

NO. 969

MARCH 1988

FIRE SERVICE DELIVERY SYSTEMS IN MICHIGAN

In 1986, 242 people died and 2,022 people were injured in fires in Michigan. The 69,942 reported fires caused an estimated \$256 million in property losses.

In 1987, three Detroit firefighters lost their lives in an arson fire in a downtown warehouse, and three volunteer firefighters died in a training fire in Milford.

Citizens Research Council has recently published a lengthy report on various fire department organizational structures, staffing levels, fire station siting, comparative fire loss and costs of fire protection. Report No. 287 includes detailed fire department survey results, a brief review of state statutes relating to fire service, descriptions of mutual aid pacts and regionalization, and case studies of departments which use volunteers, combinations of part-time and full-time firefighters, career firefighters, and public safety officers. This Council Comments summarizes that report, which is available upon request.

Fire service is a local option in Michigan. The ability of a community to support a fulltime fire department increases as property valuation and population increase, but not all small communities have inexpensive volunteer departments, and not all large cities have career departments. Communities have developed a variety of fire protection systems, with costs ranging up to the \$102.8 million budgeted for the Detroit Fire Department in 1987-88. For example, the village of Hamburg contracts with a private, non-profit fire department, which is owned by its members, while Lathrup Village contracts with the city of Southfield for fire protection. Hundreds of communities depend on unpaid volunteers to provide fire protection; others rely on firefighters who are paid by the hour, or by the fire, or through a volunteer association. Many others, including Detroit, support fulltime, paid departments, where career firefighters spend much of their time on stand-by, waiting for an opportunity to work. Still others, like Troy and Farmington Hills, combine the use of volunteer and full-time firefighters. Oak Park and Grosse Pointe Park are among the cities that have combined their police and fire protection functions into departments of public safety.

In order to determine what fire service delivery systems are being utilized by various sized communities, and to compare fire losses and community costs for different kinds of fire protection systems, a survey was sent to all Michigan fire departments protecting communities of over 7,000 population. That survey generated 181 usable responses; responding departments were categorized by the population and/or density of the primary community served and by departmental structure, broadly defined by the pay status of firefighters. In the report, "volunteer" refers to departments staffed only by on-call firefighters who serve as needed and receive no compensation whatsoever; these were the most poorly represented in the survey results. Departments staffed by on-call volunteer firefighters who receive some form of compensation, whether hourly, monthly, or through an assignment or association, are referred to as "part-time". Combination departments, labeled "P-T/F-T" in tables, employ both on-call, compensated volunteers and full-time, career firefighters; over 40% of responding departments were combination departments.

BOARD OF DIRECTORS

ROBERT F. MAGILL, President
DANIEL J. KELLY, Vice President
KENNETH AIRD
LOUIS BETANZOS
JAMES F. CORDES
GEORGE H. CRESS
HAROLD E. D'ORAZIO

ALFRED R. GLANCY
MICHAEL M. GLUSAC
CHARLES M. HEIDEL
JOHN J. HOLTON
R. BRUCE JOHNSON
DAVID K. LEAK
DAVID N. McCAMMON

FRANK H. MERLOTTI
JOSEPH F. PAQUETTE, JR.
J. MASON REYNOLDS
IRVING ROSE
WILL SCOTT
JOHN A. SIMONSON

HOWARD F. SIMS
F. ALAN SMITH
A. ROBERT STEVENSON
RICHARD C. VAN DUSEN
RICHARD WEBB
NORMAN B. WESTON

ROBERT L. QUELLER, Vice President-Executive Director

“Full-time” departments rely on career firefighters; these departments were found over the entire range of populations served, and in all responding departments representing communities of over 100,000 population. (The Detroit Fire Department is not included among the responding departments.) Twenty-one departments of public safety, employing public safety officers (PSOS) who function both as police officers and firefighters, responded to the survey. Tables containing survey responses from, and derived data for, all responding departments are included in Report #287.

