

University of Montana

ScholarWorks at University of Montana

Graduate Student Theses, Dissertations, &
Professional Papers

Graduate School

1985

Fire master planning : a case study of Missoula Montana

Ann Englehart

The University of Montana

Follow this and additional works at: <https://scholarworks.umt.edu/etd>

Let us know how access to this document benefits you.

Recommended Citation

Englehart, Ann, "Fire master planning : a case study of Missoula Montana" (1985). *Graduate Student Theses, Dissertations, & Professional Papers*. 9191.

<https://scholarworks.umt.edu/etd/9191>

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

COPYRIGHT ACT OF 1976

THIS IS AN UNPUBLISHED MANUSCRIPT IN WHICH COPYRIGHT SUBSISTS. ANY FURTHER REPRINTING OF ITS CONTENTS MUST BE APPROVED BY THE AUTHOR.

MANSFIELD LIBRARY
UNIVERSITY OF MONTANA
DATE: 1985

FIRE MASTER PLANNING: A CASE STUDY OF
MISSOULA, MONTANA

By

Ann Englehart


B.A., Portland State University, 1974

Presented in partial fulfillment of the requirements for the
degree of
M.S. in Rural, Town and Regional Planning

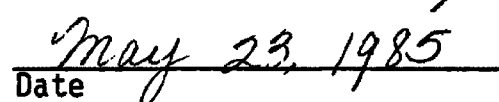
UNIVERSITY OF MONTANA

1985

Approved by:


Chairman, Board of Examiners


Dean, Graduate School


Date

UMI Number: EP39993

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI EP39993

Published by ProQuest LLC (2013). Copyright in the Dissertation held by the Author.

Microform Edition © ProQuest LLC.

All rights reserved. This work is protected against unauthorized copying under Title 17, United States Code



ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

ACKNOWLEDGEMENTS

I wish to thank Ellen Gilliam, Chuck Gibson and Karen Timchak for their assistance and direction, and Dr. Evan Denney, professional paper committee chairman, for his expertise and patience.

Table of Contents

Chapter	Page
ACKNOWLEDGEMENTS.....	ii
I. INTRODUCTION	1
Background	
Purpose of Paper	
II. COMPONENTS OF A FIRE PROTECTION SYSTEM.....	5
The Theory of Public Goods and Services	
The Components of a Fire Delivery System	
The Fire Master Planning Process	
The Relationship of the ISO Grading Schedule to Master Planning	
III. THE FIRE MASTER PLANNING PROCESS IN MISSOULA.....	20
Missoula's Current Fire Protection	
Progress to Date in Developing a Fire Master Plan	
Comprehensive Planning for Fire Protection	
The Legal Framework	
The Citizen Survey	
The Fire Function Survey	
IV. ANALYSIS AND RECOMMENDATIONS.....	42
Accomplishments and Expectations	
Conclusion	

APPENDICES	55
A. Citizen Survey	
B. Master Planning Communities with U.S.F.A. Contact	
C. Master Planning Community Characteristics	
D. Fire and Emergency Response Components Included in Master Plans	
E. Fire Master Planning Committee's Data/Information Chart	
FOOTNOTES.....	70
SELECTED BIBLIOGRAPHY.....	72

CHAPTER I

INTRODUCTION

The fire department has a greater impact on society than is generally realized. The true costs of fire loss to society are often underestimated. According to the Federal Fire Prevention and Control Act of 1974, the nation's fire problem is "an undue burden affecting all Americans, and fire also constitutes a major public health and safety problem. Fire injures 300,000 Americans each year and destroys almost three billion dollars worth of property. As of 1974, the total economic cost of destructive fire in the United States was estimated conservatively to be eleven billion dollars per year. In addition, fire fighting is considered the nation's most hazardous profession."¹

According to the most recent statistics from the National Fire Data Center and the National Center for Health Statistics, the annual cost of fire is about 1% of the United States' Gross National Product. Residential fires are the main source of U.S. fire deaths. These fires account for about 75% of all structural fires. The leading causes of residential fires are heating and cooking. The leading cause of death or injury from residential fires is from smoking.²

Fire master planning is a new and effective method for maximizing fire service delivery. It is a strong analytical tool for evaluating past methods of providing fire protection and assessing the cost effectiveness of current fire protection. "It is a systems approach for

providing the highest level of protection at the least possible cost."³

The 1973 report America Burning spurred the creation of the National Fire Prevention and Control Act of 1974. The first master planning process as we know it today evolved from this Act and has become Public Law 93-498. It was a section of this law which encouraged the development of fire master plans at the state and local level.

The United States Fire Administration's master planning program has evolved since 1973 through two major stages which have resulted in enough experience and documentation to recommend implementation of a nationwide program. The first stage included the development and validation of the master planning process and the development of basic informational materials. The second stage focused on design and implementation of pilot master planning, technical assistance, and training programs.

As a result of the first stage, basic master planning guides were validated, revised, and made available for general distribution. Missoula's Emergency Services and Fire Master Planning Committee is following steps from A Basic Guide for Fire Prevention and Control Master Planning and the Urban Guide for Fire Prevention and Control Master Planning.⁴ These guides were developed to enable communities to validate the feasibility and effectiveness of the master planning process. Participation in the initial validation included 27 communities working independently and with minimal support and assistance from the United States Fire Administration. One hundred other communities used the draft guides for their master plans, and

their experiences were used to revise the guides. Experience gained during the development and validation stage of the master planning process was used by the United State Fire Administration to design technical assistance and training programs.

The United States Fire Administration currently assists states and communities in providing more effective arson prevention, detection and control. In addition, it lends technical and educational assistance to state and local governments; collects and analyzes fire information; regulates the flammability of materials; conducts research and development in certain areas; and provides financial assistance when adequate fire protection lies beyond a community's needs. Through fire master planning, fire prevention and control is intended by the United States Fire Administration to remain a local responsibility.

Purpose of Paper

The City of Missoula through its fire departments, city administration, and planning office are in the initial stages of developing a Fire and Emergency Services Master Plan for the urban area. The urban area includes three fire protection jurisdictions. The master plan will be developed following the fire master planning process established by the United States Fire Administration.

This paper is a descriptive analysis of the process of community planning for fire protection using Missoula as a case study. It traces the initial steps taken by the Fire Master Planning committee in its attempt to achieve established goals. In addition, this paper discusses

the significance of the fire master planning process; the expectations of the end result of the process; and provides an evaluation of current and proposed directions of fire master planning in Missoula. A documentation of Missoula's Fire Master Planning Committee's process will be useful to cities who are about to participate in their own fire master planning, and will provide planning ideas and general guidance for comprehensive planning efforts in Missoula.

CHAPTER II

COMPONENTS OF A FIRE SERVICE PROTECTION SYSTEM

The Theory of Public Goods and Services

Fire protection is a publicly provided urban service whose success depends on the quality of delivery. Quality of delivery is responsive to the characteristics of a metropolitan area whose dense population and diverse activities dictate the form, consequence and variety of publicly provided goods and services. Local governments are increasingly faced with tight budgets and decreasing Federal funding. Consequently, public decision makers are faced with the problem of trying to minimize expenditures on fire protection services while at the same time attempting to provide quality service. This is especially difficult since they are dealing with a system that cannot be reorganized or modified in a major way.⁵

The theory of public goods and services provides a framework for looking at the way local government finances goods and services. Fire protection is one of many activities which is financed through the public sector, because it is economically efficient to do so. Public services provide for a common need which frequently cannot be satisfied by the market system. Many services such as police and fire protection are essential, and citizens cannot do without them.

The theory of public goods and services is based on the economic efficiency of joint consumption and nonexclusion. Joint consumption means that people can obtain services at a lower cost by acting

together, rather than individually. Local governments can provide a more efficient means of purchasing services, as governmental institutions are vehicles through which individuals can act jointly to obtain services. Exclusion means preventing individuals from utilizing services for which they have not paid. In the public services theory, individuals cannot be excluded from receiving the services for which they have not paid.⁶

For example, a police patrolman can protect all the houses on his/her jurisdiction, but he cannot exclude from protection those who have not paid for that service. It would be impractical for each house on the block to hire a policeman. In addition, it would be physically impossible to protect only those who want or are willing to pay for the service. Another example is national defense. U.S. residents who have not paid taxes cannot be excluded from the benefits provided by the U.S. Armed Forces.⁷ Such protection could hardly be provided on an individual basis.

Fire protection is a good example of a service acquired in common. It is economically efficient to purchase fire protection facilities, such as a fire station, jointly. Furthermore, it is economically efficient to extend protection over a defined service area. It is almost an economic axiom that the provision of common services will be more efficient when the boundary of each service area coincides with that of the government providing it. But in the real world there will usually be some spillover benefits to larger geographic areas or populations than those covered by the taxing jurisdiction.

When a community's population increases, the fire protection service and corresponding costs must increase to at least provide equal protection. With increased population density, greater fire hazards are encountered. This is a function of higher more intense land use, crowding of structures and diverse types of land use. To meet the demands of greater population density, fire fighting equipment must be expanded and fire fighting methods improved. Consequently, a paid professional fire service is usually needed in a high density area, while a volunteer fire service may be adequate in low density areas"⁸ Some low density areas depend on volunteer contributions, whereas medium density areas tend to rely on district assessments for funding. High density areas usually depend on city general fund taxes for funding.

Two principal questions arise. How can local communities obtain or determine the optimum quantity of each service they provide, and how can they determine the optimum quality? Both questions pose problems since the quantity and quality of local governmental services are difficult to measure. There is no yardstick. Taxes are levied and budget allocations are made through a political process. Market factors do not affect local governmental performance. In situations where individuals cannot be excluded from receiving a service because of nonpayment, the market system cannot function. Consumer preferences may not be an incentive for more or better service. Unlike private enterprise, public service institutions do not have to respond to the demands of a competitive market. Rather, local government and its politicians respond to public sentiment. To act in the interest of the public is

what guides local governmental institutions to provide more efficient and economical services.

