Leaders at the Core of Better Communities

Data and Operational Analysis Report

Public Safety Services (Police / Fire / EMS)

Huron, Ohio

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ICMA Background

The International City/County Management Association (ICMA) is the premier local government leadership and management organization. Since 1914, ICMA's mission has been to create excellence in local governance by developing and advocating professional local government management worldwide. ICMA provides an information clearinghouse, technical assistance, training, and professional development to more than 9,000 city, town, and county experts and other individuals throughout the world.

ICMA Consulting Services

The ICMA Consulting Services team helps communities solve critical problems by providing management consulting support to local governments. One of ICMA Consulting Services' areas of expertise is public safety services, which encompasses the following areas and beyond: organizational development, leadership and ethics, training, assessment of calls for service workload, staffing requirements analysis, designing standards and hiring guidelines for police and fire chief recruitment, police/fire consolidation, community-oriented policing, and city/county/regional mergers.

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Part 1: Data Analysis Report – Police Operations

I. Introduction

This is the data analysis report on police operations for the city and township of Huron, Ohio, conducted by ICMA Consulting Services. The data analysis focuses on three main areas: workload, deployment, and response times. These three areas are almost exclusively related to patrol operations, which constitute by far the bulk of the Huron police department's personnel and financial commitment.

We developed all information in this data analysis report directly from data recorded in the department's dispatch center. The purpose of this report is to provide the city with our data analysis findings and to allow the police department to review and bring to our attention any dispatch information that may be inconsistent with other internal records of the department.

The analysis focused on two months: the winter month of February 2008 and the summer month of August 2008. Generally, we limit our analysis to four-week sample periods. In this case, the four-week periods were February 1 to February 28 and August 1 to August 28.

We make no recommendations in this data analysis report—our purpose here is to share information that we have developed from the source data to confirm its accuracy.

II. Data Analysis

The police operations data supplied by the police department required the attention of Sergeant Majoy, who combed through the department's dispatch logs in order to provide us with a useful set of data. We had the basic information needed to complete our analysis. The problems that we encountered and our solutions are detailed below.

- All of the records of calls for service contain times only for a single patrol unit. Clearly, multiple units often respond to calls, but we have no information regarding the times or number of secondary units.
- Because the dispatch log was recorded manually, times were recorded only to the nearest minute.
- A significant percentage of calls involving patrol units recorded zero officer time spent on scene. This included 59 percent of calls in February and 55 percent of calls in August. Most of these were investigations (which include building and neighborhood checks).
- The computer software generates a large number of call categories (more than 70), which we reduced to 13 categories for our tables and 8 categories for our figures.
- The dispatch center does not explicitly record a call's source. It is not obvious which calls were police initiated and which were "citizen" (called "other") initiated. We dealt with this in two distinct ways.
    - For February, we created our own criterion to make a judgment as to the likely source of the call. As police departments typically do, we classified as police or officer initiated calls those that were generated by the patrol officer in the field.
    - For August, Sergeant Majoy determined which calls were initiated by the patrol officer.

Before presenting our analysis of workload, deployment, and response times for the city of Huron's police operations, we briefly review the data we received. There were 1,516 calls for service in February 2008, with 1,470 calls in the first four weeks (excluding February 29). There were 1,852 calls for service in August 2008, with 1,660 calls in the first four weeks (excluding August 29 to August 31). As every officer on the police force, excluding the chief, performs patrol duties at least a portion of the time, no units were excluded from our analysis. In addition, when analyzing workloads and response times, we ignored calls with incorrect or missing time data. The inaccuracies included elapsed times that were either negative or exceeded eight hours. There were fewer than 20 calls each month with inaccurate and/or missing time data. From this point forward, we will focus on the two four-week periods in February 2008 and August 2008.

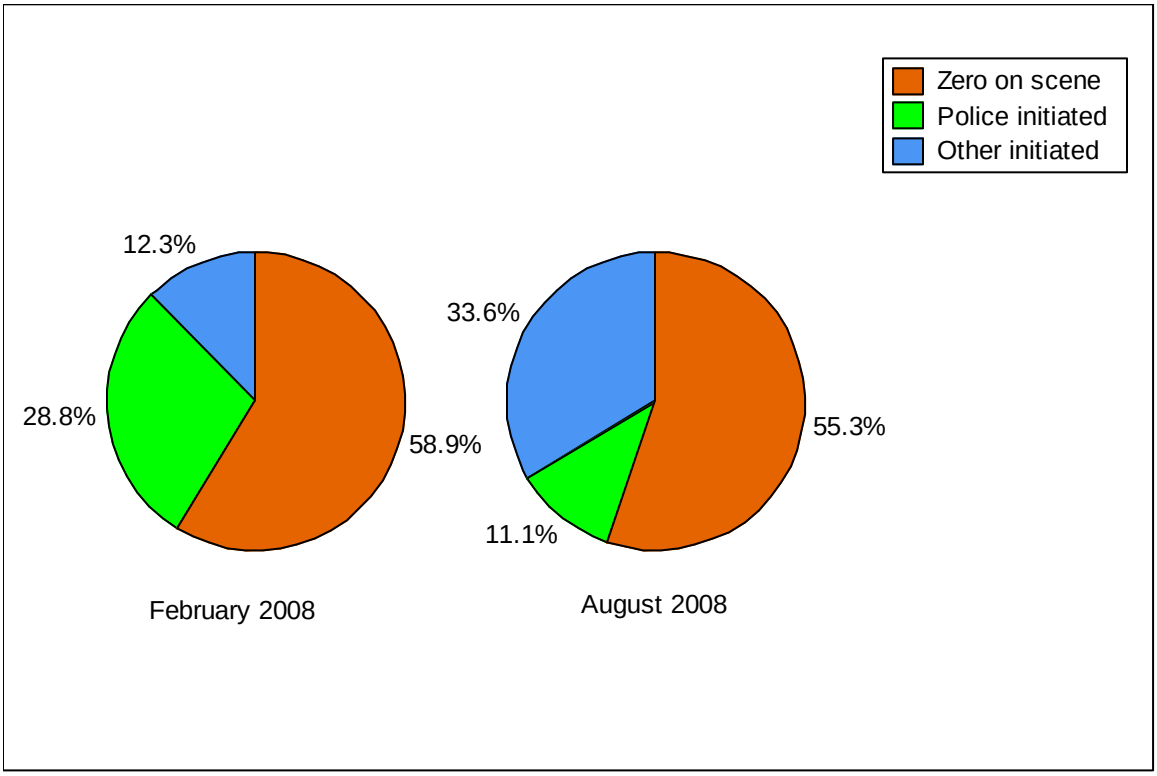
Workload

In February 2008, the police department reported 52 calls per day. In August, the police department reported 59 calls per day. As mentioned, more than 50 percent of these calls show no officer time spent on the call (referred to in the analysis as “zero-on-scene” calls).

For the workload analysis, we present two types of data: activity level and workload. Activity levels, shown in Figure 1 through Figure 3 and Table 1 through Table 3 are measured by the average number of calls per day, broken down by the origin of the calls and categorized by the nature of the calls (e.g., crime, traffic). Workloads, shown in Figure 4 through Figure 8 and Table 4 through Table 6, are measured in average work-hours per day. Activity levels indicate when a patrol unit was “out of service. The tables below use 13 call categories. For our figures, we have consolidated these into eight distinct categories. We show our categories below.

Table Categories	**Figure Categories**
Accidents	Traffic
Traffic enforcement	
Check/investigation	Investigations
Animal calls	General noncriminal
Miscellaneous	
Assist other agency	Assist other agency
Crime-persons	Crime
Crime-property	
Disturbance	Suspicious incident
Suspicious person/vehicle	
Juvenile	Juvenile
Prisoner-arrest	Arrest
Prisoner-transport	

Figure 1 -- Percentage of Calls per Day by Initiator by Month



Note: Percentages are based on a total of 69,433 calls.

Table 1 -- Calls per Day by Initiator by Month

Initiator	February 2008		August 2008	
	Total Calls	Calls per Day	Total Calls	Calls per Day
Zero on scene	867	31.0	924	33.0
Police initiated	425	15.2	183	6.5
Other initiated	165	5.9	553	19.8
Total	**1,457**	**52.0**	**1,660**	**59.3**

Note: Table excludes 13 calls in February with missing time data.

Observations:

- As stated earlier, more than half of all calls involved zero on-scene time. These calls are shown in this chart and table. Later, we will exclude calls with zero on-scene time.
- In February, where we estimated police-initiated calls, these calls exceeded other-initiated activities.

- In August, where we were supplied with a category describing officer-initiated incidents, these exceeded police-initiated activities.
- In February, there were 52 calls per day, or 2.2 calls per hour.
- In August, there were 59 calls per day, or 2.5 calls per hour.

Figure 2 -- Percentage of Calls per Day by Category and Month

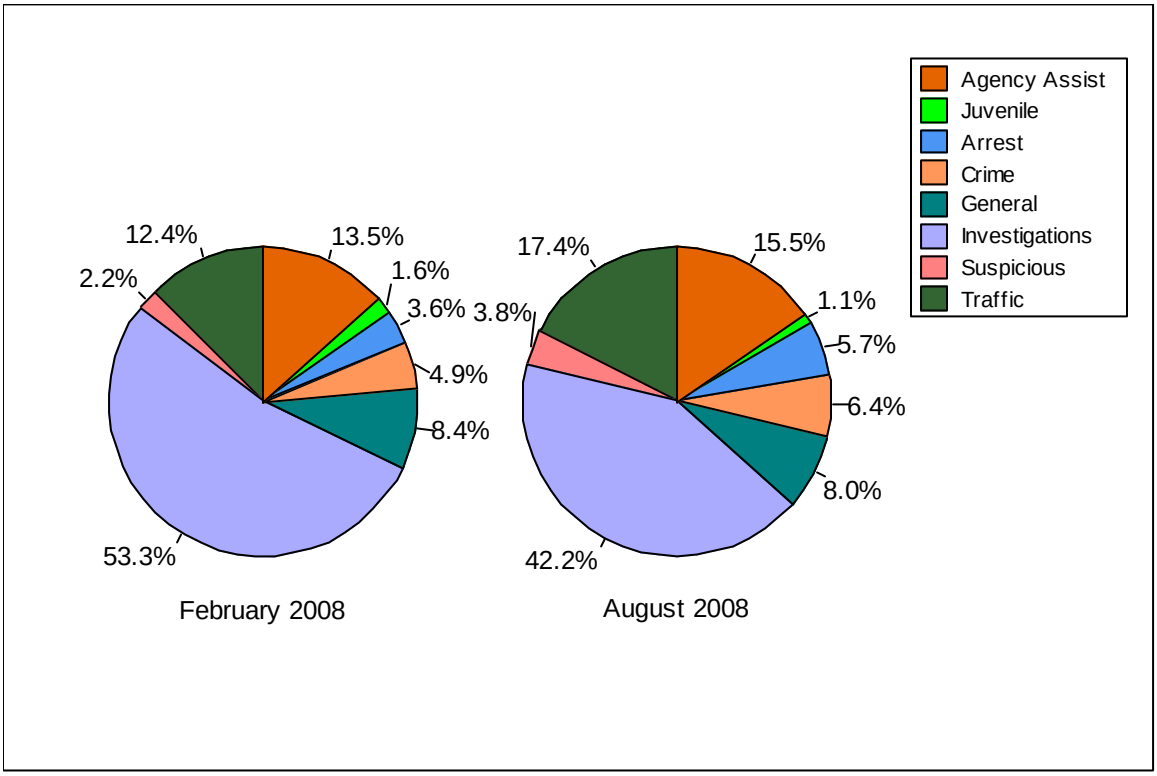


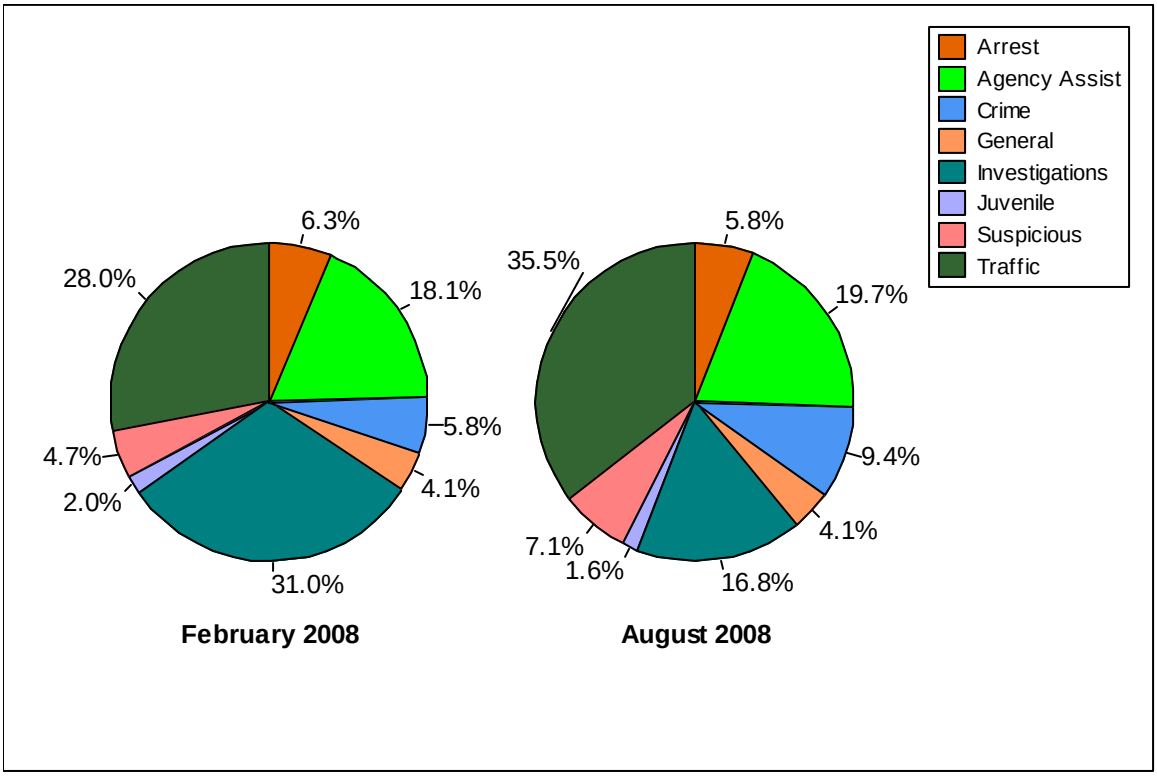
Table 2 -- Calls per Day by Category and Month

	February 2008		August 2008	
Categories	**Total Calls**	**Calls per Day**	**Total Calls**	**Calls per Day**
Accidents	13	0.5	22	0.8
Animal calls	7	0.3	15	0.5
Assist other agency	197	7.0	257	9.2
Check/investigation	777	27.8	700	25.0
Crime-persons	26	0.9	37	1.3
Crime-property	45	1.6	69	2.5
Disturbance	26	0.9	56	2.0
Juvenile	24	0.9	18	0.6
Miscellaneous	116	4.1	118	4.2
Prisoner-arrest	41	1.5	83	3.0
Prisoner-transport	11	0.4	11	0.4
Suspicious person/vehicle	6	0.2	7	0.3
Traffic enforcement	168	6.0	267	9.5
Total	**1,457**	**52.0**	**1,660**	**59.3**

Observations:

- In February, 12 percent of calls were traffic related. In August, 17 percent of calls were traffic related.
- In February, 53 percent of activities were investigations, including building and neighborhood checks. In August, 42 percent were in that category.
- In February, 5 percent of calls involved crimes. In August, 6 percent of calls involved crimes.

Figure 3 -- Percentage of Nonzero Calls per Day by Category and Month



Note: The chart and table exclude calls missing descriptions.

Table 3 – Nonzero-on-scene Calls per Day by Category and Month

	February 2008		August 2008	
Categories	**Total Calls**	**Calls per Day**	**Total Calls**	**Calls per Day**
Accidents	12	0.4	18	0.6
Animal calls	6	0.2	14	0.5
Assist other agency	107	3.8	145	5.2
Check/investigation	183	6.5	124	4.4
Crime-persons	13	0.5	28	1.0
Crime-property	21	0.8	41	1.5
Disturbance	22	0.8	48	1.7
Juvenile	12	0.4	12	0.4
Miscellaneous	18	0.6	16	0.6
Prisoner-arrest	27	1.0	32	1.1
Prisoner-transport	10	0.4	11	0.4
Suspicious person/vehicle	6	0.2	4	0.1
Traffic enforcement	153	5.5	243	8.7
Total	**590**	**21.1**	**736**	**26.3**

Observations:

- When zero-on-scene calls are excluded, there were only 21 calls per day in February, or 0.9 per hour.
- Similarly, there were only 26 calls per day in August, or 1.1 per day.
- In February, 28 percent of nonzero-on-scene calls were traffic related.
- Similarly, 36 percent of these calls were traffic related in August.
- In February, 6 percent of nonzero-on-scene calls were crimes.
- Similarly, 9 percent of these calls were crimes in August.
- In February, 31 percent of nonzero-on-scene calls were investigations.
- Similarly, 17 percent of these calls were investigations in August.

Figure 4 -- Average Busy Times by Category and Initiator for February 2008

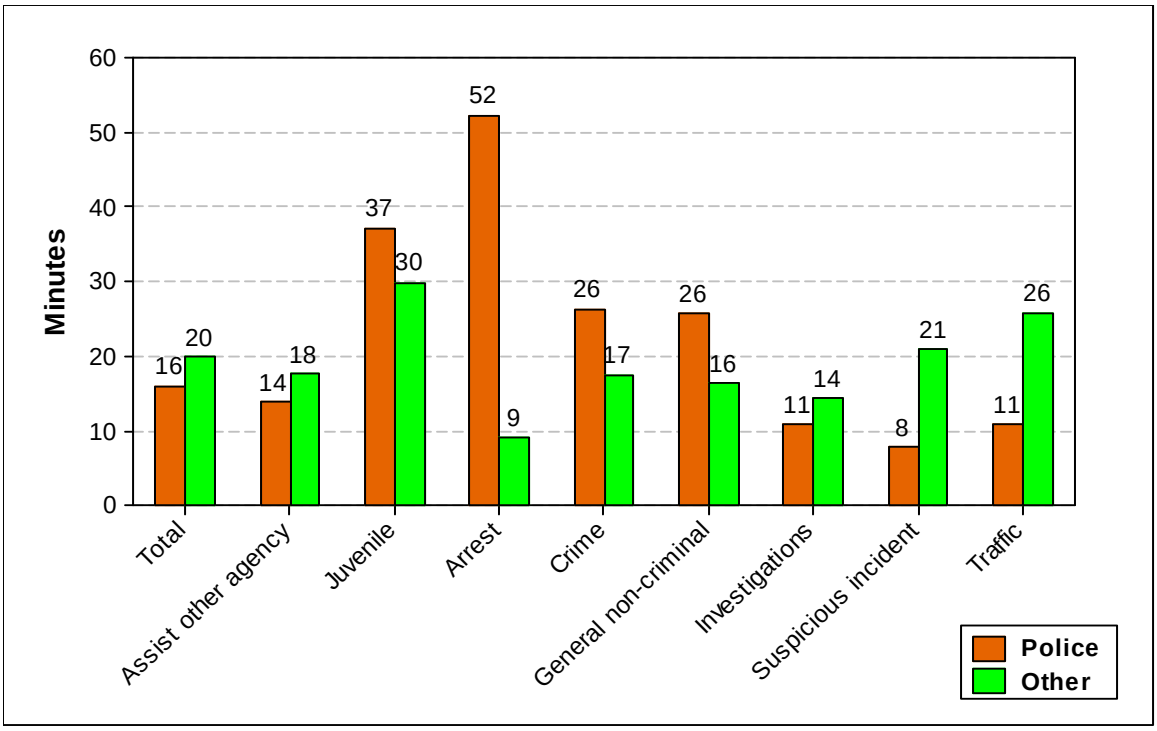


Table 4 -- Average Busy Times by Category and Initiator for February 2008

	Police Initiated		Other Initiated	
Categories	**Total Calls**	**Minutes**	**Total Calls**	**Minutes**
Accidents	1	7.0	11	34.3
Animal calls	2	14.5	4	35.3
Assist other agency	47	13.9	60	17.6
Check/investigation	180	10.8	3	14.3
Crime-persons	4	24.8	9	17.3
Crime-property	11	26.9	10	17.5
Disturbance	3	10.0	19	19.6
Juvenile	8	37.1	4	29.8
Miscellaneous	4	31.3	14	11.0
Prisoner-arrest	27	63.8	0	N/A
Prisoner-transport	9	17.7	1	9.0
Suspicious person/vehicle	1	1.0	5	26.0
Traffic enforcement	128	10.9	25	22.1
Total	**425**	**15.9**	**165**	**19.9**

Note: The chart and table exclude zero-on-scene calls.

Observations:

- Average time spent on a call (“busy time”) was between 1 and 64 minutes overall with significant variation by call type (see Table 4).
- The longest average times spent were 64 minutes on patrol-initiated prisoner arrests.
- Traffic-related calls averaged 11 minutes per call when police initiated and 22 minutes when other initiated.
- Other-initiated crime calls averaged 17 minutes per call, while police-initiated crime calls averaged 26 minutes per call.

Figure 5 -- Average Busy Times by Category and Initiator for August 2008

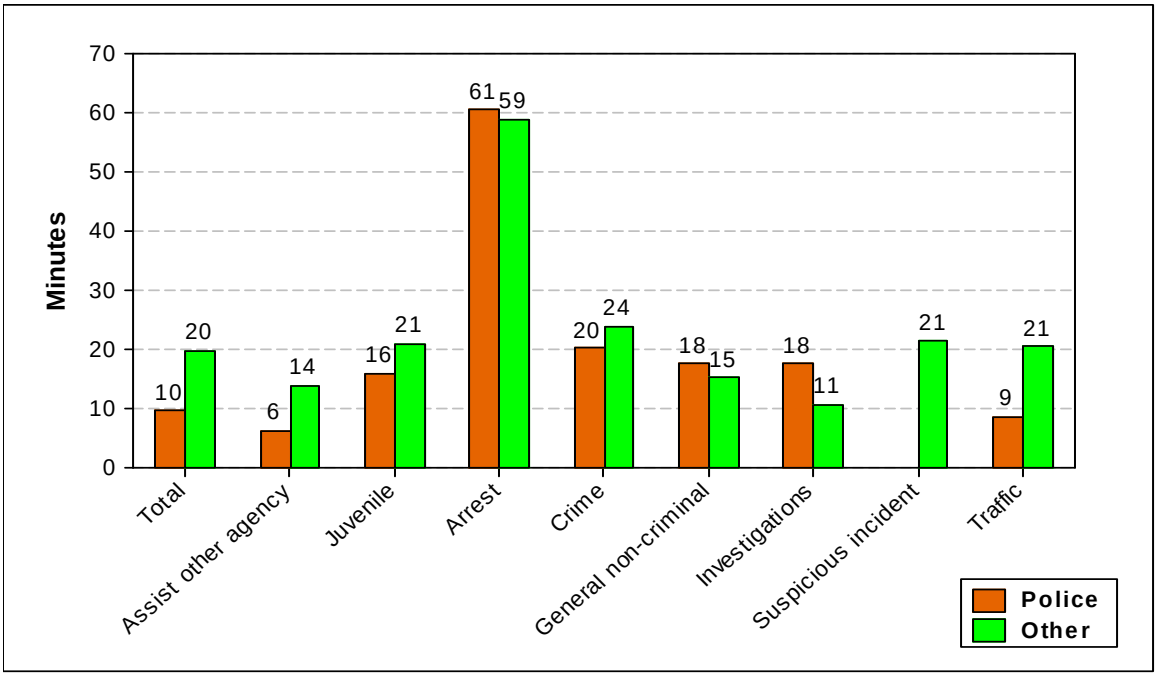


Table 5 -- Average Busy Times by Category and Initiator for August 2008

Categories	Police Initiated		Other Initiated	
	Total Calls	Minutes	Total Calls	Minutes
Accidents	0	N/A	18	23.2
Animal calls	2	17.5	12	20.8
Assist other agency	4	6.3	141	13.9
Check/investigation	2	17.5	122	10.7
Crime-persons	2	25.0	26	24.3
Crime-property	3	17.0	38	23.6
Disturbance	0	N/A	48	22.4
Juvenile	1	16.0	11	20.9
Miscellaneous	0	N/A	16	11.1
Prisoner-arrest	2	60.5	30	65.4
Prisoner-transport	0	N/A	11	41.2
Suspicious person/vehicle	0	N/A	4	10.0
Traffic enforcement	167	8.6	76	19.9
Total	**183**	**9.7**	**553**	**19.7**

Note: The chart and table exclude zero-on-scene calls.

Observations:

- Average time spent on a call was between 6 and 65 minutes overall with significant variation by call type (see Table 5).
- The longest average times spent were more than 60 minutes per call on prisoner arrests.
- Police-initiated traffic-related calls averaged 9 minutes per call, while other-initiated calls averaged 21 minutes per call.
- Other-initiated crime calls averaged 24 minutes per call, while police-initiated crime calls averaged 20 minutes per call.

Figure 6 -- Percentage of Calls and Work-hours by Category in February 2008

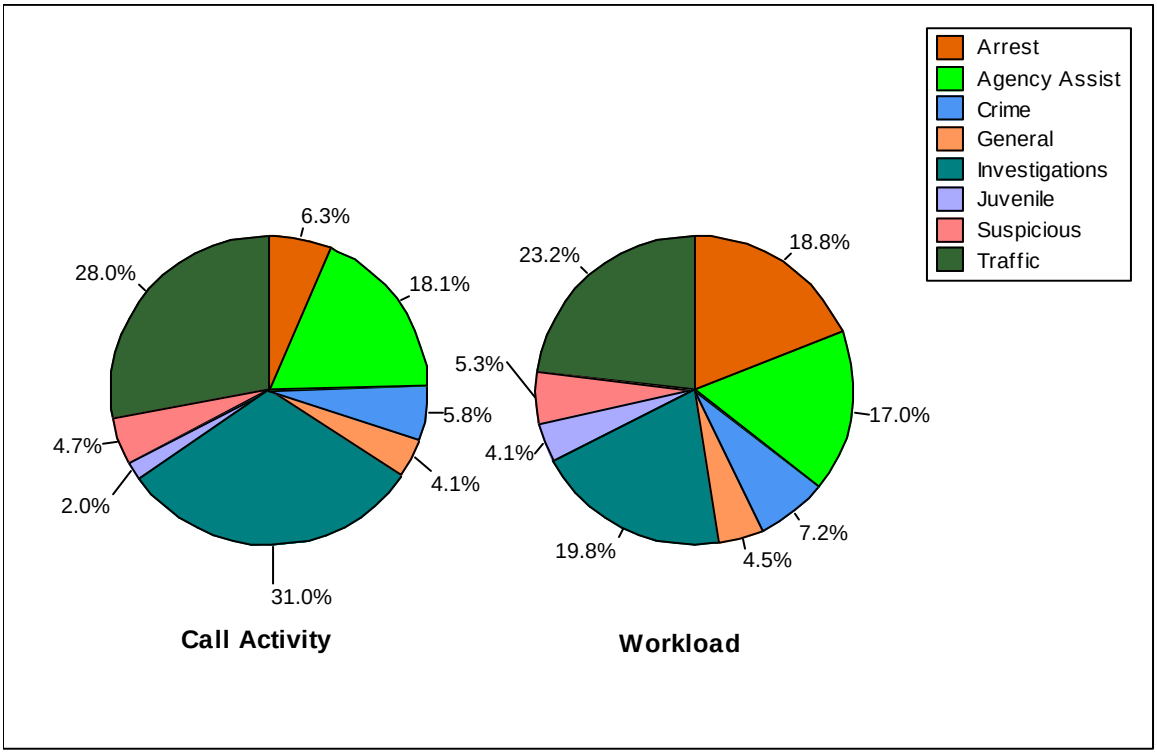
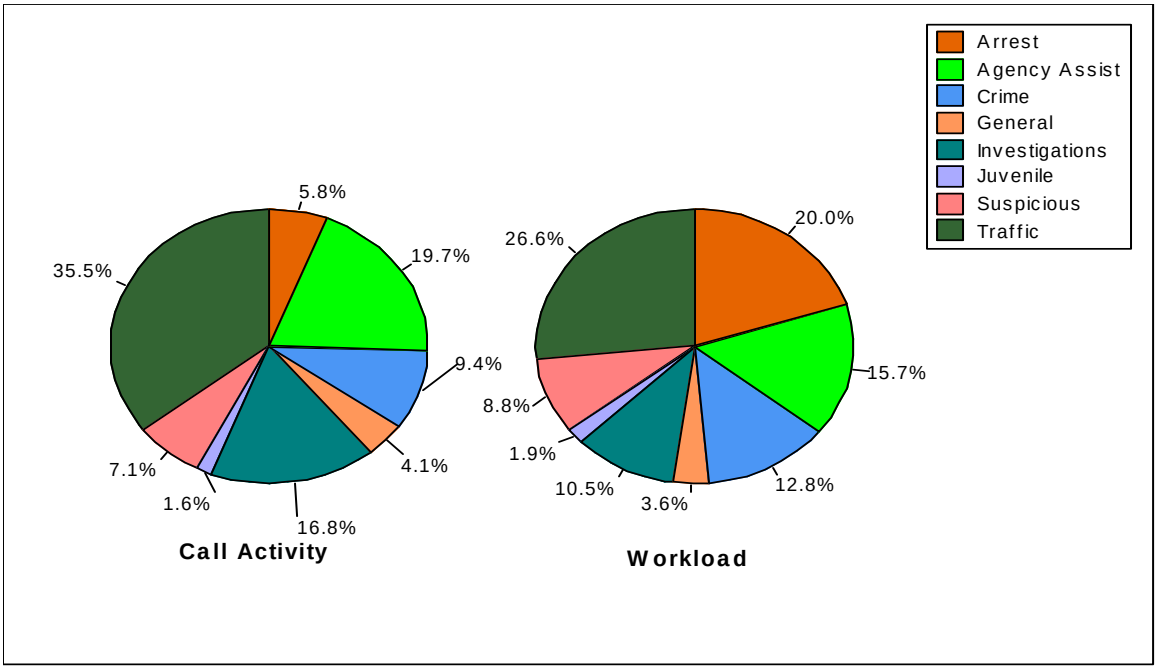


Figure 7 -- Percentage of Calls and Work-hours by Category in August 2008



Note: Calculations include only nonzero-on-scene calls.

Table 6 -- Calls and Work-hours per Day by Category and Month

Categories	February 2008		August 2008	
	Calls	Work-hours	Calls	Work-hours
Arrest	1.3	1.1	1.5	1.5
Assist other agency	3.8	1.0	5.2	1.2
Crime	1.2	0.4	2.5	1.0
General noncriminal	0.9	0.3	1.1	0.3
Investigations	6.5	1.2	4.4	0.8
Juvenile	0.4	0.2	0.4	0.1
Suspicious incident	1.0	0.3	1.9	0.7
Traffic	5.9	1.4	9.3	2.0
Total	**21.1**	**6.0**	**26.3**	**7.6**

February observations:

- There were a total of 21.1 calls per day, or 0.88 calls per hour.
- Total workload was 6.0 work-hours per day, or 0.25 personnel per hour.
- Traffic-related events constituted 28 percent of calls but only 23 percent of workload.
- Crimes constituted 6 percent of calls and 7 percent of workload.
- Investigations, including premise checks, represented 31 percent of calls and 20 percent of workload.

August observations:

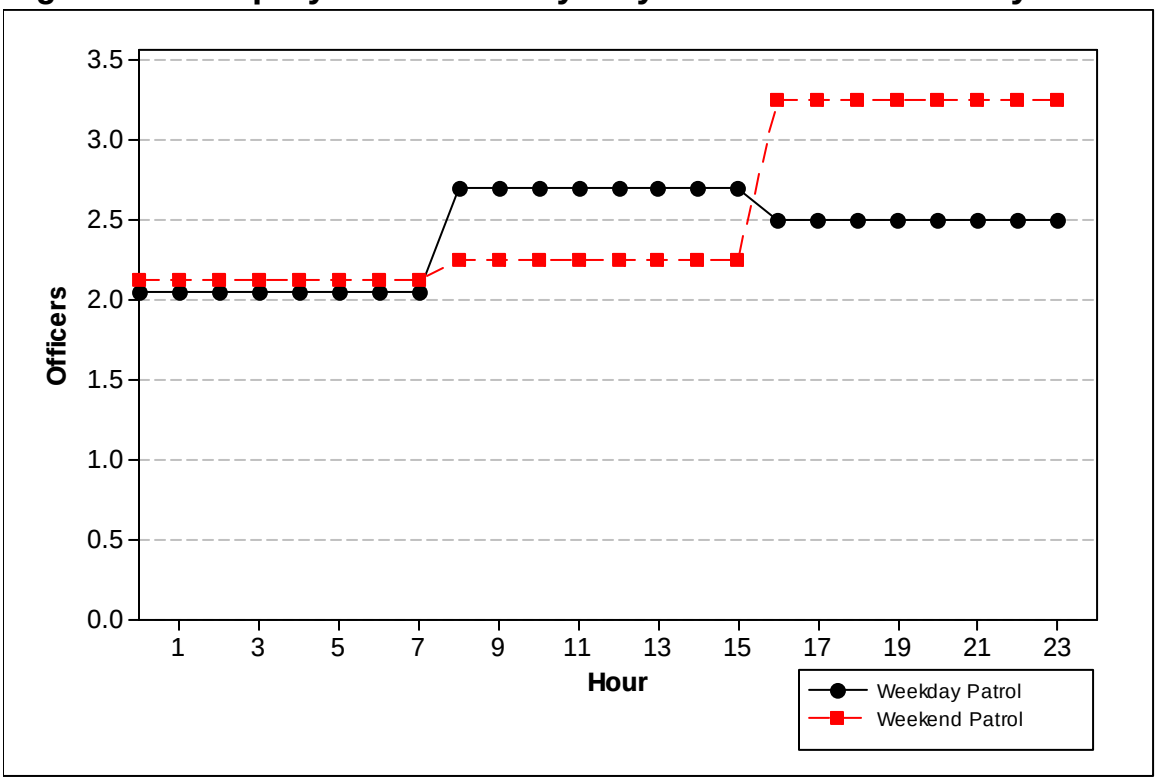
- In August, the total calls and workload were higher than in February.
- There were a total of 26.3 calls per day, or 1.1 calls per hour. This was 27 percent higher than in February.
- Total workload was 7.6 work-hours per day, or 0.32 personnel per hour. This was 25 percent higher than in February.
- Traffic-related events constituted 35 percent of calls but only 26 percent of workload.

- Crimes constituted 9 percent of calls and 13 percent of workload.
- Investigations, including premise checks, represented 17 percent of calls and 11 percent of workload.

Deployment

The department operates with three eight-hour shifts starting at 8 AM (morning shift), 4 PM (afternoon shift), and 12 AM (night shift), respectively. Along with regular patrol officers, the department has supervisors who perform patrol duties as a portion of their responsibilities. Our deployment figures make no distinction between officers and supervisors. The department deployed an average of 2.5 and 2.3 police officers during the 24-hour day in February and August 2008, respectively. Deployment varied a bit by season but much more between weekends and weekdays and by time of day.

Figure 8 -- Deployed Officers by Day of Week in February 2008



February observations:

- The average deployment was approximately 2.5 police officers but varied by day of week and time of day.
- There was a small variation (5 percent) between average deployed officers on the weekend and during the weekday.
- During the week, deployment reached as high as 2.7 officers during the day shift and dropped to as low as 2.1 officers during the night shift.
- On weekends, deployment reached as high as 3.3 officers during the evening shift and dropped to as low as 2.1 officers during the night shift.

