire service. Fire trucks and equipment, communications gear, fire stations, protective clothing, and other necessary supplies are all capital costs. Since many of these initial capital costs are large, communities may want to spread out payments for these budget items over a period of years through borrowing.

- *Operating* costs include payments for fuel, repairs or replacement of worn out or broken equipment, utilities (water, electricity) at the fire station, labor (if firefighters are paid), and training. These costs will usually vary directly with use of the equipment.

Many communities that are just beginning to provide a fire service may find themselves concentrating very strongly on capital costs. They need to find a fire truck, communications gear, axes, hoses, some land for a fire station, and a way in which to construct the building. Consequently, they could neglect how the fire service will be provided to the community over time and fail to budget properly for *operating* costs. Forms 1 and 2, provided in this publication, can be used to estimate both capital and operating costs.

### New, used, or surplus equipment?

The basic approach used in this publication is to estimate the costs of *new* rather than *used* or *surplus* equipment in most instances. Most rural fire services *are not* formed entirely with new equipment. However, it is very difficult (if not impossible) to estimate costs for used equipment because of a wide range in prices.

Also, communities have different standards. While a used or reconditioned fire truck may be acceptable in one community, a new truck may be desired in another. These are choices that must be made by each community considering a fire service.

Planners for each community are advised to estimate the costs of fire protection alternatives, using the new equipment cost estimates first. As fire planners become more knowledgeable and obtain cost estimates for used or surplus items, these estimates can be substituted for new equipment costs in the budget. Also, community members can decide what equipment they desire to purchase new, and those items that can be obtained from used or surplus sources.

The cost estimates in this publication will become outdated in time. As inflation and other economic factors take their toll, prices for equipment, building costs, insurance, utilities, etc., will become obsolete. Therefore, local communities are encouraged to check the price estimates used in this publication against any newer estimates they may obtain, and substitute them whenever possible.

### Types of capital costs

- *Fire trucks*—A fire truck or pumper that meets standards is one of the largest capital costs. The entire fire service generally is formed around providing adequate vehicles. There are basically three ways to obtain fire trucks for use in rural Oregon: 1) purchase a new truck from an equipment dealer; 2) buy a used truck, usually from another fire district or local, state, or federal government organization; or 3) obtain and rebuild donated or surplus government equipment, usually from a state or federal agency.

The vehicle should meet standards described in the National Fire Protection Association, Pamphlet 1901 Automotive Fire Apparatus (formerly Pamphlet 19). This publication, along with other very important information, can be obtained by writing to the sources listed in Appendix B.

- *Buying a new truck*—This choice for obtaining a vehicle is by far the most expensive. Minimum standard fire vehicles range from \$14,000 for a small fire truck with four-wheel drive to \$80,000 or more for a large fire truck. The difference in price is due mainly to features and capabilities of the vehicle.

If the community is seriously considering purchasing a new vehicle, several opinions should be obtained on the type of truck suitable for the area to be served. Vehicles designed for use in urban areas will most likely not be suitable for the rough terrain found in many rural Oregon communities.

Also the nature of the fires most likely to occur (brush, house, business, etc.) will play a large role in determining the vehicle needed. A four-wheel drive truck, for example, might be appropriate in many rural areas of Oregon.

- *Buying a used truck*—A certain amount of risk is attached when purchasing a used fire truck. Generally, used fire equipment is not easy to find for rural fire districts. However, with some persistent effort, used vehicles can be found.

One national source of information on used fire trucks is *Fire Engineering* (see Appendix B). This monthly publication carries a listing of used equipment for sale and also lists those communities that are looking for various fire fighting vehicles. Also each January issue of *Fire Engineering* contains an extensive price list for fire equipment. Prices



are usually quoted for new equipment. Other organizations listed in Appendix A can be contacted as a source of information on used vehicles for fire protection.

The League of Oregon Cities, a voluntary association of municipal governments, also occasionally has information on used fire equipment. Their monthly newsletter occasionally carries advertisements on fire trucks for sale by cities throughout Oregon (see Appendix A).

The following guidelines are recommended when purchasing a used fire vehicle:

1. Be certain that the vehicle fits the needs of your community.
2. Have the vehicle inspected and tested by qualified mechanics and fire personnel.
3. Make certain your community is not "buying someone else's headache" by purchasing a low-quality vehicle that has a history of breakdowns, repairs, and mechanical problems.

• *Converting used or surplus vehicles*—This method for providing rural fire protection vehicles is, by far, the most common. Several publications on obtaining or converting vehicles are listed in Appendix B.

Conservative cost estimates for converting a surplus vehicle such as a 6 x 6 military truck with 500 to 1,500 gallon tank, vary from \$5,000 to \$12,000, depending on options such as sirens, lights, and painting. Estimates for reconditioned used trucks that qualify as "tankers" and carry as much as 3,000 gallons of water range from \$30,000 to \$45,000.

One source of information on fire equipment in Oregon is the Oregon Fire Equipment Dealers' Association. Representatives from this association can provide cost estimates not only for fire vehicles but for a wide range of equipment necessary for the fire service (see Appendix A for address).

The state's Emergency Services Division administers a program for "Federal Excess Property." This agency can assist a rural fire service in obtaining surplus and used federal equipment (see Appendix A for address).

• *Deciding on fire vehicles*—Since vehicles are the major capital cost for a rural fire service, some expert help and advice will be needed in deciding which route to pursue: purchasing new or used equipment or converting surplus or donated trucks. Much of the choice will be determined by the willingness of community residents to support the service financially.

According to the Insurance Services Office of Oregon, a "booster truck" is the minimum apparatus required for a recognized fire department for insurance purposes. Requirements and estimated costs for the booster truck are listed in Table 2.

The *booster truck* meets only minimum protection requirements for fire insurance recognition as recommended by the Insurance Services Office of Oregon. This office strongly encourages a beginning fire service to obtain the following truck and equipment in Table 3 classified as a "pumper."



**Table 2. Initial Capital Cost: Booster Truck and Equipment.**

Equipment	Estimated cost <sup>1</sup>
1. A fire vehicle with a permanently mounted pump with capacity of 50 to 250 gallons per minute rated at 150 pounds square inch and water tank of at least 300-gallon capacity.	\$ 14,000
2. At least two 150-foot lengths of 3/4- (\$1.65/ft) or 1-inch (\$1.85/ft) fire department booster hose, each provided with a nozzle (\$150) capable of discharging either a spray or a straight stream; (3/4-inch hose used here as example). Vehicle and hose subtotal = \$ 14,795	795
3. General equipment	
a. Two sets of 2 portable fire extinguishers suitable for use on Class A, B, and C fires with the following characteristics: minimum sizes should be 20 BC rating (\$70 each) in dry chemicals; 10 BC rating in CO <sub>2</sub> (\$90 each); and 2A rating in water-type extinguishers (\$45 each); (20 BC dry chemical used here as example).	280
b. One 12-foot (preferably 14-foot) fire department type ladder with folding hooks.	130
c. One 24-foot fire department type extension ladder.	240
d. One pick-head axe (6 pounds).	30
e. Two electric hand lights (4-volt minimum).	30
f. One pike pole (6-foot minimum).	20
g. One bolt cutter.	35
h. One claw tool.	45
i. One crowbar (36-inch minimum).	30
General equipment subtotal = \$ 840	
Vehicle and hose subtotal = \$ 14,795	
Total estimated cost = \$ 15,635	

<sup>1</sup> Mounting brackets included with all equipment.