Number Of Fire Departments Responding To Crc Survey

Population of Community Served	----- Type of Fire Department-----					Total
	Volunteer	Part- Time	P-T/F-T	Public Safety	Full- Time	
7,000- 9,999	1	14	11	5	1	32
10,000-19,999	2	21	27	9	7	66
20,000-29,999	0	5	19	3	4	31
30,000-39,999	1	4	8	1	8	22
40,000-59,999	0	0	2	3	7	12
60,000-79,999	0	0	4	0	3	7
80,000-99,999	0	0	2	0	3	5
100,000 and over	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>6</u>	<u>6</u>
Total	4	44	73	21	39	181

The average annual number of fires for responding communities in 1984-1986 was derived from the State Fire Marshal Division's Fire Incident Reporting System. These three-year averages for individual departments were then averaged within categories by population of primary service area and structure of department. Generally, the number of fires increased with the size of the community, and communities with volunteer and part-time departments reported fewer fires, while communities with full-time departments reported more.

Average Annual Number Of Fires Reported By Responding Departments, 1984-1986

Population of Community Served	----- Type of Fire Department-----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	39.7-	47.4	57.1	59.3	94.7+
10,000-19,999	70.3	68.6	81.9	53.2-	120.4+
20,000-29,999		123.9-	147.0	271.9+	185.0
30,000-39,999	48.7-	96.3	204.0	181.3	238.9+
40,000-59,999			246.3	142.1-	292.9+
60,000-79,999			301.3-		420.3+
80,000-99,999			582.5-		644.3+
100,000 and over					858.9

NOTE:“-” indicates smallest and “+” indicates largest average annual fire loss per population category.

There were an annual average of 6.2 fires per 1,000 population in responding departments in the 1984-1986 period. Generally, communities with full-time departments at any given population level tended to have higher fire frequencies. These data may reflect better reporting or more requests for service in communities with career departments, but they also may indicate that communities with more fires adopt more intensive fire protection options.

Average Annual Number Of Fires Per 1,000 Population In Responding Departments, 1984-1986

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	5.4-	6.1	6.9	7.2	11.3+
10,000-19,999	6.1	5.5	6.0	4.2-	8.9+
20,000-29,999		6.0-	6.3	13.6+	8.6
30,000-39,999	1.4-	2.9	5.9	5.0	6.7+
40,000-59,999			4.7	3.4-	6.0+
60,000-79,999			4.6-		5.5+
80,000-99,999			7.1-		8.7+
100,000 and over					6.0

The fire Marshal Division of the Michigan State Police annually reports the total value of property loss reported by each fire department: for the state, \$309.9 million was lost in 1984, \$272.0 million in 1985, and \$255.7 million in 1986. Responding departments accounted for between 53% and 59% of the non-Detroit losses for each year in the three-year period. Volunteer and part-time departments reported the lowest average annual fire loss in three of the four population categories in which they were represented. Combination departments reported the lowest average annual fire loss in three of the population categories.

Average Annual Dollar Fire Loss For Responding Departments, 1984-1986

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	\$ 242,383	\$ 202,419-	\$ 453,875+	\$ 233,638	\$ 232,838
10,000-19,999	301,458-	337,910+	312,795	328,859	316,084
20,000-29,999		599,117	514,858-	1,534,601+	1,260,392
30,000-39,999	281,777-	423,113	596,251	1,376,884+	1,268,629
40,000-59,999			976,121	613,914-	884,608
60,000-79,999			926,168-		1,335,684+
80,000-99,999			1,304,622-		6,447,407+
100,000 and over					2,725,148

The relative ability of fire service systems to control the dollar loss per fire is sometimes used to evaluate the effectiveness of different organizational structures. In the seven comparable categories based on population, combination departments reported the lowest average annual loss per fire in five categories. Both public safety and career departments reported the highest annual average loss per fire in three categories.