In summary, fire protection is a joint consumption service which satisfies a common need. Because this service is paid for in common, through taxes, it can be provided to more people at a lower cost. People who do not pay for the service are therefore not excluded from protection. Local decision makers are responsible for budget allocations. In turn, the decision makers are dependent on their constituency to maintain them in office. As a result, there is a tendency for elected officials to be responsive to the general public. Local government officials and elected representatives together with citizen insight can best assess community needs and preferences. The fire master planning process should provide an alternative method for elected officials to assess community needs and preference for this service. It should also provide means for allocating scarce resources more efficiently.

The Components of a Fire Delivery System

In order to evaluate and compare the performance of fire protection service and to be able to improve fire protection, one must understand the components of the system. The following is an explanation of terms used to study a fire service delivery system.

The responsibility of a fire protection service is to prevent uncontrolled fires, to minimize the human and property loss in the event of ignition, and to confine and suppress a fire once ignited. Fire

suppression is the control of fire, which includes detection, the alarm dispatch response by fire fighters, containment, and finally extinguishing the fire.

Fire prevention involves the interplay of land-use planning; architectural design; building material and furnishing characteristics; and individual care in handling flammable materials, tools, etc. Most of these activities are performed in the private sector. But land values, insurance rates and neighborhood safety of all citizens are affected by these activities. Consequently, regulation of these activities at the local, state, and Federal level provides protection of the public interest. Traditionally, the municipality oversees the regulation of these activities, as mandated by state enabling legislation. For fire protection at the local level, regulation would include building codes, fire codes and zoning for fire safety. Thus, fire prevention includes many local governmental programs and codes. Although not all inclusive, the following list enumerates a few of them:

1. Fire education programs
2. Arson investigation
3. Fire codes
4. Life safety codes
5. Building codes
6. Building plans check
7. Code enforcement policy
8. Building inspection programs
9. Change of occupancy notification and follow-up programs⁹

According to the 1974 Federal Fire Prevention and Control Act, local fire departments allocated about 95 cents of every dollar to fire services in efforts to extinguish fires, and only about 5 cents on fire prevention. However, since that time, prevention work has been gaining ground, and fire departments in bigger cities now have sizeable staffs who do nothing but fire prevention work through education and inspection.

To be successful, a fire protection plan must be effective and productive. Effectiveness means reducing the incidence of fires and minimizing losses that do occur. Productivity measures the cost of varying levels of effectiveness. Productivity is measured by the total cost of fire, which includes budget expenditures and losses per capita. Productivity means that as expenditures increase, losses should decrease.¹⁰ An effective and productive fire protection plan should minimize the incidence and losses from fire. At the same time, expenditures on providing protection should not increase.

The total tangible cost of fire is dollars spent for prevention and suppression which includes direct and indirect costs. Direct costs are the expenditures made to prevent and suppress fire. Today, about one-fourth of the total cost of fire to society is from direct property losses. Thirteen percent is from fire insurance costs. Thirty percent is for building safety, which includes such things as the cost for fire doors, thicker walls, sprinkler systems, etc. About one-third of the cost, the largest share, goes to the cost of running a municipal fire department which does not even include volunteer time.¹¹ Indirect costs include wages lost from injuries, lost production and idleness during

the period of reconstruction, or permanently lost jobs when reconstruction is not feasible.

Research on fire service delivery has concentrated on variables which affect fire service delivery. Variables are categorized as either output or demand variables. Output variables directly affect fire service expenditures. Examples of output variables would include equipment costs; manpower; staff hours; building and fire codes; the existence of mutual aid agreements or contracts with private companies; arson; false alarms; the water system; and technological factors.

Demand factors involve the incidence of fire or the magnitude of property loss within the community. Demand can be measured as the number of various types of fire loss, or by a fire loss index which measures damage per \$1,000 sales value of property. Fire departments maintain these fire loss records.

Variations in the type and degree of fire service protection is a function of variation in the character of the environment and how the fire service delivery system is organized. The environment determines the nature of the fire hazard. Every community is different. The Research Triangle Institute's study of performance in fire service delivery listed 17 environmental constraints as relevant to variations in fire service performance. These factors were categorized into five areas - demographic, quality of housing, climatic, socioeconomic, and governmental (local decision making). Organizational features of a fire protection service determine how effectively the fire service is supplied. These organizational aspects include the number of

inspections, emergency room versatility, level of training of building inspectors, the number of mutual aid agreements, etc.¹²

In summary, fire master planning can improve fire protection by responding to or controlling output and demand variables. The community can identify those environmental and organizational variables which they can or want to control. The community can thus develop public safety goals or standards which will meet its needs.

The Fire Master Planning Process

The fire master planning process incorporates planning principles which are utilized in developing a comprehensive plan. Planning strategies involve a "rational" planning process to arrive at one chosen course of action. This means following a rational thought process, "going through the generation of alternatives, evaluation, and choice based on that evaluation." In public decision making, choices and the reasons leading up to them must be communicated to allow for discussion and democratic control.¹³

The steps involved in a comprehensive planning process include assessing the political and physical environment with its limitations; identifying data needs; developing goals and objectives; and setting steps to achieve these goals, which includes gathering the data. The final steps involve documenting and implementing the plan. Implementation includes endorsement by the local governing body. The task of goal setting and documentation of the plan ideally should include public involvement. This may include citizen task forces which are made of up

people from the community who have an interest and/or expertise in the project.

"Systematic procedures built into a fire protection system should result in finding the solutions to the following questions:

1. What are the real fire problems?
2. What are the causes of the problems?
3. What are the possible solutions?
4. What are the best solutions?
5. What action will be taken?¹⁴

A fire master plan should provide for the following:

1. Define the current and future fire protection environment by establishing and maintaining a comprehensive data base.

"By acquiring and regularly updating a data base containing information on the risks (what there is to burn) and the fire system management aspects, a continuously current picture is maintained of what the fire protection system must protect."¹⁵

2. Define accepted life and property risk levels by setting goals and objectives.

"Fire protection may cost a lot, but it should not cost more than it is worth to the community. The cost should be acceptable to those who must pay for it. The risk of loss must go along with the level of protection paid for."¹⁶

3. Define the fire protection system which provides the level of service commensurate with the level of risk.

4. Identify and justify the resources necessary to develop and operate the fire protection system.

5. Provide a detailed program of action to implement and maintain the system.

These five items will be useful to any community regardless of whether or not the plan is implemented. At whatever level their resources and experience allow, as a result of fire master planning, communities will uncover fire problems previously unknown and be in a much better position to address these problems.

The major source of information for any fire master planning committee is a publication entitled The Basic Guide for Fire Prevention and Control Master Planning. The guide sets forth a process which identifies steps to lay the groundwork for a plan, to prepare the plan, and to implement the plan.

The Relationship of the ISO Grading Schedule to Fire Master Planning

Fire insurance costs are one of the many expenses of operating an organized fire department. Fire insurance rates are established by the Insurance Services Office (ISO) Grading Schedule.¹⁷ The ISO Grading Schedule for Municipal Fire Protection was originally published in 1916 as a guide for insurance underwriters who were concerned about the abilities of communities to control fires.¹⁸ However, the grading schedule has evolved as the main standard to rate the quality of fire protection in a community. These standards have been used and promoted by fire services agencies to rate the effectiveness of fire services.

Because fire master planning is presented as an alternative to using the grading schedule, the grading schedule itself should be explained.

A fire service jurisdiction is graded or assigned to one of ten protection classes; class one being the best rating, even though there has never been a class 1 city. The grading is based upon the extent to which the city complies with the provisions of the grading schedule. The protection class, or grade assigned, is then used to determine the fire insurance rates paid by the citizens of that jurisdiction.¹⁹

The way fire services are measured by the grading schedule includes a complex set of fixed standards governing the amounts and types of fire fighting resources that the insurance industry feels should be in place in each community. These fire fighting resources include the water system and water supply; equipment; training/communications; manpower; structural conditions; effectiveness of fire alarm systems; fire prevention measures; and building codes. The purpose of the grading schedule is to anticipate the risk of inadequate fire protection. This risk is then assigned as a cost to policy holders. The obvious conclusion is that the protection class assigned should reflect fire losses, i.e., better protection classes should have lower fire risks. However, in reality the ISO protection class may not be an accurate indicator of the actual quality of the community's fire protection.

The problem with using the grading schedule to assess the quality of a community's fire protection is that it measures fire service inputs and not outputs. Outputs include fire incidence, fire loss, and casualties. Outputs are the true measure of a fire service's

effectiveness. In other words, effectiveness of fire service delivery includes the total costs of fire protection. Effectiveness, as stated earlier, is the extent to which the incidence of fire, injury, and loss of life and property are minimized.

The ISO grade reflects higher levels of fire service inputs. According to a study by International City Management Association (ICMA), "where fire department expenditures are higher (in total or per capita), where total building department salaries are higher, where more preventive activities are higher, or where more preventive activities are performed, the ISO grade is consistently better."²⁰ In fact, the ISO grade is consistently better the larger the size of the city. But, with respect to outputs, cities with good ISO ratings are more likely to be associated with higher loss, greater fire incidence, and more casualties.

Several articles in the journal Public Management (1977) cited the shortcomings of the grading system. Below are some criticisms of the ISO Grading Schedule method of rating a community's fire protection system and how fire master planning would be a better method of assessing and establishing a fire protection system.

A principal problem with the grading schedule is overdesign. For example, historical concerns about spreading fires resulted over time in excessive water, equipment and manpower requirements. Cities are assigned penalty points if they do not exactly meet the rigidly fixed standards. This results in the grading schedule discouraging innovation. It emphasizes acquisition of resources, or inputs, rather

than looking at the effective use of resources. The emphasis on grading schedule standards discourages more productive alternatives. For example, it might require six men to be on duty at all times for each engine and ladder company. In reality, very few local governments are able to meet this requirement. However, they are able to do an outstanding job by utilizing other imaginative methods of increasing manpower. Those creative solutions are given no recognition in the grading schedule.

Another problem with the grading schedule is its lack of objectivity, leading to uneven and subjective application. In addition, no attention is given to fire prevention in the grading schedule. In contrast, the fire master plan approach may provide a system which focuses primarily on prevention rather than suppression. Whereas the grading schedule was intended to control community-wide property losses, a fire master plan emphasizes life safety more than structural protection.