**Table 3. Initial Capital Cost: Pumper Truck and Equipment.**

Equipment	Estimated cost
1. A fire vehicle with a permanently mounted pump with capacity of at least 750 gpm at 150 psi (or at 120 psi for Class B pumpers). In lieu of a single apparatus, two pumping units (each capable of pumping at least 250 gpm at 150 psi) operated as a single engine company, and together capable of delivering an effective 250 gpm stream at a distance of 1,000 feet from the water source. Also the vehicle must be equipped with a water tank of at least 150-gallon capacity. In municipalities without a recognized water supply, the tank should be at least 500-gallon capacity.	\$ 35,000
2. Sufficient 2 1/2-inch (or equivalent) hose (\$1.80/ft) so that, with the pump provided, the apparatus can deliver effective fire streams totaling 500 gallons per minute for a distance of 500 feet from the water source and totaling 250 gallons per minute for a distance of 1,000 feet.	1,800
3. Equipment	
a. Two nozzles for 2 1/2-inch hose (\$280 each), each capable of discharging either a spray or a straight stream.	560
b. Two hydrant wrenches (\$10 each).	20
c. One gated wye, 2 1/2-inch to 1 1/2-inch.	130
d. Two combination spanner wrenches for 2 1/2-inch and 1 1/2-inch couplings.	8
e. 400 feet of 1 1/2-inch fire hose (\$1.30/ft).	520
f. Two nozzles for 1 1/2-inch hose, each capable of discharging either a spray or a straight stream (\$170 each).	340
g. 150 feet of 3/4- (\$1.65/ft) or 1-inch (\$1.85/ft) fire department booster hose, and a nozzle capable of discharging either spray or a straight stream (3/4-inch hose used here).	247
h. The "general equipment" listed under "booster truck" (from General Equipment Subtotal Table 2).	840
Total estimated cost	\$ 39,465

• **Communications equipment**—The modern communications equipment needed by a rural fire service is another large capital cost. As with obtaining a fire vehicle, some local expert advice will help the community determine its needs and the costs of purchasing and installing the necessary equipment. The following estimates will provide some idea of the 1978 costs of a modern communications system.

**Table 4. Initial Capital Cost: Communications System.**

Item	Estimated 1978 cost
Radio base station .....	\$ 2,500
Two-way radio (2 needed) \$1,050 each .....	2,100
Monitors (one per volunteer for 20 firefighters @ \$150) .....	3,000
Tone generator (optional) .....	400
Fire siren (3.5 square mile effectiveness) .....	9,000
Pagers (20 needed @ \$300) .....	6,000
1978 total estimated cost .....	\$23,000

Most rural fire services do not provide both monitors and pagers, usually choosing one of the two. However, both have been included here for consideration.

Again, a professional communications consultant or local expert should be contacted to help

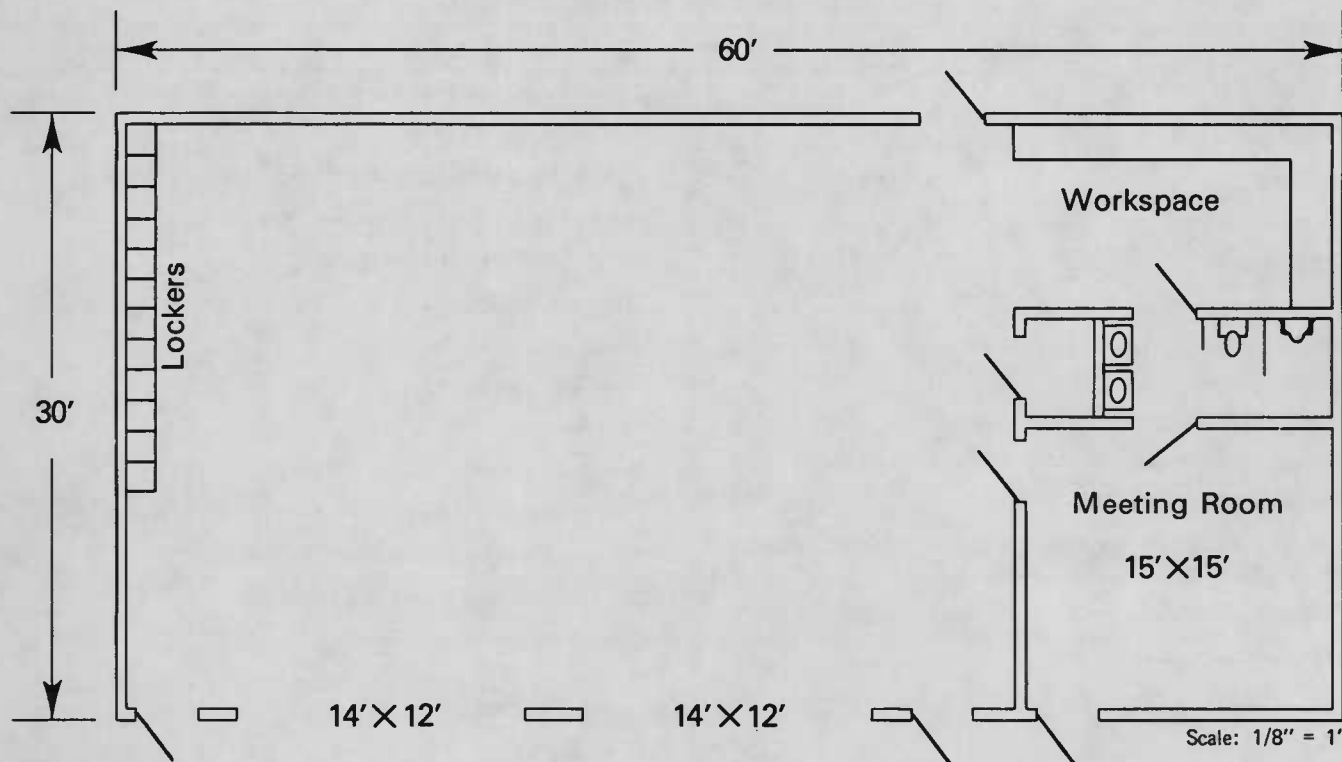
determine the current prices of necessary communication equipment, installation charges for the local fire service area, and problems of dispatching volunteers and equipment on fire emergencies.

• **Fire station plans**—A fire station to house trucks and equipment, and serve as a meeting place, will be needed by any rural fire service. The station can be constructed by members of the local community, contracted to a private builder or developer, or remodeled from an existing structure.

A sample plan for a rural fire station<sup>1\*</sup> is presented below. Construction costs through a local private contractor were estimated at \$30,000 in 1978, not including land costs. Some communities may need a larger station. For example, the meeting room contains only 225 square feet of meeting space, which might be inadequate for larger rural communities. Publications containing more information on floor plans for fire stations are listed in Appendix B.

Besides a plan for the building, a site plan should be developed. The site plan can include such items as the location of outside hose drying racks, paved training areas, or equipment wash and scrub-down locations. The costs of the site and building plans should be included in the total cost for the fire station.

Numbers <sup>1</sup> through <sup>11</sup> in text refer to References, page 17.



**Two-Bay Fire Station**

• *Location of the rural fire service building*—A suitable location for the station may already be predetermined by existing public facilities or a donated land parcel. However, those communities that have not chosen a site location for the fire station or are having a difficult time determining where it should be located should be aware that various mathematical techniques are available and can be used for estimating the most economical location.<sup>2</sup> Though not discussed in this publication, assistance in applying these analytical techniques can be obtained through the Oregon State University Extension Service.

• *Protective clothing*—Minimum protective clothing consisting of coat (\$65), gloves (\$6), helmet (\$35), boots (\$30), and pants (\$42) must be available for each firefighter.<sup>3</sup> The cost of outfitting each individual is estimated at \$178.