Average Annual Dollar Loss Per Fire For Responding Departments, 1984-1986

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	\$ 6,111	\$ 5,027	\$ 7,404+	\$ 3,882	\$ 2,460-
10,000-19,999	4,379	4,503	3,842-	5,054+	3,862
20,000-29,999		5,197	3,430-	4,822	5,390+
30,000-39,999	5,790	4,644	2,973-	7,593+	5,178
40,000-59,999			4,475	5,904+	3,437-
60,000-79,999			3,075-		3,156+
80,000-99,999			2,298-		11,743+
100,000 and over					3,122

Insurance Services Office (ISO) ratings rank communities on the basis of their physical conditions and fire defenses. Actual ISO ratings range from a low of 10 up to the grade 2 assigned to Detroit. Responding communities with volunteer departments were assessed the poorest ratings for fire insurance

purposes. Ratings improve from the left to the right of the chart, with full-time departments having the best ratings, and larger communities having better ratings than smaller communities.

Iso Ratings Of Communities Supporting Responding Fire Departments

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	8.50-	8.15	6.86	6.70	6.00+
10,000-19,999	8.75-	7.58	6.83	6.06	5.75+
20,000-29,999		7.40-	6.95	6.17	5.504
30,000-39,999	8.50-	7.75	6.86	5.00	4.75.+
40,000-59,999			8.50-	5.80	5.07-+
60,000-79,999			5.00-		4.00+
80,000-99,999			4.00+		4.33-
100,000 and over					3.50

Average departmental budgets were determined for each category of department using budget data from the 170 departments that did report their 1987-88 budgets. Costs for public safety departments are not comparable to costs for fire departments because PSOs provide both police and fire service; costs for these departments should only be compared within the public safety categories. Full-time departments are clearly the most expensive fire service option.

Average Budgets Reported By 170 Responding Departments In 1987

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999		\$ 85,169-	\$ 346,865	\$ 774,042	\$ 497,353+
10,000-19,999	\$ 78,565-	121,641	395,920	1,878,319	765,095+
20,000-29,999		243,593-	671,503	612,500	1,396,102+
30,000-39,999	22,000-	139,000	968,059	1,032,127	2,042,008+
40,000-59,999			2,432,928-	1,874,848	2,600,407+
60,000-79,999			1,889,576-		3,813,932+
80,000-99,999			2,038,209-		5,181,771+
100,000 and over					9,136,808

The survey used annual budgets as a surrogate for departmental costs. Cost (budget) per capita was calculated on the basis of population reported in the primary service area, which is the supporting community, not extended areas covered in mutual aid pacts. Costs are clearly related to the pay status of firefighters, with career departments being the most expensive.

Average 1987 Fire Department Budgets Per Capita For 170 Responding Departments

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	\$ 10.35-	\$40.32	\$ 90.05	\$ 59.21+	
10,000-19,999	\$ 6.86-	9.53	26.89	134.97	57.93+
20,000-29,999	11.64-	28.61	30.63	62.01+	
30,000-39,999	0.65-	4.32	27.46	28.18	56.55+
40,000-59,999			47.52-	54.10	53.53+
60,000-79,999			27.86-		50.02+
80,000-99,999			27.73-		64.14+
100,000 and over					63.64

Cost per square mile protected is another indicator of the relative expense of fire departments, which are generally supported through the property tax. For all sizes of communities, the budget per square mile

for part-time departments was measured in thousands, the budget for combination departments in tens of thousands, and the budget for full-time departments generally in hundreds of thousands.

Average Department Budget Per Square Mile In Primary Service Area 1987

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999		\$ 4,983-	\$ 65,893+	\$ 266,310	\$ 58,512
10,000-19,999	\$ 2,573-	2,909	40,367	561,886	184,442+
20,000-29,999		8,951-	55,908	16,947	365,639+
30,000-39,999	611-	3,125	70,054	198,486	244,292+
40,000-59,999			74,983-	164,393	127,963+
60,000-79,999			58,282-		262,272+
80,000-99,999			84,218-		204,979+
100,000 and over					259,944

Of the 181 departments which responded to the CRC survey, 177 provided sufficiently detailed descriptions of the primary service area to allow determination of the state equalized valuation (SEV) of property in that area. SEV per capita is a measure of the wealth of the supporting community. In six of the seven comparable population groupings, the wealthiest communities support combination departments.