Figure 9 -- Deployment Versus Workload on Weekdays in February 2008

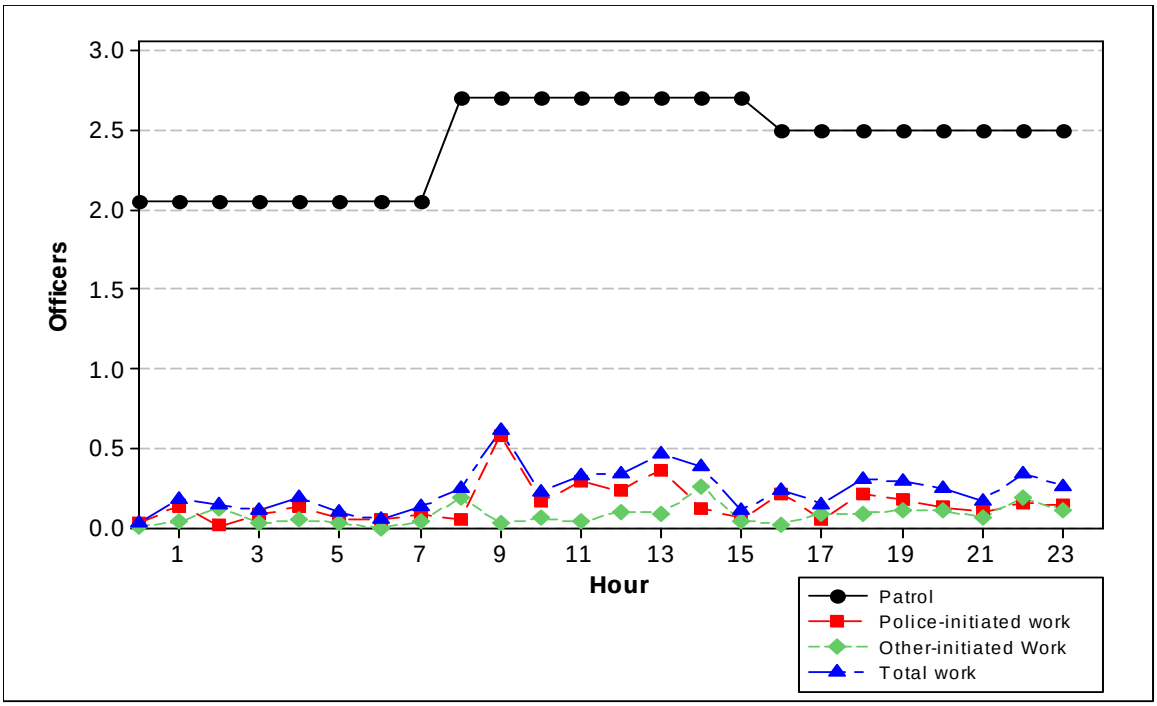
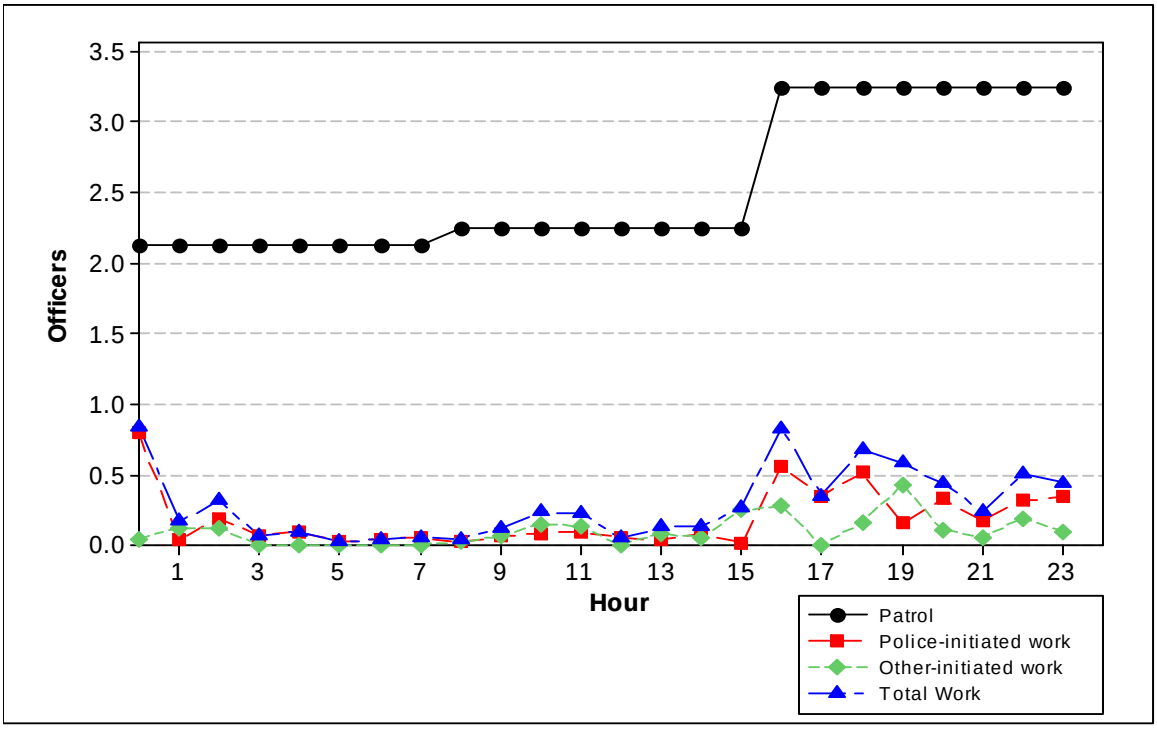


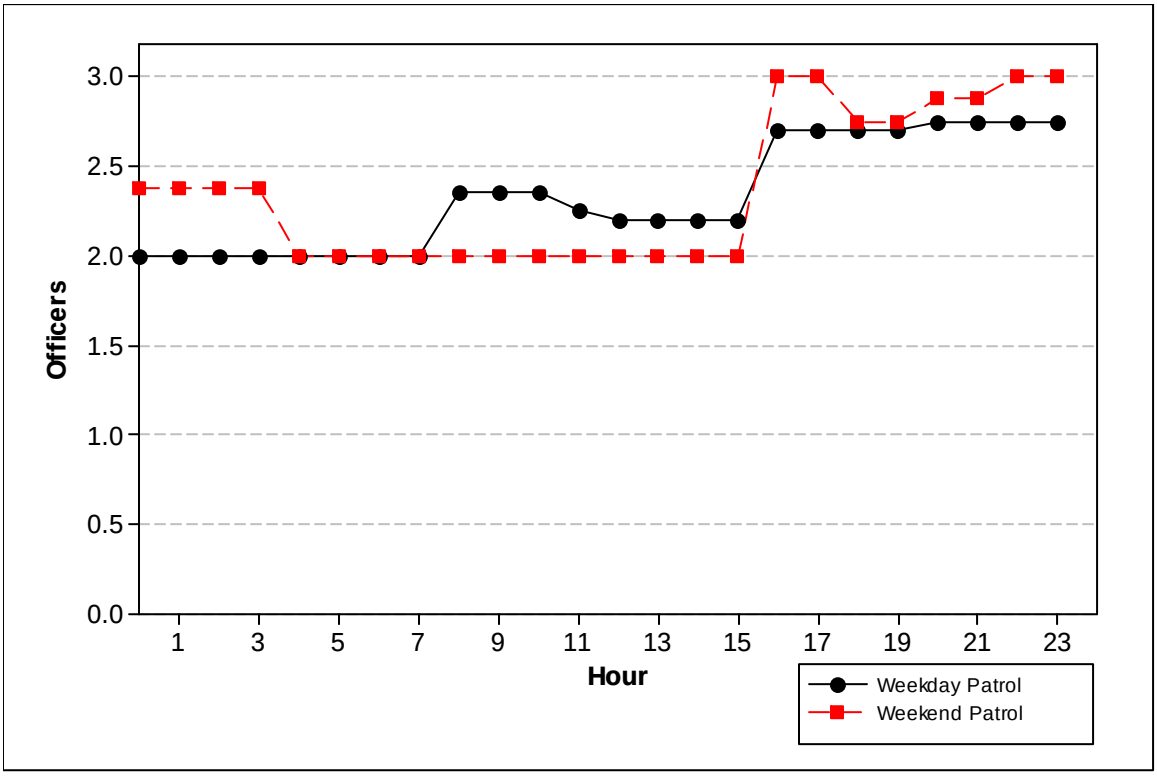
Figure 10 -- Deployment Versus Workload on Weekends in February 2008



February observations:

- During the week, patrol workload averaged 0.24 personnel per hour.
- This was 10 percent of deployment. This means that patrol officers spent 10 percent of their time on patrol-related activities.
- During the week, patrol workload dropped to as low as 2 percent of deployment between midnight and 1 AM and as high as 23 percent of deployment between 9 AM and 10 AM.
- On the weekends, patrol workload averaged 0.29 personnel per hour.
- This was 11 percent of deployment.
- On the weekends, patrol workload dropped to as low as 1 percent of deployment between 5 AM and 6 AM and as high as 39 percent of deployment between midnight and 1 AM.

Figure 11 -- Deployed Officers by Day of Week in August 2008



August observations:

- The average number of officers deployed in August was similar to the average in February. Weekday deployment was 8 percent lower than in February.
- Deployment averaged 2.3 officers during the week and 2.4 officers on weekends.
- Deployment varied during the day.
- During the week, deployment reached as high as 2.7 officers during the evening shift and dropped to as low as 2.0 officers during the night shift.
- On the weekends, deployment reached as high as 3.0 officers between 4 PM and 6 PM and dropped to as low as 2.0 officers between 4 AM and 4 PM.

Figure 12 -- Deployment Versus Workload on Weekdays in August 2008

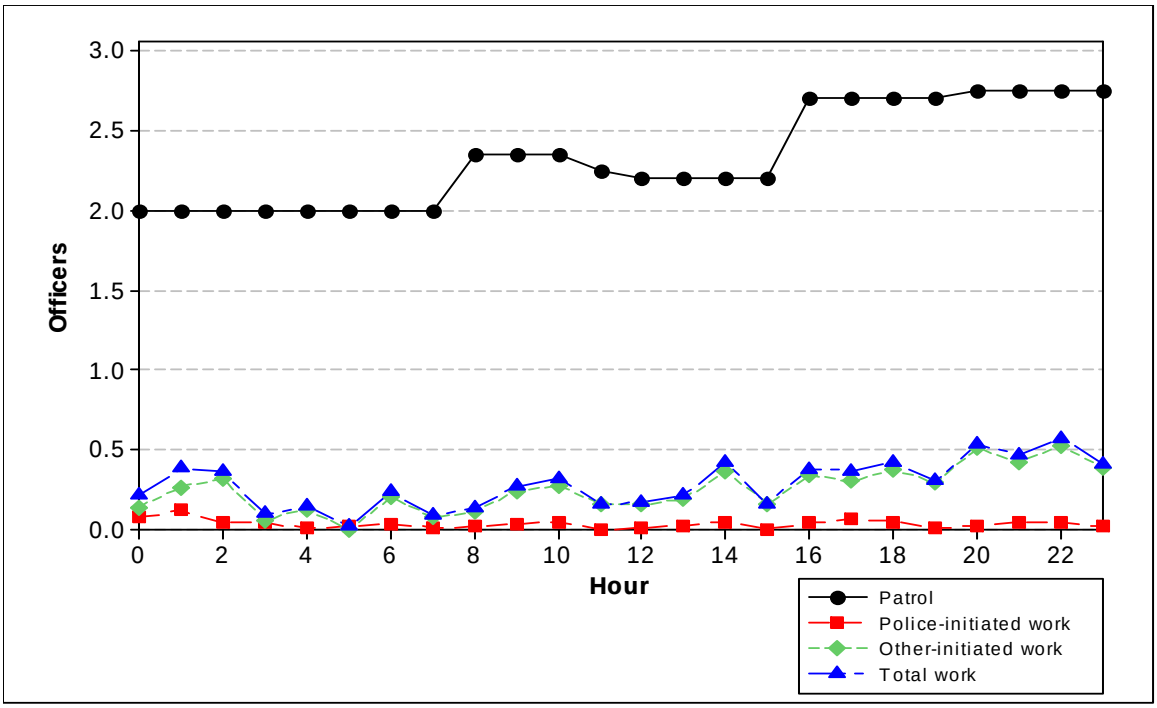
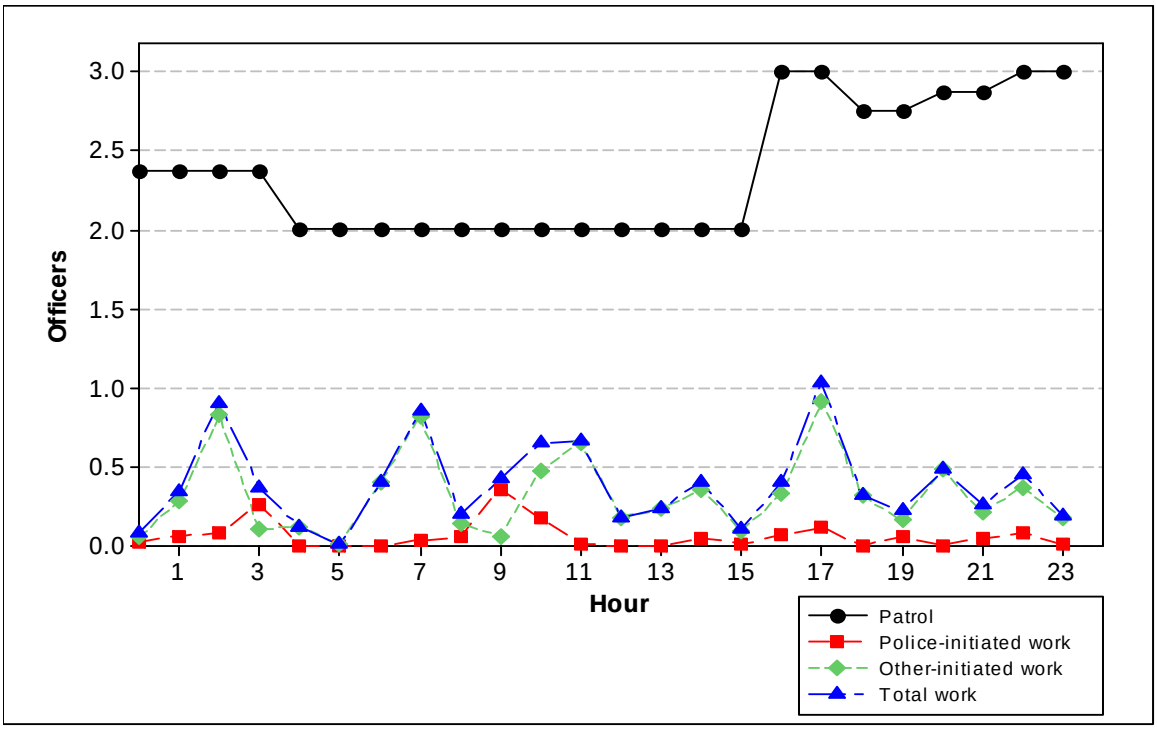


Figure 13 -- Deployment Versus Workload on Weekends in August 2008



August observations:

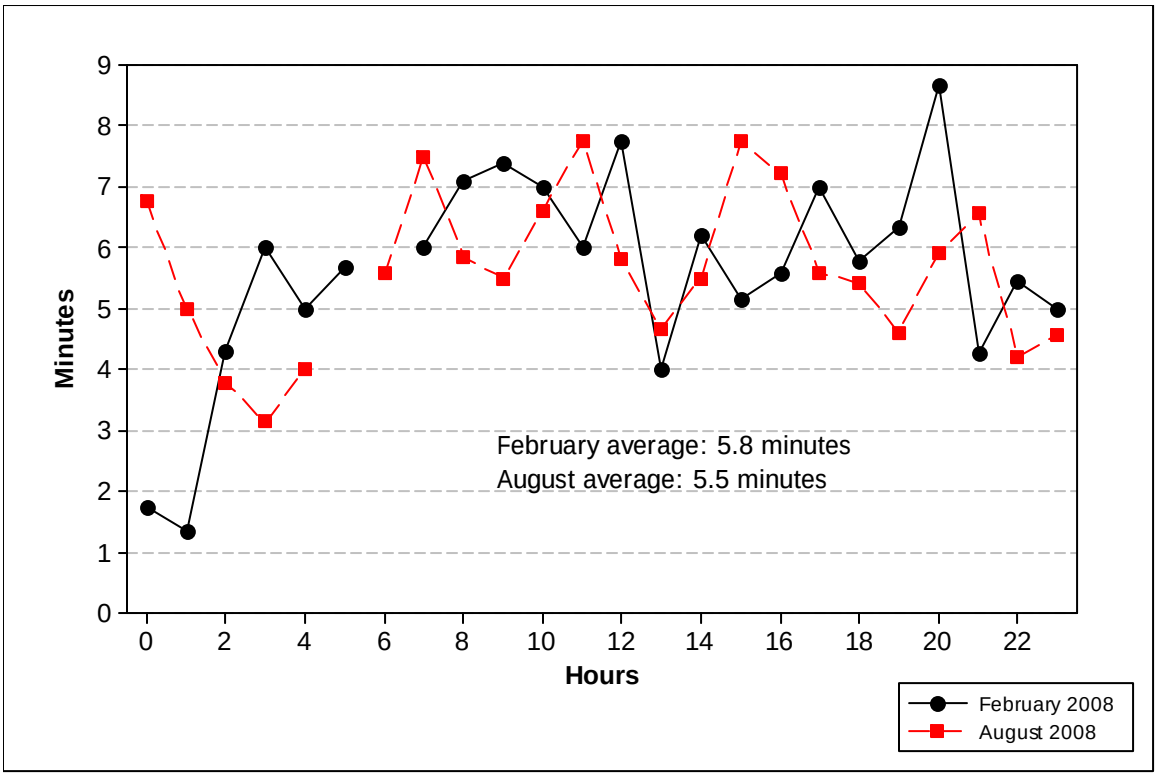
- During the week, patrol workload averaged 0.29 personnel per hour.
- This was 12 percent of deployment. This means that patrol officers spent 12 percent of their time on patrol-related activities.
- During the week, patrol workload dropped to as low as 1 percent of deployment between 5 AM and 6 AM and was as high as 21 percent of deployment between 10 PM and 11 PM.
- On the weekends, patrol workload averaged 0.39 personnel per hour.
- This was 17 percent of deployment.
- On the weekends, the patrol workload dropped to as low as 1 percent of deployment between 5 AM and 6 AM and was as high as 43 percent of deployment between 7 AM and 8 AM.

Response Times

We analyzed the response times for various types of calls, separating the duration into dispatch and travel times. First, we discuss statistics that include all calls combined. We analyzed several types of calls to determine whether response times varied by call type. To better understand response times, the ICMA team calculated the cumulative distribution function (CDF) of response time for three types of calls. We calculated the dispatch delay, travel time, and total response time.

Before presenting Figures 14–19 and Tables 7–9, we summarize all of the observations. We started with 1,470 and 1,660 calls for February and August 2008, respectively. When we limited our analysis to calls that were other initiated, with nonzero on-scene times and nonzero response times, the number of calls shrank considerably. This left 165 calls in February 2008 and 272 calls in August 2008.

Figure 14 -- Average Response Time by Hour of Day for February and August 2008



Observations:

- Average response times varied significantly by time of day.
- They were 6 percent lower on average in August than in February 2008.
- In February, the longest response times were between 8 PM and 9 PM with an average of 8.7 minutes, and the shortest response times were between 1 AM and 2 AM with an average of 1.3 minutes.
- In August, the longest response times were between 11 AM and noon and 3 PM and 4 PM with an average of 7.8 minutes, and the shortest response times were between 3 AM and 4 AM with an average of 3.1 minutes.
- Averages by time of day should be treated with caution. Different hours of the day include as few as 1 call to as many as 23 calls from

which to form an average. There are gaps in the graph because there were no calls for some hours of the day.

Reading the Cumulative Distribution Function Charts

The vertical axis of the CDF is the probability or percentage of calls. The horizontal axis is the time of dispatch delay, travel time, or total response time. For example, approximately 90 percent of all calls in August 2008 experienced a dispatch delay of 0 minutes. (The 90 percent line intersects the curve for August at the 0 minute mark.) For response time, 90 percent of all calls experienced a dispatch delay of 11 minutes for February and 10 minutes for August.

Figure 15 – CDF of Dispatch Delay

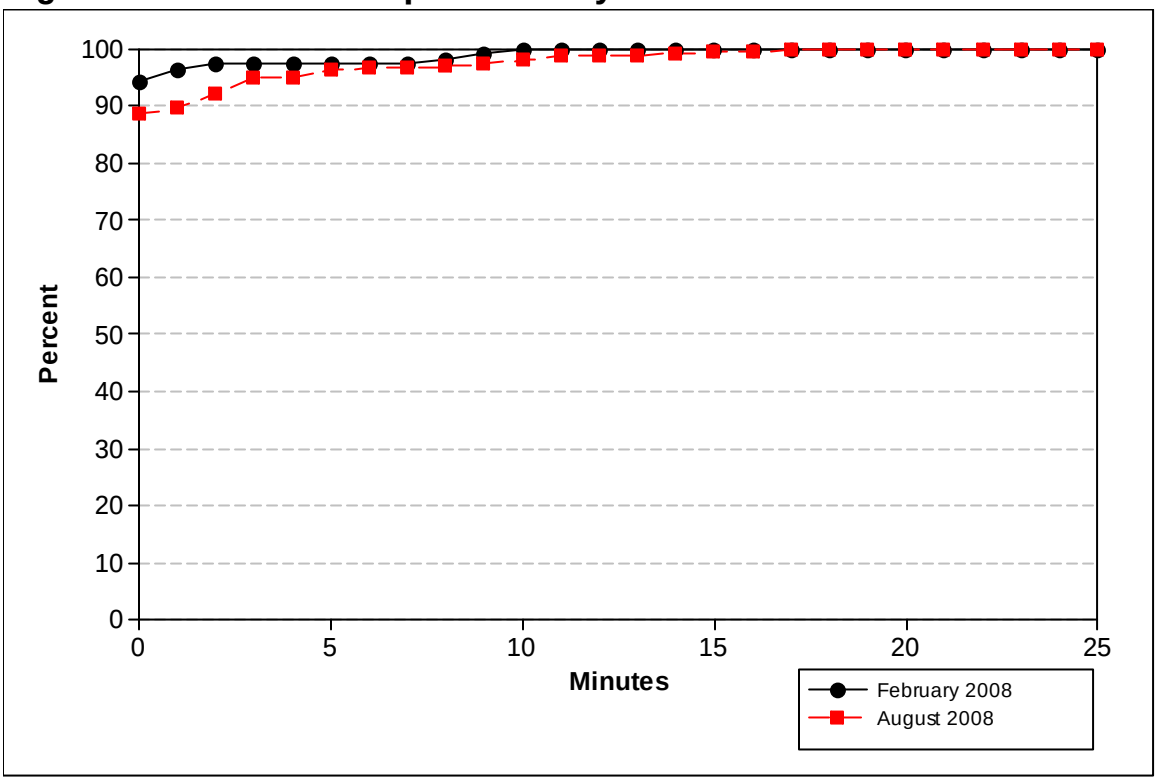


Figure 16 -- CDF of Travel Time

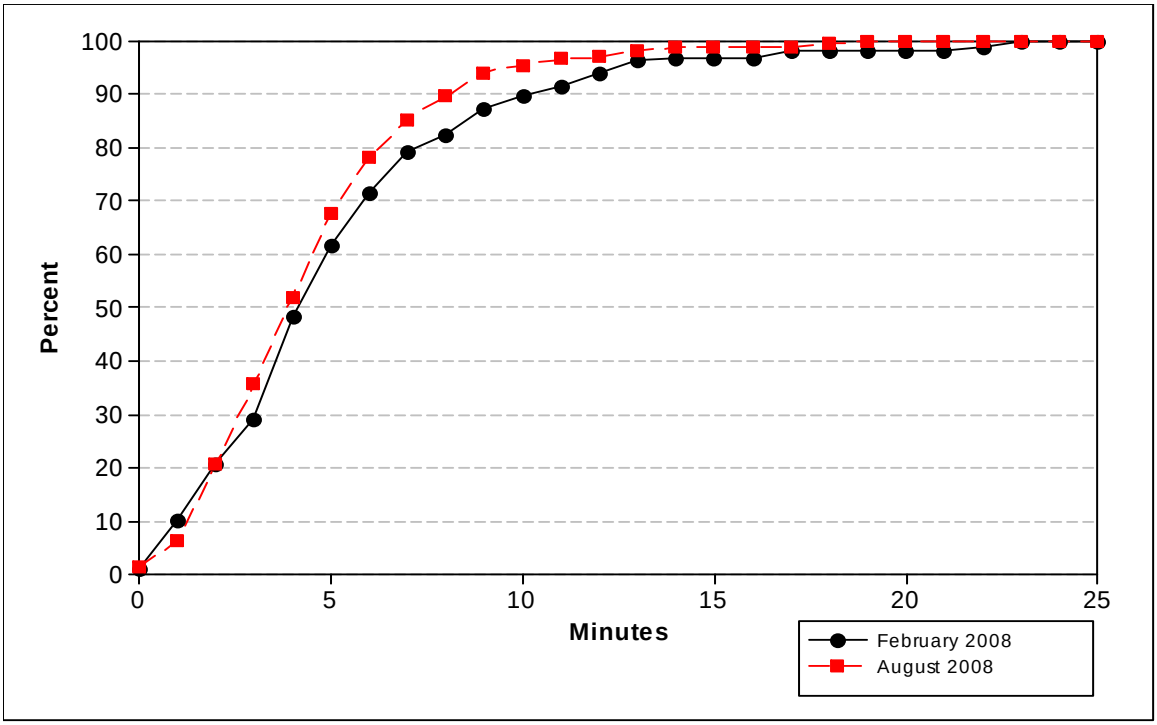


Figure 17 -- CDF of Response Time

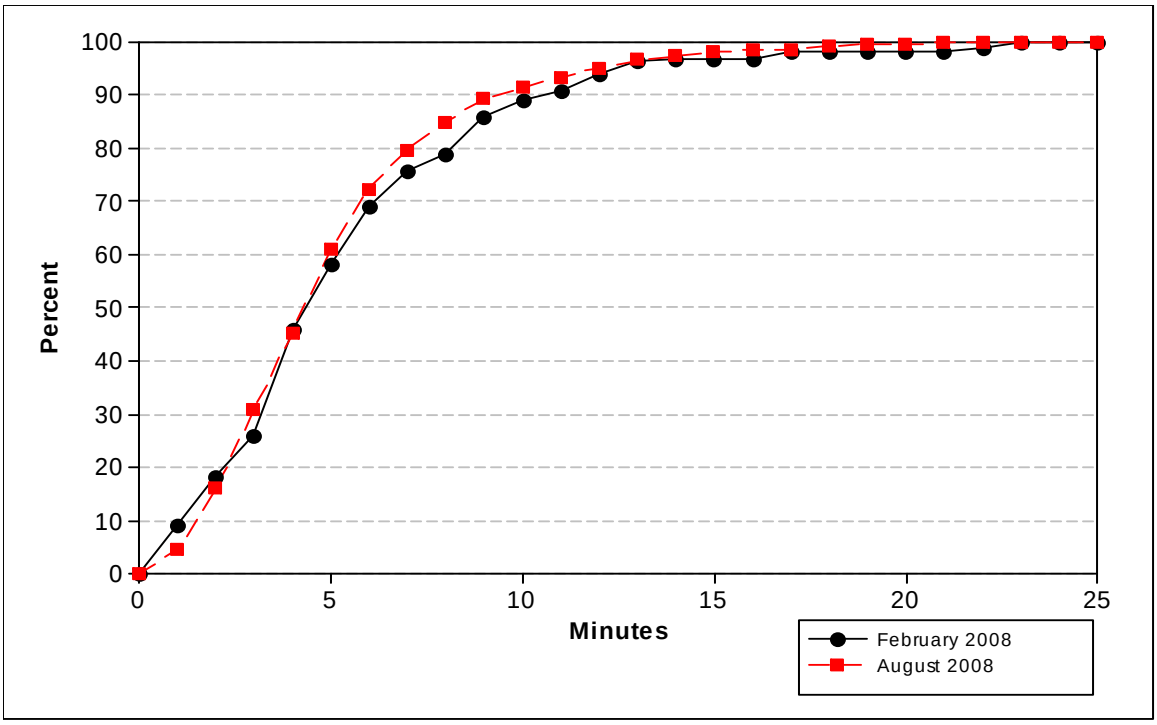


Figure 18 -- Average Dispatch, Travel, and Response Times in February 2008

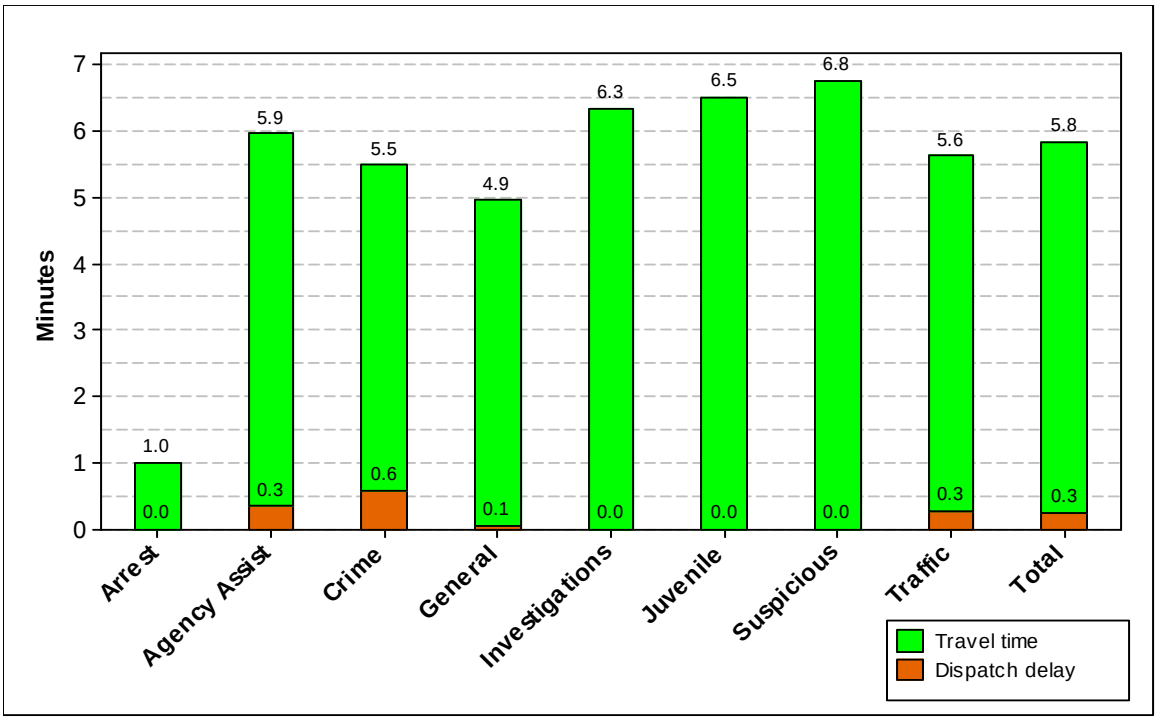


Figure 19 -- Average Dispatch, Travel, and Response Times in August 2008

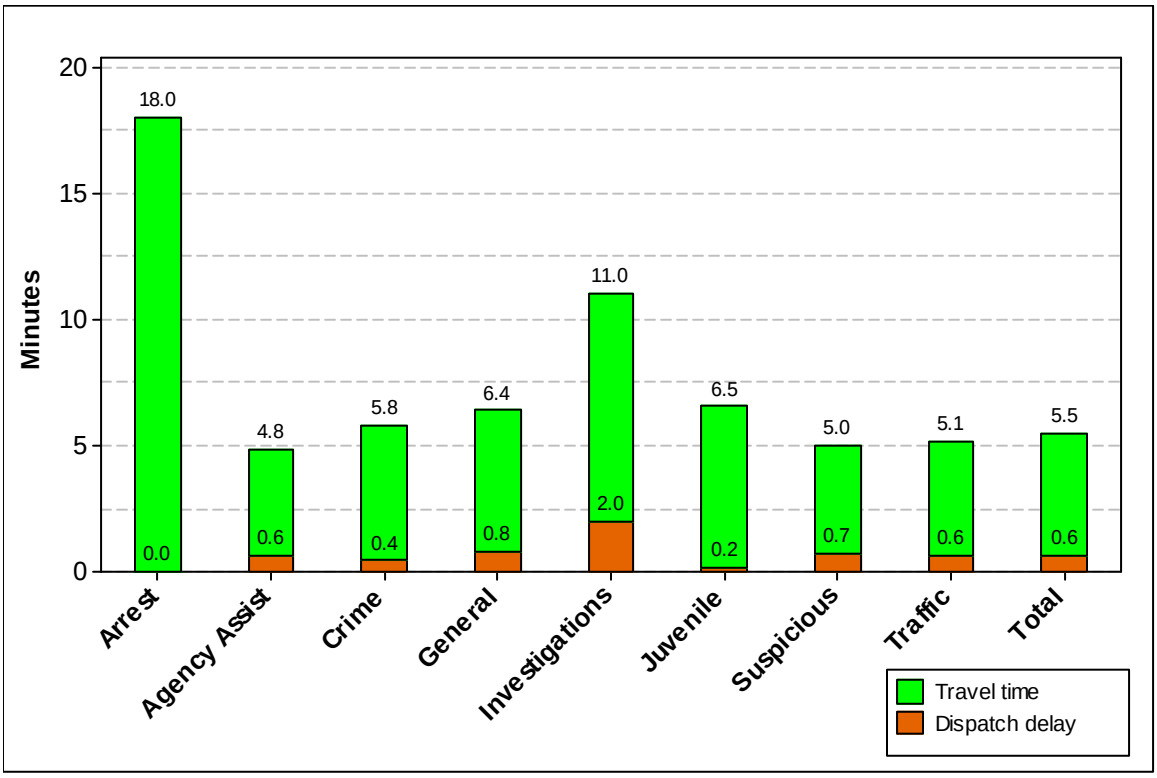


Table 7 -- Average Dispatch, Travel, and Response Times by Category

Category	February 2008			August 2008		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Arrest	0.0	1.0	1.0	0.0	18.0	18.0
Assist other agency	0.4	5.6	6.0	0.6	4.2	4.8
Crime	0.6	4.9	5.5	0.4	5.3	5.8
General noncriminal	0.1	4.9	4.9	0.8	5.6	6.4
Investigations	0.0	6.3	6.3	2.0	9.0	11.0
Juvenile	0.0	6.5	6.5	0.2	6.4	6.5
Suspicious incidents	0.0	6.8	6.8	0.7	4.3	5.0
Traffic related	0.3	5.3	5.6	0.6	4.5	5.1
Total	**0.3**	**5.6**	**5.8**	**0.6**	**4.9**	**5.5**

Table 8 -- 90th Percentile Dispatch, Travel, and Response Times by Category

Category	February 2008			August 2008		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Arrest	0.0	1.0	1.0	0.0	18.0	18.0
Assist other agency	0.0	11.0	11.0	2.0	7.1	9.0
Crime	2.0	9.0	9.0	0.0	9.0	11.0
General noncriminal	0.1	10.4	10.4	3.0	10.0	10.8
Investigations	0.0	11.0	11.0	8.0	19.0	19.0
Juvenile	0.0	17.0	17.0	1.6	9.0	9.0
Suspicious incidents	0.0	22.5	22.5	2.2	7.0	7.2
Traffic related	0.0	10.6	12.0	0.0	7.0	10.0
Total	**0.0**	**11.0**	**11.0**	**2.0**	**9.0**	**10.0**

Table 9 -- Total Calls with Response Times by Month and Category

Category	Total Calls	
	February	August
Arrest	1	2
Assist other agency	60	78
Crime	19	50
General noncriminal	18	21
Investigations	3	4
Juvenile	4	11
Suspicious incidents	24	47
Traffic related	36	59
Total	**165**	**272**

Observations:

- Response times varied significantly by call category.
- Average response times were as short as 1.0 minute (for arrests) and as long as 6.8 minutes (for suspicious incidents) in February, and as short as 4.8 minutes (for agency assists) and as long as 18.0 minutes (for arrests) in August.
- Average dispatch delays varied between 0.0 (for arrests) and 0.6 minutes (for crimes) in February and between 0.0 (for arrests) and 2.0 minutes (for suspicious incidents) in August.
- 90^{th} percentile values for response times for different call categories were as short as 1.0 minute and as long as 22.5 minutes in February and as short as 7.2 minutes and as long as 19.0 minutes in August.
- Overall average travel time and 90^{th} percentile values barely changed from February to August.

Part 2: Data Analysis Report – Fire/Emergency Medical Service (EMS) Operations

Part I. Aggregate Call Totals and Dispatches

The data include calls between 01/01/2007 and 12/31/2007. Duplicate records (those with the same call arrival time, unit ID, and crew name) were removed, as were the records of fire chief cars. Categorization of call type is based on the incident description and designed to match the call types reported in the 2007 Fire service annual report. We counted 1,348 calls in 2007, an average of 3.7 calls per day. The EMS calls totaled 1126 (83.5%), more than the total of 1,069 EMS responses reported in the fire department's annual report. The fire calls totaled 222 (16.5%), matching the fire responses reported in the annual report. Unfortunately, in 142 instances the same incident number was assigned to two distinct calls in totally different time periods; this represents approximately 10% of the total. This may cause a slight underestimation of specific unit workloads.

Table 1—Call Types

Table 2—EMS Calls by Area (only EMS calls record the dispatch jurisdiction)

Figure 3—Fire Service Calls Partitioned by Type and Duration (in the format of branches of a tree)

Figures 4—EMS and Fire calls by Type of Call (pie chart)

Figure and Tables 5—Calls by Month

Figure 6—Calls by Hour of Day

Table and Figures 7—Number of Units Dispatched to Fire Category Calls

Part II. Workloads by Individual Unit—Calls and Total Time Spent

In this part, we report two types of statistics: dispatches and workload. In Part I we reported 1,348 calls, but because multiple units are often sent, the total number of dispatched units we analyzed was 2,229. We also looked at the actual time spent by each unit at every call. The average time from call arrival until unit back to service was less than an hour per unit. The time spent on EMS calls averaged 56 minutes per call. This time includes travel to the scene, on-scene time, transport to the hospital, time at the hospital, and travel to back in-service. More than thirty-seven minutes of this total involved transport and travel to the hospital (12 minutes) and time at the hospital and return travel (25 minutes). We added up the total time spent by each unit at calls-for-service over the course of the year. The combined workload for 2007 for all units was 2,081 hours, equivalent to 5.7 hours per day. After the introductory table, we present run data and workload data for every unit, as well as the daily average for fire equipment and ALS units.