• *Additional supplies: fire station and vehicle*—Additional supplies may be useful, but are not necessarily required. These could include supplies for use at the fire station or on the vehicles. A brief checklist is presented in Table 5 to give some idea of the kinds of supplies that may be requested. Local choices will determine which will be included as budget items. (Price estimates are included if available.)

The Oregon Fire Action Council Equipment Committee recommends the purchase of quality equipment: All tools and equipment should be of

good quality and suited to the job to be done. A firefighter's life may depend upon the tool being used. A sacrifice in quality may mean a sacrifice in life or property.<sup>4</sup>

### Estimating annual capital costs

Payments for buildings and large equipment items like vehicles and communications systems are generally spread over a number of years. A community may use one of the financing alternatives discussed in a later section to spread out these payments. The size of the annual payment depends on the rate of interest and the repayment period. An amortization table (Appendix C) is used to determine the size of the annual payment; individual entries in this table identify the proportion of the total cost which must be repaid each year at different interest rates and repayment periods. For example, the annual payment on a \$100,000 loan or bond with an interest rate of 9 percent and a repayment period of 25 years is \$10,180.60 (.101806 x \$100,000). The procedure outlined on Form 1 can be used for estimating the *annual capital costs* for a rural fire service. This form is filled out to serve as an example of how it can be used.

*This is only an example of how to use the form. Blank forms are provided at the back of this publication for use in individual communities.*

**Table 5. Additional Supplies Checklist.**

Fire station	Fire vehicle
Table	2 self-contained breathing apparatus @ \$600 <sup>1</sup>
Chairs	1 scoop shovel (\$15)
Lockers	4 portable lights (forest service type) (@ \$15) <sup>1</sup>
Workbench	Rubberized salvage covers—12' x 18' (\$75)
Office desk	Water bags and canteens (\$5 @)
File cabinet	Tire chains (\$30)
Office supplies (pens, pencils, fire record books, accounting books, desk calculator)	Truck blocks (\$20)
Cook stove	Pipe wrenches (\$15)
Eating utensils (coffee pot, cups, plates, etc.)	Tow chains <sup>1</sup>
Wood heat stove	Tool kit (\$75) <sup>1</sup>
Training materials (books, manuals, projectors, blackboard, etc.) <sup>1</sup>	Portable water pump (NFPA approved) (\$900)
Fire extinguisher	20 feet of suction hose and strainer (\$225)
Programmable door locks	200 feet of discharge hose (\$260)
	Extra fuel containers (@ \$10)
	Chain saw (carry case, extra chain, file, gas/oil cans, etc.) (\$300)
	First aid kit

<sup>1</sup> High-priority items should be obtained before other additional supplies are acquired.

# Form 1: Procedure for Estimating Annual Capital Costs of a Rural Fire District.

Ownership item	Cost
1. <i>Vehicle</i> : Cost of vehicle ( <del>\$35,000</del> ) x amortization rate ( <del>.124059</del> ) corresponding to the assumed interest rate and repayment period of 15 years, from Appendix C	= \$ 4,342
2. <i>Communications system</i> : Cost of system ( <del>\$23,300</del> ) x amortization rate ( <del>.155820</del> ) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= 3,630
3. <i>Fire station</i> : Cost of building ( <del>\$40,000</del> ) x amortization rate ( <del>.092960</del> ) corresponding to the assumed interest rate and repayment period of 40 years, from Appendix C (includes \$10,000 land cost)	= 3,718
4. <i>Firefighting suits</i> : Cost of suit ( <del>\$178</del> ) x number of firefighters ( <del>20</del> ) x amortization rate ( <del>.155820</del> ) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= 555
5. <i>Additional supplies</i> : Cost of supplies ( <del>\$4,700</del> ) x amortization rate ( <del>.155820</del> ) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= 732
Total estimated annual capital costs (add 1, 2, 3, and 4) 9 percent interest rate used from Appendix C	= \$12,977

## Types of operating costs

Once the initial cost of vehicles, fire station, communication equipment, protective clothing, and supplies is determined, the job of providing a rural fire service has really just begun. Supporting the service over time also requires financial outlays.

Every time the fire service is called into action some costs will result. Costs for fuel, broken equipment, labor (if firefighters are paid), and other expenses are a reality of providing a fire service. Even when the fire service is not in operation costs are incurred for heating and maintaining the fire station.

These expenses are called *Operating Costs*, and they provide a means for keeping the fire service active and ready to respond to a fire alarm.

**Table 6. Estimated Vehicle Operating Costs, 1978.**

A. Gasoline	Large truck, 4 miles per gallon at 70¢ per gallon
B. Tires	Replaced every 10,000 miles or 5 years at \$150 per tire
C. Oil	Changed every 500 miles or every 6 months at \$1.00 a quart
D. Oil filter	Changed each oil change, \$6 each
E. Grease	Each oil change, \$4
F. Tuneups	Every 1,000 miles, \$70
G. Antifreeze	\$10 per year
H. Miscellaneous <sup>1</sup>	\$10 every 500 miles
I. Insurance <sup>2</sup>	\$14 per \$1,000 insured
J. Communications	\$50 per year (service)

<sup>1</sup> Includes items such as headlight replacement, brake repair, etc.

<sup>2</sup> Coverage for liability and physical damage (fire, theft, etc.). Check with local insurance agent.

• *Fire equipment*—Some equipment will be broken or need replacing after each fire call. An estimate might be that \$5 per call will be needed. One set of protective clothing usually needs replacing each year at a cost of \$178.

• *Fire station*—Annual operating costs for utilities like electricity and heating will vary in Oregon by regional location and type of building. Table 7 can be used as a checklist of costs to be estimated.

**Table 7. Checklist for Fire Station Operating Costs.**

Service or item	Estimated monthly cost
Electricity	\$ 20
Heat	40
Water/sewer	15
Insurance	20
Maintenance	10

• *Labor*—The most common types of labor systems for rural fire departments are voluntary, part-paid, and full-paid personnel. Volunteer systems are most common in small communities. Three-fourths of all firefighters in Oregon are volunteers.

• *Volunteer system*—Volunteer systems are not always "free." Non-salaried firefighters are often compensated at \$3 per fire and \$2 per meeting attended. However, most out-of-pocket expenses are not reimbursed. The most common small system consists of 15 to 19 firefighters with one fire chief.

The chief often receives at least \$50 per month to supervise and insure that all equipment and vehicles are properly serviced and maintained.

The chief is also responsible for holding regular meetings and training sessions—usually at least once per month.

About one-third of the volunteers are normally available for each fire. If they are paid \$3, the labor cost would be \$15 to \$18 per fire.

If monthly meetings were attended by an average 12 volunteers, the yearly cost at \$2 per meeting would be \$288. In addition the chief would receive \$600 annually (\$50 per month x 12 months).

Some volunteer systems have found many benefits in organizing and utilizing auxiliary firefighters. These auxiliary firefighters may be men or women usually at home, local municipal employees, or others likely to be available for fire duty at times of the normal work day when many of the regular volunteer firefighters are not. However, these auxiliary firefighters will also need to be fully trained if they are to efficiently respond to fire calls.

- *Part-paid system*—This system generally includes one or two full-time employees responsible for supervising the department, servicing and maintaining equipment, holding training sessions, and carrying out other necessary operations. Study shows 12 to 20 volunteers generally make up the remaining personnel; they are often paid in a similar manner as in the all-volunteer system. Average monthly salary for full-time personnel in this system in Oregon in 1976 was \$1,075 for fire chiefs, and \$825 for beginning firefighters.<sup>5</sup>

- *Full-paid system*—This type of system relies on full-time firefighters. Enough people are employed so that at least one fire truck can be operated efficiently by firefighters on duty at the station. Since most rural areas in Oregon are not likely to be able to afford the costs of this system, it is not discussed in this report.