Another criticism of the grading schedule is the insurance function it plays. The grading schedule protection class of a community is actually a minor factor in determining fire insurance rates paid by its citizens. It is this perceived link to insurance rates that has mistakenly led to the use of the grading schedule as a comprehensive guide to fire protection planning. Contrary to what city officials have been led to believe, a protection class has never had much to do with property insurance rates. Although there are ten protection classes, homeowners' package policy rates are grouped by two or more

protection classes. This means that 1 through 6 would carry a single rate, classes 7 and 8 would carry a second, and classes 9 and 10 a third. Thus, a class 2, 3, 4, 5 and 6 would have no impact on residential rates. But the protection class rate does indeed have a greater impact on commercial and industrial fire insurance rates in that businesses may pay higher fees.

Consequently, insurance premium rates may be faulty indicators of the quality of fire protection in a community. Insurance premium rates are not only based on the ISO Grading Schedule but also on market considerations and a state's regulatory provisions. In contrast, the master planning process results in a local, tailor-made plan suited to an entire area's or city's resources, which need not be influenced by the rate setting requirements of the insurance industry.

Presently, the City of Missoula has a fire protection class of 4, and there are special areas of the city which are a class 6 because of a lack of water lines and the need for fire hydrants. The rating for the city was done six to eight years ago. A new evaluation or rating will be requested prior to the development of the fire master plan so that the plan can address those weak points. According to the city Fire Department, the service within the city would have to be kept at or above the present level and not spread spatially. Otherwise, the city's ISO rating would be adversely affected. The Missoula Rural Fire District, which serves the county, is a Class 6 and 8. Consolidating resources from the two major fire districts of the Missoula urban area might improve the Missoula Rural Fire District's ISO rating.

The ISO Grading Schedule may be used as one standard by which to measure the quality of a fire protection service. Furthermore it may be used as an inventory procedure for a community's fire protection capability. However, equal consideration should be given to other factors which are measures of quality rather than quantity.

CHAPTER III
FIRE MASTER PLANNING IN MISSOULA

At present Missoula County has eight fire departments providing protection. These include Alberton Volunteer Fire, Clinton Rural Fire, East Missoula Volunteer Fire, Frenchtown Volunteer Fire, Florence Rural Fire, Seeley Lake Volunteer, Missoula Rural Fire District, and Missoula City Fire District. State and federal agencies also provide fire protection in some areas. The eight rural fire districts are special districts which lie within Missoula County. Each district levies taxes with no mill levy limit. The Missoula urban area is served by the three fire department jurisdictions of Missoula Rural Fire District, Missoula City Fire Department, and East Missoula Volunteer Fire Department. Since East Missoula is strictly volunteer, there is no information available on their operations.

The Missoula Rural Fire District covers about 70 square miles and has an operating budget of \$910,000. Salaries account for \$523,000. The operating budget is financed from special district taxes which is the principal way of providing money for the delivery of services in limited areas.²¹ A special district is an agency of government which operates outside the regular structure of government, and is characterized by a considerable amount of financial and administrative independence.

Missoula Rural Fire District operates seven engine companies, five mini and midi pumpers and four tankers. The district provides

crash/fire rescue protection by contract to the Missoula County Airport Authority. From a 1981 study, Missoula Rural Fire District employees include nineteen suppression, one prevention, one training, one maintenance and two administrative personnel. Seventy-four volunteers support the career employees. Four fire stations are manned twenty-four hours a day. The rural fire district is made up of mainly volunteer personnel.²²

Information from the 1981 study states that the city operates five engines and two aerial fire trucks. The city provides protection to about thirteen square miles and has a budget in excess of \$1.5 million. Salaries account for \$1.27 million. The Missoula City Fire Department employs thirty-six suppression, four prevention, two maintenance, one training and three administrative personnel. The suppression personnel work a forty-two hour work week over a one year period. Tours of duty are two ten-hour day shifts and two fourteen-hour night shifts, then four days off.

The Missoula City Fire Department operates three stations within 1 1/2 miles of each other and the city limits, except the lower Grant Creek area. Response time is within five minutes. The minimum time to any fire is from Station #1. Station #1 is located at 200 West Pine. Station #1 has one engine, one ladder truck, four firefighters; Station #2 at 247 Mount, has one engine, and three firefighters. Station #3 at 1501 39th Street, has one engine, and two firefighters.

Medical calls are answered with one or two engines. Structural fires are answered with two or three engines and one ladder truck.

River rescues are a two station response to provide enough manpower to get the boat in the water and man the fire engine.

All fire engines carry 500 gallons of water, 2800 feet of fire hose, ground ladders, extraction gear, and medical kits. The ladder trucks have 75 foot and 100 foot power ladders and 208 feet of ground ladders each. A jet powered boat is kept in a boathouse on the bank of the Clark Fork River for river rescues. The Fire Prevention Bureau is responsible for building inspections and fire investigations.

In an eight-week cycle, crews work two 10-hour shifts and two 14-hour shifts with four days off, which is averaged as a 42-hour work week. Over a one-year period this is averaged as a 40.9 hour work week. Staff personnel with the exception of the secretary work four 10-hour days. Fire-fighters are required to pass the 80-hour Emergency Medical Technician course and the ten manuals of the International Fire Service Training Association before they can advance. Fire department officers must have attended the National Fire Academy on Incident Command. Missoula Fire Department answered 1260 alarms during 1981. Missoula Fire Department has a Mutual Aid Agreement with Missoula Rural Fire Department. M.F.D. depends on a fire hydrant system because of the large building fire load within the city. In 1980/81 the hydrant rental took \$90,000 of the Fire Department budget.²³

Progress to Date in Developing a Fire Master Plan

Chronology

By April 1984, the Missoula Fire and Emergency Services Master Planning Committee had completed the preliminary steps of the fire

master planning process. These steps included 1) forming a planning team and obtaining staff commitment; 2) setting meeting guidelines and recording committee decisions; 3) developing a planning proposal which includes a time line and an outline of tasks to be accomplished by team members; and 4) obtaining a multi-jurisdictional commitment and endorsement by the City Council. This process began in January 1983, and in approximately one year, meeting on the average of once a month, the committee has accomplished these preliminary steps using the United States Fire Administration's Basic Guide as a model. The following is a brief summary of these steps:

I. A preliminary working team was put together after the Mayor's Administrative Assistant gave the needed authorization to begin master planning. The committee was originally formed to look more closely at the provision of fire and emergency services in the community. The committee started discussing and categorizing problems of fire protection in the Missoula urban area. Data collection and discussion continues to be centered around the following issues:

1. A joint use fire station.
2. A joint training program.
3. Automatic aid/mutual aid agreements.
4. Water supply availability.
5. Capability of firefighters to deliver the amount of water needed to fight a fire.
6. Insurance savings at various levels of service.
7. Dispatching procedures.

8. Physical obstacles to faster response times (such as railroad tracks).

9. Alternatives for various levels of service.

II. A decision was made to do a master plan. A number of problems were recognized. There was a desire to understand the total picture of the fire and emergency services situation, and there was a need to prepare for future needs of the fire departments.

III. A committee was formed to make decisions on problems as they arose; define a level of risk for the community; make decisions on cost-effective measures; and establish goals and objectives for the community.

A proposed work schedule for data collection was set forth by the committee. To be able to analyze areas of protection, it was decided that information must be collected on the history of fire protection and the present fire and emergency services situation. The area of interest included the three fire departments which have jurisdiction over the Missoula urban area and the outside urbanized nodes (Frenchtown and Lolo). Data were organized into eight categories 1) current operations (apparatus, personnel, equipment, programs); 2) fire flow (water flow through fire hydrants); 3) response time; 4) legal/interlocal problems; 5) the Citizen Survey; 6: the Fire Function Survey; 7) financing; and 8) ISO rating. A Data Progress Chart was prepared by the team to assign tasks to team members. (Appendix E).

Aside from basic coordination of the fire master planning process, the planning office has participated in three of the eight categories for information gathering. These three areas include: 1) the Citizen Survey, which measures public awareness and attitudes towards fire protection; 2) the Fire Function Survey, which measures interagency existing and proposed participation in a fire protection system; and 3) the legal/interlocal aspects of formulating a fire protection system for an area which covers three jurisdictions. The other five categories listed above cover those areas of information which are provided by the fire department.

IV. A preliminary endorsement was given by the City Council for a fire and emergency services plan. Presentations were given by members of the Fire Master Planning Committee to the City Council and Missoula Rural Fire Department Board. Members who participated in the presentations included representatives from the Mayor's office; the Missoula planning office, Missoula Rural Fire District; and the City of Missoula Fire Department. The City Council approved the representatives' joint efforts to develop a master plan, and endorsed future funding of a computerized station location package.²⁴

The fire master plan for Missoula is intended to be multi-jurisdictional in scope. The following jurisdictions have representatives participating on the fire master planning committee: The City of Missoula Fire Department; the Missoula Rural Fire District; and the East Missoula Fire District. Two County agencies, 911 Emergency Dispatch, and the Missoula County Disaster and Emergency Services Office, are also

participating in the fire master planning process. A principal function of the multi-jurisdictional approach is to identify which fire and emergency response program provides the most economically efficient service.

The committee is now embarking upon the second stage of the fire master planning process, that of making the plan. The data collection phase is currently underway. Much of the data will be mapped. Data collection will include a history of past fires and associated losses to determine if there are fire problems of a particular nature. Consequently, programs can be initiated to attempt to correct the problems. Computerized information from the State Fire Marshall's Office will be used to establish a fire history. A visual display of a three-year fire history will be made for all three fire departments. This display will include three maps, one map for each year.²⁵

The bulk of the information concerns identification of current fire problems, including the current emergency services system. Several maps will be developed to visually display problems as information is gathered about the system. Maps include a jurisdictional map with an emergency service locational overlay, a water map, a risk map, and a station response time map. As overlays, these maps will provide a comprehensive picture of current fire protection problems and needs. The jurisdictional map will display first-response fire departments, fire stations and their jurisdictions. The water map will show water availability to suppress fires. The risk map will show general gradations of fire risk (high, medium, and low), weighing factors of

water availability (hydrants, ponds, lakes, swimming pools), the number of firefighters and/or equipment available, and the nearness of the fire station.²⁶

Comprehensive Planning for Fire Protection

The fire master planning committee and the planning staff should both benefit by combining efforts in the master planning process. The planning staff is involved not only for their planning expertise but because of a need for coordination between the fire master plan and the Missoula Comprehensive Plan update. As a separate entity created by an interlocal agreement between the city and county of Missoula, the Missoula planning office includes many activities and agencies in its planning efforts. Currently, building inspection, regulatory functions (subdivision review and zoning), and comprehensive planning are under the jurisdiction of the planning office. As an agency which is involved in comprehensive planning, the office has the unique ability to coordinate and refine the participation and involvement of various agencies and services within the community.