Table 8—Busy Time by Call Type

Figure 9—Average Busy Minutes per Day by Call Type

Table 10—Workloads by Unit

Table 11—Fire Equipment: Total Annual Runs

Table 12—Fire Equipment: Average Busy Minutes per Day

Table and Figure 13—ALS Units: Average Number of Runs and Busy Minutes per Day

Part III. Response Time

The city records do not differentiate among call received time, dispatched time, and en route time. Therefore, response time cannot be broken into dispatch delay, turnout, and travel time. The city records also do not differentiate among times of different units dispatched to the same call. Therefore, all units have the same on scene time, clear time, arrival destination (hospital) time, and back to service time. For EMS calls, we also

reported the travel time to the hospital and the time spent at the hospital and travel time back in service. The overall average response time to the call scene was 5.6 minutes. For EMS calls the average travel time from scene to hospital was 12.2 minutes.

Table and Figure 14—Average Response Time, Travel Time to Hospital, and Travel Back Time of First Arriving Units, by Call Type
Figure and Table 15— Average Response Time, Travel Time to Hospital, and On Scene at Hospital plus Travel Back Time of First Arriving Units, by Hour of Day
Figure and Table 16—Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for EMS Calls
Figure and Table 17—Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for Fire Calls
Table 18—Average Response Time of Fire Equipment for Structure and Outside Fire Calls

Table 1—Call Types

	Call Type	No. of Calls	Calls/Day	% of All Calls
EMS	Breathing Difficulty	88	0.2	6.5%
	Cardiac Arrest	13	0.0	1.0%
	Chest Pain/Discomfort	139	0.4	10.3%
	DOA (Death on Arrival)	6	0.0	0.4%
	Medical	513	1.4	38.1%
	Stroke/CVA/TIA	16	0.0	1.2%
	Trauma	351	1.0	26.0%
	EMS Total	**1126**	**3.1**	**83.5%**
Fire	Structure Fire	12	0.03	0.9%
	Outside Fire	35	0.1	2.6%
	Rescue	51	0.1	3.8%
	Hazard	60	0.2	4.5%
	False Alarm	50	0.1	3.7%
	Good Intent	12	0.0	0.9%
	Service	2	0.0	0.1%
	Fire Total	**222**	**0.6**	**16.5%**
	Grand Total	**1348**	**3.7**	**100.0%**

Note: There were six cancelled alarm calls in 2007.

Observations:

- On average, the city received 3.7 calls per day.
- Of all calls, 1126 (83.5%) calls, about 3.1 per day, were EMS calls.
- Of all calls, 222 (16.5%), about 0.6 per day, were fire category calls.
- There were only 47 structure and outside fire calls, or about 4 per month.

Table 2—EMS Calls by Area

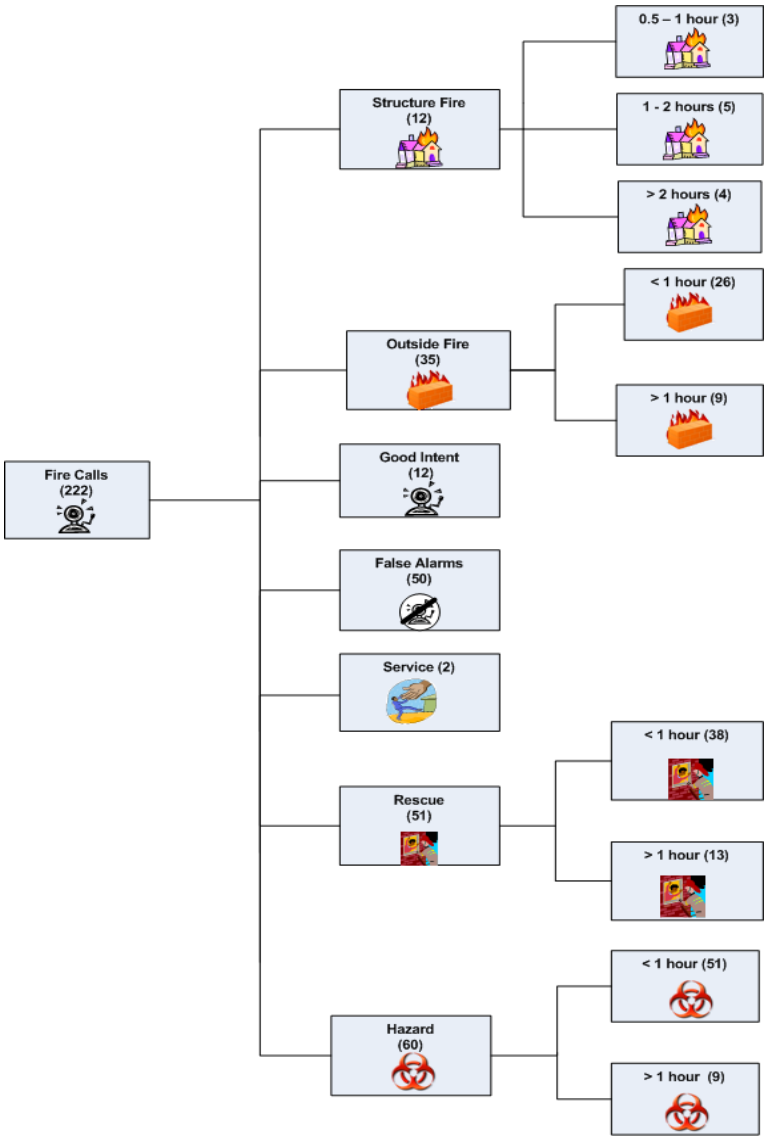
	Huron City Fire Department		Huron Township Fire Department		Other
	Total Calls	Calls / Day	Total Calls	Calls / Day	Total Calls
Breathing Difficulty	49	0.1	39	0.1	0
Cardiac Arrest	6	0.0	7	0.0	0
Chest Pain/Discomfort	92	0.3	45	0.1	2
DOA	5	0.0	1	0.0	0
Medical	323	0.9	185	0.5	5
Stroke/CVA/TIA	14	0.0	2	0.0	0
Trauma	197	0.5	152	0.4	2
EMS Total	**686**	**1.9**	**431**	**1.2**	**9**

Note: Only EMS calls have the dispatch jurisdiction text.

Observations:

- In a year, 686 calls (61%), averaging 1.9 per day, reached Huron City Fire Department.
- In a year, 431 calls (39%), averaging 1.1 per day, reached Huron Township Fire Department.

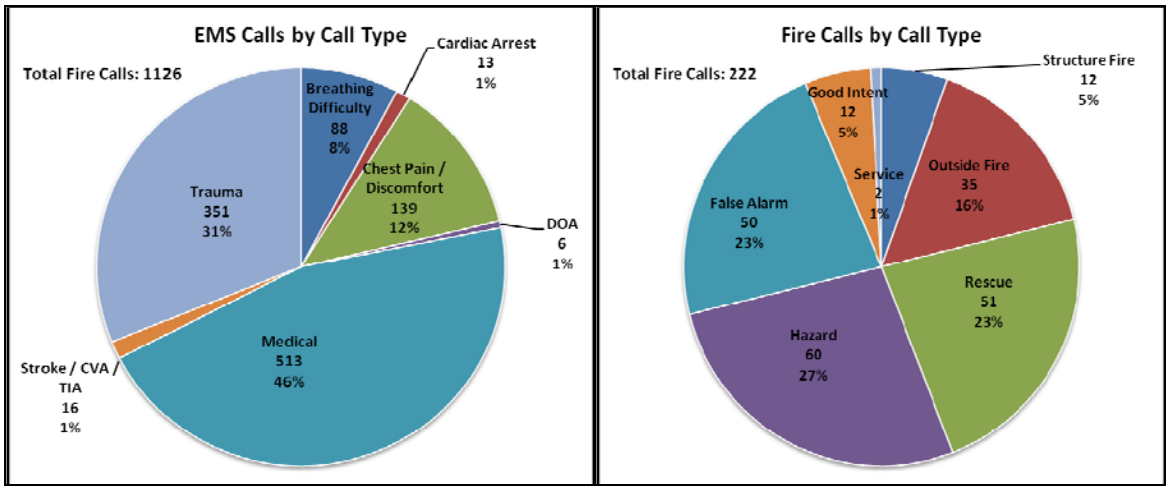
Figure 3—Fire Service Calls Partitioned by Type and Duration (in the format of branches of a tree)



Observations:

- There were 222 fire calls in a year.
- Of the 12 structure fire calls, 4 lasted more than two hours, 5 lasted between one and two hours, and 3 lasted less than one hour.
- Of the 35 outside fire calls, 26 (74%) lasted less than an hour.
- Of the 60 hazard calls, 51 (85%) lasted less than an hour.
- Of the 51 rescue calls, 38 (75%) lasted less than an hour.

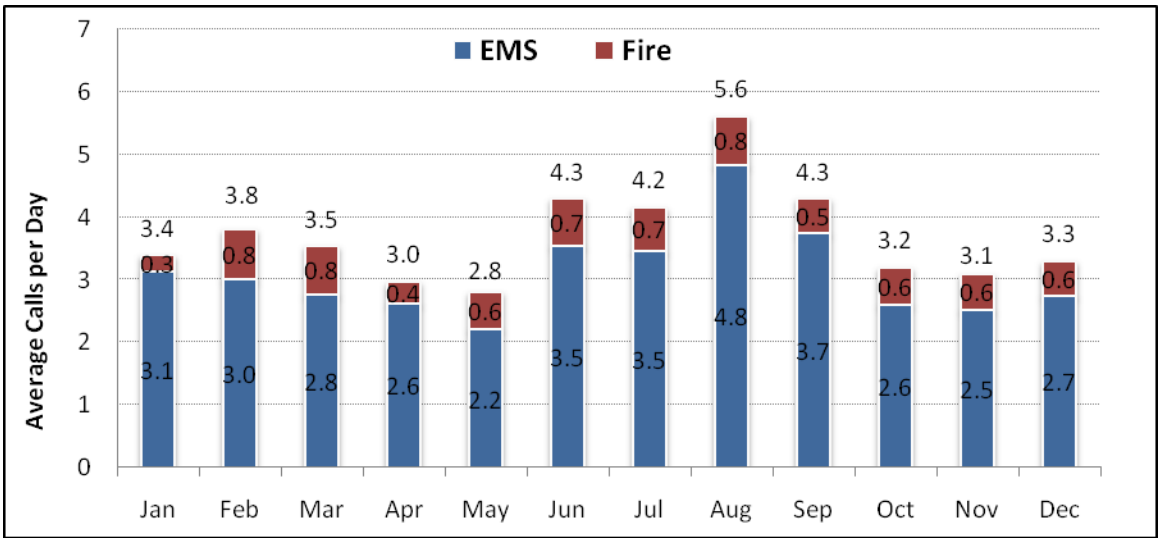
Figure 4-EMS and Fire Calls by Type of Call (pie charts)



Observations:

- Of the 222 fire calls, 47 (21%) were structure and outside fire calls, averaging 4 per month.
- Of the EMS calls, 513 (46%) were medical calls, averaging 1.4 per day.
- Trauma calls totaled 351 (31%), averaging 1.0 per day.
- Chest pain calls totaled 139 (12%), averaging 0.4 per day.
- Breathing difficulty calls totaled only 88, averaging 7.3 per month.
- Stroke calls and cardiac arrest calls totaled 16 and 13, respectively.

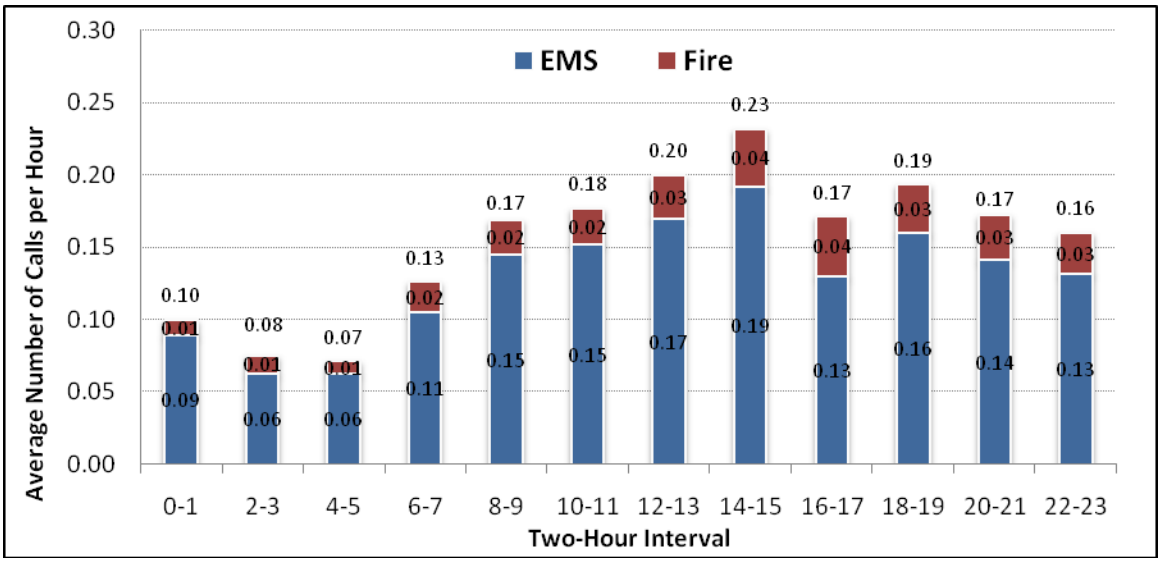
Figure and Table 5—Calls by Month



Observations:

- Average number of calls per day varied significantly by month. The number dropped to less than 3 calls per day or in May.
- Total calls ranged from a low of 2.8 calls per day in May to 2 times more in August with a high of 5.6 calls per day.
- The reason for the peak in average calls per day in August was a significant increase in the number of EMS calls.

Figure 6—Calls by Hour of Day



Two Hours Interval	EMS	Fire	Total
0-1	0.09	0.01	0.10
2-3	0.06	0.01	0.08
4-5	0.06	0.01	0.07
6-7	0.11	0.02	0.13
8-9	0.15	0.02	0.17
10-11	0.15	0.02	0.18
12-13	0.17	0.03	0.20
14-15	0.19	0.04	0.23
16-17	0.13	0.04	0.17
18-19	0.16	0.03	0.19
20-21	0.14	0.03	0.17
22-23	0.13	0.03	0.16
Calls/Day	3.08	0.61	3.69

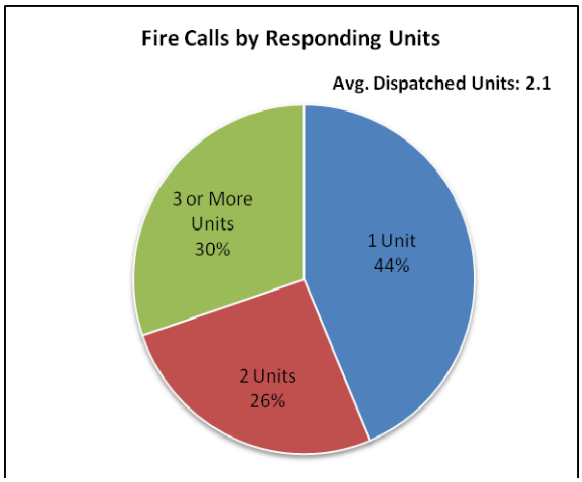
Observations:

- Total call rates peaked between 2 PM and 3 PM, the 14-15 hour.
- The call rate was lowest between midnight and 7 AM.

Table and Figures 7—Number of All Units Dispatched to Fire Category Calls

	Call Type	1 Units	2 Units	3 or more Units	Total
Fire	Structure Fire	0	4	8	12
	Outside Fire	17	6	12	35
	Rescue	11	13	27	51
	Hazard	51	8	1	60
	False Alarm	11	24	15	50
	Good Intent	5	3	4	12
	Service	2	0	0	2
	Fire Total	**97**	**58**	**67**	**222**

Note: due to the data issue, we can't link units to call data for284 EMS calls, therefore EMS calls were not included in this table.



Observations:

- On average, 2.1 units were dispatched per fire category call.
- All 12 structure fire calls were dispatched with 2 or more units.
- Of the 35 outside fire calls, 18 (50%) were dispatched with 2 or more units.

Table 8—On-Call Time by Type

	Call Type	Avg. OCT Min./Call	Total OCT Hours	% of Total Workload	Avg. OCT Min./Day	No. of Runs
EMS	Breathing Difficulty	56.8	123.1	6	20.2	130
	Cardiac Arrest	54.9	24.7	1	4.1	27
	Chest Pain/Discomfort	62.4	222.6	11	36.6	214
	DOA	54.8	9.1	0	1.5	10
	Medical	54.3	737.9	35	121.3	815
	Stroke/CVA/TIA	57.2	22.9	1	3.8	24
	Trauma	56.4	518.5	25	85.2	552
	EMS Total	**56.2**	**1658.9**	**80**	**272.7**	**1772**
Fire	Structure Fire	104.7	73.3	4	12.0	42
	Outside Fire	57.8	71.2	3	11.7	74
	Rescue	59.4	137.7	7	22.6	139
	Hazard	45.1	52.6	3	8.6	70
	False Alarm	34.3	60.5	3	9.9	106
	Good Intent	25.5	10.2	0	1.7	24
	Service	494.0	16.5	1	2.7	2
	Fire Total	**55.4**	**422.0**	**20**	**69.4**	**457**
	Grand Total	**56.0**	**2080.9**	**100**	**342.1**	**2229**

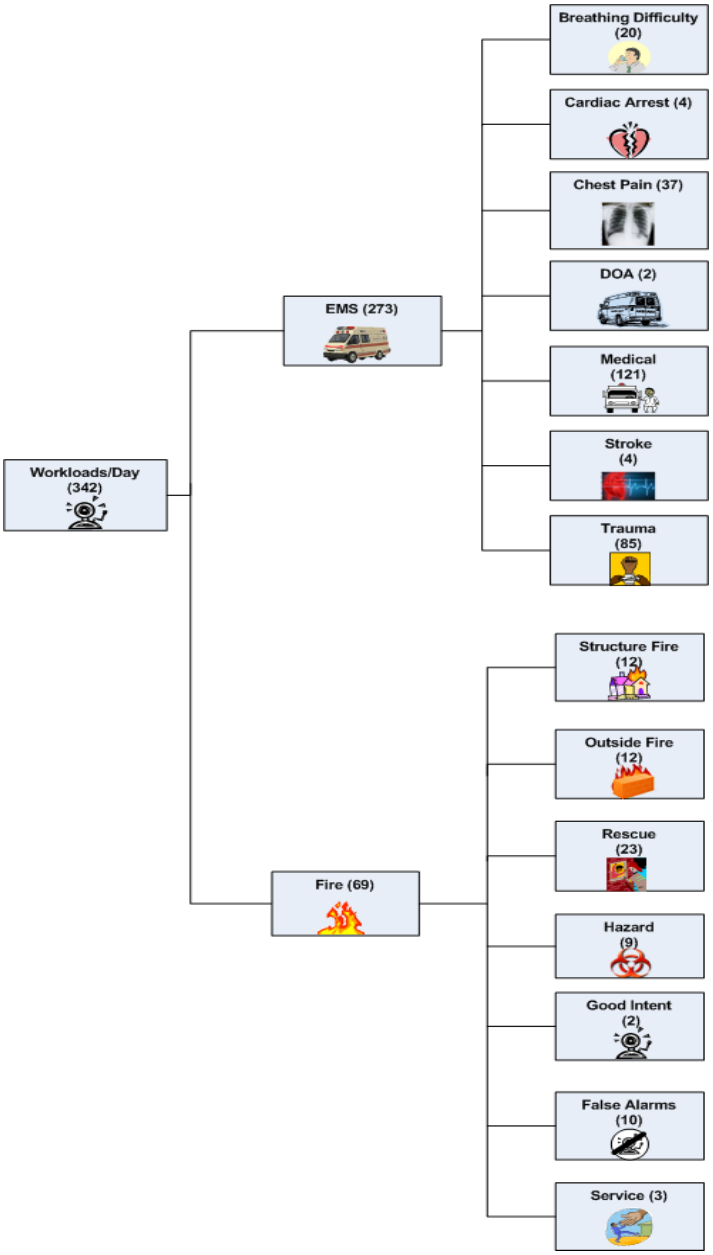
Note: For medical calls, the total On-Call Time includes response time, on scene time, travel time to the hospital, and travel time back in service.

Observations:

- The various units were busy a combined 2,081 hours. The average department workload per day was 5 hours 42 minutes.
- The number of dispatches totaled 2,229, an average of 6 per day.
- The EMS calls accounted for 80 percent of the workload, and average time spent on an EMS call was 56 minutes. On average, the various units spent a total of 4.6 hours on EMS calls every day.
- Structure and outside fire calls were 7 percent of the workload. Average time spent on a structure fire call was 105 minutes, and on an outside fire call, 58 minutes. On average, the various units spent 24 minutes on structure and outside fire calls every day.
- For false alarms, the average busy time was 34 minutes per dispatch.

- For good intent calls, the average busy time was 26 minutes per dispatch.

Figure 9—Average On-Call Minutes per Day by Call Type



Observations:

- The various units spent 69 minutes for all fire category calls per day. Out of this total, there were 12 minutes for structure fire calls and 12 minutes for outside fire calls.
- The various units spent 273 minutes on EMS calls per day, including 121 minutes (44%) for medical calls and 85 minutes (31%) for trauma calls.

Table 10—Workloads by Unit

Unit Type	Unit ID	Avg. Busy Min./Run	No. of Runs	Busy Min./Day	Total Busy Hours
ALS Unit	411	55.9	887	135.8	826.2
ALS Unit	412	56.8	796	123.9	753.8
Aerial Ladder	451	57.6	35	5.5	33.6
Attack Engine	421	46.4	147	18.7	113.7
Fire Prevention P/U Truck	409	51.7	149	21.1	128.4
Tanker	431	83.0	24	5.5	33.2
Rescue Unit/Grass Fire Truck	441	46.7	67	8.6	52.2
Fire Boat	461	158.4	10	4.3	26.4
On Station	STA	59.2	109	17.7	107.6
	Total	56.0	2229	342.1	2080.9

Note: P/U prevention and utility

Observations:

- The two busiest units were the ALS units: 411 had an average workload of 2.3 hours per day, followed by 412 with an average workload of 2.0 hours per day.
- Fire prevention P/U truck (409) was busy 21 minutes per day, and attack engine (421) was busy 19 minutes per day.
- Fire boat had only 10 dispatches in a year, tanker had 24 dispatches, and aerial ladder had 35 dispatches.

Table 11—Fire Equipment: Total Annual Runs

	Call Type	451 (Aerial Ladder)	421 (Attack Engine)	409 (Fire Prevention P/U Truck)	441 (Rescue Unit/Grass Fire Truck)
EMS	Breathing Difficulty	0	2	6	1
	Cardiac Arrest	0	1	4	1
	Chest Pain/Discomfort	0	4	5	1
	DOA	0	0	3	0
	Medical	1	17	42	12
	Stroke/CVA/TIA	0	0	0	2
	Trauma	1	10	25	7
	EMS Total	**2**	**34**	**85**	**24**
Fire	Structure Fire	9	8	1	0
	Outside Fire	5	23	6	11
	Rescue	2	18	14	23
	Hazard	1	17	37	4
	False Alarm	13	39	3	4
	Good Intent	3	7	3	1
	Service	0	1	0	0
	Fire Total	**33**	**113**	**64**	**43**
	Total	**35**	**147**	**149**	**67**

Observations:

- Of the annual number of runs, 145 (36%) were EMS runs.
- Attack engine (421) handled the most fire dispatches, 113 runs in a year. Attack engine also handled most structure fire (8 out of 18) and most outside fire (23 out of 45) runs.
- Aerial ladder (451) handled the second-largest number of structure fire and outside fire runs, 14 in all.

Table 12—Fire Equipment: Average "Busy" On-Call Minutes per Day

	Call Type	451 (Aerial Ladder)	421 (Attack Engine)	409 (Fire Prevention P/U Truck)	441 (Rescue Unit/Grass Fire Truck)
EMS	Breathing Difficulty	0.0	0.2	0.8	0.2
	Cardiac Arrest	0.0	0.0	0.7	0.2
	Chest Pain/Discomfort	0.0	0.7	0.8	0.2
	DOA	0.0	0.0	0.4	0.0
	Medical	0.2	2.2	6.2	1.5
	Stroke/CVA/TIA	0.0	0.0	0.0	0.3
	Trauma	0.2	1.9	4.1	1.1
	EMS Total	**0.4**	**5.1**	**13.1**	**3.3**
Fire	Structure Fire	2.4	1.9	0.4	0.0
	Outside Fire	0.7	3.3	1.0	1.4
	Rescue	0.2	2.6	1.9	3.2
	Hazard	0.1	1.5	4.3	0.4
	False Alarm	1.6	3.7	0.2	0.2
	Good Intent	0.2	0.5	0.2	0.1
	Service	0.0	0.1	0.0	0.0
	Fire Total	**5.1**	**13.6**	**8.0**	5.2
	Total	**5.5**	**18.7**	**21.1**	**8.6**

Observations:

- Fire prevention P/U truck (409) was busy 21.1 minutes per day, including 8 minutes for fire calls.
- Attack engine (421) was busy 18.7 minutes per day, including 13.6 minutes for fire calls.
- Rescue unit/grass fire truck (441) was busy 8.6 minutes, including 5.2 minutes for fire calls.
- Aerial ladder (451) was busy 5.5 minutes, including 5.1 minutes for fire calls.
- Aerial ladder spent most of its busy time on structure fires, 2.4 minutes per day.
- Attack engine spent most of its busy time on outside fires, 3.3 minutes per day.

Table and Figure 13—ALS Units: Average Number of Runs and Busy Minutes per Day

	Call Type	411 (ALS Unit)			412 (ALS Unit)		
		Average Minutes /Day	Average Runs /Day	Total Annual Runs	Average Minutes /Day	Average Runs /Day	Total Annual Runs
EMS	Breathing Difficulty	10.6	0.2	68	8.4	0.1	53
	Cardiac Arrest	1.5	0.0	10	1.7	0.0	11
	Chest Pain/Discomfort	18.1	0.3	107	16.7	0.3	96
	DOA	0.5	0.0	4	0.5	0.0	3
	Medical	58.6	1.1	393	52.6	1.0	350
	Stroke/CVA/TIA	2.4	0.0	15	1.1	0.0	7
	Trauma	39.6	0.7	260	37.8	0.7	246
	EMS Total	**131.3**	**2.3**	**857**	**118.9**	**2.1**	**766**
Fire	Structure Fire	1.3	0.0	4	0.6	0.0	2
	Outside Fire	0.0	0.0	0	0.0	0.0	0
	Rescue	2.8	0.1	21	2.9	0.0	18
	Hazard	0.2	0.0	3	1.0	0.0	3
	False Alarm	0.1	0.0	2	0.4	0.0	5
	Good Intent	0.0	0.0	0	0.1	0.0	2
	Service	0.0	0.0	0	0.0	0.0	0
	Fire Total	**4.5**	**0.1**	**30**	**5.0**	**0.1**	**30**
	Total	**135.8**	**2.4**	**887**	**123.9**	**2.2**	**796**

Observations:

- ALS unit 411 had 887 runs in a year and averaged 2.4 runs per day; 97 percent of the dispatches were for EMS calls.
- ALS unit 411 was busy two hours and sixteen minutes per day; of those hours (96%) were for EMS calls.
- The workloads of ALS unit 412 were similar to those of ALS unit 411.

Figure 13 – Average Daily Workload of Both ALS Units

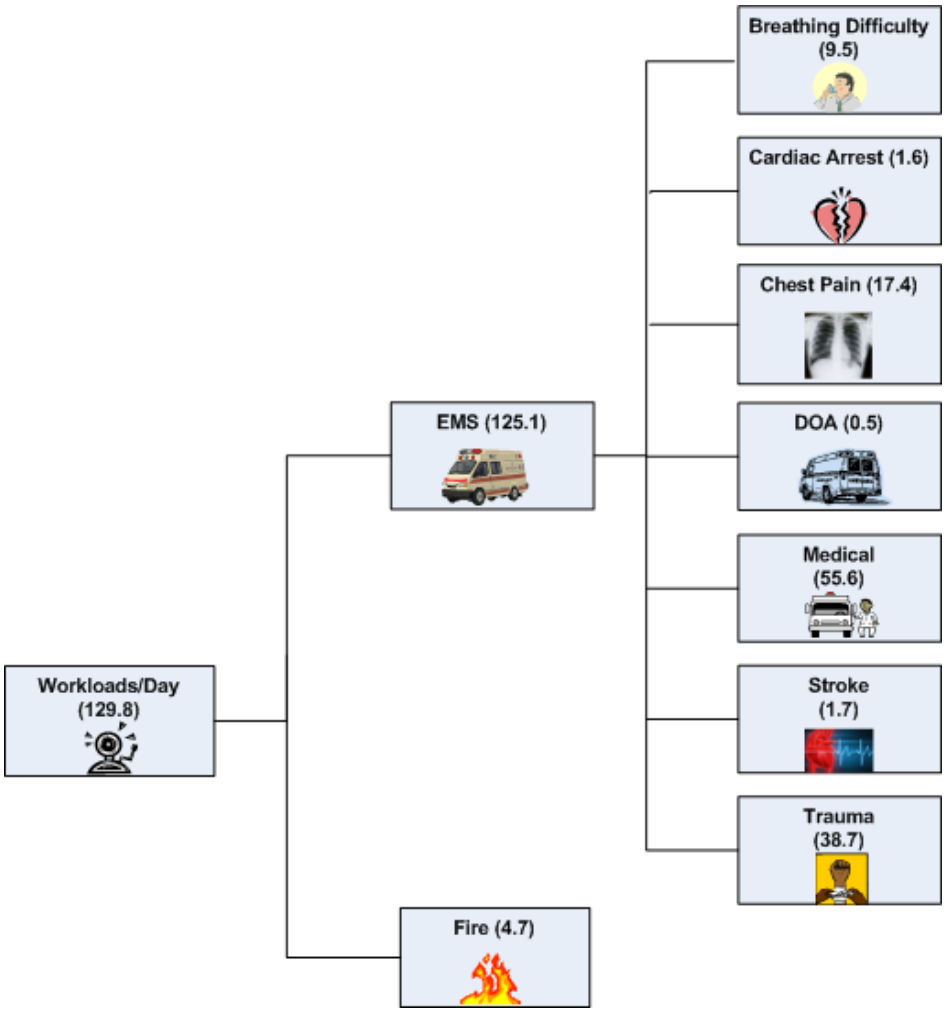
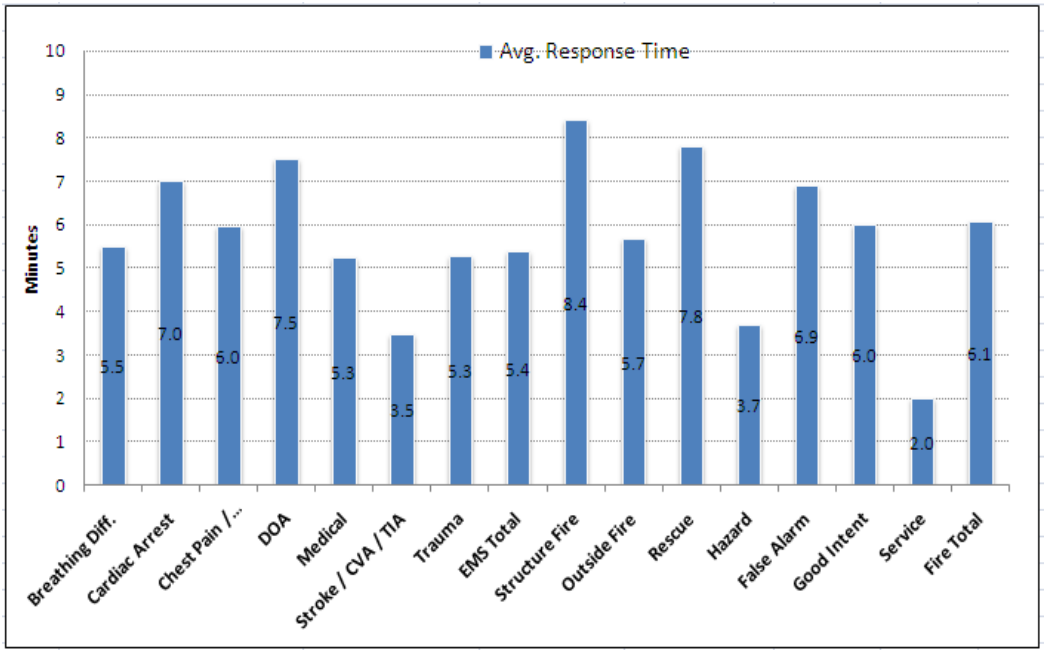


Table and Figure 14—Average Response Time, Travel Time to Hospital, and On scene at Hospital plus Travel Back Time of First Arriving Units, by Call Type

Call Type	Avg. Response Time	Travel Time to Hospital	On Scene at Hospital plus Travel Back to Service Time	No. of Calls
Breathing Difficulty	5.5	12.5	25.7	88
Cardiac Arrest	7.0	11.2	31.3	13
Chest Pain/Discomfort	6.0	13.3	29.9	139
DOA	7.5	0.0	12.3	6
Medical	5.3	12.0	25.2	513
Stroke/CVA/TIA	3.5	13.7	28.5	16
Trauma	5.3	12.2	23.5	351
EMS Total	**5.4**	**12.2**	**25.4**	**1126**
Structure Fire	8.4	NA	NA	12
Outside Fire	5.7	NA	NA	35
Rescue	7.8	NA	NA	51
Hazard	3.7	NA	NA	60
False Alarm	6.9	NA	NA	50
Good Intent	6.0	NA	NA	12
Service	2.0	NA	NA	2
Fire Total	**6.1**	NA	NA	**222**
Total	**5.5**	NA	NA	**1348**

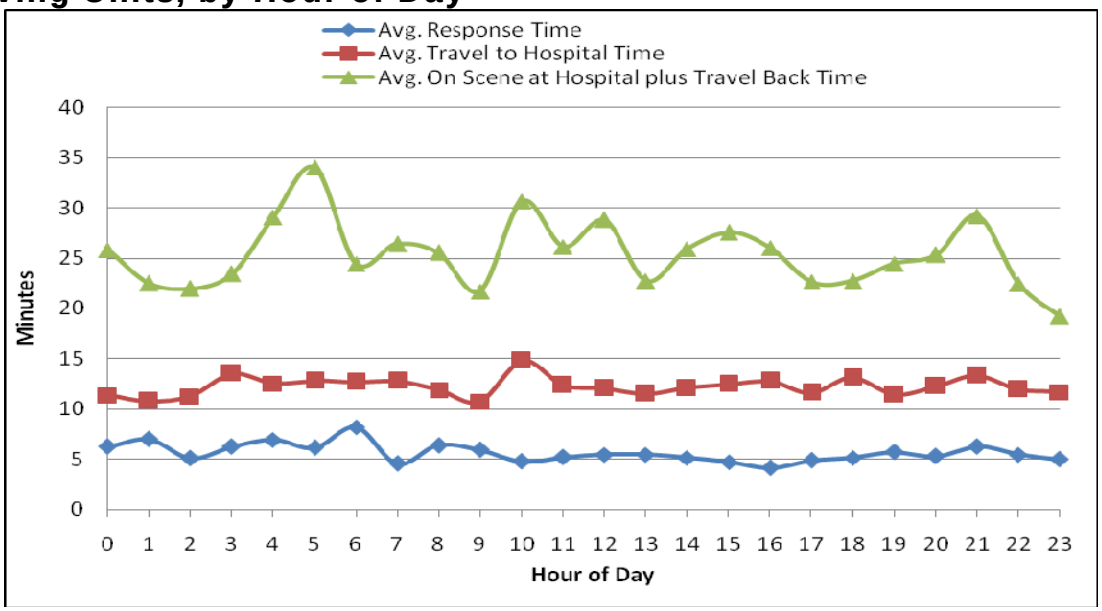
Note: Only EMS calls have data for time of arrival at hospital and time in service, which can be used to calculate the travel to hospital time and travel back to service time.



Observations:

- The average response time for EMS calls was 5.4 minutes.
- The average response time for structure fire calls was 8.4 minutes; for outside fire calls, 5.7 minutes.
- The average travel to hospital time for EMS calls was 12.2 minutes.
- The average time at the hospital plus travel back to service time for EMS calls was 25.4 minutes, more than twice the travel to hospital time.