- *Insurance for firefighters*—Insurance for the fire vehicle and station are included as operating expenses in Table 4. Another insurance cost is death and disability insurance for firefighters.

The rates for this insurance vary, but about \$15 per year for each volunteer should be included in estimates of operating expense. Estimates from local insurance brokers should be obtained.

- *Training*—The subject of training for firefighting personnel and administrators does not appear as an operating expense in many rural fire service budgets. Training, however, costs money. Whether it occurs in the local fire station, at a yearly seminar or workshop, or in coursework at a community college, training could require paying for instructors, educational materials (such as books or other publications), travel, meals, and lodging of those attending educational sessions.

Training requirements are growing and will probably continue to expand in the future. The Insurance Services Office of Oregon, for example, states in its criteria that minimum training for a recognized fire department "shall be conducted at least 6 hours every 2 months."

In addition, minimum accreditation requirements for firefighters and administrative personnel have been developed by the Oregon Fire Standards and Accreditation Board at the direction of the Oregon Legislature. For example, one requirement states that 180 hours of instruction shall be completed in subject areas such as Basic First Aid, Fire Department Organization, Fire Apparatus, etc., to qualify in a "Firefighter I" category. This is the entry-level job description for beginning firefighters.<sup>6</sup> While the Oregon accreditation standards are voluntary, most rural fire services consider them desirable goals.

It is difficult to estimate the cost of training for firefighters and administrative personnel in a new fire service area. There do not seem to be any definite guidelines on costs of training.

Most people volunteering for firefighting duty in rural areas will not already be trained. The responsibility for adequately training volunteers will fall on the beginning fire district and some funds will need to be budgeted to do the job. The Oregon Fire Standards and Accreditation Board can assist in establishing a training program.

The best plan might be to budget a specified amount, say \$100 per year, for each firefighter. This amount could be re-examined each year at budget preparation time, increasing or decreasing it as experience dictates.

- *Contingency account*—A contingency is an event that is of possible but uncertain occurrence. Some unplanned occurrences requiring expenditures of funds are likely to happen and a plan must be available for dealing with them. A contingency account can help solve the problem.

For example, what if the costs of budgeted items were underestimated? The fire truck that was estimated at \$35,000 actually cost \$37,500 when finally delivered. Where will the extra funds be found to pay for the \$2,500 shortage?

Or what if several important pieces of equipment are destroyed on a fire call? How will they be replaced? Will the fire service be operated without them at reduced effectiveness? Many local governments provide for the unexpected by maintaining a contingency account. A community might budget, as one example, 10 percent of its total yearly operating budget for a contingency account. The contingency account, like the amount budgeted for training, will be a matter of local choice and can be examined after a year to allow appropriate changes.



### Estimating annual operating costs

Form 2 can be used to estimate annual operating expenses of a rural fire district. This form has been filled in *only as an example* of how it

can be used. Blank forms are available in Appendix D. A "use" of the vehicle as described in Form 2 can occur either at a fire call or during a training session.

#### Form 2. Estimating Annual Operating Costs for a Rural Fire District.

Operating item	Cost
1. <i>Vehicle</i> (see costs, p. <u>6</u> )	
A. Gasoline: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 4 mpg x .70¢ per gal	\$ <u>105</u>
B. Tires: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 10,000 miles x \$150 x 4 tires (use 6 tires for large trucks)	<u>36</u>
C. Oil: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x 6 qt oil x \$1.25/qt	<u>15</u>
D. Oil filter: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x \$6 per filter	<u>12</u>
E. Grease: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x \$4	<u>8</u>
F. Tuneup: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 1,000 miles x \$70 (or 2 times a year whichever is greater)	<u>140</u>
G. Antifreeze each year (\$10)	<u>10</u>
H. Miscellaneous: Yearly uses ( <u>30</u> ) x ( <u>20</u> ) average miles per use ÷ 500 miles x \$10	<u>12</u>
I. Insurance: \$14 per \$1,000 of vehicle value	<u>490</u>
J. Communication system service: \$50 per year	<u>50</u>
Vehicle subtotal	\$ <u>878</u>
2. <i>Fire equipment damage/replacement</i> (see costs, p. <u>9</u> )	
A. Equipment: No. of yearly fires ( <u>10</u> ) x \$5	<u>50</u>
Equipment subtotal	\$ <u>50</u>
3. <i>Fire station</i> (see costs, Table 5, p. <u>8</u> )	
A. Average monthly electricity charge ( <u>\$20</u> ) x 12 months	<u>240</u>
B. Average monthly heating bill ( <u>\$40</u> ) x 12 months	<u>480</u>
C. Average monthly water and sewer charge ( <u>\$15</u> ) x 12 months	<u>180</u>
D. Insurance per year	<u>240</u>
E. Maintenance ( <u>\$10</u> ) x 12 months	<u>120</u>
Fire station subtotal	\$ <u>1,260</u>
4. <i>Labor</i> (see costs, p. <u>9</u> )	
A. No. of paid personnel ( <u>1</u> ) x amount per month ( <u>\$50</u> ) x 12	<u>600</u>
B. Average no. of firefighters at each monthly meeting ( <u>10</u> ) x amount paid per meeting ( <u>\$2</u> ) x 12 months	<u>240</u>
C. No. of fires ( <u>10</u> ) x average no. of firefighters responding ( <u>12</u> ) x amount paid per fire to firefighters ( <u>\$3</u> )	<u>360</u>
Labor subtotal	\$ <u>1,200</u>
5. <i>Insurance for firefighters</i> (see costs, p. <u>10</u> )	
A. No. of firefighters ( <u>20</u> ) x yearly insurance rate ( <u>\$15</u> )	<u>300</u>
Insurance subtotal	\$ <u>300</u>
6. <i>Training</i> (see costs, p. <u>10</u> )	
A. No. of firefighters ( <u>20</u> ) x yearly training costs ( <u>\$100</u> )	<u>2,000</u>
Training subtotal	\$ <u>2,000</u>
Subtotal annual operating costs	\$ <u>5,486</u>
(Add subtotals 1-6)	
7. <i>Contingency fund</i>	
A. 10% x ( <u>\$5,573</u> ) total annual operating costs	<u>569</u>
Total annual operating costs (Add 6 and 7 above)	\$ <u>6,257</u>

### Estimating total annual costs

By adding the totals from Form 1 and Form 2, the total annual costs of providing the rural fire service can be obtained as follows:

**Table 8. Total Annual Estimated Cost.**

Budget items	Annual cost
Annual capital costs (total from Form 1)	<u>\$12,977</u>
Annual operating costs (total from Form 2)	<u>+ 6,257</u>
Total	<u>\$19,234</u>

### Financing a Rural Fire Protection District

Many financing options for rural fire protection require formation of a rural fire protection district. Special districts are local government units created under Oregon law to serve a number of purposes, including water conservation, parks and recreation, irrigation, and rural fire protection.<sup>7</sup> The principal advantage of this form of organization is that Oregon law permits special districts to levy property taxes to support their operations.

The Oregon State Fire Marshal and his deputies assist in the formation and administration of rural fire protection districts. Communities considering the formation of a rural fire protection district should contact the State Fire Marshal's representative in their region of the state. They can supply a booklet, *Guidelines for the Formation of Rural Fire Protection Districts*, that contains a listing of the laws to be followed in forming the district and other useful general information.

County government officials can advise and help in forming the rural fire district. The County Assessor's office, for example, can be of assistance in estimating the assessed value of the proposed district.