The Missoula planning office is presently updating the 1975 comprehensive plan. Ideally the fire master planning process could be developed in tandem with the comprehensive plan. Both fire master planning and comprehensive planning involve public participation; data collection and analysis; problem identification; goal setting and the presentation of alternative goals. Fire services and facilities will be examined in relation to water supply, subdivision design, and accessibility when more demand data have been obtained regarding the

need for different land uses. This is one way to encourage realistic plans to guide future land use decisions. In addition, the Missoula planning office can provide expertise coordinating efforts to control public safety and to guide future land use decisions. Comprehensive area-wide fire services planning will identify fire hazards which can be prevented by community planning and development decisions. Area-wide planning will avoid duplication by the two political jurisdictions in planning for fire services and fire station location. And as a result of area-wide planning, the City of Missoula Fire Department and the Missoula Rural Fire District may discover a single fire station location which will serve both jurisdictions.

The Legal Framework

It is important to evaluate the fire protection system to assure that proposed goals are legally possible. To do this, the fire master planning team must consider the existing legal framework. This includes local laws which regulate fire safety such as building codes and fire codes, and existing state and federal laws. It includes legal provisions covering financing (personnel, equipment, etc.), jurisdictional boundaries, rural vs. urban services, contracting services for fire protection, mutual aid agreements, civil preparedness, labor contracts, and jurisdictional liabilities. Interlocal agreements, mutual aid agreements and ordinances and statutory changes, specifically are necessary to implement a fire protection system. These legal provisions become even more significant in that the Missoula urban area fire protection system involves both city and county jurisdictions.

The following issues were identified by the fire master planning team as multi-jurisdictional in scope:

1. Uneven city boundaries.
2. A possible new configuration of fire stations.
3. The need for optimum coordination between all fire stations;
and
4. The need by the city and county for a fire station in the Grant Creek area.

The fire master planning team has also identified the goal of greater coordination of fire response through mutual aid agreements and automatic aid. Currently the City Fire Department and Missoula Rural Fire Department have a mutual aid agreement. Mutual aid agreements are recognized as a necessity by both fire departments. A mutual aid agreement involves two-way assistance by fire departments from two or more communities or jurisdictions. The assistance is given under prearranged plans or contracts on the basis that each will aid the other when needed. This is different from automatic aid. Automatic aid involves a prearrangement between two or more fire departments that routinely provide emergency response assignments to each other. Presently the city fire department is not obliged to respond to a fire if that fire is outside its jurisdiction, i.e., no automatic aid agreement exists.

At issue regarding the mutual aid agreement is at what level are fire services needed. It is the planning committee's consensus that optimum mutual aid leading to the most cost-effective fire protection is

possible only through joint determination of optimum fire station locations regardless of jurisdictional boundaries. Joint use of a fire station leads to many possibilities which must be addressed in terms of their legality within the jurisdiction.

Below are the issues identified by the planning committee which might require further legal research. These are summarized in conjunction with a preliminary response by the City Attorney's office.

Joint Fire Station. The city and county may enter into interlocal agreements for the establishment and operation of a fire station. An alternative is for the city to lease space to the rural fire district. (Section 7-2-4734 (4), Montana Code Annotated). One inherent problem with a joint fire station located at or near a city's limits is that it may discourage annexation of areas adjacent to the city which are densely populated. It is very likely that the area adjacent to or nearby the fire station, no matter how densely populated, will have a reduced chance of being annexed. This may constitute poor long-range planning since a "rural" fire district may contain urban development. If a rural fire district was organized at least 10 years before an attempt at annexation, no part of the area to be annexed can be within the boundary of the rural fire district. Thus, no annexation can occur unless the fire district agrees to it. Thus, annexation of these urban areas would be discouraged. In addition, volunteer fire fighters, who have a strong lobby in the legislature, have a vested interest to oppose annexation.²⁷

Joint Training Center. There is no legal reason why a joint training center could not be established. An interlocal agreement or contract could be negotiated regarding financing, maintenance, and use of a joint training center. This could be financed by any source of funds that the city or county might legally have available.²⁸

Factors Affecting ISO Grading Schedule. If the City were to implement automatic aid outside its jurisdiction, there could be adverse effects on liability insurance premiums and fire classifications.²⁹ It would also adversely affect fire insurance rating classifications for city properties. This would be the same situation for the county.

Mutual Aid/Automatic Aid Agreements. The planning committee is interested in redefining or making more specific its mutual aid agreement. The fire master planning committee has posed the question, at what point is mutual aid warranted? According to the City Attorney, this would have to be resolved between the two major fire districts and spelled out in a negotiated mutual aid agreement.³⁰

Financial Liability. A fire protection service has no legal obligation to provide fire protection service to properties that do not pay through tax assessments. City property owners have a right to the fire protection services that they are paying for.³¹

Provision of Fire Protection to the University of Montana. The university is outside the city's taxing jurisdiction, and therefore the university does not pay through taxation for city fire services. The

university does not pay for fire protection at all. In addition, the city fire department does not have the equipment or the personnel for fires which might occur in the high-rise buildings. One remedy to the problem is for the university and the city to negotiate an agreement. Another alternative would be to notify students as to the lack of fire protection. Concerned students might be able to influence university officials and state legislators to change this situation. The ultimate decision will most likely be left to the state legislature which could provide monies for protection for state universities.³²

The Citizen Survey

One more step in the process of evaluating fire protection services is the Citizen Survey which was administered by the Missoula planning office (Appendix A). The 1983 Citizen Survey on Fire Protection was undertaken to gauge public perception of fire protection in the Missoula urban area. This citizen survey was designed to obtain citizens' opinions on 1) what fire protection functions are needed or not needed; 2) what fire protection functions are being performed and, if so, whether they are adequate or inadequate. The planning office followed the model citizen survey in the Basic Guide, designed to determine the attitudes and concerns of local citizens toward fire protection in their community.

A telephone survey was implemented by the Missoula Planning Office using a combination of questions from the survey in the Basic Guide, and questions formulated by the planning office staff. A pretest was conducted in September, 1983 to check the effectiveness of the

questions. Questions were then rewritten for clarity. The actual survey was conducted by fourteen members of the Retired Senior Volunteers and four planning staff technicians. The survey was a stratified random sample representing approximately 60,000 residents in the Missoula urban area. The sample size consisted of 420 residents from Lolo, Frenchtown, and the Missoula area. Ninety-four percent of the sample represented the urban area, the other 6% represented Lolo and Frenchtown. Considering the response rate, it can be said with 95% confidence that the results are true within a $\pm 5\%$ margin of error. The stratified sample was created by matching telephone prefixes to geographical areas. This represented a geographical distribution that excluded Seeley Lake and Condon. The number of prefixes used proportionately represented the population distribution in that area. These prefixes were paired with telephone numbers, which were randomly created using a Burroughs computer.

Survey questions were formulated to determine the residents' knowledge about and perception of their fire protection. In addition, information was acquired regarding respondent demographic characteristics. The information obtained was categorized as follows:

1. Knowledge of jurisdiction or the station providing fire service
2. Adequacy of fire service
3. Method of taxation
4. Characteristics of respondents
5. Complaints about service

6. High risk area
7. Interjurisdictional aid
8. Problems and prevention measures³³

A summary of the survey's results suggested the following major concerns:

1. Additional education programs focusing on increased fire prevention and safety.
2. Fire hazards related to woodstoves and fireplaces.
3. The need for home safety inspections.
4. Fire hazards related to trees and weeds.³⁴

Seventy-three percent of those surveyed felt that fire services were adequate and only 3% thought services were inadequate, and 17% did not know. A little more than one-fourth of the respondents did not know which fire department provided their fire protection. But, most of the respondents were aware of the various services provided by the fire department, such as emergency rescue, emergency medical, fire safety inspections and public service demonstrations.

Two-thirds of those surveyed own their own homes. Only 12% of the respondents were aware that they lived in a high risk area. Nearly half favored keeping financing at the same level, while nearly one-fourth favored decreasing spending, and over one-fourth had no opinion. Nearly 40% of those surveyed were not aware of the method of taxation used for financing for their fire protection. The methods of taxation include city tax, special district tax, or an assessment for volunteer fire department. This information may reflect the fact that fire protection

is a service one is aware of only when an emergency occurs, which is seldom.

The most important issue to come out of the Citizen Survey was that of inter-jurisdictional aid. This was an issue the fire master planning committee had already identified. Seventy-five percent of the respondents felt that the nearest fire station is obliged to respond to a fire even if the fire is outside that fire station's district. Currently there is a mutual aid agreement between the Missoula City Fire Department and the Missoula Rural Fire District which allows one jurisdiction to ask assistance from another given certain circumstances. But this does not mean the nearest fire station is obliged to respond. This is an important issue for Missoula because the city and county service areas are intertwined.

In answer to an open-ended question which asked what respondents thought were the most important fire related problems in the community, most people suggested the need for educational programs on fire safety. This again stresses the importance of a fire master plan, which emphasizes prevention. Such a plan could provide for more community educational programs in the community.

The Citizen Survey represents an important component of fire master planning -- i.e., citizen input and participation. Although many of the questions asked gave answers which were anticipated, the survey serves as a record and confirmation of the public's perceptions. Clearly, the public is generally not aware of their fire protection service, the quality of performance and how it is financed.