Figure and Table 15—Average Response Time, Travel Time to Hospital, and On Scene at Hospital plus Travel Back Time of First Arriving Units, by Hour of Day

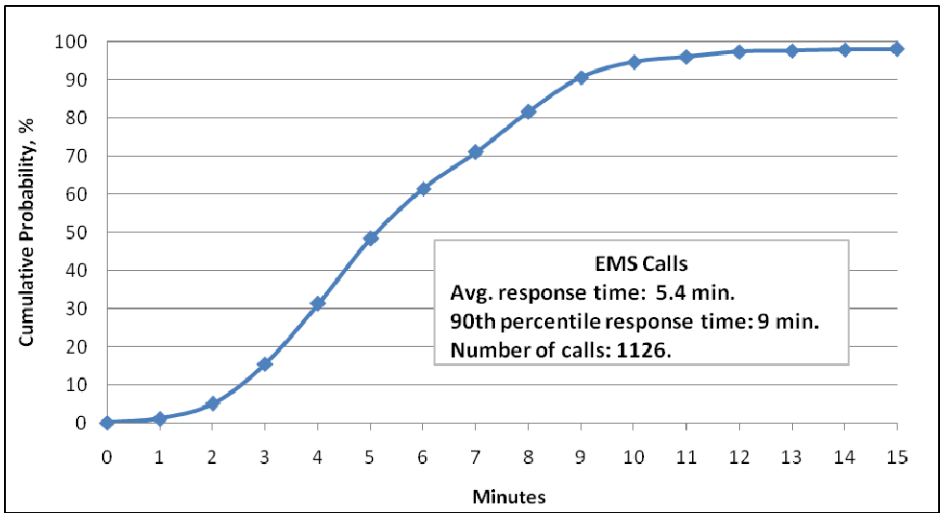


Hour	Average Response Time	Average Travel to Hospital Time	On Scene at Hospital plus Travel Back to Service Time	No. of Calls
0	6.3	11.3	25.8	35
1	7.0	10.8	22.5	38
2	5.1	11.3	21.9	25
3	6.2	13.5	23.5	30
4	6.9	12.5	29.1	27
5	6.1	12.8	34.0	25
6	8.2	12.7	24.4	35
7	4.6	12.8	26.4	57
8	6.4	11.9	25.5	61
9	5.9	10.7	21.7	62
10	4.8	14.8	30.7	70
11	5.2	12.4	26.1	59
12	5.5	12.0	28.8	71
13	5.5	11.5	22.8	75
14	5.2	12.1	25.9	79
15	4.7	12.5	27.6	90
16	4.1	12.8	26.0	68
17	4.9	11.6	22.6	57
18	5.2	13.1	22.7	60
19	5.7	11.4	24.4	81
20	5.3	12.3	25.3	67
21	6.3	13.3	29.2	59
22	5.5	11.9	22.4	74
23	5.0	11.7	19.2	43

Observations:

- Response time was slighter longer between midnight and 6 AM.
- The travel time to hospital peaked at 10 AM, when it averaged 14.8 minutes.
- There was significant variation in the time spent at the hospital plus travel back to service time, which peaked at 5 AM, when it averaged 34 minutes.

Figure and Table 16—Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for EMS Calls



Reading the CDF Chart

The vertical axis is the probability or percentage of calls. The horizontal axis is response time. For example, with regard to EMS calls, the 0.9 probability line intersects the graph at a time mark at about 9 minutes. This means that 90 percent of these calls are reached in less than 9 minutes.

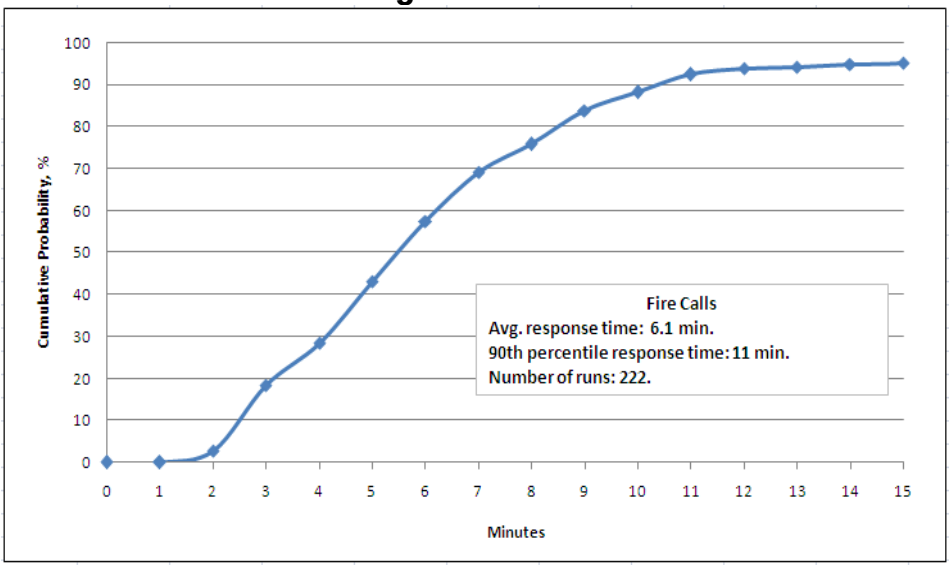
Response Time	Response Time Code	Frequency	Cumulative Percentage
0 min	0	0	0.0
0-1 min	1	11	1.1
1-2 min	2	41	5.0
2-3 min	3	109	15.5
3-4 min	4	164	31.3
4-5 min	5	177	48.4
5-6 min	6	136	61.5
6-7 min	7	100	71.1
7-8 min	8	110	81.7
8-9 min	9	94	90.8
9-10 min	10	42	94.8
10-11 min	11	14	96.1
11-12 min	12	14	97.5
12-13 min	13	2	97.7
13-14 min	14	3	98.0
14-15 min	15	2	98.2
15-20 min	16	1	98.3
>= 20 min	17	18	100.0

Note: 88 calls missed response time.

Observations:

- The average response time for EMS calls was 5.4 minutes.
- Six minutes: the response time for 62 percent of EMS calls was less than 6 minutes.
- For 90 percent of EMS calls, the response time was less than 9 minutes.

Figure and Table 17—Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for Fire Calls



Response Time	Response Time Code	Frequency	Cumulative Percentage
0 min	0	0	0.0
0-1 min	1	0	0.0
1-2 min	2	6	2.8
2-3 min	3	33	18.5
3-4 min	4	21	28.4
4-5 min	5	31	43.1
5-6 min	6	30	57.3
6-7 min	7	25	69.2
7-8 min	8	14	75.8
8-9 min	9	17	83.9
9-10 min	10	9	88.2
10-11 min	11	9	92.4
11-12 min	12	3	93.8
12-13 min	13	1	94.3
13-14 min	14	1	94.8
14-15 min	15	1	95.3
15-20 min	16	4	97.2
>= 20 min	17	6	100.0

Observations:

- The average response time for fire calls was 6.1 minutes.
- The response time for 57 percent of fire calls was less than 6 minutes.
- For 90 percent of fire calls, the response time was less than 11 minutes.

Table 18—Average Response Time of Fire Equipment for Structure and Outside Fire Calls

Unit	Structure Fire		Outside Fire		Total	
	Average Response Time	No. of Runs	Average Response Time	No. of Runs	Average Response Time	No. of Runs
451 (Aerial Ladder)	6.8	9	6.6	5	6.7	14
421 (Attack Engine)	5.9	8	5.4	23	5.5	31
409 (Fire Prevention P/U Truck)	8.0	1	9.3	6	9.1	7
441 (Rescue Unit/Grass Fire Truck)			3.9	11	3.9	11
Total	6.4	18	5.7	45	5.9	63

Observations:

- There were significant differences in the response time of various fire units.
- The response time of the attack engine was on average a minute faster than that of the aerial ladder.
- The overall response time of fire equipment for structure fire calls is 6.4 minutes, and for outside fire calls, 5.7 minutes.

Part 3: Operational Analysis Report – Public Safety Services (Police / Fire / EMS)

I. Introduction

Information supplied by the data analysis of the police, fire, and EMS functions of Huron, Ohio, together with observations made on-site and through interviews, provides the basis for recommending changes to service delivery.

The data analysis shows that the deployed hours of Huron's police department present ample opportunity to take on additional workload. Most agencies target 33 percent of their available personnel hours toward crime investigation and 33 percent toward administrative functions, with the remaining 34 percent focused on community policing activities. In Huron, nearly 80 to 90 percent of the personnel hours are available for other functions, including community policing. Certainly, available time may diminish in the busier summer months, but overall there is an opportunity to increase community policing as well as take on additional responsibility.

Likewise, in the area of fire and EMS, approximately 131 minutes (two hours and 10 minutes) of the 24-hour shift is spent on calls, which average 2.3 per day. An average of 4.5 minutes per day is spent on fire calls, which average 0.1 per day. According to contract and labor standards, a portion of the 24-hour shift must also be devoted to sleep.

With a minimum of four persons on each 24-hour shift, there is a considerable amount of time that could be used for other functions. Assigning personnel to other functions may require careful management and use of callback and paid-on-call staffs to supplement responding units, but

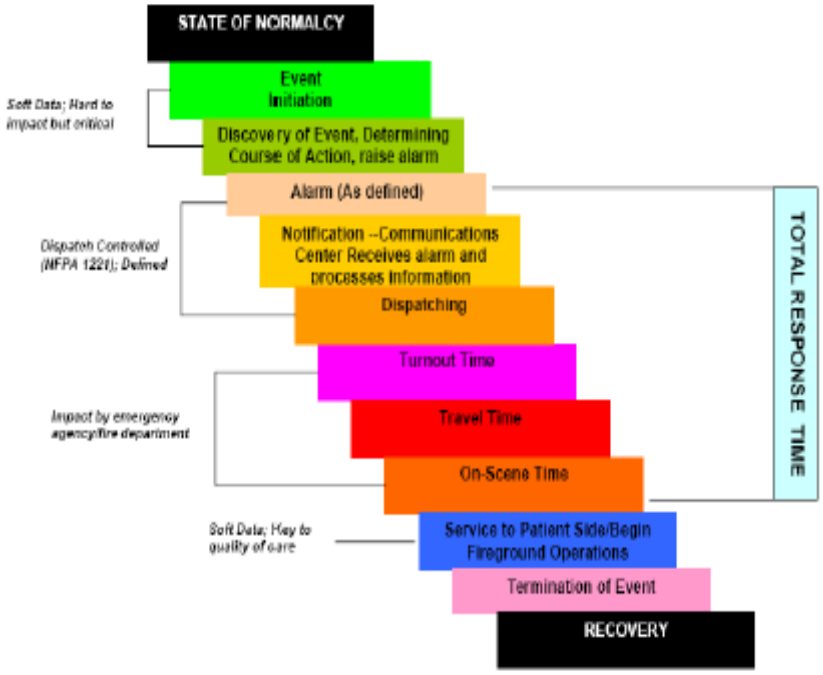
the expense of the current staffing configuration is not sustainable and cannot be recouped through cost recovery efforts.

One significant challenge for management will be covering the time necessary for transport to and return from the hospital, which is located outside the community. For this reason, callbacks and on-call assignments may be necessary but should be on a squad-type basis and not general all-callbacks. All-callbacks should be directed to responding to incidents requiring many personnel, such as structure fires, mass casualty, or disaster-type incidents. Calling personnel back unnecessarily can result in burnout of responders as well as additional risks to the public and responders during response to the station.

Data analysis was hindered by the lack of clean computer-aided dispatch (CAD) data, with the ICMA team performing considerable work to provide relevant, comprehensive, and validated values that could be used to complete the individual department analysis as well as enable policy decisions for further cost effectiveness, efficiency, and safety.

A primary recommendation based on the site visit and developed from the data analysis is to improve the CAD system through purchase of strategic software programs and record management systems. If the community pursues public safety concepts, core data and continued review for quality performance will be key to the success of any developed and adopted outcomes. The lack of core data will hinder performance measurement, analysis, and improvement.

The need to collect CAD data is not unique to Huron; the improved collection of performance data is key to improving efficiency and effectiveness in any



organization. The accompanying figure better explains the critical nature of time in the delivery of public safety services.

When a fire, medical, or police call is received at dispatch, some amount of time has already occurred from the time that a crime was committed, the point at which a fire began, or the onset of a medical emergency. That time is difficult to manage because so many factors can influence the time element, such as the presence of sprinklers, fixed alarms, or witnesses, and the time of day that the incident occurs (e.g., a crime committed at night in an office building may not be discovered until people return to work the next day).

The point at which emergency services can begin to influence the outcome of a situation starts with the “Alarm” – when the situation is noticed and a call or alert is placed to the dispatcher. How many times the phone rings before it is answered and how long the dispatcher takes to receive the information and then alert responders are critical points in the process that present opportunities to save time. Once the emergency responders receive the information and begin to assemble or “turn out,” another manageable time element occurs. This is followed by travel time and the time it takes to intervene either by stopping a crime, putting water on a fire, or reaching the patient and beginning medical triage.

Time is the key to a successful outcome, and managing the time is critical to maintaining the effectiveness and efficiency of the department as well as providing for the safety of the responders and the public.

Huron, Ohio, has been delivering fire/EMS and police services through separate departments for each discipline with a single dispatch center. The dispatch center is operated under the auspices of the police department and is covered, contractually, by the Fraternal Order of Police. With the division of duties, additional personnel are required to maintain staffing for emergency services on a 24/7 basis.

A blended public safety department is not a new concept, although it would be new to Huron. Merging the various public safety disciplines into one department can be challenging. The hurdle to overcome is uniting the various disciplines into a team focused on the *outcome* of service delivery versus the traditional role of *output*-driven delivery.

To explain, “outcome-driven” service delivery focuses on the goal sought by the community. Community, in this definition, includes not just the public safety department and its members, but also the elected officials and citizens of Huron. Focusing on achieving outcomes forces agencies to develop strategies that incorporate various tactics and techniques. An agency that is not achieving the sought-after outcome must adjust the tactics used to formulate the strategy so as to achieve the outcome.

“Output-driven” organizations, on the other hand, focus on individual pieces or tactics (such as time elements, pieces of equipment, individual or corporate membership, or training) without regard to the final outcome.

Output-driven organizations easily distance themselves from elected officials and citizens who are expecting a certain level of service delivery for the investment that is being made in the overall organization.

Public safety departments, to be successful, need to focus on outcomes in all tasks that the organization undertakes. This report looks at key tasks and response issues with suggested recommendations on policy that Huron can implement for achievement of outcomes.

II. Administration

Key to any public safety department is the creation of an administrative structure. Public safety agencies, particularly traditional police and fire departments, operate according to a quasi-military design. The same concept was carried forth in creating response for emergency management events through the development of the National Incident Management System (NIMS). In the military and in NIMS, someone needs to be the "commander." The challenge in creating an effective public safety department is that the commander must be proficient in multiple disciplines: police, fire, EMS, and emergency management.

Other challenges exist in merging disparate functions that share a common goal: protecting the life and property of the agency's customers. The main challenge is developing team concepts in achieving the mission, vision, goals, and objectives. A team does not develop from demand; a team develops from developing comfort levels within the organization and within its membership. It develops through effective leadership. For public safety agencies to be effective, efficient, and safe in providing service to their customers, the team will only be as good as its weakest members, and

everyone must know and be comfortable with the other members on the team.

Therefore, the most critical decision to make when looking at a public safety department is recruiting the administration. The administrator must be able to work and develop the public safety organization within the council-manager form of government.

Certain elements and procedures are necessary when establishing a public safety department in any form (administrative consolidation, administrative-command, limited cross-trained agency, or totally consolidated). These elements and procedures include:

1. The Public Safety Department must be legally established. This may seem remarkable, but many agencies have not reviewed the enabling legislation by which they were created. In many cases, charter or other documents were "tweaked" but not properly amended to establish the legal basis for forming the resultant service. Ordinances must clearly establish what outcome is being sought; does the authority having jurisdiction (AHJ) want a totally consolidated public safety department or does it simply want to consolidate certain portions? The desired outcome must be clearly established and articulated into legislation. For example, the opportunity exists to assign a single position to manage both the police and fire departments, with a possible savings in excess of $107,000 to the community. It is also anticipated that a staged approach will be necessary to create a public safety department with the opportunity for significant savings in both short and long term.

POLICY RECOMMENDATION: The city of Huron should consider creating a public safety department that encompasses the duties of the police and fire

department. The divisions of the Huron Public Safety Department will be known for their mission: "Huron Department of Public Safety, Police Division" and "Huron Department of Public Safety, Fire and EMS Division."

POLICY RECOMMENDATION: That the creation of the Public Safety Department be accomplished by passage of an ordinance amending the existing code of the city of Huron. In addition to creating the department, the ordinance should identify an organizational chart and establish a process for communication between the executive and administrative staff. All elected and administrative officials should be prohibited from conflict of interest with the department by separate council resolution.

2. The AHJ should undertake a strategic planning process to review and approve the programs of the Public Safety Department, approve the outcomes that have been identified, and ensure compliance with basic policies and procedures.

POLICY RECOMMENDATION: The city should undertake an outcome-focused strategic planning process to create a comprehensive strategic plan that is intended to serve as a guide toward the development of the department for the next five years.

3. A commanding officer or administrative position should be created to manage the Public Safety Department. The commanding officer or administrator must work with and under the city manager and is a key member of the city administrative team.

The public safety director shall have the following powers, duties, and responsibilities:

1. Plan, coordinate, supervise, and evaluate public safety operations and activities in and related to the city;

2. Research, write, establish, and evaluate public safety policies;

3. Develop organizational structures, including lines of authority, responsibility, and communication, in order to carry out the policies and goals for city law enforcement and public safety, and revise the organizational structure as required;

4. Coordinate media relations, oversee the release of all public information in cooperation with the city manager, and oversee all public announcements and communications to ensure compliance with applicable public safety policy, decisions, and protocol;

5. Monitor general activities of public safety divisions to ensure compliance with standard operating procedures;

6. Direct and conduct public safety strategic planning;

7. Research law enforcement, fire, and emergency medical programs and practices, and implement strategies in order to better carry out policies and goals;

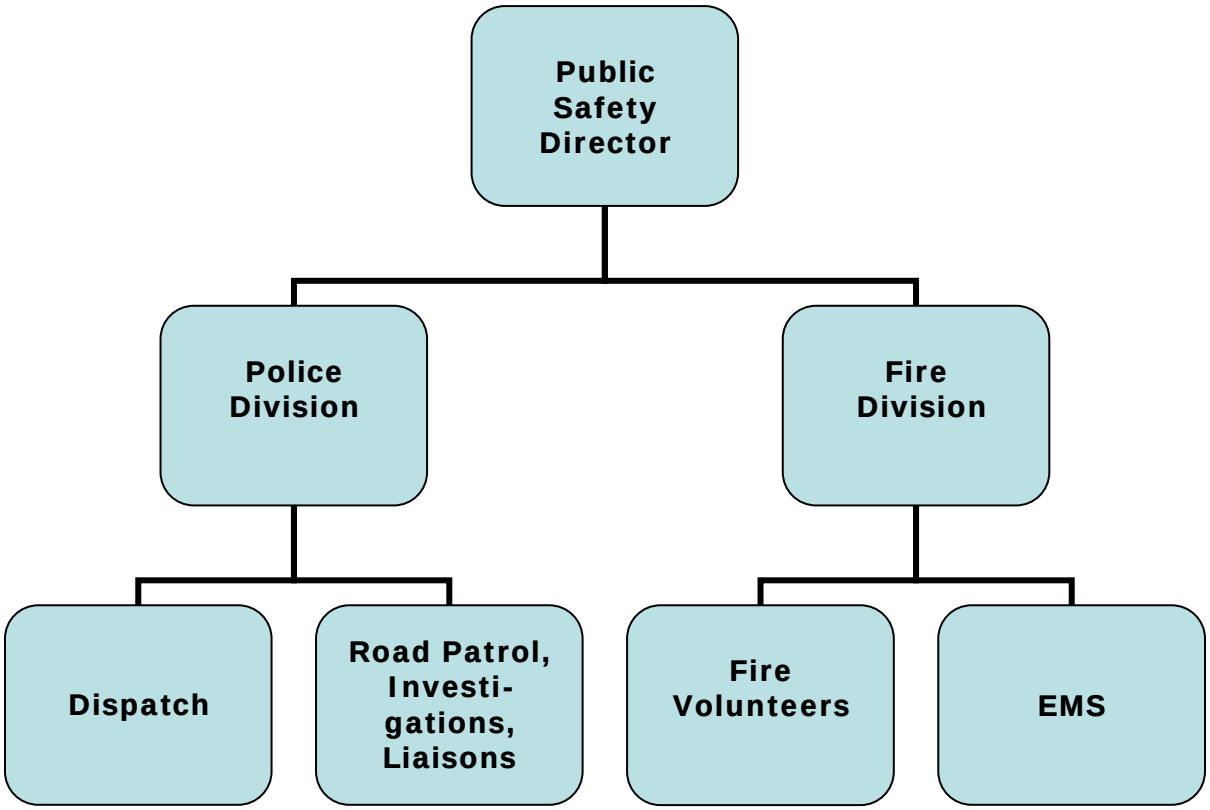
8. Conduct program evaluations and formulate action to upgrade public safety efficiency and capability as needed; and

9. Perform any other related duties as deemed necessary or required by the city manager or city council.

POLICY RECOMMENDATION: The AHJ should approve a job description outlining the components necessary to recruit a public safety director. These components should be outlined in the job description approved by the AHJ along with the qualifications and credentials used for the selection of the director. The director should be hired by the city manager and should develop and use an effective communication system and be able to demonstrate this ability.

4. The AHJ must create an organizational structure to reflect the combination of duties into a Public Safety Department as well as outline where the public safety director fits within the existing management structure.

POLICY RECOMMENDATION: The City of Huron should establish the following administrative structure or a similar one (see organization chart).



An example of an outcome-based goal using the public safety administrative structure would be a goal of minimizing calls for fire service. Achieving this outcome may involve efforts by the police division to eliminate criminal elements and by the fire division to conduct inspections. By focusing all disciplines under a united public safety umbrella, the department can address all causes that are contributing to calls for fire service in a cohesive manner.

5. Organizational Development. The public safety director will require support to effectively manage the department. The review of the individual

pieces of the organization revealed that there is significant command within the fire and police division at this time.

The fire department has an extremely top-heavy command structure. There are 13 full-time staff members in the fire department; seven are commanders, leaving six as line-officer firefighters. This results in a ratio of more than 1:1 commanders to firefighters. Another way to look at it is that there are at least two command officers on every shift for two line-officers working. Lean organizations normally allocate one command officer for seven personnel, which would mean that the fire department would need one lieutenant to serve as the chief and one captain, who would normally serve as the deputy chief. The Incident Command System, developed in the fire service, actually envisions that there should be no need for formal command titles; that all personnel should be empowered and trained to assume command until relieved by superiors or to assume command if superiors are removed. In smaller organizations and, in particular, in smaller public safety organizations, firefighters (including part-time personnel) assume command until formally relieved via radio or other communication device.

The police department has a chief and four sergeants, or five command officers, with eight line officers. This is a ratio of less than 1:1 and does provide one command officer on each shift.

In a merged public safety department, there would be a bank of 11 command officers (two chiefs, four sergeants, two captains, and four lieutenants) for 14 line officers. Our recommendation is that one chief position be eliminated with a public safety director and that the 10 remaining command personnel be reduced through attrition or reassignment

to alternative ranks. The ideal would be one command officer per squad or a total of four command officers.

Undertaking a staged approach, the public safety director should review the existing administrators below the “Chief” rank for capabilities. The existing fire contract contains Article 3, which is entitled “Management Rights.” Under those rights, the city retains the right to “Determine matters of inherent managerial policy which govern, including but not limited to….its organizational structure.”

The article also states that the city retains the right to direct, supervise, evaluate, or hire employees; maintain and improve the efficiency and effectiveness of governmental operations; determine the adequacy of the work force; and effectively manage the work force.

However, under Article 15, entitled “Hours of Work,” the city contractually stated, “Each shift shall be staffed with a minimum of one (1) Shift Officer, one (1) Lieutenant and two (2) firefighters.”

The same article goes on to spell out that shifts will be 24-hour “California Shifts” meeting the FLSA 7 (k) exemption.

> *POLICY RECOMMENDATION: Following the appointment of a public safety director, the city should negotiate that the position of Sergeant within the Police Department be changed in title or equivalency to “Shift Officer.” Should this change not be approved, then the chain of command will be recognized as “Sergeant” being superior to “Lieutenant,” and the Sergeant would be a “Shift Officer.”*

Based on Article 13, item 3, of the Sergeant labor contract, the city retained the right to require, “Appropriate training, as determined solely by the City, [which] shall be provided to members assigned new, different or additional duties unless that member has previously received such training.”

POLICY RECOMMENDATION: Based on Article 13, the job description for “Sergeant” shall include completion of Firefighter I and II training with the ability to demonstrate competence in such role.

POLICY RECOMMENDATION: Following the “Sergeants’” completion of firefighter training, the city should negotiate a flexible shift schedule that would allow the Sergeants to work an 8-hour, 12-hour, or 24-hour shift. In the intervening time, the “Sergeants” in the police department would take on the role of “Police Division Commander” in lieu of a police chief.

POLICY RECOMMENDATION: The city should work to negotiate its management rights to schedule employees in both the police and fire departments. Ideally, a 12-hour shift should be used to create four squads.

POLICY RECOMMENDATION: The rank of captain would be eliminated in the combined Public Safety Department with Commanders being the “Shift Officer” serving under the public safety director. In the intervening period, the existing Captains should become “management.” This may require that the city look at exempting that position from the existing negotiated labor contract because the Captain would take on the functions normally associated with a “Chief.” They would become the “Fire Division Command.” They would assist with hiring, firing, discipline, contractual and policy violations and all other administrative functions assigned to a fire chief. For that reason, they should not be members of the same bargaining unit as the firefighters and lieutenants.

POLICY RECOMMENDATION: With the merger and cross-training in the department, eventually there should be one command officer assigned to each shift of the public safety department with training to allow that person to function as police, fire, or EMS command. Command should come from the existing ranks of police sergeants and fire captains, with both being offered the opportunity to cross-train in the other discipline.

III. Communications and Dispatch

Huron is not unique in the issues that have been discovered to date with the computer-aided dispatch and records management system. Of all projects that ICMA Consulting Services has undertaken thus far, all dispatch centers have encountered problems with producing measurable data. Part of the recommendations and follow-up that will be created in the review process will involve providing a template for future structure in the dispatch center that will allow for regular performance measurement to ensure that service delivery goals and objectives are being met.

Dispatch centers have traditionally been looked down upon due to assumptions that the dispatch center employee simply answers a telephone and pushes a button to alert emergency responders. However, the dispatch center is the recording hub for all communications from which evaluations of performance take place. In years past, paper reports and “daily logs” were the norm for agencies, and those may or may not have been reviewed by supervisors. With the advent of computerization, such logging of “time stamps” when work began or ended was eliminated. In looking at the workload of each employee or each shift, these time stamps are critical.

The time that an officer comes on shift should be recorded, as should all breaks, administrative times (e.g., gassing up the car, processing reports).

Recording such times gives an accurate picture of how much time employees are spending on various calls for service, administrative functions, community policing, and other duties. An ideal target for cities is that 33 percent of an officer's time should be spent on criminal complaints (both called in from the public as well as patrol originated), 33 percent should be spent on administrative duties (gassing up the car, breaks, report writing, processing information), and 34 percent should be available to provide community policing. Ideas for community policing activities foot patrols in the downtown area, bike patrols in residential or beach areas, house checks of persons on vacation or at vacation residences, and contacts with citizen groups or neighborhood groups. Without proper time stamps, it is not possible to evaluate whether these targets are being achieved.

To maximize the use of police officers' time, Huron should consider continuing a system of take-home patrol vehicles for police officers. A recent study by Tacoma, Washington, showed that take-home vehicles added hours of available deployment, offered additional benefits for crime prevention, led to better care of patrol vehicles by officers, and produced a direct cost savings for the city of nearly $120,000 for each two officers. A copy of the Tacoma study can be found in Appendix II of this report.

Available officers with take-home vehicles should log in as "on duty" and be immediately available for calls for service. If the public safety option is pursued, the availability of officers with take-home vehicles could be used to afford additional coverage when EMS calls are stacked or come in simultaneously. Officers living outside the city could respond directly to portions of the township.

Similarly, in the fire and EMS service delivery area, time is critical to success. Flashover takes place at a fire scene at 8 to 12 minutes from ignition. A flashover occurs when the oxygen in a room has been consumed and the heat has reached a point where, when oxygen is introduced, the entire room and contents ignite in an explosive-like event. For EMS, cardiac events (which are one of the most frequently measured because they are indicative of the overall quality of the service) show that the probability of survival diminishes with each passing minute. Beyond 6 minutes, the probability quickly drops, and at 10 minutes it reaches zero. For that reason, intervention needs to take place quickly.

Time stamps should be taken and logged using a Computer Aided Dispatch system when the phone rings; when it is answered; when the information is relayed to responders; when responders are leaving the station; when the responder arrives; and when intervention takes place either by taking action on the fire ground or by arrival at the patient's side. If time stamps are not set up properly, times cannot be reviewed and compared with those of peers for qualitative and quantitative purposes.

POLICY RECOMMENDATIONS: Create service level objectives for the dispatch center's call processing time that state:

a. *All alarms and phone calls shall be answered within 15 seconds 95 percent of the time and within 40 seconds at least 99 percent of the time.*
b. *All alarm notifications for public safety shall be processed within 1 minute 90 percent of the time and within 1 minute 30 seconds 99 percent of the time.*
c. *These target times should be set for priority fire, medical, and police calls. Non-priority calls should be reviewed for appropriateness of time, but the*

performance template should track these calls separately from the priority calls.

These service level objectives will bring Huron's dispatch center into a performance range with national standards such as those set by the National Fire Protection Association (NFPA) under its dispatch guidelines that are numbered 1221.

The goal of dispatch is to answer the phone and process the call for help. Time is critical in achieving successful outcomes. The dispatcher should answer the phone, process initial call data, and alert the responders in 1 minute to 1 minute 30 seconds so that they can begin the next element of the response. However, these service level objectives should not prohibit dispatchers from remaining on the line with callers and using various protocol programs that have been developed for public safety dispatch. These protocol programs are able to extract vital information to make responders' outcomes efficient, effective, and safe. If, for instance, the caller initially describes a major medical emergency but the dispatcher then finds that such an emergency does not exist, the responders can provide a normal response or use just lights rather than using lights and siren.

In the case of cardiovascular incidents requiring defibrillation, there is a 10 minute window from the onset of the incident. Each minute lessens the chances of reversing the effects of the heart inaction and at 10 minutes, the probability of recovery reaches a point of zero, according to studies done in California. Time, therefore, is critical, and for each corresponding unit of time saved in dispatch, responders can reach the patient more quickly and have a better chance at a successful outcome.

The dispatcher is critical not just to achieving a successful outcome, but also to collecting the data necessary to evaluate performance on an ongoing basis. The role of the dispatcher is not just to answer a phone and push a button, but also to help develop information from the caller, to calm or guide the caller in intervention efforts, to help the caller get out of harm's way if a robbery or other event is unfolding, or to take other necessary actions as spelled out in protocols. Because some areas of Huron's response area are remote, the dispatcher's help may be critical in achieving successful outcomes.

At the same time, the dispatcher provides the raw data that are necessary to continuing evaluation of the response and outcome efforts of the public safety department. It is only by using these data that elected officials and management can ensure that the public safety department is efficient, effective, and adept at providing safety to not just the citizens but also to responders.

IV. Risk Assessment and Strategic Planning

Moving toward integrating emergency service delivery is complicated in Huron by the lack of any comprehensive master plan. The attached maps In Appendix I, Section Four show the existing zoning districts within Huron, but there is no long-range focus on what the community will look like in five, ten, or 20 years.

Matching the deployment of resources to the needs of the community is difficult in Huron because there is no guarantee that existing land uses will prevail. The city sits on the shores of Lake Erie, and much of the shoreline is being slowly reclaimed by the city through clearing of decades-old industrial uses. What density and what targeted populations will occupy these

redeveloped sites are questions that should be studied when locating future emergency service facilities and offering additional service.

Community trends, particularly trends that lead to increased calls for police, fire, and emergency medical service, should be studied and followed with education targeted at mitigating and preventing the calls for service before they occur. Research developed in the United Kingdom shows that for communities to truly be made safer for residents as well as first responders, prevention and mitigation must be emphasized. Knowing the trends and desires of the community helps to target outcome-based education such as cardiopulmonary resuscitation (CPR), first aid, crime prevention, community policing, neighborhood watch, and similar outreach.

> *POLICY RECOMMENDATION: Conduct a comprehensive all-hazard risk assessment of existing facilities in Huron utilizing existing firefighters as well as developing a community master planning document that integrates mitigation and prevention toward outcomes sought by the Authority Having Jurisdiction (the City Council). Further, if a public safety department is created, train Public Safety Officer IIIs (firefighter trained) to update the risk assessment as construction occurs.*

> *POLICY RECOMMENDATION: Train existing firefighters in geographic information systems (GIS) to develop databases critical to successful intervention in natural and human-made disasters as well as day-to-day response.*

When beginning the risk assessment, the agency should determine the outcome expectations of the elected officials and community. Examples of these expectations include:

1. To contain all fires to the room of origin.
2. To prevent loss of life by rapid arrival of responding units.

3. To contain the effects of the hazard to the smallest geographical area possible.
4. To prevent the spread of the hazardous situation.
5. To ensure that resources are deployed effectively, efficiently and safely.

The agency should then continue the risk assessment by evaluating properties within Huron based on the expectations. The evaluation should ask:

1. What is the construction of the structures? (Example: wood frame, reinforced concrete, steel, etc.)
2. What is the fire flow requirement to extinguish a fire in the structure as defined by the Insurance Services Office (ISO)?
3. If the hydrants that serve the property are not adequate for extinguishing a fire, how deficient are they and what is required to make up the difference?
4. Are there systems or modifications that could be implemented or installed that would mitigate the risk of fire, medical emergency, natural disaster, or human-made disaster?
5. Are there hazards that could be removed from the structure that would reduce calls for service?
6. Are there code violations? (Take corrective action.)
7. Are there populations at risk in the structure? For example, are there people confined to the bed or wheelchairs that occupy the structure and pose additional challenges for responders? Can preventive steps be taken before incidents occur to minimize affects of hazards on these populations?

8. Are there unusual items stored on the property (guns, knives, weapons, black powder) that may be used against responders or that could be used to injure/kill responders?

The next step of the risk assessment process is to look at the probability of an incident occurring. How often have the structures experienced a fire? A tornado? An earthquake? A flood? A human-made incident? A hostage situation? A robbery? This step of the risk assessment establishes the probability that an incident will take place, and in areas with a high probability of an incident, resources may have to be deployed or adjusted in future deployments.

Looking at the calls for service, the city is fairly well served from the central fire station. The elongated nature of the city limits, wrapped along the shores of Lake Erie, poses distance challenges. There is no heavy industry located within the city limits, but old industrial sites may pose a hazard to responders and should be evaluated. If police are being called to structures repeatedly, can mitigation measures be taken to eliminate these calls for service and thus free up personnel?

The existing station appears to service the majority of calls within 6 minutes. The attached maps (see Appendix I, Section Four) show the 4-, 5, and 6-minute driving response areas from the station; understanding there is an additional possibility in the future of another equipped station in the township. However, in lieu of this station, personnel may be stationed at the water park during peak hours identified by a review of statistics. Private ambulance companies have long used such statistical likelihood to position “roving” ambulances that can respond to calls for service at the facility as well as surrounding areas.

Risks can be categorized as high, moderate, and low. The on-site team's overview of Huron determined that there are likely few high-hazard areas present, with much of the community being residential or served by sprinkler systems. A recommendation of mandating sprinkler systems in all new construction that exceeds 5,000 square feet would contain the future risks. The International Code Council, at its meeting this summer, passed mandatory sprinkler language in all new construction. The city should embrace this mitigation effort, which would prevent fires from growing beyond the room of origin and minimize the response needed in future years. The costs of sprinklers has decreased to less than $1.60 per square foot. Sprinklers are regularly included in new construction for lawns and flowers; isn't protecting the lives of the occupants far more valuable to the property and buyer?

Sprinkler systems can move a facility's risk from high to low because they are designed to contain the fire to the point or room of origin. The systems give responders time to arrive before flashover occurs and the structure is consumed. The systems also alert occupants to a situation. Sprinklers are one of the prevention tools that should be considered when inspecting buildings and facilities.

The staffing models recommended in the latter sections of this report are based on maintaining a low risk inventory and responding with personnel to such a risk. For structures and situations that are higher risk, the city of Huron should institute agreements and policies to utilize mutual or automatic aid from other jurisdictions.

POLICY RECOMMENDATION: Based on the risk assessment and review of performance, the city council should adopt service delivery standards (see

Appendix I for a draft). These objectives, when accompanied by risk management and outcomes of protecting people and not property, form the basis for Integrated Risk Management Plans.