Enthusiasm and continued support of the district's residents will be needed if they are expected to financially support the rural fire service. There is evidence to suggest that when voters are knowledgeable of how their money is spent, they will support services such as fire protection.

### Financing alternatives

The estimated total annual cost from Table 8 shows the amount needed to support the fire service. A number of alternatives exist for financing this cost.

- *Fee per call*—Rural fire services have been supported on a "per call" basis. A fee is charged for answering fire calls. Fees are set according to the total annual cost of providing the service.

The annual variation in calls can create a highly variable income under this arrangement. Also, when fees are substantial, people may wait

until the last moment to call for help, causing more serious damage or uncontrollable fires. The fire department will risk loss of community support by charging fees to families or businesses who are already suffering from a recent fire loss. There is even a legal doubt as to whether the fire department has the authority to make the fees payable upon demand. For these reasons, the fee-per-call method seems impractical and is not extensively used in Oregon.

- *Public donations and benefits*—Some rural fire services in Oregon rely on fund-raising activities for a portion of their income by actively soliciting funds from local citizens. Others sponsor dinners, dances, bake sales, and other community events to raise money.

Few rural fire services totally rely on this method of funding for several obvious reasons: It does not supply a stable source of income; volunteer members' time is spent raising funds when it could be used more efficiently (in training, for example); and only a minority of people actually contribute for a public service that benefits the entire community.

- *Federal, state, and county support*—Some state and federal funding for rural fire systems is available through Title IV of the federal Rural Development Act of 1972. In Oregon, grants (averaging about \$2,000) are awarded for organizing, training, equipping, and conducting fire-prevention education programs. These grants are distributed by the Oregon State Department of Forestry. More information about them can be obtained from local state forestry officials or the department's headquarters in Salem (see Appendix A for address).

Mini-grants (\$500 to \$1,000) are also available from the Oregon Fire Standards and Accreditation Board in Salem (see Appendix A). These can be used for identifying community fire problems and developing fire-prevention education programs.

While these grants will be helpful, they are not designed to finance an entire rural fire service over time. Other methods must be found to insure the availability of fire services in rural communities.

County governments in Oregon usually do not finance rural fire services.<sup>8</sup> However, they may be helpful in assisting with organizational or information problems.

- *Property taxes*—The principal source of revenue for fire districts in Oregon is property taxes. More than 80 percent of the reported budgets for Oregon rural fire districts in 1977 were financed with property taxes. Many districts are almost entirely property tax supported.

There were 234 rural fire districts in Oregon in 1977.<sup>9</sup> Property tax rates vary considerably

among districts. In 1976, tax rates for rural fire protection districts ranged from \$.31 per \$1,000 of assessed value to \$4.99 per \$1,000 of assessed value. Most rural fire districts have tax rates which fall somewhere between these two extremes.

A tax rate is the amount of money needed to support district operations (minus expected non-property tax revenues) divided by the assessed value of the district. If a district expects to raise all of its revenue from taxes, the tax rate needed to support a proposed district can be estimated by dividing the annual district cost (from Table 8) by the estimated assessed value within the proposed district boundaries. The following formula can be used to determine a tax rate for a proposed district, assuming that the entire cost will be supported by property taxes.

#### Formula for Determining Tax Rate.

$\$19,234 \div \$8,000 = \$2.40$		
(Estimated total annual cost from p. 12.)	(Assessed value of district in thousands of dollars)	(Tax rate per thousand dollars of assessed value)

(Example of proposed fire district with an assessed value of \$8 million.)

#### Establishing a tax base

According to the Oregon Constitution, local governments (including rural fire districts) may levy property taxes only in an amount equal to their tax base plus a 6 percent yearly increase, unless district voters authorize an amount outside this limit. In districts without a tax base, the entire tax levy must be approved by voters each year.

A new rural fire district may establish a tax base by submitting a measure to district voters at a primary or general election (May and November of even-numbered years). The measure specifically states the amount of money authorized in the tax base. If voters approve the tax base, then the district may levy the specified amount each year, plus a 6 percent increase, without further voter approval.

Almost 95 percent of the fire districts in Oregon have a tax base. In many cases, however, this base has proved inadequate to finance district operations. More than two-fifths (43 percent) of rural fire districts levying taxes in 1977 had to receive authorization from district voters through tax elections for levies outside the 6 percent Oregon property tax limitation. These levies alone comprised 45 percent of the annual costs of rural fire districts.

Rural fire districts in parts of Oregon where population is expanding seem more likely to seek

and receive levies outside the 6 percent limitation than sections of the state that are not experiencing growth. These figures emphasize the need for a proposed or new rural fire district to give careful consideration to establishment of a tax base that adequately fits the needs of the fire service.

Questions concerning tax levies, elections, and budgeting can be addressed to the Oregon Department of Revenue (see Appendix A for address). Officials from the department's Local Budget Section can assist local units of government such as rural fire districts.

#### Financing capital costs

While establishing a tax base will allow the rural fire district to raise a specific amount of financial support each year, it may not be enough to make long-term commitments on large expenditures as fire trucks, stations, and other major equipment. Oregon law limits the indebtedness of a fire district to 80 percent of its tax base without voter approval. This restricts long-term financial agreements the rural district can make on loans. Rural districts can, however, enter into lease purchase agreements to obtain fire equipment.

Bonds are also a source of funding for major needs. With voter approval, a rural fire district may issue general obligation bonds in an amount not to exceed 1 1/4 percent of the district's true cash value. Almost one-sixth (15 percent) of Oregon's fire districts had bonds outstanding in 1977. Information about the procedures for selling bonds is available from the Oregon Municipal Debt Advisory Commission (see Appendix A). The publication *Planning, Designing and Selling General Obligation Bonds in Oregon* can be very helpful for considering financing alternatives (see Appendix B).

#### Deciding Whether to Organize a Rural Fire Protection District

When voters in a rural community are asked to support the formation of a rural fire district the first questions they may ask are, "Why should I? I already pay enough taxes! What benefits will I receive?" There are no easy answers to these questions, but several issues can be raised for discussion.

#### High property damage per fire

There is little doubt that rural areas unprotected by organized fire services receive a larger share of property damage due to uncontrolled fires. Evidence to substantiate this statement is available in the Oregon State Fire Marshal's annual statistical reports. For example in 1977 aver-

age insured losses from fire were twice as high in unprotected areas as in protected areas. In 1976 they were five times as high.

### Reducing fire insurance premiums

Fire insurance rates for rural areas of Oregon are higher than suburban or urban communities. In general, a rural home in an area where no fire protection is provided could have fire insurance rates that are two or three times as great as those on a similar home in an urban city. (Many factors are involved in determining fire insurance rates, such as the type of insurance policy, structure and age of the house, community fire service, water supply, etc.) If some level of fire service can be provided to the community, these high insurance rates usually can be reduced.

Generally, insurance companies adjust the cost of fire insurance premiums according to the rating class of fire protection. On a scale of 1 to 10 a Class 10 rating for a community would indicate no recognized fire protection is provided. Many rural areas of Oregon fall into a Class 10 rating, particularly in Eastern Oregon.

If a rural fire service meets the equipment standards for the "pumper" as explained on page 6, and the training standards explained on page 10, a community usually can reduce its fire rating from Class 10 to Class 9. This may bring about a 15 percent decrease in fire insurance premiums. (This 15 percent figure is used only as a guideline. The exact amount will be determined by the type of insurance purchased, the company from whom it is purchased, and other factors.)