The Fire Function Survey

Fire departments cannot provide fire protection by themselves. As previously mentioned, a fire department is dependent on other governmental agencies. It is difficult to provide an adequate level of fire protection without a close working relationship between the fire department and other municipal agencies such as the water department, road department, and planning department (which includes building inspection and zoning). In fire protection master planning the roles of these agencies in fire protection are defined and their participation is solicited in controlling fire problems.

The Fire Function Survey, taken from the Basic Guide, consists of ninety questions which are designed to aid in identifying agencies and functions which are concerned with fire protection planning. The Fire Function Survey was used as a base for informal discussions with the city fire department and building inspection department. Issues have surfaced which will help guide data collection and focus on problems which were previously not identified. These issues will be addressed again when more data have been collected to confirm areas of special concern, needed improvement, or more information. The functions of the agencies will then be reassessed. Information has yet to be collected from the Missoula Rural Fire District and other public safety agencies. At this point in time, the survey has been administered to the Missoula Fire Department but not the Missoula Rural Fire Department.

When all surveys are completed, data should identify:

1. Fire protection functions being performed.

2. Public or private agencies responsible for performing the function.
3. Functions not being performed but perhaps should be.
4. Functions now being performed which have problems that need to be solved during the planning process.
5. Functions that are appropriate and are being adequately performed.³⁵

The Fire Function Survey substantiates what the fire department perceives could be beneficial results from coordinating or improving coordination, with other agencies.

As a result of the 90 questions asked of the Missoula City Fire Department, in addition to input received from the master planning committee, the following issues were identified. These were categorized into areas which need to be addressed by the fire master planning committee and the citizen task force groups.

1. Coordination with the water companies, county disaster planning, the Rural Fire District, and the Building Inspection Department.
2. Renewed emphasis on prevention and public relations.
3. Continued monitoring of dangerous building abatement program.
4. Encouragement of maximum performance through more formalized training procedures.

Another problem which emerged concerned problems with new land developments. This is evolving as a separate issue. A

subcommittee has been formed to address fire standards in relation to the design standards in the Missoula County subdivision regulations.

Coordination with other public agencies

Building inspection. The building department and the fire department are the two major departments responsible for new construction. Overall, inspections would be more effective for new construction if there were more cooperation. Presently building inspection is situated within the planning department where zoning and subdivision review are handled. Only new construction sites are checked by the fire inspectors, although it was suggested that the building department is best with code enforcement and would be better at identifying problems. Occupancy permits are required but this is done through the business license check-off procedure through zoning and building inspection at the planning office. These issues will be addressed by some members of the fire planning committee, under "current operations", after data gathering has been completed. In summary, fire codes are adequate, but there are some problems in implementing them.

Water companies. There needs to be better cooperation and communication between the fire department and the water company. Water systems, hydrants and fire flow (water flow through fire hydrants) sometimes present problems. Generally better records need to be kept and a more formal mechanism established for the fire department to check fire flows. In new developments, adequate fire flow and water systems are addressed through the planning process under subdivision review

conducted by the planning office. Water systems in new developments are approved by a private water company, but it is up to the developers to install fire hydrants after the location has been approved by the fire department. After fire hydrants are installed the fire department is charged with fire hydrant maintenance.

The fire department would like to have more input and control regarding fire hydrants. At this time there is inadequate fire flow in some areas of Missoula and no formal mechanism to monitor fire flow. In addition, hydrants are not tested by the fire department as often as they should be. The water companies do not flush fire hydrants so the city fire department must do this routinely. Hence, the fire department may not always be aware of which fire hydrants are out of service. It is important that hydrants are easily visible, but fire hydrants and fire zones are not replaced or repainted when necessary. These issues will be addressed by a member of the fire master planning committee who is reporting on fire flow and water flow.

Mutual Aid and Automatic Aid. The concept of the mutual aid and automatic aid agreement between the Missoula City Fire Department and Missoula Rural Fire District needs to be redefined. There are no criteria at this time for when automatic aid is warranted. The problem is political in that each department has its own budget and there could be financial problems in sharing manpower and equipment. A memorandum has been sent to the City Attorney which addresses general legal issues identified by the master planning team. This is addressed later in the paper under legal issues. These concerns will be reworked as the team

obtains more information and formulates more specific goals.

Disaster Planning. Missoula County currently has a Disaster Plan Coordinator. It has been suggested by the City Fire Department that there should be a task force made up of members of the fire departments to coordinate with disaster planning. Emergency disaster drills are in the process of being set up by Orin Olsgaard, County Disaster Coordinator.

Prevention and Public Relations. The Citizen Survey addresses the needs yet to be met in fire prevention and public relations in greater detail. Presently, public education is handled by the fire prevention bureau through routine fire inspections. Inspectors, fire crews, and staff are all involved in public education. Career education is done at the public schools level by firefighters. Public relations are funded by union Local 271 of Fire Fighters, which is not connected with the city.

Monitoring of Dangerous Building Abatement. Housing quality or housing deterioration is an important variable when considering the environmental constraints on fire service delivery performance. In the City of Missoula fortunately the number of old buildings is not a major concern for the fire department. The downtown area has the largest concentration of old buildings and they are in relatively good condition. The central business district and north side of town consists of a relatively small area. Consequently, the number of old buildings in town is not a major issue.

Training. Although it was felt that there needs to be some improvement in fire training, providing training and management procedures for disasters and hazardous materials emerged as a more important issue. For the city fire department, a policy manual for management training needs to be devised, a library of training aids organized, and a long-range staffing plan developed. Training needs to be standardized with training and hiring conducted simultaneously. Although the system is workable at this time and the training division adequate in quantity, a future emergency situation may prove it to be lacking. Since concerns about hazardous materials are a forefront issue now, training for special hazards should be addressed. At this point not everyone gets special hazards training. The fire department expects these problems to be resolved through master planning.

The Fire Function Survey asked many questions directed toward meeting informational and data needs. Much of the data needed could be acquired and readily at hand by developing better record-keeping procedures. In addition, many questions concerning equipment needs were asked in the survey. These needs will also be addressed as those members of the planning committee assigned to "current operations" collect and organize their data.

CHAPTER IV

ANALYSIS AND RECOMMENDATIONS

Over a one-year period, steps have been taken to develop a successful fire master plan. As of February, 1985, these steps include exploration of the legal ramifications of cooperative fire service efforts, analysis of a citizen survey and fire function survey, collection of data and maps, and a fire risk analysis of the area. In addition, this paper has included a discussion of the deficiencies of the ISO grading system which becomes a barrier to creative planning for fire and emergency services. Following is a summary of these elements.

The Legal Framework

Addressing the legal constraints of cooperative fire service efforts is an essential first step in the fire planning process. These legal constraints will obviously affect the direction the committee will pursue when they begin to formulate goals and objectives. At this time the adequacy of city and county laws and what can be accomplished through an interlocal agreement are being considered. Although in broad terms state law will play a role, according to an International City Management Association study, state statutes appear to have little influence on local fire service delivery.

The issues thus far identified are multi-jurisdictional in scope and cover liability in the sharing of equipment, personnel, or fire stations. Thus far, the planning team has received preliminary

information from the city attorney. Definite answers are not necessary until after data have been collected and the planning committee begins to formulate goals. At that time more specific questions regarding legal ramifications can be addressed. As the planning committee works with the issues and goals, the legalities of the proposals will then have to be resolved. It should be recognized though, that since this plan involves three jurisdictions and it is part of a political process, it is possible that small unresolvable problems could appear which would preclude a jurisdiction's participation in the plan.

The Citizen Survey

Many of the issues identified at the beginning of the master planning process were confirmed by some of the early data that were collected. Preliminary data include those studies conducted by the planning office, the Fire Function Survey, and the Citizen Survey. These two surveys have served to confirm the direction and goals of the planning committee. The responses in these surveys will be useful for future reference especially when cross tabulations on the responses are completed. For example, correlations can be made between the value of a home and the adequacy of its fire protection; the location of a home and its actual, not perceived, distance from a fire station, etc. This is information which could be useful to the fire departments.

Most information gleaned from the survey confirms that many people are not aware of how even the most basic service of fire protection is financed. That is, they are not aware of how quality of service relates

to what that service should cost. Therefore, the public may not have enough information to be able to adequately answer a question about whether to increase or decrease financing. This was a question on the Citizen Survey. Perhaps this is because fire is experienced so seldom by any one individual, that the cost to the individual and the cost to the community is difficult to ascertain.

Many of the Citizen Survey questions dealt with the public's perception of fire service delivery. A public education campaign could help correct misperceptions. As part of this campaign, the fire department must be able to produce information on the actual situation. For example, what is the time from one fire station to a neighborhood; where are the areas which lack adequate water supply for fire fighting, etc. Once accomplished, this information could be available to potential home buyers. Then the public would have answers to questions of critical concern to their well being.

The 1982 Federal Emergency Management Agency study concluded that different socio-economic groups had different leading causes of fire. It was suggested that analysis of the cause of fire by neighborhood is important. Areas that have the most incidents of fire would benefit from more fire prevention activities, rather than merely a public education campaign. For example, opportunities exist for a variety of fire safety measures such as home inspection, mandatory use of smoke detectors, code enforcement, etc. Public education and other risk reduction programs must reach the poorest neighborhoods and must emphasize the incidents of fires due to smoking, arson and children playing with fire. Such programs will target the social and behavioral

patterns that lead to fire.³⁶

To reiterate, public education and fire prevention efforts have high visibility, and if the public are not informed, as indicated in the survey, then there must be a need for improvement. Emphasis on prevention is the thrust of the fire master plan, so public education in fire prevention most likely will be accomplished.

The other major issue previously identified by the master planning committee was what people thought about automatic aid. The Citizen's Survey revealed that respondents thought automatic aid or nearest station response was necessary. People's attitudes toward automatic aid could provide support for a request for a new fire station in an area where quicker response time is needed. It would also support redefining the mutual aid contract between the fire departments and thus strengthening interjurisdictional coordination.

As information is gathered, prevention programs designed, and other issues identified through the master planning process, it may be beneficial to target geographical areas that were identified by the survey as having specific problems. This will also be useful information to attach to a fire risk analysis. Because all questionnaire answers were tabulated by fire station service area, this will be possible.