Another term for "service delivery standards" is "standards for response coverage." The concept of "standards of coverage" originated in the United Kingdom before World War II. However, by 2002, research and review indicated that a standard of coverage did not affect the overall safety of the responder or population. Instead, prevention and mitigation pre-incident had to become the focus: eliminate as many hazards and threats as possible so that incidents would not occur. In the United States, the fire service continues to use the older "standard of coverage" concept. Huron should become a leader and focus, with the available resources it already has on staff, on prevention and mitigation, thereby protecting the public and responder.

When looking at developing future public service delivery, it is recommended to have units dispatched within 1 minute and 30 seconds and then allow them 4-, 5-, or 6-minute response times to incidents. The goal is to have units on scene within the 10-minute threshold that is established in cardiac cases for 90 percent of all calls.

It is important to note the difference between "90 percent of all calls" and "average response time." Using "average response time" means that 50 percent of the calls exceed that time; 50 percent are within that time. The average response time noted earlier in this report is 6.2 minutes for fire and 5.4 minutes for EMS.

The 90th percentile response time for fire calls is 10 minutes 30 seconds; for EMS calls, units arrive within 9 minutes 90 percent of the time.

Using a 90th percentile for performance means that in 10 of 100 priority calls for service, the unit could not arrive within the standard time, but it did achieve the standard 90 out of 100 times. The 90 percent performance standard is used by fire agencies around the world and, in academia, would receive an A- or B grade. It allows for circumstances that may be out of the control of responders (e.g., weather, accidents, traffic) but creates a basis for evaluating performance.

> *POLICY RECOMMENDATION: Turnout time for responders should be within 1 minute and 30 seconds 90 percent of the time.*

As stated in Section III, Communications and Dispatch, the dispatcher plays a key role in ensuring that performance meets standards established by the public safety department and the city council. Once the dispatcher relays the information to responders, the next time element that should be recorded is turnout (the amount of time that it takes for the responder to don protective gear and begin moving the truck from the fire or police station).

The recommended deployment model uses existing firefighters to staff the fire station 24 hours a day, 7 days a week. Because these firefighters are at the station, they can perform maintenance functions, paperwork, and administrative duties in addition to driving the appropriate apparatus to the call scene. It should be noted that firefighters can be in the fire districts that are created with responding equipment and protective gear; they do not have to be physically bunkered down in stations.

By setting a performance standard of 1:30 for dispatch of calls for service, the deployment model keeps the combined time elements within the acceptable range. With 1:30 for dispatch and 1:30 for turnout, together with

6 minutes or less for travel time, the responder should first arrive on scene within the established 10-minute window.

> *POLICY RECOMMENDATION: Equipment purchases and other tactical decisions necessary to achieve the strategies adopted by the City Council should be formulated into a strategic plan with goals and objectives for the public safety department.*

After reviewing the performance of the department, the reason for any deficiencies needs to be determined. Is the equipment the department has purchased appropriate for the calls? For example, if the department was using a large ladder truck to respond to calls for medical service and was thus taking 10 minutes to travel to calls, could the travel time be reduced by using rapid response vehicles? Could compressed air foam units be installed on smaller rescue or pumper trucks that would respond to car fires, structure fires, and other similar calls? These smaller trucks could arrive faster and yet be backed by larger pumpers capable of delivering additional water or pump service.

V. Training and Education

Personnel Training

If the AHJ (city council) chooses to pursue public safety, it is recommended that the long-term goal be to train all responders in as many disciplines as possible and thus maximize available responders to police, fire, and EMS calls for service.

> *POLICY RECOMMENDATION: All persons hired to work in the Huron Public Safety Department, effective immediately, shall have the following qualifications:*

a. *They must be certifiable and have attended training qualifying them as a police officer under the applicable State of Ohio training standards for law enforcement officers.*
b. *They must have completed Firefighter I training through the State of Ohio (Firefighter II should be reviewed and added in the next 5 years).*
c. *They must have a Hazardous Materials Operation certification.*
d. *They must have an emergency medical technician (EMT) license through the State of Ohio or be eligible to be licensed through the State of Ohio. As a first step, all existing police personnel should be trained as Medical First Responders (MFR). This is less than the EMT level. Ultimately, in order to maintain ALS, paramedics should be staffed on each shift.*
e. *Items (a) through (d) are in addition to general standards of being over the age of 18, possessing a valid driver's license, having at least a high school diploma, etc.*
f. *Persons should also be able to pass the Certified Physical Agility Test (CPAT) as well as satisfactorily passing a physical exam and background investigation.*

POLICY RECOMMENDATION: All existing personnel meeting the qualifications listed above should be categorized as "Public Safety Officer I" and should be eligible for all promotional opportunities that arise in the Huron Department of Public Safety.

All personnel who meet only the police training portion of the description should be categorized as "Public Safety Officer II" and would not be eligible for all promotional opportunities but instead would be limited to police road patrol.

All personnel who meet only the paramedic/EMT, firefighter, and hazardous material qualifications would be categorized as “Public Safety Officer III” and would not be eligible for all promotional opportunities but instead would be limited to the delivery of fire-related services.

All personnel who meet only the firefighter and hazardous material qualifications, which would be the paid-on-call, reserve, or other personnel, would be limited to fire-related services and not eligible for promotion. They would be categorized as “Public Safety Officer IV.”

POLICY RECOMMENDATION: The Huron Department of Public Safety mandates that personnel categorized in the descriptions above attend and successfully complete the following yearly training:

1. *For Public Safety Officer (PSO) I*
    a. *Must qualify annually with a firearm and issued department weapons. Such training will consist of live firing as well as written testing and shall be at least 16 hours per year.*
    b. *Must attend defensive tactics refresher training for 8 hours each year.*
    c. *Must attend 4 hours of taser training per year.*
    d. *Must attend 2 hours of baton training per year.*
    e. *Must attend 1 hour of pepper spray training per year.*
    f. *Must attend 8 hours of emergency vehicle operations training per year.*
    g. *Must attend 4 hours of active shooter training per year*
    h. *Must attend bi-yearly Intoxilizer (breath testing machine) training of 2 hours per year.*
    i. *Must attend 2 hours of radar training per year.*
    j. *Must attend 4 hours of mobile field force training per year.*

k. *Must attend a hazardous material refresher program of at least 8 hours per year delivered in house.*
l. *Must attend a vehicle extrication and vehicle stabilization training program of 8 hours at least once per year delivered in house.*
m. *Must attend a fireground tactics and operation program that includes tagging fire hydrants, laying hose into fires for supply as well as attack, and smoke reading. The training program shall be at least 8 hours and delivered in house.*
n. *After completion of the Firefighter Survival Course (2 days of intensive training), must attend one 8-hour refresher course yearly.*
o. *Must attend 25 hours of EMT training per year with a total of 100 hours over 4 years for EMT training and 12 hours additional for paramedics.*

2. *For Public Safety Officer II –*
    a. *At a minimum, must complete items (a) through (k) above with other training to maintain skills as well as training necessary for any specialized duties s/he may be required to perform.*

3. *For Public Safety Officer III –*
    a. *At a minimum, must complete items (a) through (k) above. The department will also conduct 2-hour training sessions twice monthly (first and third weeks) that will build skills necessary for these areas. On-duty PSO IIIs will be required to attend; all other personnel will attend as available or as required by management.*

4. *For Public Safety Officer IV –*
    a. *At a minimum, must complete items (a) through (k) above. Also attend, as available, training to be conducted twice-monthly for 2 hours.*

POLICY RECOMMENDATION: All personnel shall demonstrate that they are competent and capable of performing the duties and functions of their classification annually. Personnel will be offered the opportunity for one-on-one skill enhancement from on-duty personnel prior to the competency testing. Should personnel not be able to perform the functions and requirements of their description, they shall be afforded one additional opportunity to meet the requirements and thereafter shall be reclassified both in duties and pay scale to areas for which they are qualified.

One challenge that is facing fire departments across the country today is the lack of fires. A challenge for public safety departments is that with shift schedules, it is highly likely that personnel may not be working when a fire call is received and for which they may be first responders. The personnel may be called back to conduct operations but they would be the second, third, or fourth unit in and not the first responders who make the critical size-up and deployment decision.

The public safety department should make every effort to conduct one live burn each year and require all personnel to attend in addition to the above training. Conducting such burns builds the camaraderie of the department as well as building skills and maintaining education and training.

Public Education

For both police and fire services, educating the public is one way to begin minimizing the calls for service. Police officers can educate businesses on prevention of such things as bad checks, fraud, and robbery; the police can also integrate themselves with the school system and offer programs such as Drug Abuse Resistance Education (DARE) and other drug prevention activities. This provides an opportunity to unite the presentation with fire so that students and the community view the agency as a joint force effort.

Public education should target hazards and issues that are present in the community. There is little use having public safety officers spend personnel hours on immigration policies and enforcement if that is not an identified problem in Huron. Carefully surveying, looking at causes of fire, and developing ways to prevent or mitigate calls for service should be the focus of public education efforts.

A number of resources are available to work toward this goal, but any public education should include pre- and post-testing to determine if the message is indeed being received and understood by the targeted populations. Too often, personnel do not connect with the audience when they make presentations, or the audience does not receive the message. Pre- and post-testing helps identify if the message is being communicated and also provides an evaluation tool for presenters representing the agency and city.

> *POLICY RECOMMENDATION: A committee that includes school officials, city council, police and fire command, and the business community should be established to develop a menu of desired public education programs. The same committee should also use run data and fire marshal reports to determine targeted programs necessary to mitigate or prevent calls for service. Lastly, the committee should develop pre- and post-testing processes to evaluate the effectiveness of all public education and outreach by the Huron Department of Public Safety with the goal of preventing or mitigating calls for service, thereby making the community and responders safer.*

VI. Equipment

The purpose of the following policy recommendations is to minimize the time required to deliver first responders to emergencies. It is understood that emergency medical transport is provided to a hospital outside the city limits of Huron.

POLICY RECOMMENDATION – All Public Safety Officers shall achieve and maintain at least an EMT level of certification for medical response; it is preferred that all have paramedic status in the future. All Public Safety Vehicles shall be equipped with automated external defibrillators (AEDs). All vehicles used by the Public Safety Officer Is shall also be equipped with:

a. *Gear bags containing their turnout gear.*
b. *Spanner wrenches and other devices necessary to attach hose to hydrants or to other hoses.*
c. *Necessary medical bags to perform basic EMT functions but not immobilization.*

PSO I vehicles should arrive on the scene of all medical and fire emergencies prior to additional equipment from the fire station because PSO I vehicles are more mobile than heavy fire equipment. The PSO vehicles will carry the equipment to perform immediate life-intervention processes, with the heavier equipment dispatched and responding from fixed-base stations that will support the initial functions. All of these functions shall then be supported with transport, when necessary. Because officers take their vehicles home, the city has additional coverage opportunities outside of the normal shifts.

POLICY RECOMMENDATION – All fire vehicles that are replaced in Huron should be designed with the concept of a sole operator driving and pumping.

The vehicles should have backup cameras that view the rear of the truck and allow the driver to view 360 degrees. In addition, all pumpers and aerial units shall have top mid-mount pump panels to allow the operator to view the entire fireground while operating the equipment. Aerial devices shall have the ladder designed so as to allow water delivery from the top-mounted pump panel and not require an additional person on top of the device.

The design of future equipment is critical to minimize the number of personnel required to drive, position, and operate the equipment. All equipment should be designed for a single person to operate with the exception of, for example, tagging a fire hydrant on the way to a call. In those cases, the responding PSO I unit can do an initial size-up and position at the hydrant to catch the hose as the responding unit lays into the fire scene.

POLICY RECOMMENDATION – All new vehicles for the Huron Department of Public Safety shall be equipped with a Compressed Air Foam (CAF) delivery system.

Studies and practical use have shown that the use of a CAF system minimizes the amount of water that must be used on fires as well as drawing fire out and smothering it, rather than cooling, and eventually cutting off the oxygen supply.

The less water a department has to use, the less damage from water that occurs; the less water that has to be carried; the less hydrant systems have to be used, and so forth.

POLICY RECOMMENDATION – All PSO I vehicles shall be equipped with thermal imaging camera systems.

Thermal imaging cameras are useful in a number of ways other than simply helping spot victims inside fire scenes. The cameras are useful for spotting overheated ballasts in fluorescent lights, overheated plugs and switches, arcing electrical systems covered by walls or panels, or even victims who have wandered away from custodians (e.g., children, dementia patients).

Sizing up the scene and requiring the right equipment to be delivered with the right deployment force at the right time is critical to achieving a successful outcome in all-hazard deployment. The faster that decisions can be made using critical information, the faster intervention can occur.

VII. Deployment and Work Assignments

The concept of Public Safety is centered on delivery of the right equipment, and right personnel with minimum deployment time. To that end, using data compiled from the CAD system and the ICMA team's on-site visit indicate that the most efficient use of resources would be as specified in the policy recommendation below.

POLICY RECOMMENDATION – The following deployment pattern should be adopted by the Huron Department of Public Safety:

a. *Existing firefighter-trained personnel would be located at the station 24/7 on 12-hour shifts. This would allow for work assignments to be performed not just on the day shift but also on the night shift. Normal work assignments would be 6 AM to 6 PM. This deployment pattern would not preclude the assigned personnel from taking the engine and performing building inspections, property inspections, or other assignments with the fire command manning the station or vice versa. The key is that turnout*

should take place within 1 minute 30 seconds. If the firefighter is within the district created, the travel time impact should be minimal because the turnout time should be less.

b. *All Public Safety Officer I personnel would be assigned to sections of the community and would maintain their patrols in those sections. Only when calls for service were of a severe nature requiring multiple responding units would they leave the patrol "districts" that are created. It would be imperative that supervisors monitor compliance with this deployment, as the PSO I will normally arrive on scene prior to the responding PSO III or PSO IV with the heavier equipment.*

The deployment goal is to allow a minimum of two PSO Is on patrol in each district with two PSO IIIs or IVs at the station along with a commanding officer.

1. *The public safety director could work the 12-hour shift or a standard 5-day/40-hour week.*
2. *Purple Shift: One "officer," two PSO Is, and two PSO IIIs.*
3. *Orange Shift: One "officer," two PSO Is, and two PSO IIIs.*
4. *Green Shift: One "officer," two PSO Is, and two PSO IIIs.*
5. *Blue Shift: One "officer," two PSO Is, and two PSO IIIs.*

c. On structure fires and wildland fires requiring additional staffing, the off-duty personnel shall be alerted via the dispatch center.

1. *On all structure calls with a known fire, off-duty personnel and paid-on-call personnel shall be alerted, called to the station, and due at the scene as second, third, and fourth responders.*
2. *For structure fires, the goal is to staff the following roles:*
    a. *One driver/pump operator.*
    b. *One initial arriving PSO I who shall serve as the Incident Commander until relieved by command or who passes command to senior PSO III. The PSO I, if passing command, shall then assume the task of pump operator.*

c. *Two persons on a 1.75-inch attack line with two additional persons assigned as backup/rapid intervention crew (two in/two out).*
d. *Two persons assigned to search, rescue, and ventilation. This function would be staffed after items (a), (b), and (c) are staffed.*
e. *Two persons on a 1.75-inch attack line staffed after item (d).*
f. *Two persons assigned to set up the necessary ladders to allow escape of persons fighting the fire inside the building.*
g. *One safety officer/ secondary acting or appointed command officer. This function involves ensuring that safe fireground procedures are being followed, that assistance in command at the rear of the structure allows the commanding officer to "see," and that rehabilitation procedures can begin.*
h. *Two persons assigned to rehabilitate and begin relieving persons on attack lines for longer fire situations.*

3. *As off-duty and paid-on-call personnel arrive, PSO I personnel (other than initial commanding officer or pump operator) should be returned or freed for service. The commanding officer should ensure that at least one PSO I is available for calls except under extreme hazard responses. In such extreme cases, PSO I personnel responding from off-duty may be activated and put in road positions.*

POLICY RECOMMENDATION: Any additional personnel hired in the second, third, and fourth years following this initial deployment and training shall be assigned to patrol functions, allowing initial deployment in 4 minutes travel time or less and total deployment of all resources for a minimum/low-hazard incident in 8 minutes travel time or less. Note that the times are for travel time; added to those times are the 1 minute 30 second call processing time and 1 minute 30 seconds turnout time.

It shall be critical to monitor service delivery times and see where personnel are needed to meet the goal times. A minimum/low-hazard incident requires four personnel to respond within 4 minutes travel time, and 12 to 13

personnel should respond within 8 minutes. Sprinklers, quick intervention, and other preventive efforts can lower the number of responders required as well as allow extra time for some incidents (fires).

VIII. Cost Analysis

The city of Huron should take into account the following budgetary considerations for implementing its public safety department . Some of the decisions, such as attendance at the police academy, can be implemented over multiple years because of the time requirements.

Times: Firefighter I & II -- 400 hours (done in house)

The attached spreadsheet incorporates the assumption that personnel would be paid overtime for all 400 hours (worst-case scenario). Also, in future years, a Wednesday night training would be mandatory every other week and would include a hazardous material refresher.

To minimize the costs, the 400 hours of fire training could be provided to half the department in 2009 and half in 2010. Also, by holding the training in house, the schedule could allow for PSO IIs to attend while on duty and would eliminate the overtime costs. The costs can be recalculated by simply entering “0” in the 400-hour boxes, and the formulas will make the change at the bottom line. The spreadsheet was designed to be an active document; there are formulas in the columns that allow you to make any changes and will adjust the bottom lines accordingly. Therefore, if someone is not going to take training in fire or police skills, a “0” can be entered in that column, and the bottom line will reflect the change.

The attached chart also provides costs for equipping PSO IIs for firefighting: approximately $1,200 each if bought in bulk.

At the completion of Firefighter I and II training, the chart shows a $1,500 salary increase for making the personnel who complete the training a PSO I.

In the second year, the overtime number projects a 3 percent salary increase for PSO Is; a 2.9 percent salary increase for PSO IIs; and a 2 percent salary increase for PSO IIIs.

The bottom line can also be influenced by conducting much of the police annual certification on duty times with training days on the four platoons. Again, these numbers can be recalculated on an individual basis simply by entering “0” into the boxes.

The chart assumes that one firefighter will train as a police officer over the next 3 years and that his or her shift will be filled by a part-time hire, either from the reserves or from outside the department so that staffing remains constant. The assumption is that this firefighter would attend the academy for the 596 hours and that his or her shift would be backfilled, which is the reason for the hours credited.

Times: Ongoing Training

The annual training costs are calculated with the following:

Police officers (PSO IIs at this time) would receive training firearms at 16 hours; defensive tactics at 7 hours; taser at 4 hours; baton at 2 hours; pepper spray at one hour; emergency vehicle operations at 8 hours; active shooter at 4 hours; Intoxilizer at 2 hours; radar at 2 hours; and mobile field

force at 4 hours. The assumption is that Intoxilizer, radar, and mobile field force training is bi-yearly and that one training would not be on overtime (both could be scheduled on regular shifts and reduce costs further).

Firefighters (PSO IIIs at this time) would receive 25 hours of training each year over 4 years to maintain their EMT license; 36 hours for Firefighter I and II training, and 24 hours for paramedic training. Firefighters would train on Wednesday nights, but this schedule would eventually be reduced to every other Wednesday.

The reserves could continue training every Wednesday, and on-duty personnel could be required to join them to build teamwork.

Daily work tasks would remain the same for chiefs and commanding officers; by converting to 12-hour shifts, the station duties would be split between day and night shifts with most maintenance performed on night shifts and inspections on day shifts (see attachments from Huron).

The following page outlines the costs of the existing department. The base salary is often the only number quoted for the cost of an employee. However, there are substantial other costs that need to be factored in when looking at the true cost of employees. The following page outlines the costs per employee at the existing contract rate and makes some quick projections of cost savings if different forms of the public safety concept are implemented;

ranging from the director to all command staff.

POLICE

Name	Identifier	Rank	Base Pay	Benefit %	
G. Bodkin	1010-075	Sergeant	$ 58,849.93	55.79%	$ 91,679.66
J. Bowens	1010-100	Officer-A	$ 47,346.91	63.63%	$ 77,473.43
K. Durbin	1010-125	Sergeant	$ 60,954.70	54.67%	$ 94,279.05
C. Fleming	1010-135	Officer-A	$ 47,954.49	63.12%	$ 78,223.80
R. Glovinsky	1010-150	Chief	$ 71,792.53	49.97%	$ 107,663.77
T. Graham	1010-175	Officer-A	$ 50,922.54	60.81%	$ 81,889.34
K. Lobsinger	1010-310	Officer-A	$ 48,503.23	62.67%	$ 78,901.49
J. Maloy	1010-325	Sergeant	$ 59,540.97	55.41%	$ 92,533.10
N. Orzech	1010-410	Officer-A	$ 41,867.78	68.88%	$ 70,706.71
S. Ryan	1010-425	Officer-A	$ 49,242.97	62.08%	$ 79,815.07
D. Zappa	1010-500	Sergeant	$ 57,177.06	56.73%	$ 89,613.67
J. England	1010-550	Officer-A	$ 46,585.16	64.29%	$ 76,532.67
M. Jacobs	1010-560	Officer-C	$ 30,898.83	52.63%	$ 47,160.06
F. Chubak	1500-075	Dispatch A	$ 41,918.63	63.78%	$ 68,652.62
J. Dean	1500-195	Dispatch A	$ 37,274.80	69.42%	$ 63,152.00
V. Ripley	1500-275	Dispatch D	$ 26,220.97	90.91%	$ 50,058.74
M. Jacobs	1500-280	Dispatch E	$ 26,774.36	52.06%	$ 40,714.23
R. Boesch	1500-285	Dispatc Prob	$ 26,774.36	52.06%	$ 40,714.23
T. Hoover	1500-400	Pt Officer	$ 57.38	23.95%	$ 71.12
J. McMillion	1500-525	Pt Officer	$ 1,695.75	23.95%	$ 2,101.88
K. Schafer	1500-680	Pt Officer	$ 3,072.77	23.95%	$ 3,808.70
E. Papes	1500-700	Pt Officer	$ 516.38	23.95%	$ 640.05
B. Clayman	1500-720	Pt Officer	$ 2,116.54	23.95%	$ 2,623.45
M. Hunter	1500-730	Pt Officer	$ 13,770.08	23.95%	$ 17,068.01
J. Gibboney	1500-745	Pt Officer	$ 2,832.50	23.95%	$ 3,510.88
R. Boesch	1500-750	Pt Officer	$ 1,179.38	23.95%	$ 1,461.84
B. Grimm	1500-765	Pt Officer	$ 1,420.00	23.95%	$ 1,760.09

FIRE

S. Dircks	1310-050	Firefighter A	$ 60,392.41	59.91%	$ 96,574.05
S. Osterling	1310-200	Captain	$ 63,740.09	58.26%	$ 100,874.15
P. Berlin	1310-450	Chief	$ 69,064.39	55.96%	$ 107,713.21
K. Berlin	1310-550	Lieutenant	$ 64,182.20	58.05%	$ 101,442.04
C. Kaman	1310-625	Lieutenant	$ 53,636.37	63.87%	$ 87,895.92
K. Gadd	1310-650	Firefighter A	$ 51,909.46	65.05%	$ 85,677.70
M. Hohler	1310-675	Captain	$ 62,537.86	58.83%	$ 99,329.88
K. Schafer	1310-700	Lieutenant	$ 53,912.85	63.69%	$ 88,251.06
B. Ware	1310-725	Firefighter A	$ 48,591.37	67.55%	$ 81,415.61
D. Nash	1310-750	Firefighter A	$ 48,662.63	67.49%	$ 81,507.15
P. Hasenmeier	1310-775	Firefighter A	$ 48,680.37	67.48%	$ 81,529.94
C. Folger	1310-805	Firefighter C	$ 33,025.33	55.70%	$ 51,421.04
J. Smith	1310-806	Fire-Probati	$ 33,025.33	55.70%	$ 51,421.04

Price of Command	$ 845,998.52
Ave. Price of Comm	$ 93,988.72
Price Public Safety	$ 375,954.90
Price Savings	$ 469,943.62
Price Savings with (	$ 577,656.83

Price of Staff Fire	$ 529,546.52
Price of Staff Police	$ 590,702.56
Price of PT Police	$ 33,046.04

IX. Building Department Delivery

The duties of building inspector are contracted to the former fire chief, who now works for the township of Huron. At this time, with the economy slowed, it would not be a wise use of available city funds to bring these functions in house.

However, during the slower economic times, it would make sense to train existing firefighters on building inspection and code enforcement. One additional job that firefighters could perform in their downtime would be inspections of every building in the community as part of developing the risk management report. At the same time they could make mitigation and prevention recommendations that would reduce future calls for service. As an example, the city of Scottsdale, Arizona, conducts a “trip and fall” inspection of homes to eliminate falls by senior populations.

This program came about after the department evaluated calls for service and found that falls in the home were a leading reason for calls to the department, that persons who fell and broke a hip often did not recover, and that such falls led to complicating issues resulting in death.

Personnel training should take place during slower periods, which would allow assigned fire responders (PSO IIIs) to handle these duties in the future and generate additional income in the form of charges for service to perform the inspections along with fines to the city to offset downtime.

Appendix I
Integrated Risk Management Plan
Huron, Ohio

Section One: Introduction

The following report serves as the Huron, Ohio, Department of Public Safety's first Standard for Response Coverage document, which should be expanded to create an Integrated Response Management Plan (IRMP). To create the next step will require a risk assessment coupled with a focus on prevention and mitigation to eliminate hazards in the community so as to eliminate calls for service. The focus of any Public Safety approach should be to prevent incidents from happening; if they do occur, having an effective, efficient, and safe method for responding to the call for service.

The police and fire service defines standards of response coverage, otherwise known as "deployment analysis," as those written procedures that determine the distribution and concentration of fixed and mobile resources. The purpose of completing such a document is to assist the agency in ensuring a safe and effective response force for major police calls, fire suppression, emergency medical services (EMS), and specialty response situations such as hazardous materials incidents.

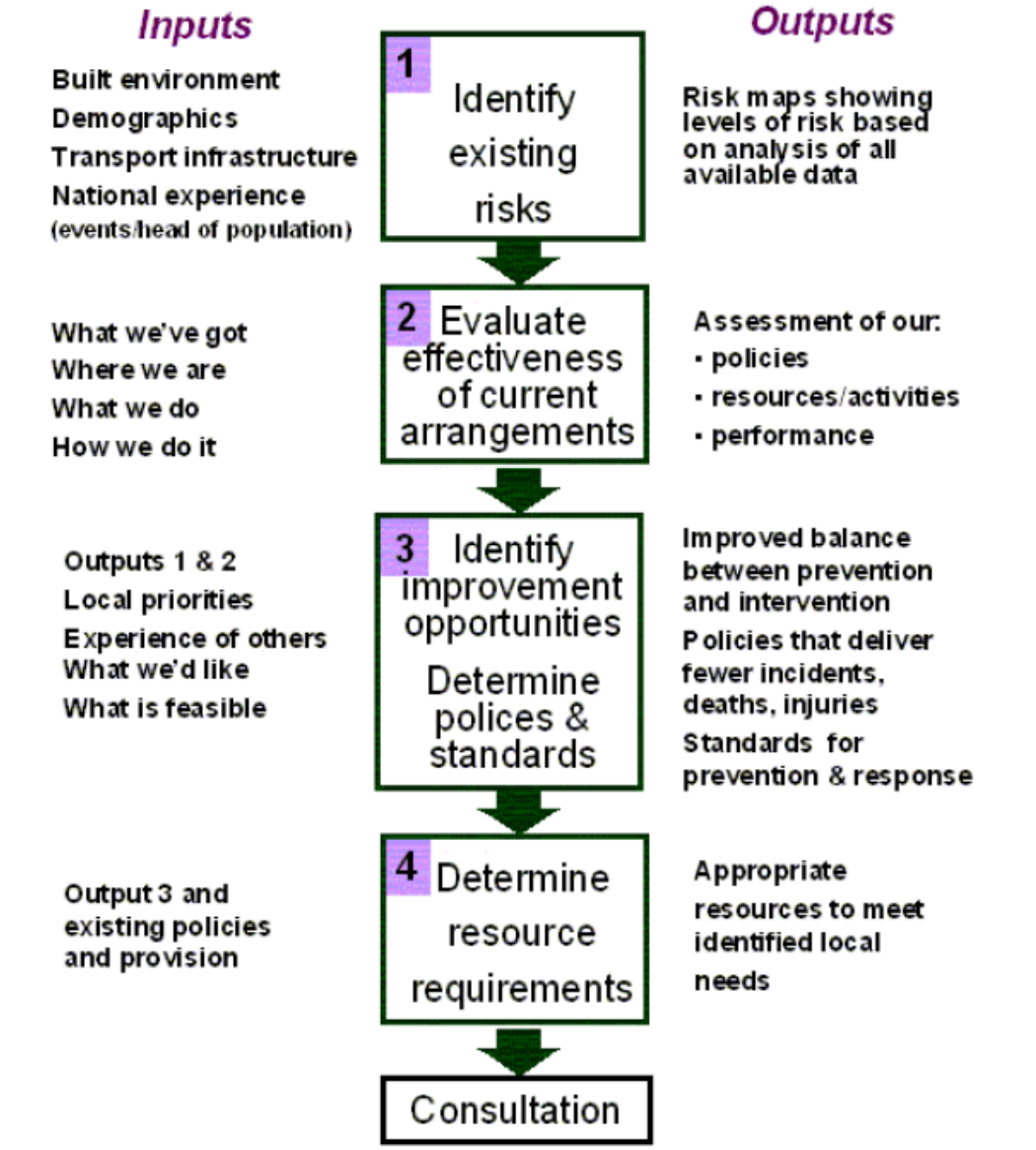
A "Standard for Response Coverage" is the expected service level that the community can expect from the currently deployed resources. It is reviewed on an annual basis and may be changed, if improvements are possible based on hard data or deployment configuration changes. Likewise, if resources are eliminated, the authority having jurisdiction (AHJ), which is

usually the elected body of the city. will be able to see what the response is likely to be given these changes.

This report assumes that Huron, Ohio will move toward the public safety model for service delivery; however, it is practical even in a separate police and fire service delivery framework. If working with separate divisions or agencies, this document should be expanded and should integrate the standards for police, fire, and EMS functions into one document and project the response times to emergency calls in those disciplines. Nonemergency calls are assigned a lower priority for response so as not to endanger the responder or the public. The ultimate goal is to have the right resources respond in the right manner at the right time to effect a positive outcome.

Creating a standards of response coverage document requires researching, studying, and evaluating several areas. This document begins with an overview of both the community and the agency. Following this overview, it discusses areas such as risk assessment, critical task analysis, agency service level objectives, and distribution and concentration measures.

Fire Authority Integrated Risk Management Planning: Overview



Section Two: Community and Agency Overview

The Department of Public Safety of Huron, Ohio, hereafter referred to as the “agency,” offers not only fire services to the community but also police services and EMS first response as well.

In 2009 the Huron police and fire departments were placed under the umbrella of public safety. Police officers will receive the necessary training to become qualified as firefighters, and firefighters who are interested will receive the necessary training to become certified police officers. In future years, all new hires of the department must be qualified as both police officers and firefighters as well as being EMTs and/or paramedics.

The department operates out of an administration building that houses the main headquarters for its law enforcement functions and two additional fire stations. Only one of the two fire stations is utilized; the second may be utilized when sufficient growth or call volume develops in the township.

Today, the Huron Department of Public Safety consists of a director, a fire division chief, a police division chief, four captains, and 16 public safety officers. In addition, the department has a number of paid-on-call members who serve as firefighters/EMTs.

The officers, who work 12-hour shifts, are divided into four squads. Together with the shift supervisor, there are five or more personnel on duty at all times. The agency also schedules members of the paid-on-call force, who are paid a stipend for purposes of emergency medical response and fire coverage.

Because the agency is somewhat small, all of its personnel are expected to be knowledgeable in the operation of every department vehicle (fire and police) and the equipment on board in the police, fire, and EMS areas. All Public Safety Officer (PSO) Is, IIIs and IVs are expected to be able to perform each task on a fire scene, such as pump operations, interior attack, ventilation, and search and rescue. PSO Is and IIs are exclusive to police functions.

The goals of the agency are to provide a safe and secure environment for all citizens, businesses, and visitors of the community and to provide the highest standard of fire protection and prevention to the community through employee and public education. To achieve its goals, the agency plans to continue safety presentations in the schools and expand those presentations to the community's elderly population. This safety education focuses not just on fire safety but also on drugs, personal safety, home safety, business safety, and other topics that are identified through evaluation of incidents occurring in the jurisdiction. By targeting crimes and causes, specific education programs can be developed with a target of eliminating future calls for service and improving the overall quality of life in Huron. Updating the agency's response policies has become a priority to ensure the quickest and safest response on all calls, and monitoring available grants to assist with funding for equipment replacement, training, and other enhanced services has become equally important.

Section Three: Risk Assessment

The first step toward completing a standards for response coverage document is conducting a risk assessment. Risk assessment is the analysis of community risk using real-world factors, specifically those that the agency

and the community have agreed on as representing the community's risk level. Risk assessment also involves estimating the possibility of loss or injury. All of this allows the agency to better plan for an emergency. The fire portion of the risk assessment consists of six key elements:

Fire Flow: The amount of water required to control a fire. This figure is based on the structure involved, its contents, and its exposures.

Probability: The likelihood that a particular event will occur within a given period of time. An event that occurs daily is highly probable, and an event that occurs only once in a century is very unlikely. Probability, then, is an estimate of how often an event will occur.

Consequence: There are two components by which consequence is measured: life safety (risk to the lives of occupants from life-threatening situations that require police, fire and emergency medical services) and economic impact (the loss of property, income, or irreplaceable assets such as historic structures or community landmarks).

Occupancy Risk: An assessment of the risk to life and property regarding a fire or other disaster in a specific occupancy or in generic occupancy classes.

Fire, Police, and EMS Management Zones: Areas marked by geographical boundaries that are used to assist the agency in defining the management of risk. Also known as "demand zones," a management zone can be a single building or a group of buildings.

Community Profile: The overall profile of the community based on the unique mixture of demographics, socioeconomic factors, occupancy risk, management zones, and the level of services currently provided. Demographics are extremely important when designing response. For instance, if a new senior citizen complex locates in the city, there may be few additional calls for police or fire service, but many for EMS. As another example, if a mental health counseling service locates a center in the community, the police may be called more frequently to handle unruly patrons or clients and the EMS may have to transport these patients to secure facilities. All of these demographic factors may affect staffing and deployment of resources.

Most agencies seek to classify risks in four categories that also are defined in National Fire Protection Association (NFPA) literature and guidelines. The four risk categories are high hazard, significant, moderate, and low. While these often pertain just to fire, for purposes of this document, these risk categories will be used to deploy police, EMS, and fire resources acting as a public safety department.

When computing a risk on a particular structure, the agency looks at many items, such as the building's construction, regulatory ordinances concerning the structure, the number of occupants within (awake or asleep), occupant mobility (e.g., elderly, restrained), distance to nearest exposure (nearest structure), hazardous materials within the structure, value of the property to the community (monetary and cultural), minimum gallons per minute (GPM) to mitigate a fire within the structure, and the available GPM the department can deliver to a fire in the structure (via hydrants, tanker shuttles, and pumping capabilities of the specific fire apparatus). The agency should also review hazards that may affect the safety of the responders: are

there weapons on the premises? Narcotics? Explosives? Are there other weapons that could be used against public safety officers responding to disturbances, intrusion calls, or crimes in progress? Are there locations where public safety officers should stage vehicles so as to not alert persons in the structure that the area is cordoned off (e.g., for banks and financial institutions)?

For the available GPM of water, it should be noted that Huron has a hydrant system for fires within the city and properties just adjacent. Many people are under the impression that all fire hydrants provide the same GPM. This is not true; the City Department of Public Works has performed flow tests showing that different amounts of water can be flowed from hydrants in various parts of the city.

It is obvious that large factories or agricultural businesses would be considered high risks with some serious consequences if they should experience a fire. But what about those irreplaceable structures that are of specific concern to the community, such as cultural or historical structures (churches, schools, historical homes, and historical districts)? A risk assessment allows the agency to place values on such cultural and historical structures and denote these particular structures or areas of structures as having great importance within the community.

As previously mentioned, there are key elements that need to be addressed when developing a risk assessment.

Probability is the next element of a complete risk assessment program.

Consequence is the next calculation or consideration in a risk assessment program. To perform this analysis, the agency looks at life safety of the occupants of each structure. The agency asks specific questions concerning the mobility and alertness of occupants. It also looks at the structure's alarms (if any) and determines whether the structure's exits are adequate. The consequence element also allows the assessment of the economic impact on the community, should a specific residence or business ignite.

Occupancy risk is a portion of the risk assessment process. What type of construction is the structure? What hazards are involved? What type of fire load is there? Is the structure regulated? If so, how often is it inspected?

Other information recorded includes community demographics. Data on the city's population, natural hazards, and services currently provided are included to make the risk assessment specific to the community.

Last, the computations suggest the creation of different geographical management zones based on the location of various structures and the different public safety risks and consequences these structures pose. With an understanding of the different risk factors, each structure within the public safety service area can be placed into one of the following four risk categories.