While 15 percent reduction in insurance premiums is substantial, it may not be enough to persuade local residents to support the fire service through increased taxes. Therefore, the goal of most rural communities will be to obtain a Class 8 fire rating. A Class 8 rating for dwellings is about as far as most rural communities can be expected to reach, since to obtain a rating lower than Class 8 an established community water system is usually needed. A Class 8 rating for dwellings usually will afford an additional 35 percent decrease in insurance premiums, again only a guideline.

The standards to obtain a Class 8 rating are, of course, more costly and difficult to achieve. The largest hurdle is for the rural fire service to "effectively develop and continuously apply water for not less than 20 minutes at a rate of not less than 200 gallons per minute."

For all practical purposes, this statement means that at least 4,000 gallons of water must be available at a fire. This standard is usually met by supplying two or more fire trucks. For example, a pumper carrying 1,500 gallons and a tanker loaded with 2,500 gallons of water would essentially meet this requirement. These vehicles must be strictly available for use in the fire service and not be used to perform other community functions such as watering roads, trucking of drinking or livestock water, etc.

Other requirements to meet a Class 8 rating are that the area protected must be *within a 5-mile response (road) distance from the closest pumper or within 8 miles of the balance of fire equipment; the fire trucks must be radio equipped; and at least five people must be available to respond to the fire on the first alarm.*

The Insurance Services Office in Portland (see Appendix A for address) helps by working with communities on standards that must be met to reduce fire insurance rates. Most insurance companies recognize the ISO ratings and use them when determining fire insurance premiums. The ISO is a private organization, not a government agency. Any group considering a rural fire service should seek the counsel of this office, so the latest, detailed regulations and standards can be obtained.

### How soon will insurance premiums be reduced?

Insurance premiums will not be reduced overnight for most rural areas just beginning to provide some level of fire service. Realistically, it could take from one to two years before any real insurance premium reductions are noticed by local residents, depending upon how ambitiously the community works towards satisfying various laws, standards, and regulations.

### Additional benefits

Besides reduced fire insurance premiums, many rural residents have indicated that they feel more secure knowing some level of fire protection exists in their community. Injuries and deaths have occurred in unprotected rural communities from untrained local residents attempting to extinguish fires without assistance.

A trained force of volunteers can help prevent, or reduce, the loss of personal and income-producing property which may have taken a lifetime to accumulate. Local residents will feel more secure in knowing that their community has an

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A Class 8 rating requires 4,000 gallons of water, with continuous delivery capability of at least 200 gallons per minute for 20 minutes. Usually this is met with a combination of equipment. *Top:* 500-gallon Pumper and equipment—approximate cost \$26,000 in 1977 equipped with 650-gallon-per-minute rated pump. *Center:* 1,500-gallon Nurse Tanker converted from a surplus military vehicle obtained through federal excess property. *Bottom:* 2,000-gallon Tanker equipped with 1,000-gallon-per-minute rated pump—approximate cost \$50,000 in 1977.







organization ready to respond to emergencies. Traffic accidents, heart attacks, floods, and storms also occur in rural communities, and rural fire services are often called into action when these events occur.

An individual family may find that their total savings in insurance premiums and income tax deductions exceeds their payment of tax dollars to support the rural fire district. Tax dollars given to support a rural fire service can be used as deductions for income tax purposes. This will vary from one property owner to another.

Large land owners, however, are likely to pay more than other residents for essentially the same level of protection to their improvements (homes, barns, etc.). This is a serious issue in most rural communities considering the formation of a rural fire district.

### **Additional Fire Protection Options**

After analyzing the situation, some Oregon communities may find that it is not financially feasible to provide a rural fire service. Making expenditures necessary to provide adequate fire protection might require a tax rate that a majority of taxpayers in the proposed district would not support. In such cases, these communities may wish to consider other fire protection options which can be initiated at the local level.

#### **Contracting services—an alternative to purchasing and operating a fire suppression system**

Some communities have found that fire protection services can be contracted with neighboring cities or other rural fire protection districts. Some level of financial support will still be necessary, of course, to help pay costs for providing the service.

In some instances, residents living in rural areas have formed a fire protection district and then used the tax funds to actually purchase fire protection services from a neighboring city or other rural district. Cities and established rural districts may be somewhat reluctant to enter into such contracts unless they can benefit in some way from the arrangement. This option is being used in some areas, however, and may be a viable alternative.

#### **Voluntary assessment: an alternative to taxation**

Because of the problems and limitations in forming a rural fire protection district under current laws, some Oregon communities are attempting to provide a rural fire service through a voluntary assessment system. When using this approach an association usually is formed within the community to provide the fire service. All residents are asked to contribute a fee to provide protection to their homes, businesses, and prop-

erty. Once established, the necessary equipment can be obtained and standards reached that will allow residents in the association to receive the desired insurance premium reduction and fire protection security.

The justification for such a voluntary system is that the same fire service can be provided to the community and assure the same level of protection and insurance premium reduction with a minimum of governmental restriction. If, over time, residents in the association fail to provide enough financial support, the fire service will become inoperative. In this case, the community will lose its insurance premium reduction rating and will revert to an area with no organized fire protection, with higher insurance premiums. Under this system, local residents have a strong economic incentive to keep the fire service operating.

Some skepticism for such a voluntary fire system is likely to arise. As with any voluntary system, some people will choose not to contribute. This may cause hard feelings among those that are contributing and carrying the major support for the fire service while the benefits of protection and reduced insurance rates are enjoyed by all. Some Oregon communities apparently feel that these disparities can be kept to a minimum and are willing to give the voluntary system a try.

#### **Education programs**

Programs to educate the community on the need for fire prevention can also be used. For example, if most of the community's fires are occurring in homes, education programs help people become more aware of the problem. Examples include:

- Home, farm, and ranch fire safety surveys
- In-home safety talks conducted by local trained volunteers, service clubs, civic groups, local firefighters, etc. (less than 5 percent of Oregon residents receive annual fire inspections, while home fires account for two-thirds of all fire deaths)
- Poster campaigns on installing smoke alarms and fire extinguishers in homes
- In-school programs (Junior Fire Marshal Program)
- Neighborhood slide/tape talks or demonstrations

A number of excellent fire education programs are currently available. The community education effort, however, should be planned, organized, and initiated with some specific goal in mind. Fire education programs must be designed to prevent fire problems before they start. The Fire Standards and Accreditation Board, State Fire Marshal, or a local fire chief can be very helpful in assisting a community organize fire education programs and providing prepared materials.

The Fire Standards and Accreditation Board (see Appendix A for address), for example, has helped establish "Resource Centers" throughout Oregon. These centers contain a number of educational materials, training equipment, and audio-visual aids that can be used in fire education programs.

A recent national study showed a 10 percent increase in fire prevention education programs can cause a 10 percent decrease of fires in large cities.<sup>10</sup> Recent home fire prevention programs in Santa Ana, California, and Edmonds, Washington, have contributed to reducing fire incidents by 50 percent or more.

Rural communities might consider increased educational programs in fire prevention as an alternative to forming a fire service district. The home installation of smoke alarms and fire extinguishers, voluntary fire safety inspections, and fire escapement training for the entire family are possible goals. Experience has shown that rural fire districts, once formed, also become involved in fire prevention education.

#### **Enforcement of building and development codes**

State and county land-use planning restrictions affect fire control. Some Oregon counties have already adopted fire regulation requirements into their subdivision and building ordinances. For example, a section from Klamath County's ordinance reads:

Proposed subdivisions, partitioning of land or other development as herein provided for and for purposes herein cited shall be reviewed by the proper fire authorities of Klamath County or the district within which such subdivision is situated, or both, and no final plat or map shall be approved without the inclusion of adequate standards such as ingress and egress routes, right-of-way clearing, block lengths, street grades, fire fighting equipment access to the subdivision and adjacent property, etc., as recommended by said fire authority and which are deemed necessary for the protection of the general welfare of the people who inhabit the subdivision as well as adjacent land owners and the general public.<sup>11</sup>

Such ordinances are possible under Oregon laws and will help insure that fire protection problems are considered when land in rural areas is subdivided or partitioned.