The city fire department is compiling a Fire Risk Survey analysis to accomplish targeting areas of the city which has the highest risk. A fire risk survey has been completed on a sample of structures within the city limits for a one year period. The fire risk survey, among other things, gathers information on structure type and age, the building

material, use, likelihood of a fire, and availability of water, manpower and equipment. The fire risk survey divides risks into high, medium, and low for identification of fire management areas, which are subsequently mapped. High risk areas will be evaluated for the maximum fire flow, manpower and equipment. Where there are gaps in capabilities regarding fire flow, manpower, and equipment, alternatives will be proposed to offset the risks. For example, more men could be added, or more water made available.³⁷

ISO Grading Schedule

The U.S. Fire Administration makes clear in their planning manuals that although they include ISO based calculating procedures, this does not mean they endorse the ISO methods on the grading schedule as the only means to measure community fire protection capability. It is essential that management and fire service personnel have optional methods of calculating their manpower and equipment needs, response times, etc. Missoula's fire service planning committee is emphasizing optional methods in their data collection efforts.

As already explained, the Fire Risk Survey, being compiled by the city fire department, is another means to ascertain a community's fire protection capability without relying on the ISO grading system. The Fire Risk Survey includes a method adapted from the Insurance Services Office for computing fire flow requirements. Calculation of fire flow is important to reach conclusions as to manpower, apparatus, and equipment needs. This will be used in conjunction with a vast array of information to assess fire protection capability in relation to risk.

One goal of master planning is to be able to minimize fire loss to a community. By considering key variables, one can arrive at a better idea of potential loss. Master planning allows greater flexibility in measuring potential loss by both inputs (capital expenditures) and outputs (the quality of delivery), so one is not tied to the ISO Grading Schedule. In the fire service delivery literature, it has been shown that higher ISO ratings do not necessarily lead to a more productive fire system. Key variables might include any of many organizational and environmental factors which affect fire service delivery.³⁸ For example, research has shown that wealthier suburbs always have the most effective fire service delivery. Wealthier suburbs usually have larger lot sizes, fairly high property values which bring in more revenue, a low level of industrialization, and occupants who are usually more educated and in a higher socio-economic bracket. Such areas require considerably less prevention because their fire hazard and natural incidents are rather low. Through a fire master plan process, most facets of a fire system can be addressed geographically, and areas of special need targeted for specific treatment. These kinds of factors are more accurately measured through a master plan than through ISO compliance.

Thus, more is not necessarily better, as set forth by the ISO. Innovative reallocation of resources, rather than providing more resources might be what is required. For example, reallocation of resources might include assigning a larger proportion of fire suppression capability to densely populated neighborhoods with

deteriorated housing. In addition, municipal codes could be passed and enforced which mandate the installation of a variety of private prevention and suppression devices.³⁹

Another possibility is that of adopting a municipal fire insurance program which would eliminate the need for coverage based on the ISO ratings. Some obvious advantages would be the ability to provide insurance incentives which improve fire safety and reduce city costs, and improve the ability to track results of fire protection efforts.

Fire Function Survey

The major goal of the Fire Function Survey is to bring agencies who have some contact with fire protection service into a more coordinated or closer working relationship. It appears at this stage that the principal function of the building inspection department should be that of prevention. Enforcement of the building code establishes the level of the fire problem within a community. Thus, it also establishes the level of fire protection costs. The building code together with zoning regulations determine the allowable area, height, and type of occupancies within structures, and the permitted uses within zones. As such, it is very important that the fire department and building inspection department work together closely.

Even though a fire function survey provides answers to many questions, these answers may not actually reflect an agency's performance. As such, it would be better to use the responses only as a basis for discussion. Agency heads can better work through their responses in a committee, or round-table discussion. Nonetheless, the emphasis of a

fire function survey is to establish what functions are not being performed by an agency, which functions should be performed, and what functions could be better coordinated. Fire master planning relies on the resources and coordination of many community elements. These elements must function together efficiently.

As an example, building inspection and the fire department both review construction plans in separate consultations. It may not become apparent until after site inspection that the written description of the type of building may not coincide with its actual use. An example is chemical storage in a warehouse. At that point fire codes would come into play which might be more strict or require different construction standards. In addition, sometimes the fire codes are more strictly enforced than what the codes require. In essence this conflict of information may strain the relationship between local government and local business. More cooperation is needed between departments regarding code interpretation and application.

Accomplishments and Expectations

All data gathering was concluded by the end of Summer 1984, and most of that information has been mapped for the city fire department. Thus far the planning committee has answered the questions of 1) how much property has a high risk of burning; 2) how much equipment and manpower is needed to take care of it; and 3) what steps can be taken to make up for the deficiencies. In addition, fire station location alternatives, through the use of a computer program, have been

completed. The city fire department now has three alternatives for relocating stations.

As of January, 1985, the planning committee has drafted preliminary goals, objectives and alternatives for the fire master plan. Criteria will be established by the planning office to select alternatives for objectives which will meet the goals. Initially, alternatives to the most important objectives will be under consideration. However, because master planning is an on-going process, the committee will continue to look at alternatives over time. The completion of the goals, objectives and selected alternatives is expected by March, 1985. A citizens advisory committee will be created to participate in the selection of best alternatives pertaining to selected objectives. Policies will then be developed by professional staff in the city administration, the city fire department, and the rural fire district.

The development of the capital improvements program is expected to be completed by March, 1985. It is hoped that by the middle of the capital improvements development process any equipment needs, or the need for a new fire station could be included in the program. A bond issue could then be approved by the City Council for financing a fire station. It is expected that the planning committee together with the Citizens Advisory Committee will be able to seek approval of the fire master plan from the City Council by May, 1985. The resulting fire master plan is expected to be a guide, to be used by the fire departments and cooperating agencies.

It is also expected that by Spring 1985 the problem of providing fire protection service for the university could be resolved in some

way. Currently the city fire department provides service to the University of Montana when the occasion arises, but there is no formal agreement, financial or otherwise.

Following are some possible outcomes of the planning committee:

- 1) A closer working relationship between the building inspection department and the fire department.
- 2) A new fire station and accompanying manpower in the Grant Creek area.
- 3) An investigation of the relationship of zoning to water availability. The committee intends to look at how areas are zoned vis-a-vis the availability of water for fire fighting. This would be particularly applicable in high density residential zones or industrial zones.
- 4) A joint training facility.
- 5) The conclusion that a mutual aid agreement between the Missoula Rural Fire District and Missoula City Fire Department most likely will not work. A preliminary study by the City Attorney suggests that the city is liable if the city is responding outside its district when a demand arises in its own district and the city is not available to respond.

Conclusion

In developing a master plan, the members of the fire master planning team through data collection efforts, brainstorming, and the formulation of goals and objectives are attempting to answer the following questions:

1. What do people in the community know about fire and fire service delivery?
2. Do people know what to do when they have a fire?
3. What specific fire risks now exist or are expected to exist in the future?
4. What is included in the existing fire protection system?
5. What things are now being done by the current protection system and what should be done?
6. What kinds of fire have occurred and what losses resulted from these fires?

Although the fire master plan is a plan for the various community fire departments, it becomes a plan for the community as well. Not only is a physical land use plan a necessity in a comprehensive plan, but the provision of human services is another and equally important part of that plan. Land use patterns are a reflection of the availability of services, or the ability of services to be extended. The fire master plan, as does a capital improvements plan, serves as another mechanism for determining the best physical location for people in any community. A fire department represents a large capital investment. Personnel training, staffing, budgeting constraints and fire station location are obviously not easily incorporated into a community's comprehensive plan. Many of the resulting recommendations will be useful as guidelines to follow for any plan or activity which involves many agencies and more than one jurisdiction.

It might be useful to Missoula to take advantage of the sources of on-site technical assistance provided by the United States Fire

Administration to those communities who have completed a master plan. The booklet Master Planning Report to Congress put out by the Federal Emergency Management Agency has a list of the 90 communities which either participated as validation communities or received technical assistance (Appendix E). This report contains a table of the characteristics of 47 validation communities. These characteristics include population, land area, population density, the type of government and the type of fire department. Also included for these same communities is a table of the elements which each community addressed in its master plan (Appendix C). These elements are included in the four program areas of prevention, suppression, emergency response, and administration. It would be beneficial for Missoula to communicate with those communities which have approximately the same physical characteristics and the same elements in their plan (Appendix D).

Fire master planning is a far superior method of assessing a community's fire protection as compared to the ISO Grading Schedule. In the literature investigated for this paper, studies have shown that higher ratings in various inputs, i.e., increased manpower or equipment, do not necessarily lead to a more productive fire protection system. So many organizational variables (number of personnel assigned to apparatus, amount of education and training for firefighters, etc.) and environmental variables (density of area, housing deterioration, etc.) are involved in evaluating a community's fire system protection. It follows that consideration of only inputs is not a rational consideration of alternatives to solve the problems. Rather, it is the wise

allocation of resources which makes an effective and productive fire protection system. All community service agencies, which involve large capital investments and physically affect new development and community land use patterns, should be encouraged to undertake a fire master plan. Both the agencies, the public, and the community would benefit.

APPENDICES

APPENDIX A
CITIZEN SURVEY

Citizen Survey

QUESTIONNAIRE NUMBER _____

City and County Fire Master Planning
Missoula, MontanaInterview Date:
Elapsed Time:
Interviewer Name

INTRODUCTION

Hello, my name is _____ and I am calling from _____. We are doing a county-wide opinion survey on fire safety issues for the City and County Fire Departments.

I would like to ask a few questions, it will take about five minutes of your time (pause).

This interview is completely confidential and voluntary. If I ask a question you don't want to answer, just let me know and I'll go on to the next question.

1. Which Fire Department provides your fire protection?

Don't know 27 (112)

2. A. Do you think your fire protection is adequate?

1. Yes 73
2. No (Answer B Below) 3%
3. Don't know 17

- B. What do you think could be done to improve fire protection?