High Hazard Risk: For a structure or group of structures to be classified as a high hazard risk, it must contain built-up areas of substantial size with a high concentration of property presenting a substantial risk of life loss, a severe financial impact on the community,

or an unusually high potential for damage to property in the event of fire, disaster, or crime.

Significant Risk: These are areas, whether comprised of a single structure or a group of structures, that require a first response over and above that appropriate to the risk that predominates the surrounding area. These structures should be considered to represent special risks and be given an appropriate predetermined response. For instance, large banking institutions may represent a significant risk from crime, and responders must be directed to position themselves so as to not lead to hostage situations.

Moderate Risk: For a structure to be classified as a moderate risk it must contain built-up areas of average size, where the risk of life loss or damage to property in the event of a fire or other emergency event in a single occupancy is usually limited to the occupants. In certain areas, such as small apartment complexes, the risk of death or injury may be relatively high. Concentrations of property may vary but will generally be of limited extent. The majority of the structures in the agency's fire district score in the moderate risk category. Examples of such structures include:

- Developments of generally detached, single-family housing, including estates and smaller multistory dwellings.
- Areas of older, attached, multifamily, two-story dwellings with most of the property accessible to pre-connected attack lines.
- Mixed low-risk industrial and residential areas.
- Industrial or commercial areas under 10,000 square feet without high hazard or high fire load contents.

Low Risk: Structures that fall within this category include small commercial structures that are remote from other buildings, detached residential garages, and outbuildings.

By using a geographic information system (GIS), the agency can document risk categories and geographically represent the more than XXX structures in its jurisdiction. Through this process the agency has found that XX percent of structures categorized as significant risks are located in the downtown business district, which is within 4 minutes travel time from the agency. A further study of the locations of the remaining structures that have been categorized as significant or high risk structures has led the agency to find that all but XX of these structures are located within 8 minutes travel time of the agency. The agency therefore found it beneficial to consider all areas within 4, 5, and 6 minutes' travel time as one management zone. This particular management zone is labeled as Demand Zone 1.

The second and only other management zone the agency saw the need to create includes all of the remaining structures and areas located outside Demand Zone 1. This particular management zone, labeled as Demand Zone 2, is comprised mainly of rural homes and agricultural buildings, with some small businesses as well. All structures located in Demand Zone 2 are either low or moderate risk structures.

Creating the different management zones has allowed the agency to plan better for responses in those areas. Each management zone has a predetermined response plan that designates the appropriate apparatus based on the emergency event. For example, due to construction types and

fire loads within the structures located in the downtown business district, it is the agency's policy to respond with all of the resources of the agency. For structure fires in Demand Zone 2, it is the agency's policy to respond first with the primary pumper and then with a tanker for water shuttling. Again, responses can vary based on the emergency event.

Similarly, the management zones allow predetermined responses to major police incidents as well. Bank alarms, high risk facilities, gun dealers – all should have predetermined responses to provide maximum safety for police responders. Backup, rehabilitation, and support crews should also know where they should stage so as not to hinder incident command in responding to situations.

Non-fire Risk Assessment

Today's public safety officers have many responsibilities, with involvement in several different disciplines. In addition to firefighting, public safety departments today also provide police, EMS, animal control, code enforcement, technical rescue, and hazardous materials response. As with a structure fire, these types of responses have associated risks, referred to as "non-fire risks." There are also non-fire risks associated with other events, or "non-fire hazards," that the agency may become involved with, such as severe weather, flooding, utility failure, a railroad accident, civil disorder, and terrorism. Like with any fire, planning and preparation are two important factors that can aid in the successful mitigation of an incident involving a non-fire hazard.

The remainder of the agency's risk assessment addresses non-fire risks. The agency identifies non-fire hazards in each of the two demand zones, addresses the frequency and probability of each non-fire hazard, and

then identifies resource allocation and other strategies that will aid in the mitigation of these potential emergencies. The hazards identified are broken into two groups, natural hazards and human/technological hazards.

Natural Hazards

Severe thunderstorm. Severe thunderstorms are most common in the spring and summer months. Some of the hazards associated with severe thunderstorms include lightning, high winds, heavy rains, and hail. These associated hazards can cause fire, a loss of utilities, flooding, and other damage. The magnitude of the storm will determine what type of action the agency will take. If the storm results in little or no damage, on-duty agency personnel can effectively mitigate the situation. On-duty personnel have the option of requesting assistance from the Department of Public Works if necessary. However, if the storm damage is of high magnitude—resulting in other hazards such as fallen trees, downed power lines, and flooding—on-duty personnel will immediately request a full department tone-out. If necessary, the agency will activate the Emergency Operations Center. Assistance from other jurisdictions will be requested as needed.

Flooding. With the varying topological relief in Huron and proximity to Lake Erie, flooding is a potential hazard. Demand Zone 1 is at much more of a risk than Demand Zone 2. In the event of a severe flood, the Emergency Operations Center will be activated. Agency personnel will assist members of the Department of Public Works and the Department of Public Utilities. Other available resources include the Red Cross, Americorps, and private excavating companies.

Snow and Ice. Because of the proximity to one of the Great Lakes as well as the additional lakes in the region, snow events can become major incidents. Ice must also be considered, particularly when the lakes have not yet iced over and fronts move through the area. Snow and ice may require coordination between the agency and the Department of Public Works as well as other transportation agencies in the region. Activation of the Emergency Operations Center is a possibility.

Human / Technological Hazards

Hazardous materials. The transporting of hazardous materials through the agency's jurisdiction is a daily event. Although chemical spills are rare, if this type of accident occurred, on-duty personnel would immediately request a full department tone-out. The first responding units would attempt to gather initial information regarding the chemical(s) involved and render first aid if possible. The magnitude of the incident and the type of chemical involved will determine other agency procedures. If necessary, area residents will be evacuated. Other resources available to the agency are neighboring fire departments, the State Police, neighboring police departments, the Department of Public Works, and the Department of Public Utilities.

Utility failure. Utility failure can be in the form of gas, water, or electricity, each of which can develop some form of hazard. The two most common types of failures that the agency confronts are downed power lines as the result of high winds or extreme heat, and natural gas main breaks resulting from improper digging with heavy machinery. Extreme heat conditions coupled with extreme demand

cause power outages that require the services of the public safety department.

In the event that on-duty personnel become overwhelmed with calls regarding downed power lines, a full department tone-out will be implemented. Additional resources can be obtained from neighboring fire departments, the City Department of Public Works, and the power company. The Emergency Operations Center will be activated based on the magnitude of the incident.

Gas main breaks are a concern. In the event of a major gas line break, on-duty personnel will immediately respond and assess the situation. The need for evacuation and additional personnel will then be determined. Public safety personnel will also immediately notify the gas company.

Civil disorder. Civil disorder is a rare occurrence, but must be considered in areas near correctional facilities.

Terrorism. Although terrorism is more prevalent across the United States than ever before, a large-scale terrorist act is not likely to occur in the area. The agency is more likely to deal with a smaller-scale, domestic terrorist act.

As part of its nonfire risk assessment, the agency has identified high hazard risks, special risks, routine risks, and remote risks within each of its two demand zones.

Demand Zone 1 is primarily residential with some industrial manufacturers and several small businesses, including the downtown area.

A typical or routine non-fire risk in Demand Zone 1 is the provision of emergency medical service. The agency is a licensed ALS transport agency with all current fire personnel trained as paramedics. Because the ambulance response takes transports out of the city to Sandusky, draw-down of resources for travel time is a concern and can be accommodated with scheduled callback.

Demand Zone 2 is primarily rural and less densely populated. A maximum risk identified by the agency in Demand Zone 2 is the in-transit shipping of hazardous materials. This occurs on a daily basis, with a variety of hazardous materials involved.

The construction of a water park/hotel has placed considerable demand upon the EMS functions of the department. Monitoring of calls for service and trends for these calls should be studied to determine if a “roving” medical unit should be positioned in the township at peak usage periods.

A special hazard non-fire risk identified in Demand Zone 2 is that of an automobile accident requiring extrication. Because there are fewer facilities in Demand Zone 2 to be concerned about, traffic and unsatisfactory road conditions combine to pose a special hazard.

As in Demand Zone 1, a typical or routine non-fire risk in Demand Zone 2 is the provision of emergency medical service.

The agency will need to complete more work in the fire service area to convert the general risk assessment to specific properties. The next step toward completing a Standard for Response Coverage document is addressing service level objectives.

Section Four: Service Level Objectives

One of the most crucial elements toward completing a Standard for Response Coverage document is setting service level objectives. Service level objectives are statements of performance unique to a given jurisdiction. These statements are developed based on nationally recognized standards and practices for public safety services. The purpose of developing service level objectives is to provide guidance to the agency and its personnel in regard to deployment in the different demand zones.

Several elements need to be addressed when developing service level objectives. First, the agency needs to determine both the number of personnel and the equipment that will be needed to effectively provide the service. Another element to consider is response time. How quickly will the first responding unit arrive on the scene, and how quickly will supporting units arrive? Last, the agency needs to list those service level objectives that it wishes to achieve at the scene of a particular incident. These service level objectives are met through a variety of tasks that are assigned to and performed by responding personnel. Completion of these tasks is critical at the scene of any emergency; therefore, they are labeled “critical tasks.”

Identifying Critical Tasks

One of the most probable emergencies to occur is a fire in a single-family dwelling or a crime in progress. The agency therefore finds it most beneficial to document critical tasking for those types of incidents.

Critical tasks are those tasks that must be accomplished to stop the escalation of the incident and bring the situation under control. The agency has identified a minimum of ten tasks that must be simultaneously performed at the scene of a structure fire to prevent the loss of civilian lives and stop further property loss while keeping the risks to the public safety officers' lives at a reasonable level. Responder safety is of utmost importance at the scene of a fire, crime in progress, or any emergency call for service.

Structure Fire – The following are those critical tasks that the agency needs to accomplish to facilitate a safe and successful outcome at the scene of a structure fire. It is important to realize that these particular critical tasks are based on a worst-case scenario and that every fire scene is different. The stage of a fire and several other factors determine exactly what critical tasks need to be performed at a fire scene.

Incident Command: An officer positioned outside the structure with the responsibility for coordinating that attack. Responsibilities include directing responding personnel, calling for additional resources when needed, evaluating results, and changing strategies when necessary.

Safety Monitoring: An officer responsible for monitoring conditions that might jeopardize crew safety.

Pump Operation: One firefighter assigned to deliver water under the right pressure to the attack, backup, and exposure lines. The pump operator can also assist with hose hookups to the proper discharges as well as hydrant hookups and other water supply lines.

Water Supply: One or two firefighters who are responsible for dressing the hydrant and connecting a 5-inch supply line between the hydrant and the apparatus. At the scene of a rural fire, it is the responsibility of the water supply officer(s) to shuttle water from a water source to the fire scene via the agency's tanker truck.

Attack Line: A 1.75-inch hose capable of producing up to 150 gallons per minute (GPM) of water or a 2.5-inch hose capable of producing 250 GPM. The 1.75-inch hose can be handled by either one or two firefighters, depending on the type of attack (interior or exterior), and the 2.5-inch hose is handled by either two or three firefighters. Each engine carries a set of attack lines that are either preconnected to the pump or folded on the hose bed. Hose lines are selected in accordance to the type of attack and the stage of the fire.

Backup Line: A 1.75-inch or a 2.5-inch line that serves as a backup line to the initial attack line. This line, which is controlled by two firefighters, is to be utilized if a problem develops with the attack line. It would also be used if the initial attack crew were to become overwhelmed with fire.

Search and Rescue: A minimum of two firefighters assigned to search for victims in an involved structure. These firefighters work

behind the initial attack crew, and it is their responsibility to attempt to locate and remove any victims.

Rapid Intervention: Two firefighters staged near the entry point on the exterior of the involved structure. These individuals must be prepared to enter the structure within a few seconds' notice. They are to serve as a rescue team, should a problem develop with any of the firefighters already inside the structure.

Ventilation: Two firefighters, equipped with ventilation equipment, who perform either horizontal or vertical ventilation in an attempt to release superheated gases and excessive smoke, thus allowing the attack crew to work closer to the seat of the fire.

Exposure Line: A 1.75-inch or 2.5-inch line controlled by either one or two firefighters. The purpose of this line is to protect other nearby structures from radiant heat given off from the involved structure. Exposure lines can also be used to protect tanks containing flammable liquids.

Police Call for a Crime in Progress – Responders will come first from the district to which they are assigned (two one-person patrol vehicles) and will be backed up by the other on-duty personnel. In cases where injury may occur or have occurred, the PSO IIIs will respond and be staged at a safe location out of the way of any danger such as shots fired until the situation is stabilized. They may be called upon to provide triage, rehabilitation, or other supporting functions.

Effective Response Force

An effective response force is the minimum amount of staffing and equipment that must respond to the scene of a fire or other emergency within a maximum prescribed total response time. The number and type of tasks that need to be conducted at the scene of an incident will dictate the minimum number of public safety officers needed to control the situation.

As previously mentioned, this agency's most probable response (excluding EMS) is to a single-family residential house fire or crime in progress call. The agency has determined that a minimum of 12 personnel would be needed to establish an effective response force for a fire incident; 4 on-duty personnel would be needed for a crime in progress call. Given that Huron is a smaller community, the agency tones out personnel by squads if needed for fire calls. This may include responding with every piece of apparatus as well. By doing so, the agency can ensure that enough personnel to effectively and safety resolve any such incident is on the scene. For major fires the agency has mutual aid agreements with surrounding departments, from which additional personnel and equipment can be gathered.

Effective Response Time

One final element that needs to be addressed before setting service level objectives is response time. The agency defines response time as the amount of time that elapses from the time the call is dispatched to agency personnel to the time the first responding unit arrives on the scene.

A quick response time is essential to saving lives and property. The faster personnel can arrive on the scene of an individual experiencing

cardiac and respiratory arrest, the better chance they have of reviving that individual. Also, the faster personnel can arrive on the scene of a structure fire, the better chance they have of saving lives and property. The faster that public safety officers can arrive at a structure where an alarm has indicated a crime in progress, the more likely they are to catch the perpetrator in the structure before s/he has a chance to flee. There are, however, other factors that are beyond the control of the agency. For example: How much time had elapsed before the cardiac arrest was discovered and reported, how far had the fire progressed before it was discovered and reported, what type of alarm sounded, and where is the alarm point located? Despite these and other uncontrollable factors, it is still important for the agency to set goals regarding response times.

There are two service level measurements that should be considered when setting response time goals. From an emergency medical perspective, the 6-minute time frame is used as a reference point, as brain damage is very likely in cardiac and respiratory arrest patients after 6 minutes without any oxygen flow to the brain. Therefore, it is important that the response time be less than 6 minutes to maximize the chances for revival. The maximum response time is 10 minutes, at which point studies indicate there is irreversible brain damage. Calls for police response to crimes in progress and personal injury accidents require responders to arrive on the scene to end the chances of escalating actions. Police calls should have the same goal of rapid response as for structure fire calls. The 8-minute mark is used as a reference point for a structure fire because this is when the average fire will experience a major turning point known as “flashover.” Most fires go through three specific stages of growth. They are as follows:

Smoldering Stage: The smoldering stage is the first stage of any fire. When heat is applied to a combustible material, the heat oxidizes the material's surface into combustible gases. This oxidation process produces heat, which raises the temperature of other materials. This in turn increases the rate of oxidation and begins a chemical chain reaction of heat release and burning.

Incipient Stage: Also referred to as "open burning," the incipient stage of a fire is that point when the temperature becomes high enough that flames are both formed and visible. The visible burning at this stage is still limited to the immediate area of origin; however, the combustion process continues to release more heat, which ignites other nearby objects.

Flashover: As previously mentioned, the flashover stage of a fire marks a critical change in conditions. Prior to flashover in a structure fire, combustible gases rise and form a superheated gas layer at the ceiling. As the volume of this gas layer increases, it begins to bank down to the floor, heating all combustible objects to their ignition point regardless of their proximity to the burning object. If there is an adequate amount of oxygen left in the room, or if it is suddenly introduced (such as through a broken window), flashover will occur.

When flashover occurs, everything in the room breaks into open flame at once. This sudden eruption into flame generates a tremendous amount of heat, smoke, and pressure, thus pushing the fire beyond the room of origin. The combustion process then speeds up because it has an even greater amount of heat to move to unburned objects. Fires that reach the flashover stage burn much hotter; cause much

more property damage; and require more time, equipment, and personnel to bring under control.

Studies on the products of combustion have shown that the average fire will reach the flashover stage (from its incipient stage) in approximately 8 minutes. The objective of the agency is to arrive at the scene of a structure fire before the fire has entered into its flashover stage, therefore limiting damage and decreasing the threat of life safety. However, because there are many circumstances that can hinder the agency's ability to respond within the 8-minute mark, it is unreasonable to expect the agency to arrive at every fire prior to the fire reaching the flashover stage. These circumstances include the materials involved being very volatile, the fire being accelerated with flammable liquids, road conditions being snowy or icy, the fire being located in the outer areas of the agency's fire district, or simply the fire going unnoticed and unreported for some time after reaching its incipient stage.

Distribution and Concentration

As previously mentioned, the agency operates and deploys out of one facility. Deployment from the facility is measured using two different concepts, distribution and concentration, both of which are influenced by response time.

Station location is a key element in regards to deployment and a quick response. Maps at the end of Section Four demonstrate the agency's service area to illustrate station location.

The agency defines distribution as available first-due resources for all-risk initial intervention. These first-due resources are necessary to ensure a

rapid deployment to minimize and terminate average, routine emergencies and to initiate tactics at those more serious emergencies such as structure fires. The agency has established a set of service level objectives in regard to deployment of first-due resources for purposes of initial response. The agency took into consideration the different demand zones and the amount of time that may be required to respond to an emergency in each zone. Responding to an emergency event in Demand Zone 2 would obviously require a longer response time than an emergency event in Demand Zone 1.

The agency also addressed responses to both emergency and nonemergency events. Nonemergency events such as a downed power line and routine carbon monoxide tests are not given the same priority as a structure fire or the need for extrication at the scene of a personal injury accident. Therefore, responses to nonemergency events are not as timely as responses to emergency events. Similarly, most police calls are non-emergency events and do not require lights, siren, or rapid response. However, public safety officers should arrive on the scene of such incidents in a reasonable amount of time.

In non-emergency calls, it is *imperative* that the dispatcher give the caller a reasonable expectation of when a responder will arrive. Dispatchers should not say on non-emergency calls, “I’ll have a public safety officer there right away.” To many callers, “right away” means the same thing as “immediate.” For non-emergency calls, it is not necessary to be “immediately” at a location. Therefore, the dispatcher should tell the caller, “I will have a public safety officer there sometime in the next (state number) minutes” (the time should be agreed upon with the PSO) or “We will have a public safety officer at your location as soon as one becomes available.” This

sets the expectation for service delivery between the caller and the agency and establishes credibility.

The agency defines “concentration” as the resources needed to create an effective response force. An effective response force is that which will most likely stop the escalation of the emergency. Included in the agency’s service level objectives is a statement regarding an effective response force. When establishing these service level objectives, the agency took into consideration its most probable response, that of a single-family dwelling structure fire. The agency also determined that an effective response force should consist of a minimum of 12 personnel.

Under the deployment scenario, the agency would staff a command and four full-time public safety officers for four squads. These on-duty personnel will handle most non-emergencies, medical calls, and some minor emergencies in Demand Zone 1 with the demand zone further broken down into districts for proactive patrolling. Most medical calls and non-emergencies in Demand Zone 2 are also handled by on-duty personnel. However, more serious incidents, such as structure fires or crimes in progress, require additional personnel.

For purposes of assembling an effective response force and achieving concentration, the agency relies on a paging system for emergencies that require additional personnel. Full-time as well as paid-on-call fire personnel are issued pagers. In the event of a structure fire or any other emergency situation where on-duty personnel need additional assistance, they request that the dispatcher immediately tone out pre-planned, scheduled squads. Available personnel report to the department and then respond to the scene of the emergency in the appropriate apparatus.

Fractional Measurements

When measuring response times, the agency considers three separate time increments. The first, known as “dispatch time” or “call-processing time,” is the amount of time that elapses from the time a dispatcher receives the call to the time the dispatcher actually passes it on to agency personnel. During this period the dispatcher gathers information about the emergency, gives it a priority, and then notifies the agency having jurisdiction. The NFPA dispatch committee has stated that agencies should answer the phone in 15 seconds and be able to take the basic information and pass it to responders in an additional 1 minute to 1 minute 30 seconds. That means the total time allotted for dispatch is 1 minute 45 seconds. The data that the ICMA team reviewed indicate longer dispatch times, which will need to be monitored. Dispatchers can continue taking information after the units are alerted; it is critical to have a time stamp that allows successful outcomes through intervention, which the above times seek to provide.

The second time increment the agency measure’s is referred to as “turnout time.” This is the amount of time that elapses from the time agency personnel receive the call from a dispatcher to the time a unit is actually en route to the scene. Activities during this time period include receiving the call from the dispatcher, donning protective gear, starting the apparatus, and leaving the station. By careful positioning of public safety officers, the turnout time should be reduced to “0” as they will be able to immediately respond to the scene of the crime or the location of the fire event. When looking at outcomes, turnout time is a crucial time element that can be minimized and using the public safety concept.

The third time increment is referred to as “travel time.” This is the amount of time that elapses from the time the apparatus leaves the station to the time it arrives on the scene of the emergency. Again, by having vehicles driving or staged in each station’s district, the travel time can be reduced and allow responders to arrive at the call location faster, thereby reducing the overall risk. Coupled with the agency’s take-home vehicle policy, many areas of the fire response zone can be reached more quickly than through the current method of responding from a central station.

A fourth time that is critical to monitoring outcomes is the time elapsed between the units’ arrival on scene to the time of intervention—by applying water to a fire, giving medical assistance to a patient, or taking action on a crime in progress call. That time is not currently tracked, but a goal of three years has been set to accumulate this information while looking at outcomes.

The combination of turnout time and travel time determines the agency’s response time; however, the combination of all time elements determines total reflex time. “Total reflex time” is the amount of time that expires from the time the caller notifies a dispatcher about the emergency to the time a responding unit arrives on the scene and begins intervention. From the standpoint of the individuals who report emergencies, this is typically the time increment most critical to them.

The agency used a process involving fractional measurements to determine how often it will arrive on the scene of a fire before the 8-minute mark. The agency also separated all responses in each demand zone into three categories; emergency fire/rescue/police incidents, non-emergencies, and medical emergencies.

The data below show that the benchmarks or targeted response times in Demand Zone 1 are significantly faster than in Demand Zone 2. The fact that locations in Demand Zone 1 are closer to the agency's station than locations in Demand Zone 2 is one reason for this. Call volumes were also much higher in Demand Zone 1 than in Demand Zone 2. For these reasons the agency felt it was important to effect faster response times in Demand Zone 1.

Emergency Incidents in Demand Zone 1: Based on this study, the agency determined that it is capable of responding with its first-due unit to the scene of an emergency fire/rescue incident in Demand Zone 1 within 8 minutes of receiving the initial call from dispatch 90 percent of the time.

Nonemergency Incidents in Demand Zone 1: Because nonemergency incidents are not life threatening and the threat of property damage or personal injury is also low, a fast response to a nonemergency is not nearly as important as for an emergency call. There are also no nationally recognized benchmarks associated with nonemergency calls. Therefore, the agency simply identified the 10-minute mark as a benchmark for nonemergency incidents in Demand Zone 1. Again, it is important that dispatchers communicate that responders are not coming "immediately" but rather are responding when they become available.

Although the agency does not offer advanced life support, agency members are trained in basic life support as well as in the use automated external defibrillators. A nationally recognized benchmark

in regard to medical responses is 6 to 10 minutes, as brain damage is likely to occur when the brain has been without oxygen for this amount of time. With this in mind, the agency has opted to adopt the 8-minute mark as its benchmark for responses to medical emergencies in Demand Zone 1.

Medical Emergencies in Demand Zone 1: Based on this study, the agency determined that it is capable of responding with its first-due unit to the scene of a medical emergency in Demand Zone 1 within 8 minutes of receiving the initial call from dispatch 90 percent of the time.

Emergency Incidents in Demand Zone 2: Based on this study, the agency determined that it is capable of responding with its first due unit to the scene of an emergency fire/rescue incident in Demand Zone 2 within 11 minutes of receiving the initial call from dispatch 70 percent of the time.

Nonemergency Incidents in Demand Zone 2: Based on this study, the agency determined that it is capable of responding with its first-due unit to the scene of a nonemergency incident in Demand Zone 2 within 15 minutes of receiving the initial call from dispatch 70 percent of the time.

Medical Emergencies in Demand Zone 2: Based on this study, the agency determined that it is capable of responding with its first-due unit to the scene of a medical emergency in Demand Zone 2 within 11 minutes of receiving the initial call from dispatch 70 percent of the time.

Benchmarks for assembling an effective response force were obtained much the same way as they were for first-due units; however, the agency had very few times to work with.

Proposed Service Level Objectives

Based on the nationally recognized benchmarks adopted by the agency, and based on a study of response times over the past 1.5 years, the agency proposes the following service level objectives to responses in both Demand Zone 1 and Demand Zone 2.

For 90 percent of emergency incidents in Demand Zone 1 (excluding medical emergencies), the first-due unit shall arrive within 8 minutes of the initial dispatch. The first-due unit shall be capable of advancing the first line for fire control, intervening in a crime event or starting rescue. The remaining effective response force shall arrive within 16 minutes of receiving the initial call from dispatch, 80 percent of the time, and be capable of providing 1,250 GPM of water for firefighting.

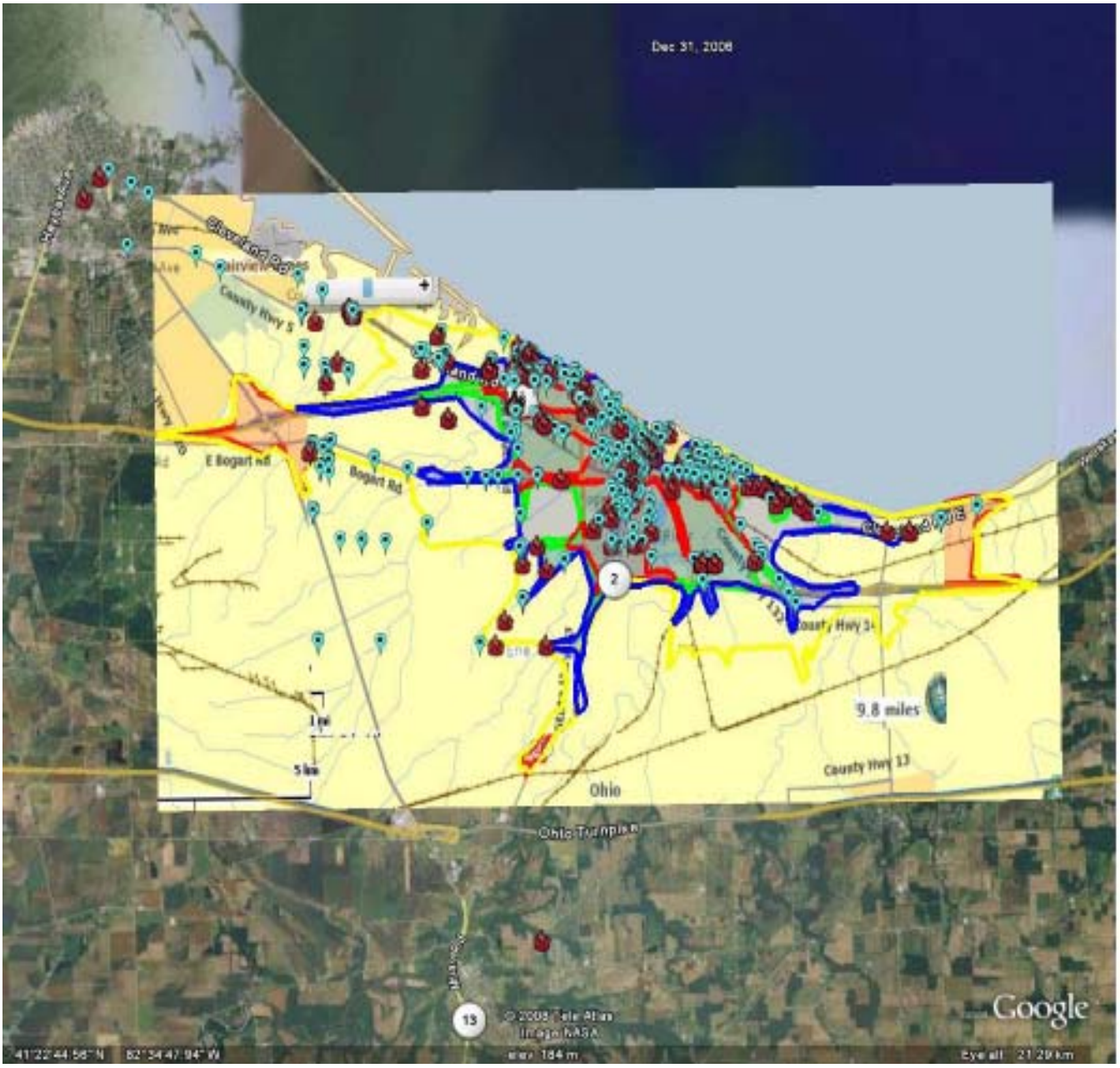
For 90 percent of all nonemergency incidents in Demand Zone 1, the first-due unit shall arrive within 15 minutes of the initial dispatch.

For 90 percent of all medical emergencies in Demand Zone 1, the first-due unit shall arrive within 8 minutes of the initial dispatch. The first-due unit shall be capable of providing basic life support. The remaining effective response force shall arrive within 15 minutes of the initial dispatch, 80 percent of the time, and be capable of handling a four-patient emergency medical incident.

For 70 percent of all emergency incidents in Demand Zone 2 (excluding medical emergencies), the first-due unit shall arrive within 11 minutes of the initial dispatch. The first-due unit shall be capable of advancing the first line for fire control, intervening in a crime event or starting rescue. The remaining effective response force shall arrive within 19 minutes of receiving the call from dispatch, 60 percent of the time, and be capable of providing 1,250 GPM for firefighting.

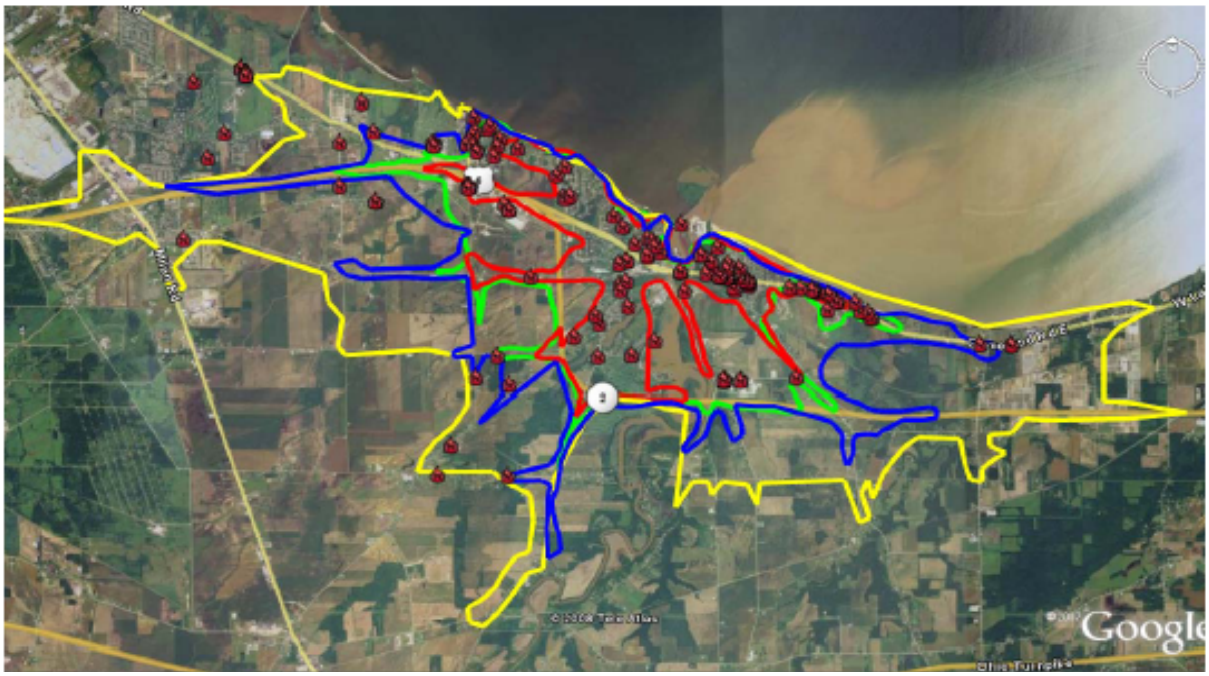
For 70 percent of all nonemergency incidents in Demand Zone 2, the first-due unit shall arrive within 15 minutes of the initial dispatch.

For 70 percent of all medical emergencies in Demand Zone 2, the first-due unit shall arrive within 11 minutes of the initial dispatch. The first-due unit shall be capable of providing basic life support. The remaining effective response force shall arrive within 15 minutes of receiving the call from dispatch and be capable of handling a 4-patient emergency medical incident.