#### **Conclusions**

Providing a fire service for a rural community in Oregon is not a simple task. A considerable amount of effort is needed to help organize for the service and an additional effort is required to keep it operational.

Four main issues face a community without fire protection:

1. What is the need for a rural fire service?
2. What will it cost?
3. How will it be financed?
4. What alternatives exist other than providing the fire service?

Communities that are just beginning to get started on a solution to their fire problem will find the information presented in Appendix B useful. While it is not a complete reference list of material available on fire protection and prevention, it is a guide to the kinds of materials available free or at low cost. In most instances, the documents can be obtained by writing to the source and requesting single copies free. Local libraries may help in obtaining copies of more costly publications on a loan basis from larger libraries.

#### **References**

1. Childs, Dan, G. Doeksen, and J. Frye, *Economics of Rural Fire Protection in the Great Plains* (Oklahoma State University, June 1977), pp. 12.
2. Doeksen, Gerald A., and Robert L. Oehrtman, "Optimum Locations for A Rural Fire System: A Study of Major County, Oklahoma," *Southern Journal of Agricultural Economics*, December 1976, pp. 121.
3. *Occupational Health Regulations, Protective Equipment and Apparel*, Section 22-069, Occupational Safety and Health Administration (OSHA).
4. *Equipment Guidelines for the Beginning Fire District*, Oregon Fire Action Council Equipment Committee, May 1966, p. 6.
5. Computed from *Annual Statistical Report*, Oregon State Fire Marshal, 1977, pp. 340-343.
6. *Fire Training and Education in Oregon*, Oregon Fire Standards and Accreditation Board, Salem, Oregon, 1977, pp. III-1.
7. A recent listing numbered 23 different kinds of special districts available in Oregon. *Government in Oregon*, Department of Education, 1976, p. 121.
8. *Planned Expenditures of Oregon Counties*. Special Report 467, Oregon State University Extension Service, November 1976.
9. A complete listing of rural fire districts in Oregon can be obtained from the Oregon Rural Fire District Directors' Association (see Appendix A).
10. Driscoll, Jennifer, "How Cities Are Coping," Special Report reprinted from *Nation's Cities*, March 1978.
11. Section 10.01, Klamath County Subdivision Ordinance, reprint received from James Brockett, Planning Director, February 2, 1978.

## Appendix A. Organizations Involved in Oregon Fire Problems

1. \*State Fire Marshal  
Room 103, Labor & Industries Building  
Capitol Mall  
Salem, Oregon 97310  
Phone: 378-4917
2. \*Fire Standards and Accreditation Board  
3000 Market Street NE, Suite 258  
Salem, Oregon 97310  
Phone: 378-5210
3. Insurance Services Office of Oregon  
421 SW 6th Avenue  
Portland, Oregon 97204  
Phone: 226-2651
4. \*Local Budget Section  
Oregon Department of Revenue  
213 Public Service Building  
Salem, Oregon 97310  
Phone: 378-3749
5. \*Fire Control Division  
State Department of Forestry  
2600 State Street  
Salem, Oregon 97310  
Phone: 378-2507
6. Oregon Rural Fire District Directors' Association  
1289 70th Avenue SE  
Salem, Oregon 97301  
Phone: 378-0896
7. Oregon Fire Equipment Dealers' Association  
P.O. Box 61  
Garibaldi, Oregon 97118  
Phone: 322-3380
8. \*Emergency Services Division  
Federal Excess Property Program  
Room 43, State Capitol Building  
Salem, Oregon 97310  
Phone: 378-4124
9. League of Oregon Cities  
P.O. Box 928  
Salem, Oregon 97308  
Phone: 588-6466
10. \*Municipal Debt Advisory Commission  
State Capitol Building  
Salem, Oregon 97310  
Phone: 378-4330
11. Oregon Volunteer Firemen's Association
12. Oregon Fire Chiefs' Association
13. Oregon State Fire Fighters' Council

\* Indicates state government agency.

Current addresses and phone numbers for organizations 11-13 can be obtained from groups 1-4. Official Oregon state agencies listed can be called toll free 1-800-452-7813.

## Appendix B. Helpful Publications

### Reports

- Annual Statistical Report of the Oregon State Fire Marshal* (see Appendix A for address).
- Oregon Laws Relating to Fire Protection* (obtain from State Fire Marshal's Office).
- Oregon Fire Standards and Accreditation Board, *Fire Training and Education in Oregon* (See Appendix A for address).
- United States Fire Administration, *Fire in the United States*. U.S. Department of Commerce, Washington, D.C. 20472, June 1978.

### Books

- National Commission of Fire Prevention and Control, *America Burning*. Washington, D.C., 1973.
- Bare, William K., *Fundamentals of Fire Prevention*. New York: John Wiley & Sons, Inc., 1977.
- Colburn, Robert E., *Fire Protection and Suppression*. New York: McGraw-Hill Co., 1975.

### Publications on beginning a fire district

- Guidelines for the Formation of Rural Fire Protection Districts* (obtain from State Fire Marshal, see Appendix A for address).
- Oregon Fire Action Council Equipment Committee, *Equipment Guidelines for the Beginning Fire District*. May 1966. (Obtain from State Fire Marshal, see Appendix A for address).
- Forest Service, U.S. Department of Agriculture, *Guide for Design of a Ground Tanker for Rural Fire Protection*. Atlanta, Georgia 30309, 1975.
- Defense Civil Preparedness Agency, *Converting Vehicles for Use as Fire Apparatus or Rescue Trucks*. Technical Memorandum 75-1, Washington, D.C. 20301, 1975.
- National Fire Protection Association, Inc., *NFPA Standard 1901 (formerly 19) Automotive Fire Apparatus*. 470 Atlantic Avenue, Boston, Mass. 02210, \$4.75.
- Association of Washington Cities and Bureau of Governmental Research and Services, *Design of Fire Stations*. Information Bulletin No. 278, University of Washington, Seattle 98105, October 1965. Price: \$4.00.

### Government publications relating to rural fire protection

- Forest Service, U.S. Department of Agriculture, *Rural Community Fire Protection*. Program Aid-1196, October 1977. (Obtain from forestry officials, see Appendix A for address).
- Fire Safety Considerations for Developments in Forested Areas*. Two volume set, (Obtain from Oregon state forestry officials, see Appendix A for address). January 1978.
- Childs, Dan, Gerald Doeksen, and Jack Frye, *Economics of Rural Fire Protection in the Great Plains*. Agriculture Information Bulletin No. 407, Oklahoma State University Extension Service, Stillwater, OK 74074, June 1977.

Jones, T. M., and M. B. Badenhop, *Fire Protection Alternatives for Rural Communities*. Bulletin 568, Agricultural Experiment Station, University of Tennessee, Knoxville 37901, April 1977.

Wiegand, Kenneth B., and Craig L. Infanger, *Planning for Rural Community Fire Protection in Kentucky*. Resource Development Series 18, Cooperative Extension Service, University of Kentucky, Lexington 40506, July 1976.

Van Pelt, Pamela, Fred A. Mangum, Jr., and John F. W. Schulze, *Rural Fire Protection in North Carolina*. Center for Resource Development No. 2, North Carolina Agricultural Extension Service, Raleigh, North Carolina 27607, February 1977.