(see table of answers)

Don't know

3. Which of the following pays for your fire protection?

- A. City Tax 37
B. Special District Tax
C. Volunteer 12
D. Other 1
E. Don't know 38
-

4. A. Do you think the financing should be?

1. Increased 23%
2. Decreased 2% 27% don't know

3. Stay the same 47%
- B. Do you own or rent your home?
1. Rent 36%
2. Own What is the approximate value? (63% own)
- | | |
|---------------------|-----|
| () 30,000 or less | 13% |
| () 30,000-45,000 | 19% |
| () 45,000-60,000 | 28% |
| () 60,000-80,000 | 22% |
| () 80,000-100,000 | 9% |
| () 100,000 or more | 5% |
5. A. Which of the following services provided by your Fire Department, are you aware of?
- | | | | | | | |
|---|-----|-----|-----|-----|----|-----|
| 1. Emergency Rescue | 9% | 15% | Yes | 87% | No | 12% |
| 2. Emergency Medical | 19% | 15% | Yes | 83% | No | 16% |
| 3. Fire Safety Inspections | 26% | 24% | Yes | 73% | No | 25% |
| 4. Public Service Speeches/
Demonstrations | 36% | 32% | Yes | 65% | No | 34% |
5. Other Home Checks - 7%
- Cats out of trees - 1%
- Chimney brushes - 4%
6. Do you have any complains about any fire services in your area?
- A. Yes 3% What is your complaint? _____
- B. No. 95%
- C. Don't know
7. How long do you think it would take your local Fire Department to reach your home in case of fire?
- | | |
|----------------------------|------|
| A. 1-5 minutes | 62% |
| B. 6-10 minutes | 23% |
| C. 11-15 minutes | 6% |
| D. Greater than 15 minutes | 2.5% |
| E. Don't know | 4% |
8. What do you think are the most important Fire related problems in the community?

(See table)

9. Do you think you live in a high risk area related to fire?
- A. Yes 12% Why (see table)
- B. No 87%
10. What is the street intersection closest to your place of residence?
(to be geographically coded)
11. Is your residence inside the Missoula City limits?
- A. Yes 54% (222)
- B. No 42% (172)
- C. Don't know 3%
12. Do you think the nearest fire station is obliged to respond to a fire even if the fire is outside their district?
- A. Yes 75% _____
- B. No 12% _____
- C. Don't know 11% _____
13. Are you aware of the following fire prevention measures?
- | | <u>YES</u> | <u>NO</u> |
|----------------------------------|------------|-----------|
| A. Education Programs | 76% | 23% |
| B. Forest Fire Danger Signs | 83% | 16% |
| C. Fire Safety Checks | 76% | 23% |
| D. Building Inspection Standards | 82% | 17% |
14. Do you think more Fire Prevention measures are need in your community?
- A. Yes 44%
- B. No 51%
- Can you explain _____
- _____
- _____

END:

Those are all the questions I have. Thank you for taking the time to participate in the survey, we appreciate your willingness to help.

SOURCE: Missoula Planning Office
September 1983

APPENDIX B
MASTER PLANNING COMMUNITIES
WITH USFA CONTACT

MASTER PLANNING COMMUNITIES WITH USFA CONTACT

ALABAMA
Madison County

ARIZONA
Flagstaff**

ARKANSAS
Benton County**
Fayetteville**
Jackson County**
Little Rock*
Springdale**

CALIFORNIA
Azusa**
Covina**
Culver City
El Monte
Fremont**
Los Altos
Mountain View
Oceanside*
Palm Springs
San Clemente
San Mateo
Santa Ana
Santa Rosa
West Covina**

COLORADO
Longmont*

CONNECTICUT
East Haven

FLORIDA
Macedera Beach**
Miami
Miami-Dade County**
Naples*
Palm Beach County
Pasco County
Pinellas County
Spring Hill*

IDAHO
Ketchum**

ILLINOIS
Godfrey**
Springfield*

KENTUCKY
Bowling Green
Pulaski County

MARYLAND
Carroll County*

MASSACHUSETTS
Princeton

MICHIGAN
Oshtemo*

MINNESOTA
Burnsville

MISSOURI
Northwest Missouri**

NEW JERSEY
Washington Twp.**

NEW YORK
Binghamton
Montour Falls
Moyers Corner
Nassau County
Perinton
Putnam Valley*

NORTH CAROLINA
Cary
Elizabeth City
Winston-Salem

NORTH DAKOTA
Devil's Lake**

OHIO
Ashtabula County
Circleville
Fairborn
Saybrook Twp.
S. Charleston**
Toledo

OKLAHOMA
Tulsa**
Tulsa/Creek Counties

OREGON
Forest Grove**
La Grande
Salem
Sandy

PENNSYLVANIA
Carlisle
Coatesville
East Allen Twp.
Kennett Square
Lower Macungie
Middletown Twp.
Neville Twp.
Palmyra County
Venango County
Wescosville
Williamsburg**

SOUTH CAROLINA
Clarendon County**
Greenwood
McCormick
Waccamaw Region

TENNESSEE
Seymour**
Southwest Tennessee**

TEXAS
Alamo Region
Denison
Richardson

UTAH
Orem

VIRGINIA
Virginia Beach**

WASHINGTON
Bellevue
Edmonds**
Forks*
Renton

WISCONSIN
Grant County

- * Communities currently receiving Technical Support Services from USFA.
** Validation community.

Source: Masterplanning Report to Congress, FEMA, August 1981

APPENDIX C
MASTER PLANNING COMMUNITY CHARACTERISTICS

MASTER PLANNING COMMUNITY CHARACTERISTICS

COMMUNITY	POPULATION	LAND AREA (Sq. MI.)	POPULATION DENSITY (Per Sq. MI.)	TYPE OF GOVERNMENT		TYPE OF FIRE DEPARTMENT			
				Manager	Other	Paid	Part Paid Volunteer	Volunteer	
Benton County, AR*	59,000	851	69		X		X		
Payetteville, AR	31,915	18	1,773	X			X		
Jackson County, AR**	21,000	829	33				X		
Springdale, AR	19,962	20	998				X		
Azusa, CA**	27,000	7	3,857			X			
Covina, CA**	33,000	6	5,500	X		X			
Culver City, CA**	38,000	48	792	X		X			
El Monte, CA**	68,000	10	6,800	X		X			
Mountain View, CA**	55,000	6	9,167	X		X			
Palm Springs, CA**	27,000	74	365	X		X			
San Clemente, CA**	21,000	16	1,312	X				X	
Santa Ana, CA**	177,000	27	6,556	X		X			
Springlake, CA**	26,000	64	406		X			X	
West Covina, CA**	73,000	15	4,867	X		X			
Madeira Beach, FL**	5,000	1	5,000	X				X	
Miami, FL**	365,000	350	1,043	X		X			
Miami-Dade County, FL**	1,439,000	2,042	705	X		X			
Pasco County, FL**	127,000	742	171	X				X	
Pinellas County, FL**	644,000	265	2,430	X				X	
Springfield, IL**	95,148	42	2,265			X		X	
Princeton, MA**	3,500	26	97			X		X	
Northwest MO* (5 counties)	50,108	2,639	19			X			X
Washington Township, NJ**	22,000	22	1,000	X					X
Nassau County, NY**	1,403,000	264	5,314			X			X
Winston-Salem, NC**	150,000	62	2,419	X		X			

MASTER PLANNING COMMUNITY CHARACTERISTICS (continued)

COMMUNITY	POPULATION	LAND AREA (Sq. MI.)	POPULATION DENSITY (Per Sq. MI.)	TYPE OF GOVERNMENT		TYPE OF FIRE DEPARTMENT		
				Manager	Other	Paid	Part Paid Volunteer	Volunteer
Ashtabula County, OH**	102,000	700	146		x		x	
South Charleston, OH**	2,000	40	50	x				x
Toledo, OH**	368,000	81	4,543	x		x		
Tulsa, OK**	347,600	175	1,986		x	x		
Tulsa-Creek County, OK* (2 counties)	466,000	1,509	309		x		x	
Salem, OR**	78,000	37	2,108	x		x		
Sandy, OR**	2,000	77	26		x		x	
Carlisle, PA**	19,000	6	3,167	x			x	
Coatesville, PA**	12,000	6	2,000	x			x	
Lower Macungie Twnsp., PA**	12,000	25	480		x			x
Middletown Township, PA**	13,000	13	928	x				x
Wescosville, PA**	2,000	25	80		x			x
Williamsburg, PA**	2,000	40	50		x			x
Greenwood, SC**	25,000	13	1,923	x		x		
McCormick County, SC**	8,000	360	22		x			x
Waccamaw Region, SC* (3 counties)	158,000	2,901	54		x		x	
Alamo Region, TX* (11 counties)	1,097,000	10,592	104		x		x	
Denison, TX**	28,000	12	1,833	x		x		
Richardson, TX**	61,420	28	2,333	x		x		
Orem, UT**	36,000	16	2,250	x		x		
Virginia Beach, VA**	230,000	310	742	x			x	
Bellevue, WA**	65,000	27	2,407	x			x	

* Indicates multi-jurisdictional planning

** Master Planning communities surveyed by U.S. Fire Administration

Source: Masterplanning Report to Congress,
FEMA, August 1981

APPENDIX D
FIRE AND EMERGENCY RESPONSE
COMPONENTS IN MASTER PLANS

**FIRE AND EMERGENCY RESPONSE COMPONENTS
INCLUDED IN MASTER PLANS**

COMMUNITIES	MASTER PLAN COMPONENTS													
	Prevention				Suppression			Emergency Response			Administration			
	Codes/Standards	Legislation/Inspection/Enforcement	Public Education	Arson Investigation	Staffing Strategies	Station Location	Water Supply	Emergency Medical Services	Hazardous Materials	Disaster Preparedness	Data Collection/Analysis	Financing	Management Systems	Training
Benton County, AR		•	•		•	•	•			•	•	•		•
Fayetteville, AR	•	•	•	•	•		•	•		•	•		•	•
Jackson Co., AR	•	•		•	•	•				•	•	•	•	•
Springdale, AR	•	•		•	•	•				•	•	•		
Azusa, CA	•	•	•		•	•		•		•	•		•	•
Covina, CA	•	•	•		•	•		•		•	•		•	•
Cuiver City, CA	•	•			•	•				•			•	
Mountain View, CA	•	•	•		•	•				•			•	•
El Monte, CA	•	•	•								•	•	•	
Palm Springs, CA	•	•			•	•			•	•	•		•	•
San Clemente, CA	•	•			•	•				•	•		•	•
Santa Ana, CA	•	•	•	•	•	•		•		•	•		•	•
Springlake, CA	•	•	•	•	•	•		•		•	•		•	•
West Covina, CA	•	•	•		•	•		•		•	•		•	•
Madera Beach, FL	•	•	•		•	•		•		•	•		•	•
Miami, FL	•	•	•	•	•	•		•		•	•		•	•
Miami-Dade Co., FL	•	•	•	•	•	•		•		•	•		•	•
Pasco Co., FL					•	•				•	•		•	•
Pineillas Co., FL	•	•			•	•		•		•	•		•	•
Springfield, IL	•	•	•	•	•	•		•		•	•		•	•
Princeton, MA	•	•	•	•	•	•		•						
Northwest MO	•	•	•	•	•	•		•		•	•		•	•
Washington Twp., NJ		•	•	•	•	•				•			•	•
Nassau Co., NY					•	•		•		•			•	•