Estimated 1986 Sev Per Capita In Communities Supporting Responding Departments

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	\$ 6,585-	\$ 10,370	\$ 13,006+	\$ 11,957	\$ 9,928
10,000-19,999	11,543	9,660-	10,662	13,239+	12,172
20,000-29,999		9,921	13,188+	7,220-	10,958
30,000-39,999	3,256-	5,767	11,469+	7,668	11,107
40,000-59,999			17,685+	9,555-	11,088
60,000-79,999			12,896+		9,009-
80,000-99,999			14,009+		9,006-
100,000 and over					11,302

According to data provided by the State Fire Marshal Division, in Michigan between 1984 and 1986 the number of paid, part-time firefighters increased from 12,614 to 13,075, while the number of career firefighters decreased from 7,714 to 7,512 and non-paid firefighters declined from 9,652 to 9,164. The following table shows the average number of firefighters in the 181 departments that responded to the CRC survey in 1987. For departments using volunteer and part-paid firefighters, these numbers represent the average of the maximum strength that could be brought to a fire scene, without mutual aid assistance.

AVERAGE NUMBER OF FIREFIGHTERS IN RESPONDING DEPARTMENTS

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	32.0+	23.6	28.3	29.2	15.0-
10,000-19,999	33.0+	31.5	32.8	38.7	18.0-
20,000-29,999		35.8	47.4+	52.7	31.8-
30,000-39,999	32.0-	36.3	69.5+	69.0	39.3
40,000-59,999			82.5+	64.0	54.7-
60,000-79,999			84.0+		78.3-
80,000-99,999					77.3
100,000 and over					147.8

If the ISO device of counting three volunteers as one full-time equivalent (FTE) firefighter is used, a staffing comparison can be made among differing types of departments. Among fire departments, combination departments have more full-time equivalents than volunteer and part-time departments, and full-time departments have more FTEs than combination departments. Public safety departments, which provide both police and fire protection, cannot be compared to departments which provide only fire service; they have more FTEs than other types of departments, but have more duties and frequently have different scheduling patterns as well.

AVERAGE NUMBER OF FTEs IN RESPONDING DEPARTMENTS

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	11.0	7.9-	14.2	22.0	15.0+
10,000-19,999	11.0	10.4-	15.3	33.1	18.0+
20,000-29,999		12.2-	23.3	45.0	27.8+
30,000-39,999	11.0-	12.0	34.4	69.0	36.3+
40,000-59,999			48.0-	63.7	54.7+
60,000-79,999			49.3-		78.3+
80,000-99,999			62.0-		77.3+
100,000 and over					147.8

The product derived by dividing the population of the primary service area by the number of FTEs provides some indication of the burden on both firefighters and taxpayers. Except for public safety departments, which are not comparable in this context, firefighters in career departments protect the fewest residents in six of seven comparable population categories - which of course increases the burden on those protected.

Average Number Of Persons Protected By Each Fte In Responding Departments

Population of Community Served	----- Type of Fire Department----				
	Volunteer	Part-Time	P-T/F-T	Public Safety	Full-Time
7,000- 9,999	662.4	1,038.1+	627.9	433.4	560.0-
10,000-19,999	1,054.3	1,324.4+	957.1	428.1	776.9-
20,000-29,999		1,932.5+	1,135.6	618.5	798.2-
30,000-39,999	3,090.9+	2,839.0	1,183.1	530.9	993.3-
40,000-59,999			1,118.8+	919.1	987.7-
60,000-79,999			512.9		1,081.1+
80,000-99,999			1,445.6+		1,279.8-
100,000 and over					1,249.8

The results of this survey of Michigan fire departments should be of interest to local officials in communities in which the fire service delivery system is being evaluated for adequacy and cost effectiveness.