United States Fire Administration, U.S. Department of Commerce, *A Basic Guide for Fire Prevention and Control Master Planning*. Washington, D.C. 20472, 1978.

United States Fire Administration, U.S. Department of Commerce, *Public Fire Education Planning—A Five Step Process*. Washington, D.C. 20472.

#### Other helpful publications

Research Triangle Institute, *Municipal Fire Service Workbook*. Research Triangle Park, North Carolina 27709, May 1977.

International Fire Service Training Association, *Fire Service Practices for Volunteer Fire Departments*. IFSTA201, Fire Protection Publications, Oklahoma State University, Stillwater 74074, 1971. Price: \$4.50.

Oregon Department of Revenue, *Local Budgeting in Oregon*. State Office Building, Salem 97310, 1978.

*Fire Engineering*. 666 Fifth Avenue, New York 10019. Published monthly, current information on all aspects of the fire problem, with emphasis on equipment. Each January issue contains a complete "Fire Service Catalog," listing fire equipment and prices and manufacturers.

Fire Standards and Accreditation Board, *Resource Centers*. (see Appendix A for address). March 1978.

Executive Department—Intergovernmental Relations Division, *1978 Handbook of State Programs for Local Governments* (with addendum). 306 State Library Building, Salem 97310.

*Oregon Rural Fire District Directors' Guide*, available through Oregon Rural Fire District Directors' Association. (see Appendix A for address).

Center for Capital Market Research, *Planning, Designing and Selling General Obligation Bonds in Oregon: A Guide to Local Users*. University of Oregon, Eugene 97403.

#### Sources of publications on fire subjects (Write for lists and costs of publications.)

International Fire Service Training Association  
Fire Protection Publications  
Oklahoma State University  
Stillwater, Oklahoma 74074

National Fire Protection Association, Inc.  
470 Atlantic Avenue  
Boston, Massachusetts 02210

Oregon Fire Chiefs' Association  
(Contact local city fire chief for correct address)

U.S. Department of Commerce  
United States Fire Administration  
Public Education Division  
Washington, D.C. 20472

#### Information on taxes

The Oregon State University Extension Service has two publications that describe Oregon's property tax system that may be useful to rural fire districts: Extension Circular 906, "Oregon's 6 Percent Limitation," and Extension Circular 907, "How Your Property Tax Bill is Computed." Single copies are available free at your Extension Office or from the Bulletin Mailing Service, Oregon State University, Corvallis, OR 97331.

The Oregon Department of Revenue also has a number of publications on Oregon's system of taxation. A list and copies of the publications are available by writing to Publications, Oregon Department of Revenue, State Office Building, Salem, OR 97310.

## Appendix C. Amortization Table<sup>1</sup>

Amortization Factors for Various Repayment Periods and Interest Rates for Use in Calculation of Annual Loan Payment.

Interest rate	Years to repay						
	10	15	20	25	30	35	40
5 Percent	.129505	.096342	.080243	.070952	.065051	.061072	.058278
6 Percent	.135868	.102963	.087185	.078227	.072649	.068974	.066462
7 Percent	.142378	.109795	.094393	.085811	.080586	.077234	.075009
7½ Percent	.145686	.113287	.098092	.089711	.084671	.081483	.079400
8 Percent	.149029	.116830	.101852	.093679	.088827	.085803	.083860
8½ Percent	.152408	.120420	.105671	.097712	.093051	.090189	.088382
9 Percent	.155820	.124059	.109546	.101806	.097336	.094636	.092960
9½ Percent	.159266	.127744	.113477	.105959	.101681	.099138	.097587

<sup>1</sup> Ellwood, L. W., *Ellwood Tables for Real Estate Appraising and Financing*, Third Edition, Part II, American Institute of Real Estate Appraisers, Chicago, 1970, pp. 68-112.

## Appendix D. Forms for Estimating Costs

### Form 1: Procedure for Estimating Annual Capital Costs of a Rural Fire District.

Ownership item	Cost
1. <i>Vehicle</i> : Cost of vehicle (.....) x amortization rate (.....) corresponding to the assumed interest rate and repayment period of 15 years, from Appendix C	= .....
2. <i>Communications system</i> : Cost of system (.....) x amortization rate (.....) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= .....
3. <i>Fire station</i> : Cost of building (.....) x amortization rate (.....) corresponding to the assumed interest rate and repayment period of 40 years, from Appendix C (includes \$10,000 land cost)	= .....
4. <i>Firefighting suits</i> : Cost of suit (.....) x number of firefighters (.....) x amortization rate (.....) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= .....
5. <i>Additional supplies</i> : Cost of supplies (.....) x amortization rate (.....) corresponding to the assumed interest rate and repayment period of 10 years, from Appendix C	= .....
Total estimated annual capital costs (add 1, 2, 3, and 4)	= .....
9 percent interest rate used from Appendix C	= .....



**Form 2. Estimating Annual Operating Costs for a Rural Fire District.**

Operating item	Cost
<b>1. Vehicle</b> (see costs, p. ....)	
A. Gasoline: Yearly uses (.....) x (.....) average miles per use ÷ 4 mpg x .70¢ per gal	\$.....
B. Tires: Yearly uses (.....) x (.....) average miles per use ÷ 10,000 miles x \$150 x 4 tires (use 6 tires for large trucks)	.....
C. Oil: Yearly uses (.....) x (.....) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x 6 qt oil x \$1.25/qt	.....
D. Oil filter: Yearly uses (.....) x (.....) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x \$6 per filter	.....
E. Grease: Yearly uses (.....) x (.....) average miles per use ÷ 500 miles (or 2 times a year whichever is greater) x \$4	.....
F. Tuneup: Yearly uses (.....) x (.....) average miles per use ÷ 1,000 miles x \$70 (or 2 times a year whichever is greater)	.....
G. Antifreeze each year (\$10)	.....
H. Miscellaneous: Yearly uses (.....) x (.....) average miles per use ÷ 500 miles x \$10	.....
I. Insurance: \$14 per \$1,000 of vehicle value	.....
J. Communication system service: \$50 per year	.....
Vehicle subtotal	\$.....
<b>2. Fire equipment damage/replacement</b> (see costs, p. ....)	
A. Equipment: No. of yearly fires (.....) x \$5	.....
Equipment subtotal	\$.....
<b>3. Fire station</b> (see costs, Table 5, p. ....)	
A. Average monthly electricity charge (.....) x 12 months	.....
B. Average monthly heating bill (.....) x 12 months	.....
C. Average monthly water and sewer charge (.....) x 12 months	.....
D. Insurance per year	.....
E. Maintenance (.....) x 12 months	.....
Fire station subtotal	\$.....
<b>4. Labor</b> (see costs, p. ....)	
A. No. of paid personnel (.....) x amount per month (.....) x 12	.....
B. Average no. of firefighters at each monthly meeting (.....) x amount paid per meeting (.....) x 12 months	.....
C. No. of fires (.....) x average no. of firefighters responding (.....) x amount paid per fire to firefighters (.....)	.....
Labor subtotal	\$.....
<b>5. Insurance for firefighters</b> (see costs, p. ....)	
A. No. of firefighters (.....) x yearly insurance rate (.....)	.....
Insurance subtotal	\$.....
<b>6. Training</b> (see costs, p. ....)	
A. No. of firefighters (.....) x yearly training costs (.....)	.....
Training subtotal	\$.....
Subtotal annual operating costs	\$.....
(Add subtotals 1-6)	
<b>7. Contingency fund</b>	
A. 10% x (.....) total annual operating costs	.....
Total annual operating costs (Add 6 and 7 above)	\$.....



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