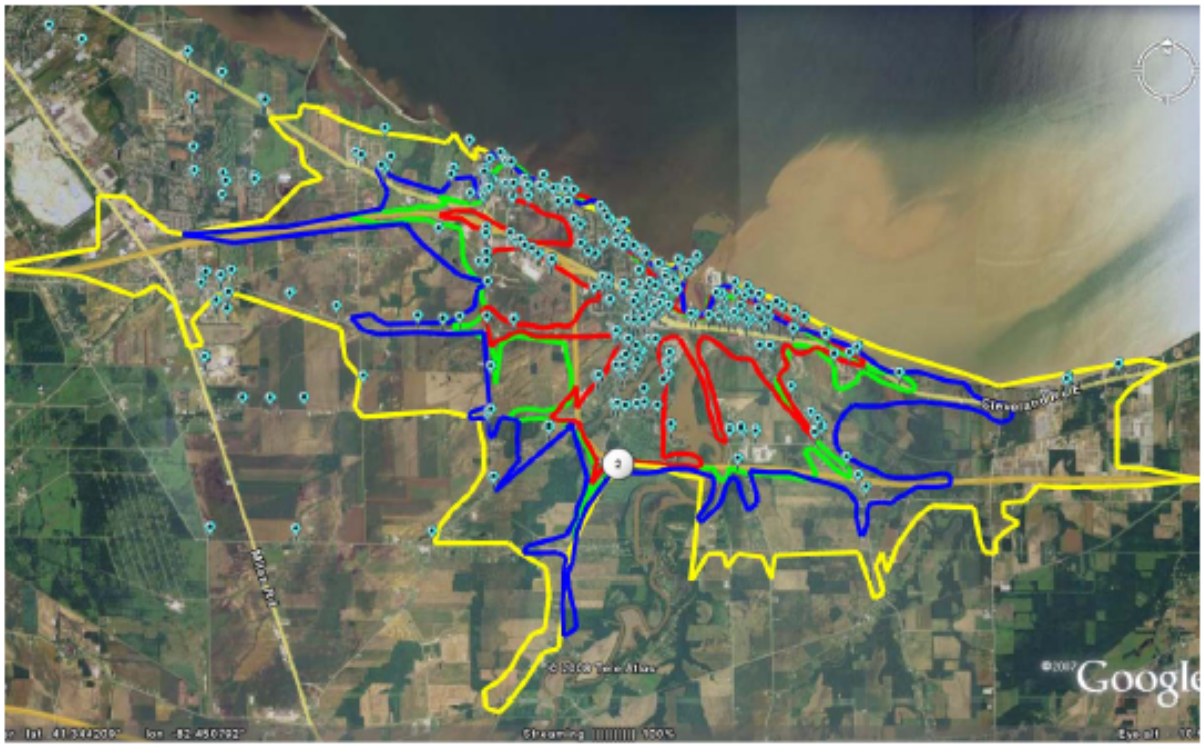


Fire and EMS Calls with 8-Minute Travel Time

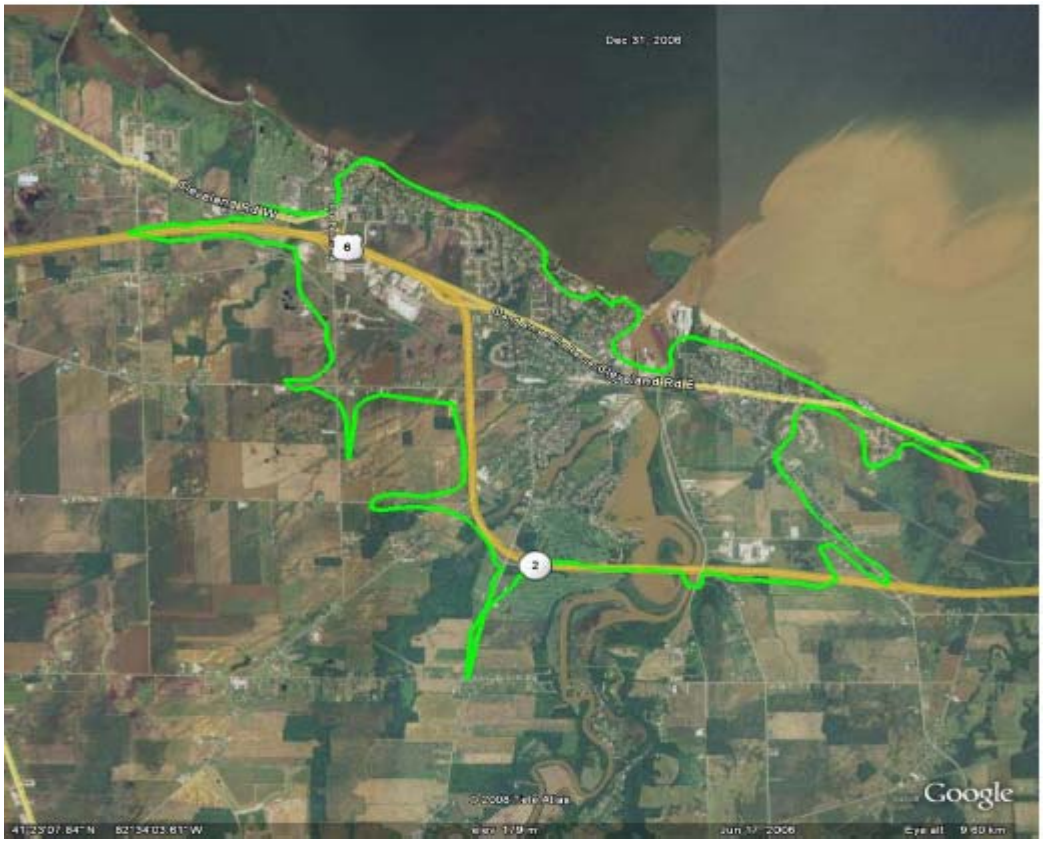
All Fire Calls



All EMS Calls



4-Minute Response Drive Time



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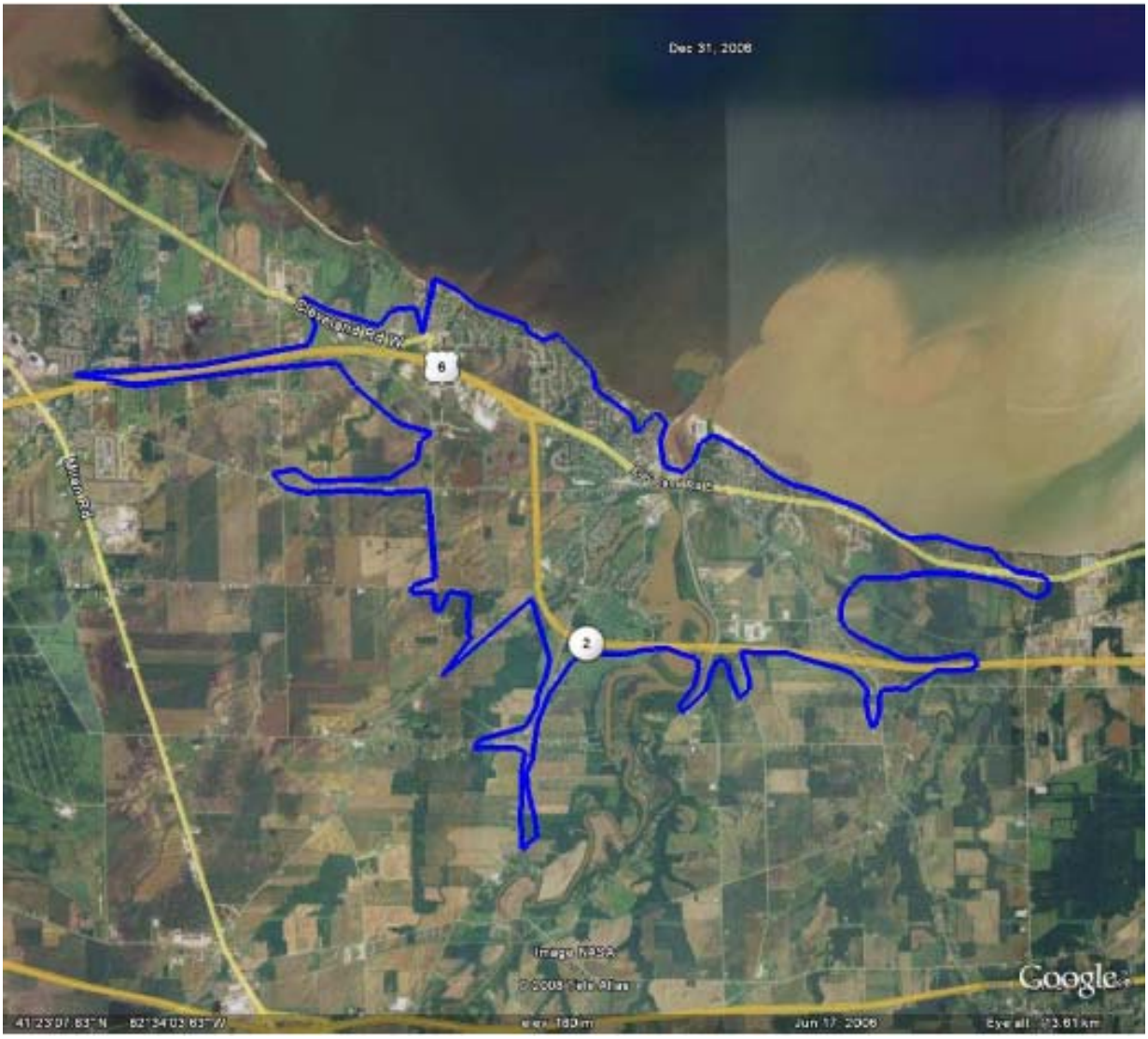
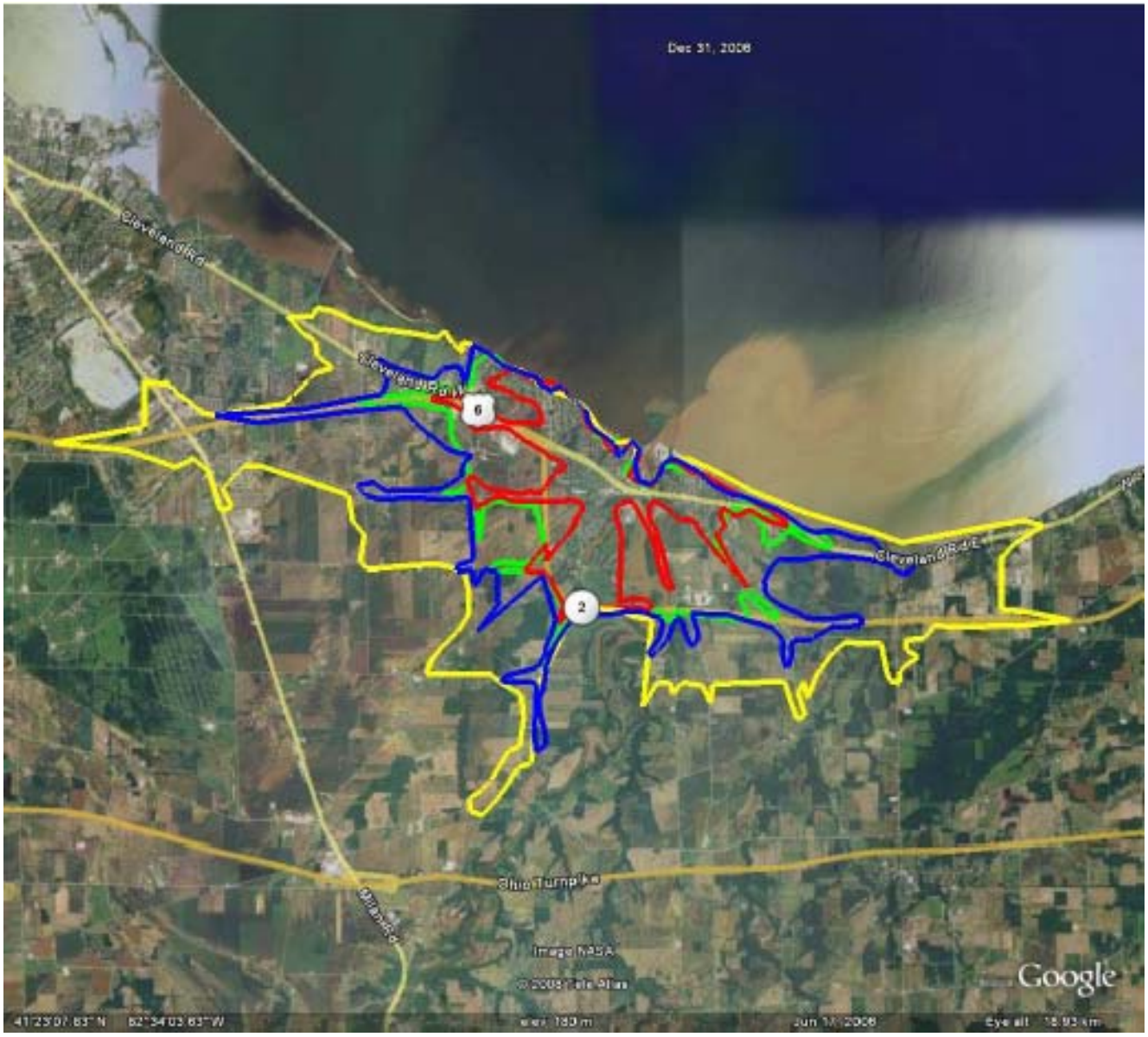


6-Minute Response Drive Time

8-Minute Response Drive Time



Effective Response Area

Section Five: Response Reliability

As stated above, the agency's service level objectives are to arrive on the scene of an emergency within those nationally recognized bench marks of 6 to 10 minutes for a medical emergency and 8 minutes for a structure fire or crime in progress. The agency realizes that conditions beyond its control, such as adverse weather, stacked calls, and long call processing times, make it impossible to respond to 100 percent of calls within a specified amount of time; thus, the percentages (e.g., 90 percent) were established. The agency has studied the responses that did not meet the objectives and learned that poor response times to emergency calls were most often due to unusually high dispatch or turnout times. In an effort to improve on these turnout times, the agency now routinely schedules paid-on-call personnel to assist with fire and medical calls when regular full-time staffing levels are low.

Draw-down

Draw-down is the resource level that an agency will not go below when asked for mutual aid. The agency has entered into an area-wide mutual aid agreement. Under this agreement, the agency agrees to render aid to the extent that available personnel and equipment are not required for adequate protection of its own jurisdiction. The agency has determined that adequate protection in regard to equipment consists of two engines at the bare minimum. Adequate protection in regard to personnel is determined to be 12 personnel. In the event that the remaining two engines do not have the seating capacity for 12, the agency has patrol cars that can be used to transport personnel to the scene of an emergency.

Because patients must be transported to a hospital in Sandusky, there is the possibility of resource exhaustion (discussed next). The policy of the department shall be that in cases where patients are transported, off-duty personnel pre-assigned to squads shall be called back to staff second ambulances. Should those responders be called and transport, additional pre-assigned squads shall be activated. This avoids calling everyone back to the station for routine calls that do not require such significant resources.

Resource Exhaustion

Resource exhaustion occurs when a system is out of resources for both an initial response and an effective response force. An example of resource exhaustion is when an emergency of sufficient magnitude occurs that it requires total commitment of the agency's resources.

As with all other departments in the county, the agency relies on mutual aid from other nearby agencies when extra personnel or equipment is needed. Large structure fires, wildfires that involve several acres of land, intense summer heat, criminal calls involving hostage situations or homicides, and stacked calls are factors that may lead to a request for mutual aid. It is the responsibility of the incident commander at the scene of an emergency to make the request. There are, however, times when mutual aid is automatically requested. For example, in the event of a fully involved rural structure fire, a request for additional tanker support is made immediately.

Historical Performance

The agency has seen a gradual increase in its call load over the past 3 years. Calls for police, fire, and medical have been increasing in the area

near the water park and will need to be monitored. It is possible that a patrol unit will be assigned to this area, which could provide immediate response to police, fire, or medical calls and thereby reduce the time to arrive on scene.

Impact of Public Safety Patrol on Travel Time to Emergencies

The agency should deploy at least four patrolling units. These units would handle routine calls but also be ready to interrupt their activities in case of a true emergency. In light of the modest levels of calls for police service, at least three of the four units should be available to be dispatched in a real emergency. One of these units would be near station #1. We used regression and found that the travel time can be estimated by the following linear relationship:

Travel Time = 1.0 + 1.7 minutes * miles.

1 mile ➔ 2.7 minutes
2 miles ➔ 4.4 minutes
3 miles ➔ 6.1 minutes
5 miles ➔ 9.5 minutes
7 miles ➔ 12.9 minutes

Maintenance of Standards of Response Coverage Document

In an effort to maintain an effective and accurate standards of response coverage document, the agency plans to continue to analyze and evaluate the data from which the document is drawn. Areas such as risk assessment and distribution and concentration measures will be monitored and verified annually. Documentation and studies of call volumes and response times will also continue to ensure that service level objectives are

being met. Continued analysis and evaluation of the standards of response coverage document is the responsibility of the agency's fire division chief.

This standard for response coverage document is the first such document in the agency's existence and is to form the framework for expansion to an Integrated Response Management Plan (IRMP). Therefore, an evaluation of the document at this time would be somewhat premature. However, after obtaining benchmarks for first-due units, the agency realizes that it needs to improve on its response times in Demand Zones 1 and 2. This will be one of the agency's goals for the upcoming years.

Appendix II

Take-Home Vehicle Report

Final Report on Cost-Benefit Analysis of Assigned Vehicle Program

Police Department, City of Tacoma, WA

by

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October 2004

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Summary of Findings and Recommendations

Findings

1. The majority of citizen respondents to the Neighborhood Council questionnaire favor: 1) assigning vehicles to police officers rather than having them use pool vehicles, and 2) allowing assigned vehicles to be taken home rather than parked in the city when officers are off-duty.

2. The citizen respondents expressed concern that the quality of police services would suffer adversely if 1) police cars were not assigned, or 2) if officers could not take them home.

3. The attitudes of the citizens on these matters were similar to those of the police officers themselves who felt that they are able to render their best services with assigned vehicles that they can take home.

4. The citizen respondents to the questionnaire did not express much concern about the possibility of officers abusing the privilege of taking their vehicles home. About 80% of respondents said they had no personal knowledge of what seemed to them like vehicle abuse.

5. On the other hand, the citizens favored a policy that would limit subsidies for commuting using police vehicles to a certain distance beyond city limits such as 10 miles.

6. About 225 police officers routinely take their assigned vehicles home. The majority work 4 days per week (about 200 days/year).

7. The average one-way commuting distance of officers who take their assigned vehicles home is 9.4 miles beyond city limits. About 20% of the officers with assigned vehicles live within Tacoma city limits, 30% live more than 10 miles beyond city limits, and 10% live more than 20 miles beyond city limits.

8. When they switched from pool vehicles to assigned vehicles, police officers on average saved about 40 minutes each workday in not having to check-out a vehicle from the pool and not having to transfer their gear to it at the beginning of each shift.

9. Although officers can prepare most of their reports and do other office work in their cars using their personal computers, about half them still need office space in addition to their assigned vehicles.

10. In May and June 2004, each officer made an average of 3 ‘contacts’ per month on his/her way to/from work while off-duty to assist an arrest, a fellow

officer, etc. In addition, each officer was called out to service while off-duty an average of 4 times per month.

11. About half the police officers said that the Assigned Vehicle Program played no role in their decision to take employment with Tacoma's Police Department.

12. The City of Tacoma is divided by the Police Department into 4 sectors, each of which is divided into 4 districts, for a total of 16 districts in the city. Average elapsed times in responding to calls for service is a commonly used indicator of the quality of emergency services provided by a city. For Tacoma as a whole, the average response time in May and June 2004 was a little under 10 minutes. The variation in average response times from one district to another was small, ranging from a low of 8.5 minutes to a high of about 13 minutes. These findings suggest that the way the Police Department currently allocates its personnel and vehicles results in a generally high level of service to the city and that no district seems to be under or over served.

13. The benefit-cost (BC) analysis was arguably the centerpiece of this study. Three questions emerged as central to the BC analysis: 1) Should vehicles be assigned to officers or should they use vehicles from a pool? 2) If vehicles are assigned, should officers be allowed to take them home while off-duty or should they be parked in the city? 3) If officers take their vehicles home, what criterion should be used for setting the policy on how the city subsidizes commuting costs?

14. Regarding the first question about whether it is better to assign a vehicle to each officer or have officers use pool vehicles, a formal BC model was developed with a 20-year planning period in which future costs and benefits were discounted to equivalent present values and net present value (NPV) was used as the criterion to assess the economic efficiency of two alternatives: 1) assigning a car to each officer v. 2) using pool cars.

15. In the case of a simple example with only two officers, the present value of net benefits (NPV) of assigning a separate car to each officer exceeded the NPV of having the officers share a single vehicle by about $140,000 over the 20-year planning period; the present value saving was equivalent to an annual saving of about $10,000 per year. When the example was scaled up for all 260 or so officers with assigned vehicles, the present value saving was about $20 million, and the equivalent annual saving was about $1.5 million per year. The optimal result of assigning vehicles was robust under a wide set of uncertainty conditions. The main reason for the saving was due to increased officer productivity as a result of not having to check out pool cars and transfer gear into and out of them.

16. The net savings accrue to the city. Thus, the BC analysis provided convincing evidence that it is far better for the city to assign vehicles to police officers than for them to use vehicles from a pool.

17. Regarding the second question for BC analysis: Whether assigned vehicles should be taken home or parked in the city when officers are off-duty, the two alternatives for comparison are: 1) the cost of commuting by officers using their private cars plus the cost of parking police cars in a city-garage v. 2) the cost of commuting using police cars plus free parking and other benefits at officers' homes. The analysis showed that the economic costs of taking police vehicles home are about $800/year per vehicle less than the alternative of parking them in a city-garage and having officers use their personal cars to access them (no-take-home option). This difference for the entire fleet of take-home vehicles is about $200,000/year, which has equivalent present value of about $2.7 million over a 20-year planning period.

18. Taking police vehicles home provides additional benefits due to officers making 'contacts' on their way to/from work and responding more rapidly to call outs while off duty (see item 10 above). Also, the take-home program gives citizens an added sense of security, officers spend personal time caring for their police cars, and some officers pay a reduced insurance premium on their personal cars. These additional benefits plus the economic advantage clearly make the take-home option best for society.

19. BC analysis treats society as a whole and pays no attention to who benefits and who pays. The city pays for commuting with a take-home policy, and the officers pay for commuting with a no-take-home policy. In addition, the city would have to pay for parking with a no-take-home policy, and the officers have to provide parking with a take-home policy, which happens to be free because of the excess parking capacity at officers' homes.

20. The take-home policy, however, has two perverse incentives: 1) it might encourage officers to use their police vehicles for personal business, and 2) it might encourage them to live outside Tacoma where the costs of living might be lower than in the city. The combination of Police Department policies that prohibit use of police cars for personal business plus the inclination of officers not to draw attention to themselves as police officers seem to negate the first negative incentive; personal use does not seem to be a problem.

21. Regarding the second negative incentive, limits could be imposed on the amount of commuting subsidized by the city using financial (not economic) criteria. For example, it could be decided that if it is less expensive for the city to provide in-city parking when officers are off duty, then officers should not take their cars home. On the other hand, if it is less expensive for the city to pay for commuting using police cars rather than in-city parking, then officers should be encouraged to take their police cars home.

22. Based on realistic but approximate estimates of parking and commuting costs using police vehicles, the break-even distance for subsidized commuting using this approach is in the range 7 to 14 miles. It appears that it may be less expensive for the city to provide in-city parking for officers who live more than this many miles beyond city limits. If the city were to use other criteria for setting policy, the city might decide to subsidize commuting for all (or most) of the officers with assigned cars.

Recommendations

1. Police officers should be: 1) assigned cars, and 2) allowed to take them home when off-duty. The city needs to decide criteria and policy for subsidizing commuting costs of take-home vehicles. This work should begin with a careful examination of in-city parking options and costs. The policy however should not be based strictly on a financial break-even analysis. The city needs to keep in mind that police officers render services while commuting to and from work which argue that it would be short sighted only to consider financial costs.

2. Fleet services should make an audit of its costs and services, including comparisons with other municipal fleet service departments.

3. The Police Department needs to be as sensitive to appearances of abuse of take-home vehicles as to the realities of abuse. Although no evidence of abuse was found, policies and procedures need to be routinely examined to ensure that they are working satisfactorily.

4. The analysis of how the Police Department allocates personnel and vehicles to meet the demands for police services revealed no particular problems demanding attention. Nevertheless, because demands are always shifting, the department needs to exert constant vigilance and scrutiny of its policies and practices to ensure that the citizens of Tacoma are well served.

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1. Introduction

Mercury Associates was selected by the City of Tacoma to conduct a cost-benefit analysis of the Police Department's Assigned Vehicle Program. This project was managed by Mercury's Senior Vice President, Mr. Randy Owen. Dr. Donald T. Lauria of the University of North Carolina at Chapel Hill was the lead technical analyst on the project who conducted the research and analysis that form the basis for the findings and recommendations and who authored this report. Mr. Dave Robertson, Senior Associate with Mercury, was the third member of the project team.

The contract between the City of Tacoma and Mercury Associates, Inc., calls for a cost-benefit (CB) analysis of the Police Department's Assigned Vehicle Program (AVP), which has been in place for about 5 years. The AVP was preceded by a pilot study that was authorized by the City Council in March 1996. *Economic Consulting Services* was retained that year to design a demonstration project in which some patrol officers were assigned personal vehicles which they could take home when off-duty while other officers not in the project used vehicles from a common pool. The demonstration project started September 1996 when 30 new take-home vehicles were added to the Police Department fleet, 25 for officers living within city limits and the rest for officers outside the city. The consultant studied two alternatives: 1) a patrol fleet of 30 assigned and 34 pool vehicles, and 2) a patrol fleet of 130 assigned and no pool vehicles.

The consultants submitted their report to the city in June 1998. In it, they compared the two alternatives they studied against the baseline case of using only pool vehicles. They found that with Alternative #1 (30 assigned & 34 pool vehicles), costs would decrease by $125,000 per year, and with Alternative #2 (130 assigned & no pool vehicles), costs would increase by $187,000 per year. However, with Alternative #1, police productivity would increase equivalent to 2.5 officers per year, and with Alternative #2, productivity would increase by the equivalent of 9.3 officers per year, thus resulting in positive net benefits for both alternatives. Furthermore, under both alternatives, crime would decrease, property values would increase, and officer morale would increase. The benefit-cost ratio for Alternative #1 was estimated to be 4.0, and for Alternative #2 it was 1.75.

The city decided to move forward with an Assigned Vehicle Program for essentially all officers in 1999. Prior to the pilot program, the city drafted the policy on assigning vehicles, which remains in force today. Employees with 18 months of employment[1] with the Police Department are eligible for an assigned vehicle according to the following priorities: within-city residence, special assignments, and seniority. Employees residing outside a 10 mile driving distance from the City limits of Tacoma or outside of Pierce County will park their assigned vehicle at a Tacoma Police Facility or a secure and approved site within the previously described boundaries. When traveling in assigned vehicles while

[1] The current policy is 24 months of employment for eligibility, not 18.

off-duty, officers are not expected to respond to routine calls but are expected to respond as back-up if in the vicinity. Assigned vehicles are not to be used for personal gain but can be used to conduct essential personal errands which do not deviate significantly from the normal route to/from work. The policy for using assigned vehicles for off-duty employment is not any different than for any other department-owned vehicle; an application must be submitted and approved prior to use. The policy for assigning vehicles was passed unanimously by the city council on February 27, 1996.

Now that the Assigned Vehicle Program (AVP) has been underway for 5 years, the city decided it was time to make an ex post evaluation of it. In March 2004, the City of Tacoma issued a request for proposals (RFP) on a cost-benefit analysis of the Police Department's AVP. The motivation for the RFP was apparently due a question raised by the City Council: Is the Assigned Vehicle Program cost effective? The RFP asked for a CB study of the AVP as it exists today, and several illustrative issues were identified for study, such as costs and benefits of the program, the views of staff and citizens about the program, duties of personnel to whom vehicles are assigned, travel distances of personnel with assigned vehicles, care and sense of ownership of assigned v. pool cars, impact of the AVP on recruitment of police personnel, value of vehicles as office v. desk space in a building, assessment of the match between demands for police services and the supply of vehicles and personnel to meet them, and similar items. The RFP made it clear that the city wanted a quantitative analysis of the AVP that included charts, tables, statistical analyses, and calculations that would bear scrutiny by professionals in fleet management; an evaluation based on anecdotal information would not suffice. In addition, it asked for recommendations on policy changes and record keeping, which implies that the city is not simply interested in knowing whether the economic benefits of the AVP outweigh its costs but also how the program can be improved.

2. Work Plan

Mercury Associates, Inc., was the successful proposer on this project. Its work plan consisted of the following major tasks:

1. Conduct start-up meetings
2. Collect background information
3. Conduct focus groups and survey of police officers
4. Conduct focus groups and survey of Neighborhood Council members
5. Assess demands for and adequacy of supply of police services
6. Perform economic benefit-cost analyses of major AVP policy questions
7. Draw conclusions and make recommendations

Regarding item 3 of the work plan, survey of police officers, the goal was to elicit their assessments of the AVP, starting with focus groups that led to questionnaire development, followed by a computer questionnaire that was administered to all officers with assigned vehicles. Questions were asked to obtain information on attitudes, present vehicle assignments, vehicle usage practices, commuting

distances and frequencies between work and home, comparisons between pool and assigned vehicle programs, strengths and weaknesses of the AVP, and suggestions for improvement. This item is reported in section 3 of this report.

The survey of Neighborhood Councils (work plan item 4) was similar; their members, who represent citizens of Tacoma, number about 80, some of whom serve on the City Council. Focus groups identified issues of concern to citizens about the AVP, which led to a questionnaire that was sent to all members. Two identical versions were developed, one for computer users that was answered electronically, plus a paper version for non-computer users that was answered using pen or pencil. Questions were asked to obtain information on knowledge about the AVP, attitudes, perceptions, issues of concerns, ranking of the AVP's most important advantages and disadvantages, etc. This work item is reported in section 4.

The assessment of demands for police services and the supply of resources to meet them (work plan item 5) was made by examining data for each hour of each day in May and June 2004 on calls for service and reports on index crimes (burglary, rape, homicide, etc.) in each sector and district of the city. The calls for service (cfs) data were not just for police but included other units as well (fire, etc.). Hence, an analysis was needed of the extent to which the temporal and geographic variations in total cfs applied to the Police Department; this was accomplished using statistical regression and correlation analyses that related total cfs with reports on index crimes. Once a relationship was established, the adequacy of police services in meeting demands was assessed using data on elapsed times between when cfs were received and when vehicles arrived on the scenes. This analysis is in section 5 herein.

Economic cost benefit analyses (work plan item 6) were made of the 3 key issues that emerged from study of Tacoma's AVP: 1) What is better, using pool vehicles or assigning a vehicle to each officer? 2) If vehicles are assigned to each officer, what is better, to park them in a city-owned garage or lot when not in use for police business or let officers take them home? 3) If assigned vehicles are taken home, the costs and benefits are jointly shared by the city and the officers; how should the joint costs be divided between them? Being an economic analysis, it focused mainly on the economic values of the resources that go into the AVP and the economic values of AVP outputs. Concern was primarily with major inputs and outputs of the system and only secondarily with the marginal inputs and outputs that are typically difficult to quantify. An input-output model was developed that examined system impacts over a 20-year planning period. The results of this work are in section 6.

Section 7 of this report includes concluding comments, and section 8 acknowledges those who assisted the study.

3. Police Questionnaire and Survey

Two focus groups were held with a total of about 40 police officers, each lasting more than one hour. They resulted in a draft questionnaire that went through several tests and iterations with help from the Police Department before being finalized. The survey was distributed on June 30, 2004, to all 263 officers with assigned vehicles; it contained 73 questions and is in Annex A. Officers had until July 2 to complete the questionnaire using the computers in their cars, and they submitted the completed survey to Mercury Associates on line over the Internet. Sixty percent of the officers surveyed were assigned marked cars and forty percent were unmarked. Identities of respondents were not revealed.

A total of 251 officers responded, which is ninety-five percent of those who received the questionnaire. The response rate was very high. A high level of statistical confidence could be placed in the responses if fewer than 100 officers responded, but because 251 responded, the confidence level in their answers is very high. Furthermore, because the allotted time for answering the questionnaire was short, and because the respondents work different shifts, the likelihood of collusion among respondents or strategic behavior is very low, which argues for high credibility in responses.

Twenty-four percent of the respondents park their assigned cars in their home garage when off-duty, fifty-three percent park in their driveway, fourteen percent park on the street, and ten percent park in some other location. A breakdown of respondents by rank is shown in Table 3.1:

Table 3.1: Distribution of questionnaires by rank

Assistant Chief	3	Detective	47	Police Patrol Specialist	14
Captain	4	Lieutenant	12	Sergeant	35
Chief	1	Police Patrol Officer	135	Total	251

The average respondent has served with the Tacoma Police Department for 16 years (i.e. joined the force, on average, in 1988). Sixteen percent of the respondents joined in 1980 or before, forty-nine percent joined in 1990 or before, eighty-two percent joined before 1995, and only four percent joined in 2000 or later. Twenty percent of the respondents spend less than twenty-five percent of their work time in their assigned vehicles, as shown in the bottom row of Table 3.2; the numbers of respondents in each category sorted by rank are as follows:

Table 3.2: Percent of time respondents spend in their cars*

% of Work Time Spent in Car	<25%	25-50%	50-75%	>75%	Total
Captains	4				4
Chiefs	4				4
Detectives	14	19	8	6	47
Lieutenants	7	2	2	1	12
Police Patrol Officers	12	18	47	54	131
Police Patrol Specialists	2		5	7	14
Sergeants	7	7	11	10	35
Total	50	46	73	78	247
% of total	20	19	30	32	100

* Table entries are numbers of respondents except for bottom row.

The average one-way driving distance between the respondent's home and the city limits of Tacoma is 9.4 miles, and the median distance is 7 miles (i.e. half the officers who take home an assigned vehicle live within 7 miles of city limits and the other half live beyond 7 miles). The cumulative distribution of one-way driving distance is in Figure 3.1. Note that twenty percent of the officers live within the city (commute distance is zero), thirty percent live more than 10 miles beyond the city, and ten percent live more than 20 miles beyond city limits.

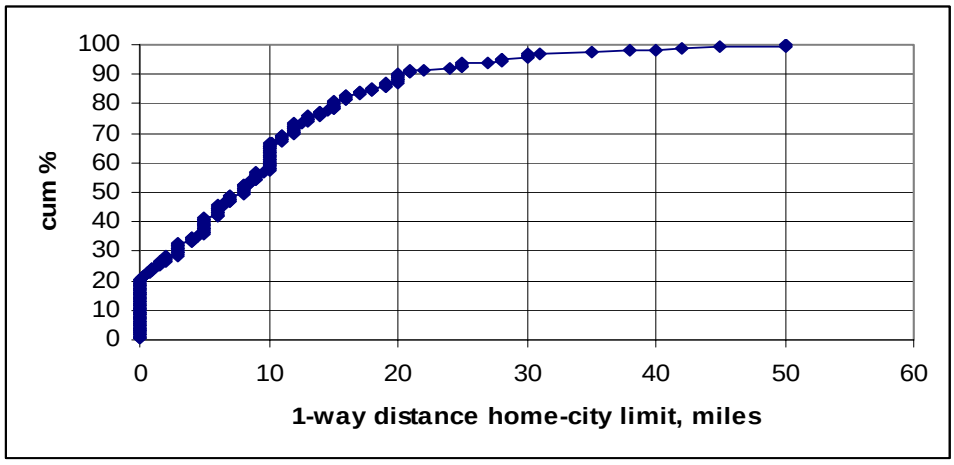

Figure 3.1: Cumulative distribution of 1-way commuting distances

Half the respondents said their one-way commute time was about 10 minutes or less (the median) and the other half has commute times of at least 10 minutes. Nine percent of respondents said that it would not be very difficult to meet their current police obligations using a pool vehicle instead of an assigned vehicle, and twenty-four percent said it would be somewhat difficult. However, two-thirds of respondents said it would be very difficult, some of the reasons for which include the following:

1. I am routinely called out at different hours and need to be able to respond quickly
2. I carry a lot of bulky and heavy equipment that can't easily be transferred
3. I need special equipment in my car (e.g. Lo-Jack, lab materials, trailer hitch, RAT, bomb unit, tracking antenna, etc.)
4. CID needs cars on the spur of the moment; same for homicide.
5. I do undercover work
6. Computer stations in pool cars frequently don't work properly, and we can't function without computers

Ten percent of respondents never take their assigned vehicle home; most of the rest take their vehicle home either 4 or 5 days per week. In the first six months of 2004, sixty percent of the respondents never filed a request for "off-duty employment," and twenty-seven percent filed only 1 or 2 requests; the level of outside off-duty employment appears to be modest.

On average, when respondents used pool cars before having an assigned vehicle, it took them about 28 minutes per day to check-out, load, and unload their pool car. The cumulative distribution of time is shown in Figure 3.2, and the breakdown of average times by rank is in Table 3.3. Note from Figure 3.2 that 20% of the respondents spent more than 40 minutes. The types of gear loaded and unloaded each day include: rifle, shotgun, helmet, breathing mask, briefcase, drug test kit, flares, first aid kit, special clothing, nightstick, tape recorder, flashlight, camera, evidence bags, etc. Some equipment had to be dispensed each day by a police officer such as car keys, shotgun, rifle, computer, special forms, etc.

Table 3.3: Average time to check out & load pool cars v. rank

	Average Minutes
Captain	31
Chief	37
Detective	19
Lieutenant	26
Police Patrol Officer	30
Police Patrol Specialist	40
Sergeant	26
Overall Average	28

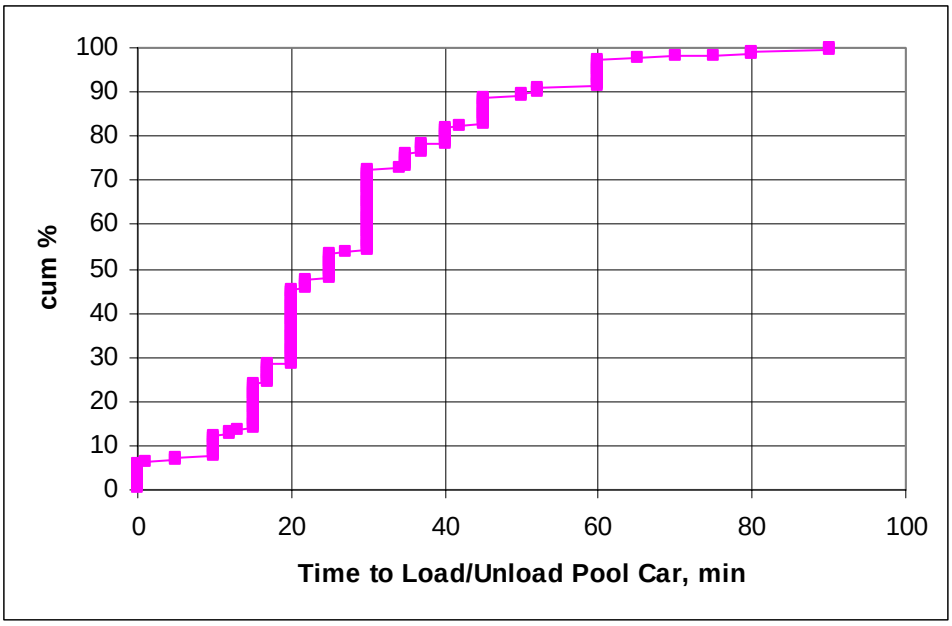

Figure 3.2: Cumulative distribution of time to check out & load pool cars

On an average of 5.6 workdays per month, the assigned pool car was unavailable because it was in the shop, needed cleaning or repair, had contraband, the keys for it couldn't be found, etc. On average it took about 25 minutes to change the assigned car and get a new one. These statistics are equivalent to an average of about 8 minutes per workday spent by each officer having to change the assigned pool car.

On an average of 12 working days each month, drivers of pool cars had to refuel them before they could start work and use them, refueling took an average of 13 minutes. Seventy-eight percent of respondents said they needed office space in addition to their pool car for completing forms, reports, etc., and only twenty-two percent did not need supplementary office space.

Nearly all respondents (ninety-nine percent) drove their own car to work when they used a pool vehicle; forty percent parked their privately owned vehicle (POV) on the street, fifty-five percent parked it at the police station, and five percent parked it in a paid lot or garage.