**FIRE AND EMERGENCY RESPONSE COMPONENTS
INCLUDED IN MASTER PLANS
(continued)**

COMMUNITIES	MASTER PLAN COMPONENTS													
	Prevention				Suppression				Emergency Response			Administration		
	Codes/Standards	Legislation Inspection/ Enforcement	Public Education	Arson Investigation	Staffing Strategies	Station Location	Water Supply	Emergency Medical Services	Hazardous Materials	Disaster Preparedness	Data Collection/ Analysis	Financing	Management Systems	Training
Winston-Salem, NC
Ashtabula Co., OH
S. Charleston, OH
Toledo, OH
Tulsa, OK
Tulsa-Creek Co., OK
Salem, OR
Sandy, OR
Carlisle, PA
Coatesville, PA
Lower Macungie Twp., PA
Middletown Twp., PA
Wescosville, PA
Williamsburg, PA
Greenwood, SC
McCormick Co., SC
Waccamaw Region, SC
Alamo Region, TX
Denison, TX
Richardson, TX
Orem, UT
Va. Beach, VA
Bellevue, WA

Source: Masterplanning Report to Congress, FEMA, August 1981

APPENDIX E
FIRE MASTER PLANNING COMMITTEE'S
DATA/INFORMATION CHART

DATA/INFORMATION PROGRESS CHART

<u>Date/Information</u>	<u>Responsibility</u>	<u>Method Design</u>	<u>Report of Method</u>	<u>Methodology Data Collection</u>	<u>Data Collection Complete</u>	<u>Data Analysis Report</u>
<u>Current Operations</u>	Chuck Gibson Ellen Gilliam with help					
<u>Apparatus</u>						. Define Current Service
- response records						
- location analysis						
- risk survey						
- location analysis						
<u>Personnel</u>						. Define Fire Situation
- suppression						
- inspection/						. Establish Goals Objectives
- prevention						
- administration						
- training						
- emergency						. Develop Policies and Concepts
<u>Equipment</u>						
<u>Programs</u>						. Develop Alternative Proposals
- suppression						
- inspection/						. Establish Selection Criteria
- prevention						
- administration						
- training						
- emergency						
<u>Fire Flow/Water Flow</u>	Lester Johnson					. Analyze Alternates
<u>Response Time</u>	Bernie Walsh					. Choose a System Concept
<u>Financing</u>	Bruce Suenram					. List Necessary Action
- property tax						
- business license						
- other						
<u>Legal/Interlocal</u>	Ann Englehart					. Prepare Cost Estimate
<u>Citizen Survey</u>	Karen Timchak					
<u>Fire Function Survey</u>	Karen Timchak					
<u>ISO Rating</u>	Bruce Suenram					

Source: Mayor's Office
City of Missoula,
October 1983

FOOTNOTES

¹Federal Emergency Management Agency, Fire in the United States, (U.S. Government Printing Office, July 1982), p. 14.

²Ibid., p. 14.

³Federal Emergency Management Agency, Master Planning Report to Congress, (U.S. Government Printing Office, August, 1981), p. 9.

⁴U. S. Department of Congress, A Basic Guide for Fire Prevention and Control Master Planning, (U. S. Government Printing Office, 1978), p. 2.

⁵Elinor Ostrom, ed., The Delivery of Urban Services - Outcomes of Change, (Beverly Hills: Sage Publications, 1976), p. 232.

⁶Ibid., p. Richard J. Aronson, Eli Schwartz, ed., Management Policies in Local Government Finance, (ICMA, 1975), p. 28.

⁷Ibid., p. 28.

⁸Coalition for Local Government Study, "Services Task Force Report - Fire Subcommittee," 30 September 1982, Missoula, Montana, p. 21,22.

⁹Ibid., Delivery of Urban Services, p. 232.

¹⁰Ibid., p. 235.

¹¹Ibid., Fire in the United States, p. 25.

¹²Ibid., The Delivery of Urban Services, p. 237-238.

¹³Andreas Faludi, Planning Theory, (New York: Pergamon Press, 1973), p. 36-38.

¹⁴Ibid., A Basic Guide for Fire Prevention and Control Master Planning, (U. S. Government Printing Office, 1978), p. 2.

¹⁵Ibid., p. 5.

¹⁶Ibid.

¹⁷Insurance Services Office, Fire Suppression Rating Schedule, (ISO, June, 1980).

¹⁸International City Management Association, Public Management, 59 (July 1977), p. 3.

¹⁹Ibid., p. 3.

- ²⁰Ibid., p. 8.
- ²¹Ibid., "Fire Sub-Committee Report," p. 12.
- ²²Ibid.
- ²³Ibid, p. 5, 6.
- ²⁴City of Missoula, Mayor's Office, Minutes of Fire and Emergency Services Master Planning Committee, May 1983.
- ²⁵Ibid., City of Missoula, Minutes, March 1984.
- ²⁶Ibid.
- ²⁷City of Missoula, City Attorney's Office, Memorandum Related to Fire Protection in the City and County, April 9, 1984.
- ²⁸Ibid.
- ²⁹Ibid., "Fire Sub-Committee Report," p. 23.
- ³⁰Ibid., City Attorney's Office Memorandum.
- ³¹Ibid.
- ³²Ibid.
- ³³Ibid., City of Missoula, Minutes, Memorandum of January 30, 1984.
- ³⁴Ibid., p. 5.
- ³⁵Ibid., Basic Guide, p. 22.
- ³⁶Ibid., Fire in the U.S., p. 173.
- ³⁷Charles H. Gibson, Assistant Fire Chief, Missoula Fire Department, interview held on January 1985.
- ³⁸Ibid., Delivery of Urban Services, p. 238-257.
- ³⁹Ibid., The Delivery of Urban Services, p. 249.

SELECTED BIBLIOGRAPHY

1. Aronson, Richard J., Schwartz, Eli, ed. Management Policies in Local Government Finance. International City Management Association, 1975.
2. Burns, Robert. "Master Planning For Fire Protection." Western City (August 1979): 10-11.
3. City of Missoula, Mayor's Office, Fire and Emergency Services Master Planning Committee. Minutes of Meetings of the Committee, January 1983-April 1984.
4. City of Missoula, Mayor's Office, Fire and Emergency Services Master Planning Committee. Status Report on Fire and Emergency Services Master Planning, March 8, 1984.
5. Coalition for Local Government Study, "Services Task Force Report - Fire Subcommittee." Missoula, September 30, 1982.
6. Faludi, Andreas. Planning Theory. New York: Pergamon Press, 1973.
7. Federal Emergency Management Agency. Fire in the United States. Washington D.C.: U. S. Government Printing Office, July 1982.
8. Federal Emergency Management Agency. Fire Risk Analysis: a Systems Approach, by National Emergency Training Center, National Fire Academy, December 15, 1983.
9. Federal Emergency Management Agency. Master Planning Report to Congress. Washington D. C.: U. S. Government Printing Office, August 1981.
10. Fire Engineering, "Master Fire Protection Plan." 126 (July 1973): 7:38-40.
11. Gibson, Charles H., Assistant Fire Chief, Missoula City Fire Department, Missoula, Montana, 16 January 1985.
12. Gilliam, Ellen. Administrative Aide. Mayor's Office, Missoula, Montana. Interview, 3 April 1984.
13. International City Management Association, Public Management 59 (July 1977) entire journal, Washington D.C.
14. Ostrom, Elinor, ed. The Delivery of Urban Services - Outcomes of Change. Beverly Hills: Urban Affairs Annual Reviews, Sage Publications, 1976.

15. Rapp, Brian; Patitucci, Frank M. Managing Local Government for Improved Performance: A Practical Approach. Boulder, Colorado: Westview Press, 1977.
16. Research Triangle Institute, International City Management Association. Municipal Fire Service Workbook. International City Management Association, May 1977.
17. Tax Symposium Institute. Financing Metropolitan Government, Princeton: Tax Institute, Inc., 1955.
18. U.S. Fire Administration, Office of Planning and Education. A Guide for Multijurisdictional Fire Protection Planning: A Draft Copy, by National Association of Counties Research, Inc., Ryland Research, Inc.
19. U.S. Department of Commerce. Urban Guide for Fire Prevention and Control Master Planning, prepared by Mountain View Fire Department, Los Angeles City Fire Dept., Mission Research Corp., U.S. Government Printing Office, 1977.
20. _____, A Basic Guide for Fire Prevention and Control Master Planning, prepared by Office of the Oklahoma State Fire Marshall, Mission Research Corp., Washington D.C.: U.S. Government Printing Office, 1978.
21. U.S. Fire Administration, Fire and Emergency Master Planning: Selected Bibliography on Master Planning, Final Report: Washington D.C.: Government Printing Office, November 1983.
22. U.S. Department of Commerce. America Burning - The Report of the National Commission on Fire Prevention and Control. Washington D.C.: Government Printing Office, 1974.
23. U.S. Fire Administration, FEMA. A Synopsis of A Study of Working Relationships Between Fire Departments and Other Municipal Services, by IMR Corporation. Washington, D.C.: Government Printing Office, October 1981.