When asked how difficult it would be to meet their present police obligations using an assigned vehicle that they could not take home (compared to the present arrangement that allows take-home for most officers), forty-three percent said it would not be very difficult, and 32% said it would be somewhat difficult. One-quarter of the respondents (twenty-five percent) said it would be very difficult. The breakdown is in Table 3.4. More than fifty percent of those who said it would be very difficult were concerned about parking, especially after new facilities are constructed; in addition, respondents felt they would be targets for the "bad guys," that it would be hard to respond to call outs, that they could not

change into uniform until they got to the station which would take time, that they would have to park blocks from the station which would delay their work, etc.

Table 3.4: Difficulty of meeting responsibilities without take-home cars v. rank

Number of Respondents v. Difficulty of Not Taking Home Assigned Vehicle				
	Not Very Difficult	Somewhat Difficult	Very Difficult	Total
Captain	2	2	0	4
Chief	1	2	1	4
Detective	10	17	20	47
Lieutenant	4	4	4	12
Police Patrol Officer	64	39	27	130
Police Patrol Specialist	7	5	2	14
Sergeant	18	9	7	34
Total	106	78	61	245
% of Total	43	32	25	100

Seventy percent of respondents said their police services would be much better by having an assigned car than by using a pool car. Using pool cars required a substantial amount of time to be spent in loading and unloading items each workday. When asked whether it would still be necessary to load and unload items each day with an assigned car that could not be taken home (it would be parked in a secure place, making it possible, e.g., to leave a weapon in the car when it was parked), forty-three percent said it would not be necessary to load or unload any items each day, but fifty seven percent said it would still be necessary to load items on a daily basis. Types of items that would need daily transfer include computers, special weapons, GPS, special equipment.

Fifty-six percent of respondents said that having an assigned vehicle would not relieve them of the need for office space, that they could not complete all their reports in their cars; forty-four percent said they would not need an office in addition to their cars. The breakdown by rank is in Table 3.5

Table 3.5: Officers who need office space in addition to assigned cars

	Need Office	Don't Need Office	Total
Captain	4		4
Chief	4		4
Detective	39	4	43
Lieutenant	10	2	12
Police Patrol Officer	47	82	129
Police Patrol Specialist	4	10	14
Sergeant	27	7	34
Total	135	105	240
% of Total	56	44	100

Respondents were asked about the condition of pool cars compared to assigned cars: eighty-two percent said that the condition of assigned vehicles was much better than pool vehicles; seventeen percent thought there was not much difference in condition between a pool car and an assigned car, and one percent thought that pool cars were in better condition than assigned cars.

In the past 2 months, each respondent on average made about 6 “contacts” while off-duty on his/her way to/from work (i.e. assisted an arrest, etc.), forty percent of which were outside city limits; the cumulative distribution of contacts is shown in Figure 3.3. About twenty-five percent of respondents made no contacts, and about ten percent of respondents made more than 20 contacts.

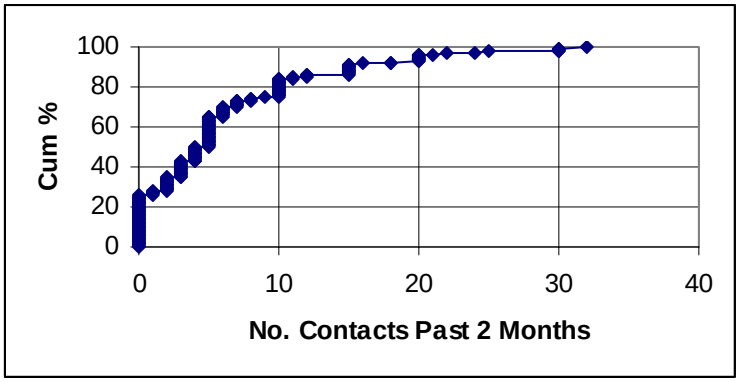

Figure 3.3: Cumulative distribution of off-duty contacts in past 2 months

On average, each officer spent about 36 minutes on these contacts during the past 2 months, which is equivalent to about 1 minute per officer per workday. In the past 2 months, each respondent on average was called out for service 8 times while off duty; the average amount of time spent on these call-outs was about 18 hours, and the standard deviation was 30 hours, indicating wide variation in the amount of time required for each call-out.

Officers spent an average of 350 minutes during the past 60 days caring for their assigned vehicle while off-duty (cleaning it, etc.), which is equivalent to an average of about 10 minutes per workday per officer.

Fifty-eight percent of the respondents said they were able to pay a lower insurance premium on their privately owned vehicle as a result of taking home their assigned vehicle; nine percent said they were unable to save on insurance, and thirty-three percent did not know. Twenty-six percent of those who were able to save said the savings amount to less than $100 a year, and sixteen percent said the savings were between $100 and $200 per year; the others (fifty-eight percent) did not know how much they saved.

Fifty-four percent of respondents said that the AVP played no role in their employment with the Police Department. Among those whose employment was affected by the AVP, nearly one-quarter said the AVP made a large difference, eighteen percent said it made some difference, and fifty-nine percent said it made little difference.

Ninety-two percent of respondents said that having an assigned vehicle contributed a great deal to their job satisfaction; seven percent said it only contributed somewhat to satisfaction, and one percent said its contribution was not very much.

Ninety-four percent of respondents said they were more productive with the AVP than if they had to use a pool vehicle; four percent said they were no more productive with the AVP, and two percent said they were not sure.

When asked if they should reimburse the city for the cost of commuting between work and home using their assigned vehicle, seventy-eight percent of respondents said they should not have to pay any of the cost, fifteen percent said they should pay some of the cost, and seven percent said they should pay all of the cost.

When asked to choose between an assigned vehicle program without take-home privileges which provides free and secure parking for privately owned vehicles while the officer is on-duty v. an AVP with take-home privileges but which requires the driver to reimburse the city at the rate of 38 cents per mile for commuting distances beyond City of Tacoma limits, one-hundred percent of respondents said they would prefer to have the secure parking and drive their own cars to/from work.

In summary, the AVP has made it possible for officers to reduce by more than 30 minutes per workday the time they formerly spent dealing with the logistics of using pool vehicles. Nearly all officers say they are more productive with assigned vehicles, their cars are in better condition and better cared for, and their morale and job satisfaction are higher. On average, each officer made 3 contacts

per month to assist citizens and other officers with services that would not be rendered without take-home vehicles, and they responded on average to 4 call outs per month while off duty. The average one-way commuting distance beyond city limits is 9-10 miles, 20% of the officers with assigned vehicles live within city limits, 30% commute more than 10 miles one-way, and 20% commute more than 20 miles one-way.

4. Neighborhood Questionnaire and Survey

Two focus groups each with 4-5 members of Neighborhood Councils were held for the purposes of eliciting information about citizen concerns regarding Tacoma's AVP and for designing a questionnaire. The questionnaire was pretested with help from the Neighborhood Councils, it was revised, finalized, and distributed on/about July 21, 2004, to most or all members (about 80) of Tacoma's Neighborhood Councils. It contained 13 questions and is in Annex B. Respondents had until July 26 to complete it. Most of the members received a questionnaire for completion using computers, but a few Council members at their request received an identical questionnaire designed for pen or pencil.

A total of 40 members responded, which is 50 percent of those who received the questionnaire. The response rate was quite high, enabling a respectable level of statistical confidence in the responses.[2] Whether the respondents represent the citizens of Tacoma is uncertain. To obtain representative results for all citizens, it would have been necessary to have a sample frame for the entire city and to draw a sample such that the chance of any person being selected to complete the questionnaire would have been the same as for any other person in the city. Such sampling is difficult and expensive, which is why the city chose the more expedient approach of administering the questionnaire to the entire population of Neighborhood Council members on the assumption that they in turn represent the citizens of Tacoma.

When asked their perception of police services in Tacoma, none of the respondents said they are excellent and that they need little improvement. A little more than half (53%) said that police services are okay but some improvement is needed, and the rest, slightly less than half (47%), said that police services are poor and that much improvement is needed.

Respondents were asked how familiar they are with Tacoma's Assigned Vehicle Program. Thirty percent said their knowledge of the program is very good, and the rest (70%) said it is fair. No one said it is poor.

Respondents were asked to select the single item from the following list that they thought is the most important benefit of Tacoma's Assigned Vehicle Program:

1. Vehicles parked at officers' homes deter crime and improve security;

[2] A rule of thumb used by statisticians who do survey work is that at least 30 responses are needed in order to place reasonable statistical confidence in the responses to a question.

2. Police cars dispersed throughout the city are less vulnerable to attack than if they were kept at a single location;
3. Take-home cars improve officer morale and productivity;
4. Parking for free at officers' homes saves the city from building parking lots or garages;
5. Officers can respond more quickly to emergencies.

After answering the question, they were given the same list and asked to select the second most important benefit. Their results are shown in Table 4.1:

Table 4.1: Percent who chose the most & 2nd most important benefits of AVP

	Most Important	2nd Most Important
1. Deter crime	23	44
2. Less vulnerable	13	15
3. Improve productivity	10	13
4. Eliminates parking garage	8	18
5. Respond quickly	46	10
Total %	100	100

From the column labeled Most Important, it is obvious that opinions about the benefits of the AVP are wide ranging. The benefit that was perceived to be most important is that officers with assigned vehicles that can be taken home are able to respond more quickly to emergencies than otherwise; it was selected by a little less than half the respondents (46%), but at the same time it was selected by twice as many respondents as the next item on the list (deter crime). The other half of responses about the most important benefit is distributed among the other 4 choices (deter crime, eliminate the need for parking, etc.), in which 'deter crime' got nearly twice as many votes as the next highest choice. Regarding the Second Most Important benefit, again the opinions are diverse, but a little less than half the respondents (44%) selected deterrence of crime, which again was chosen by more than twice as many respondents as the next item in the list (eliminate parking). The choices of the most and second-most important benefits are consistent and indicate that although the AVP provides a host of benefits, issues of security and public safety are perceived as the most important.

Respondents were asked to select the single item from the following list that they thought is the biggest problem or disadvantage of Tacoma's Assigned Vehicle Program:

1. It is unfair for the city to pay police officers for their commute while other city employees and private citizens must pay their own commuting costs;
2. The take-home program rewards city employees for living outside Tacoma;

3. The program encourages personal use of police cars and moonlighting;
4. Taking vehicles home is not cost effective;
5. The take-home program shows that police unions are too strong and have too much influence in the city;
6. Vehicles get too much extra wear and tear.

After answering the question, they were given the same list and asked to select the second biggest problem or disadvantage. Their results are shown in Table 4.2:

Table 4.2: Percent who chose the biggest & 2nd biggest problem of AVP

	Most Important	2nd Most Important
1. Subsidizing commuting is unfair	18	13
2. Incentive is given to live outside Tacoma	15	21
3. Personal use of police cars is encouraged	10	3
4. Taking vehicles home is not cost effective	18	5
5. Police unions are too strong	5	18
6. Vehicles get too much extra wear and tear	33	41
Total %	100	100

Opinions are dispersed and no single problem was selected by 50% or more of the respondents. However, the same problem got the most votes as most important or second most important, viz. that take-home cars get too much extra wear and tear. This selection is clearly an economic concern of the citizens; i.e., when given choices that deal with fairness such as No. 1 or 2 on the list in Table 4.2, or power such as No. 5, the citizens are mostly concerned about costs.

Respondents were asked their opinion about whether vehicles should be assigned to police officers or would it be better to use vehicles from a pool. The responses overwhelmingly favored assigning vehicles: 58% said “I favor assigning a vehicle to each officer,” and 26% said they were indifferent between assigning and using pool vehicles. Hence, 84% of respondents either were indifferent or favored use of assigned vehicles. Only 16% of respondents said they opposed assigning vehicles and preferred using pool vehicles. Responses to the follow-up question were consistent. Half the respondents thought that if the Assigned Vehicle Program were abolished and officers had to use vehicles from a pool, it would have a large negative effect on police services in Tacoma, 20% thought it would have some negative effect, and 30% thought it would have little or no negative effect on police services.

While the previous two questions focused on the issue of assigned v. pool vehicles, the next focused on the policy of taking vehicles home under the assumption that officers already had assigned vehicles, as under present policy. Nearly half the respondents (46%) thought that if officers could not take home their assigned vehicles, it would have a large negative effect on police services in

Tacoma. One-third of respondents thought that inability to take home assigned vehicles would have some negative effect on police services but not too much, and only 21% thought that the negative effects would be small or absent. Thus, the respondents indicated that they both favored assigning vehicles to police officers and allowing officers to take them home. The main reasons for these opinions seem to be that security, public safety, and quality of police services would be better than with the alternatives of not taking vehicles home or having to use vehicles from a pool. These opinions by citizens are quite consistent with those of the police officers themselves who felt that their services would be jeopardized if the AVP were eliminated.

The next two questions were related in that respondents were asked their opinions about who benefits most from Tacoma's AVP. First, respondents were asked about the benefits of assigning vehicles v. using a pool, and then they were asked about the benefits of taking vehicles home v. parking them in the city while off-duty. In both cases, more respondents chose "the city and officers benefit more or less equally" than any other answer. Only 5% of respondents thought that the city was the primary beneficiary; i.e. the same answer was chosen by 5% of respondents for both questions. Re use of assigned v. pool vehicles, 33% said the officers benefit most, and re take-home v. no-take-home, 43% thought the officers benefit most. The results are in Table 4.3.

Table 4.3: Who benefits most from…? *

	Assigned Vehicles	**Taking Assigned Vehicles Home**
the city	5	5
the police officers	33	43
city & officers about the same	63	48

* table entries are % of respondents

Respondents were asked if they had ever seen a police officer use his/her police car for what they were fairly sure was inappropriate personal business such as shopping, or running errands, or transporting family members. Seventy-nine percent said "never," 18% said "seldom," and only 3% said "sometimes."

The final question asked respondents to select from the following list the single alternative that they favored most regarding take-home:

1. Assigning vehicles that cannot be taken home;
2. Assigning vehicles that can be taken home only by officers who live within city limits;
3. Assigning vehicles that can be taken home by officers who live in Pierce County;
4. Assigning vehicles that can be taken home only by officers who live within a certain distance of the city (e.g. 10 miles);

5. Assigning vehicles that can be taken home by all officers regardless of where they live.

The percentages of respondents who chose each answer are shown in Table 4.4. The preference is clear by a margin of about 2 to 1: respondents favored setting a limit beyond which assigned vehicles should not be taken home.

Table 4.4: Percent who said that assigned vehicles should…

1. Not be taken home	16
2. Be taken only to homes in Tacoma	26
3. Be taken only to homes in Pierce County	5
4. Be taken no more than a certain distance beyond Tacoma, e.g. 10 miles	50
5. Be taken to homes regardless of where officers live	3
Total %	100

To summarize, the answers of 40 Neighborhood Council members from a population of 80 carry a clear message. The fact that no respondent thinks the Police Department does an excellent job is noteworthy. The respondents favor both assigning vehicles to police officers and allowing them to be taken home. They feel that public safety and the quality of police services would be jeopardized to do otherwise, which agrees with the sentiments of the police officers themselves. However, citizens are not willing to give a blank check to the Police Department in this matter. They are concerned about the extra wear and tear on vehicles that are taken home, and they favor putting a limit such as 10 miles on the commuting distance beyond city limits that is subsidized.

As important as it is to know these preferences of Tacoma citizens, it is equally important to know the items about which they have little concern. Respondents did not think that free parking at the homes of officers was a major benefit of the AVP, but as is shown below in the benefit-cost analysis of this report, parking is a major economic issue. Respondents were not particularly concerned that subsidized commuting is inequitable for other city employees, or that officers are abusing the privilege of taking home their cars, or that the city is at the mercy of police unions that are too strong. Moreover, they did not think officers were unduly benefiting from the AVP but rather that both officers and the city benefit more or less equally. Finally, no concern was expressed about officers rendering police services outside Tacoma or that police vehicles need to be specially protected against a terrorist attack.

5. Demands For and Supply of Police Services

Mercury Associates was asked to assess the effectiveness of how well Tacoma allocates its police resources, especially personnel and vehicles. Such an assessment requires 3 steps: 1) assess the demands for police services; 2) assess the supply of police services; and 3) compare supply and demand to

determine what, if any, gaps exist, which might indicate misallocation of resources.

Two common indicators of the public's demands for police services are calls for service (cfs) and index crime statistics, which report to the FBI such things as burglary, rape, homicide, etc. The city was able to provide data at Mercury's request on cfs for each day in the months of May and June 2004, broken down by hour of the day and sector/ district of the city in which the calls originated.

The calls were not just for police services but included other emergency calls as well, such as for fire and rescue squad. The immediate question is whether total calls for service also indicate the geographic and temporal distributions of calls only for police service. For example, are calls for police services high when total cfs are high, and low when total cfs are low? If police cfs are correlated with total cfs, then it is not important that data are lacking on police cfs because the zones of the city and the times of the day of high police demands will be indicated by total cfs. The reason for this focus on cfs is that in the second part of this section that addresses how well police services in Tacoma meet demands, the main indicator is elapsed time between when cfs are received and when dispatched vehicles arrive on the scene.

Correlation was investigated between total cfs (only some of which were for police services) and index crime statistics (all of which indicate demands for police services). For the 2-month period May and June 2004, the average number of cfs was 492 per day for the entire city (not just police cfs), and the average number of index crime reports was 51 per day for the entire city. Because cfs are about 10 times higher than crime stats, the data for the two indicators were normalized by dividing each daily value by its overall mean value; the results are shown in Figure 5.1. In general, high (low) peaks of cfs and crime stats follow similar patterns. The correlation coefficient between the two data traces is about 0.4, which indicates a moderately strong relationship. The correlation coefficients between the 2 indicators for sectors 1 and 4 of the city are about 0.45, and for sectors 2 and 3 they are about 0.3. Hence, total cfs seem to be a reasonable indicator of the geographical and temporal variations in the demand for police services in Tacoma.

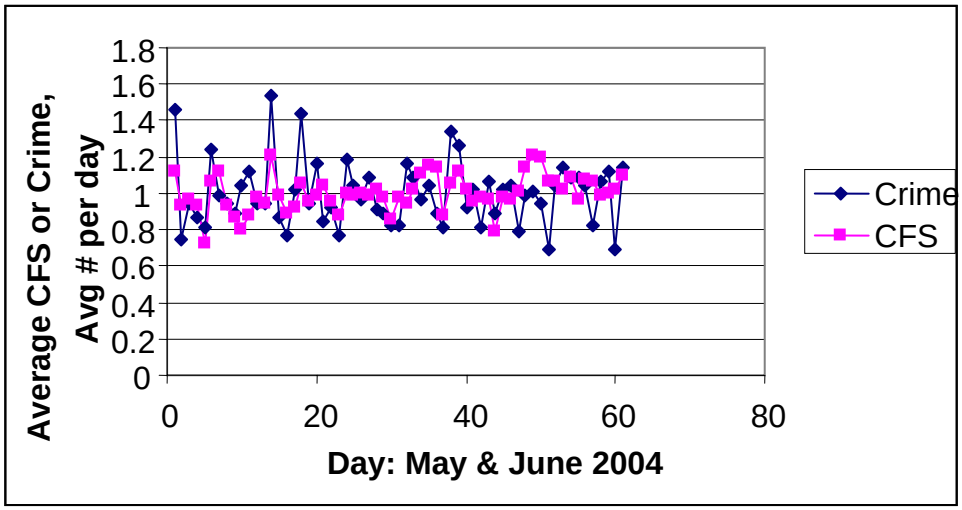

Figure 5.1: Daily variations in cfs and reports on index crimes

Figure 5.2 below shows the diurnal variation of cfs in sector 1 district 1 (TA11) averaged for the months of May and June 2004. Values for the curve labeled 'average' are not whole numbers, they vary from a little less than 1 call per hour around 6 AM to about 2 calls per hour around 1700 hours (5 PM). On the same chart but lying above the 'average' curve are the maximum hourly rates of cfs for the 2-month period under study. Note that the max rate at which cfs were received in TA11 was 9 per hour, which occurred around 1600 hours (4 PM). The significance of this graph is that while average rates of cfs provide general comparative information, the max rate for some purposes is a better indicator of the demand for police services because for the Police Department to render high quality services, it must meet all the demands that are placed on it and not just average demands. The situation with police departments is analogous to any system that faces variable temporal demands such as restaurants, airlines and highways; their effectiveness is not measured primarily by how well average demands are met but how well they meet peak demands.

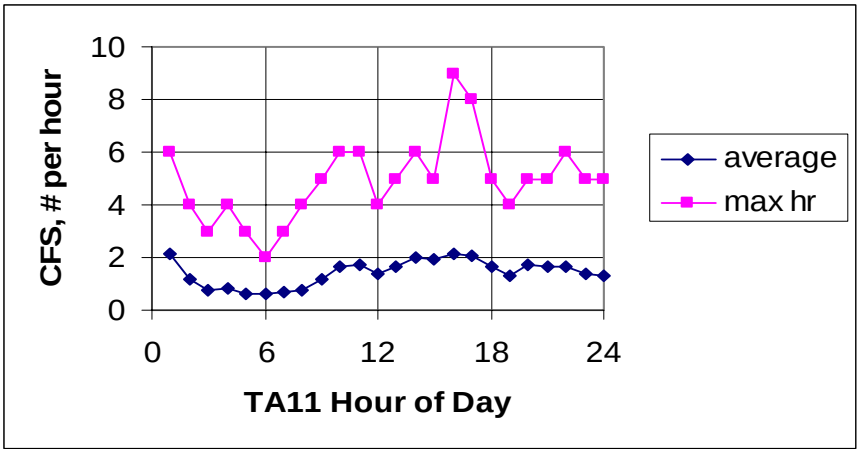

Figure 5.2: Variations in average and max hourly cfs in TA11

Table 5.1 shows summary statistics for cfs by sector and district of the city. Note that sector 1 got an average of 101 cfs per day in the 2-month study period, which was the lowest rate for any sector in the city, sector 4 got an average of 111 cfs per day, sector 2 got 131 cfs, and sector 3 got an average of 150 cfs per day, which was the highest rate for any sector in the city. Hence, sector 3 received about 50% more calls than sector 1. Note that the pattern of maximum daily rates follows the average rates, with sector 3 getting the highest rate (188 cfs/day) and sector 1 getting the lowest rate (132 cfs/day), but the differences in maximum rates are not particularly large from one sector to another. For example, the max daily rate in sector 2 (179 cfs/day) is not very different than the max daily rate in sector 3. Note further that the ratios of max daily to average cfs and the standard deviations in daily cfs are remarkably similar from one district to another. What this suggests is that the present police policy of allocating about the same number of vehicles and officers to each sector of the city seems reasonable on the basis of these demand data that are fairly consistent from one sector to another, but more evidence is needed from data on elapsed times for dispatched vehicles in order to further test how well the supply of police services meets demand.[3]

Table 5.1: Statistics on cfs by sector and district

Sectors & Districts	average	std dev	max day	max day average ratio	Districts	average	std dev	max day	max day average ratio
TA11	34	8	56	1.65	TA31	37	8	58	1.56
TA12	27	7	45	1.64	TA32	43	8	65	1.50
TA13	19	5	30	1.58	TA33	33	7	53	1.59
TA14	20	5	32	1.59	TA34	36	7	50	1.39
Sector 1	101	15	132	1.31	**Sector 3**	150	18	188	1.26
TA21	33	7	50	1.51	TA41	31	7	50	1.64
TA22	30	7	50	1.66	TA42	19	5	33	1.70
TA23	38	8	65	1.73	TA43	32	5	44	1.39
TA24	31	8	56	1.84	TA44	29	6	42	1.43
Sector 2	131	17	179	1.36	**Sector 4**	111	13	140	1.26

Additional data on demands include index crime statistics, which are similar to calls for service. Figure 5.3 is like Figure 5.2 for cfs in district 1 of sector 1 (TA11) except it shows average numbers of index crime reports per hour for the 2-month study period and the maximum hourly rates of crime reports. Table 5.2 shows statistics similar to those in Table 5.1 except for index crime reports instead of

[3] The 4 sectors of Tacoma each have 4 patrol vehicles on the street at any time, 3 with only one officer and one with 2 officers. In addition, sectors 1 and 4 each have an additional car and officer because of their geographical size and configuration. Hence, at any time, Tacoma typically has 18 vehicles patrolling its streets.

cfs. As in the case of cfs, sector 3 has the highest rate of crime reports and sector 1 has the lowest rate; the rankings of the other two sectors are the same for both cfs and crime reports. These data like those on cfs indicate some but not large differences in demands for police services from one sector to another.

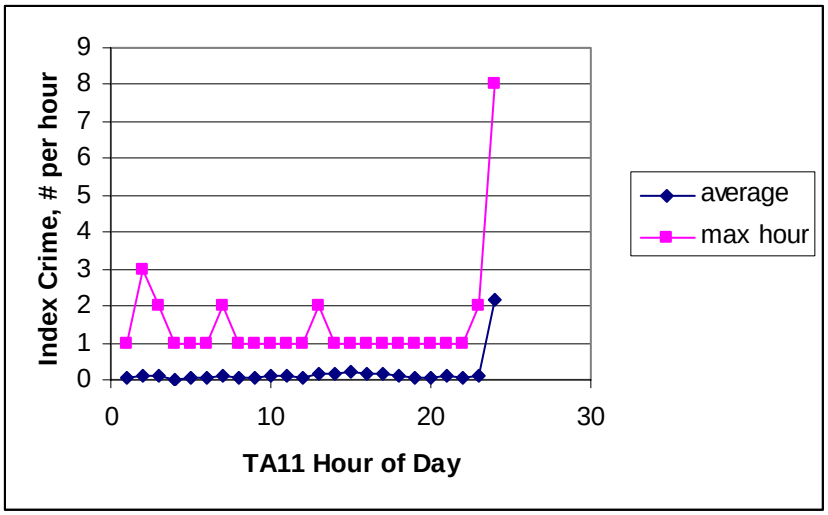

Figure 5.3: Variations in average and max hourly index crime reports in TA11

Table 5.2: Statistics on index crime reports by sector and district

Sectors & Districts	average	std dev	max day	max day average ratio	Districts	average	std dev	max day	max day average ratio
TA11	2	1.54	8	3.73	TA31	4	1.98	9	2.53
TA12	2	1.52	6	2.84	TA32	7	3.07	15	2.18
TA13	2	1.53	6	3.85	TA33	4	2.21	11	3.01
TA14	2	1.55	7	3.47	TA34	4	2.05	10	2.27
Sector 1	8	2.87	17	2.17	**Sector 3**	18	4.69	29	1.57
TA21	3	1.66	8	2.40	TA41	2	1.64	7	3.71
TA22	3	1.89	7	2.16	TA42	2	1.34	5	2.85
TA23	5	2.72	16	3.26	TA43	3	1.87	8	2.38
TA24	3	1.68	6	2.32	TA44	3	1.90	8	2.42
Sector 2	14	4.85	27	1.92	**Sector 4**	10	3.44	17	1.65

With cfs and index crime data on the temporal and geographical demands for police services in Tacoma, the task now is to assess how well the Police Department's policies of allocating its vehicles and personnel meet them. A commonly used indicator for this is the elapsed time between when cfs are received and when vehicles arrive on the scene. Data were obtained for this indicator for May and June 2004 broken down by sector, district and day but not

by hour of the day. Deficiencies in allocating police resources would be indicated by irregular or unusually long response times.

Data for May and June were treated separately instead of pooled. In May, a total of 7490 vehicles were dispatched in response to cfs in the entire city, and the average elapsed time between when calls were received and when vehicles arrived on the scene was 9.77 minutes. In June, 7570 vehicles were dispatched, and the average response time was 9.97 minutes. Results for the individual sectors and districts of the city are in Table 5.3.

Table 5.3: Average response times to cfs in May & June v. sector & district

Sectors & Districts	May # cars Dispatch	May Avg. Min	June # cars Dispatch	June Avg. Min	Sectors & Districts	May # cars Dispatch	May Avg. Min	June # cars Dispatch	June Avg. Min
TA11	448	7.42	408	7.62	TA31	501	10.37	488	9.82
TA12	437	6.97	523	7.35	TA32	636	11.00	599	9.93
TA13	314	7.43	297	8.95	TA33	556	11.20	593	10.02
TA14	295	13.38	328	13.58	TA34	584	10.88	669	10.87
Sector 1	1494	8.47	1556	9.04	**Sector 3**	2277	10.88	2349	10.20
TA21	522	9.10	476	9.87	TA41	438	8.87	384	8.52
TA22	476	8.95	495	9.02	TA42	344	9.27	325	10.60
TA23	552	11.00	593	11.40	TA43	465	8.33	495	9.65
TA24	390	12.35	392	12.73	TA44	532	11.17	485	10.90
Sector 2	1940	10.26	1956	10.69	**Sector 4**	1779	9.49	1689	9.93

The key finding from Table 5.3 is that average response times are remarkably consistent from one sector of the city to another and from one district to another. Consider the data for TA11, which show that 448 cars were dispatched in May and that the average response time was 7.42 minutes. In June, about 10% fewer cars were dispatched (408), and the average response was 7.62 minutes. For sector 1 as a whole, the average response time in May was 8.47 minutes, and in June it was 9.04 minutes. Note from the sector data that the shortest average response time was about 8.5 minutes (sector 1) and the longest was nearly 11 minutes (sector 3). The variation in average response times is somewhat higher from one district to another (e.g. 13.6 minutes in TA14 v. 8.3 minutes in TA43). However, the times are generally similar and do not suggest that police resources in Tacoma are being misallocated.

In summary, the results from this analysis suggest some differences in the quality of police services from one district to another as indicated by average response times, but the differences do not seem overly large. Furthermore, average response times on the order of 10 minutes or so seem quite acceptable. Because data were examined only for a recent 2-month period, it is not possible to extrapolate beyond them. The Police Department knows that patterns of crime

and demands for service are always changing, thus requiring constant vigilance in being able to provide adequate response. For example, the Police Department recently changed the boundaries of some of the sectors in the city so as to be able to provide better service. A full-fledged examination of how the Police Department keeps up to date in responding to changing needs is beyond the scope of this study. The fact that the Police Department seems to be providing an adequate response at the present time is not a substitute for a future examination of department policies and practices aimed at matching the supply of services to ever shifting demands.

6. Cost-Benefit Analysis

Information in this section of the report lies at the heart of the contract between Tacoma and Mercury Associates. CB analyses aim at assessing whether a project under consideration is worthwhile. The technical literature on CB analysis is vast, and CB methodologies are well developed. The main steps in the CB analysis of any project include the following[4]:

1. Decide whose costs and benefits count
2. Catalog the physical impacts of the project
3. Predict impacts over the life of the project
4. Monetize the impacts
5. Discount the impacts over the planning period to equivalent present values
6. Add up the discounted costs and benefits for the entire planning period
7. Use the sum of present value (PV) benefits and the sum of PV costs for assessing whether the project is worthwhile.
8. Address uncertainty

This summary is presented in order to lay the groundwork for the analyses described in this section. Economists are widely agreed on the first point in the methodology: CB analyses should transcend political and group boundaries. All the social benefits of a project regardless of who receives them and all the costs of the project regardless of who incurs them should be counted in a CB analysis. Hence, the services that Tacoma police officers render on their way to or from work to residents of Pierce County or other jurisdictions outside Tacoma produce social benefits every bit as important as the benefits that accrue to people within Tacoma and should be counted because they accrue to society as a whole. It would be a mistake not to count them just because those receiving them did not have to pay for them. Correspondingly, the costs that officers themselves incur in carrying out their duties, for example, getting to and from work using their personal cars, need to be included in the analysis. A key concept in CB analysis is to think in terms of society as a whole, to set aside the questions of who pays and who benefits, which are basically irrelevant.

[4] A standard reference on CB analysis is: *Cost-Benefit Analysis* by A. Boardman et al., Prentice Hall, 1996 (ISBN 0-13-519968-9)

Regarding items 2 and 3 in the above summary, 'impacts' refer to the inputs and outputs of the project. Broadly speaking, inputs are the resources that go into the project, which in the case of the AVP mainly includes vehicles, resources for their operation and maintenance (O&M), facilities for parking them, and similar items. The main outputs from the AVP are police services. Item 4 in the summary indicates that the value of the inputs and outputs must be expressed in the common units of dollars for the base year of analysis. Economic costs are associated with inputs such as concrete, steel, land and labor. On the other hand, social benefits derive from consumer willingness to pay for the goods and services from a project, i.e. from consumer demand. A lower bound on social benefits in the examples of this report is the salary that the city pays to police officers. The rationale for this is that the city derives its revenue from taxes, which represent the amounts of money citizens are willing to pay for municipal services. Salaries, then, are like prices that citizens are willing to pay for police services. In fact, citizen willingness to pay for police services probably exceeds the salaries that are actually paid to officers, which is one of the reasons why their salaries only indicate the minimum and not the full value of social benefits.

Item 5 in the above summary acknowledges that CB analyses are typically made over some period of time. Although the cost of a vehicle is incurred at one point in time, its useful life extends over several years during which the vehicle incurs cost in order to be able to enable the officer driving it to render service. Hence, a period of several years needs to be selected for making the CB analysis, which in this case is 20 years. Items 5 and 6 of the summary indicate how to treat costs and benefits that occur at different times during the planning period. Economists are agreed that a cost or benefit of, say, $1 some years in the future is worth less than $1 today. Hence, future costs and benefits are discounted compared to costs and benefits today. The typical way to discount future costs and benefits is to use what economists call the exponential discount function for calculating discount weights

$$w_t = 1/ (1+r)^t$$

where w_t is the weight used to discount a cost or benefit t years in the future, and r is the annual discount rate expressed as a decimal. For example, suppose a new patrol car fully equipped costs $27,000 today. The real economic cost of a similar car purchased, say, 5 years from now expressed in current (base year) dollars would also be about $27,000 because the value of the resources that go into manufacturing the car are not expected to change very much.[5] However, the equivalent present value (PV) of the car purchased 5 years from now is w_t times $27,000, where t= 5. If the discount rate is, say, 4% per year (r= 0.04), then w_t = 0.82 and the equivalent PV cost of the car is about $22,000.

[5] The number of dollars needed to buy the car 5 years from now will probably be more than 27,000 due to inflation, but inflation in CB analyses does not affect economic value when expressed in current (base year) dollars, and hence is ignored.

With this introduction, we can now address the 3 main questions for CB analysis that have emerged from this study of Tacoma's AVP, each of which is examined in a separate subsection below:

1. What is better, using pool vehicles or assigning a vehicle to each officer?
2. If vehicles are assigned to each officer, what is better, to park them in a city-owned garage or lot when not in use for police business or let officers take them home?
3. If assigned vehicles are taken home, the costs and benefits are jointly shared by the city and the officers; how should the joint costs be divided between them?

It is important not to lump these 3 questions together because, although they are related, each calls for a separate decision or policy.

6.1 Pool v. Assigned Vehicles

This section addresses the first question posed above for CB analysis. Suppose we want to compare 2 alternatives, one in which officers share pool cars (Alt#1) and the other in which they each have an assigned car (Alt#2). To make the analysis simple, let's consider only 2 officers who under Alt#1 share one car and under Alt#2 each have a car. For this example, we assume that the police cars cannot be taken home and thus must be parked in a secure city-owned garage when they are not being used by the officers. We begin by examining the major tradeoffs.

Under the pool alternative, the city has to buy only one car ($27,000), whereas with assigned cars, it has to buy 2 cars ($54,000).[6] However, a single pool car will get about twice as much usage as 2 assigned cars under the assumptions of this example. Police cars are replaced when they have about 100,000 miles, which under the pool alternative means it must be replaced every 3 to 4 years if the average annual distance driven by each officer is about 14,000 miles; assigned cars do not need replacement but once every 7 years. Under both alternatives the total miles driven each year by the 2 officers are about the same (roughly 28,000).

Maintenance of cars is mainly a function of how many miles they are driven, according to Tacoma's Fleet Services unit. The average maintenance cost of an assigned police vehicle in Tacoma is about $290/month; hence, the maintenance cost of the pool car is about twice as much ($580/mo). In addition to these recurring costs, the city must provide secure parking for the cars when they are not in use (recall that in this example, assigned cars are not taken home). The capital cost of a parking space in a garage varies widely around the United States, ranging from about $6,000 to about $20,000 per space; for this analysis, we assume that it is $9,000. Hence, under the pool alternative, the city must

[6] In 2002, the average price the city paid for 43 police sedans was $26,852, and in 2003, the average price paid for 30 sedans was $28,261.

provide one space at the beginning of the planning period, but with assigned cars, it must provide 2 spaces.[7] Based on a Google™ search, the annual cost of maintaining a parking place is about $300/year per space; this recurring cost is incurred each year for the pool alternative, and twice this cost (for 2 spaces) is incurred for the assigned alternative.

Results from the police questionnaire indicate that 82% of officers said their assigned vehicles are in much better condition than pool vehicles. Pool vehicles get rougher treatment, are in more accidents, and need more repairs than assigned vehicles. An effort to get statistics from Seattle on the repair costs of police vehicles in their pool was not successful, but Tacoma was able to provide data showing that the average repair cost (over and above routine maintenance) of assigned police vehicles in 2003 and 2004 was about $12/year per $1000 of initial vehicle cost.[8] Assuming the repair cost is only 10% higher in Seattle for their pool vehicles, it would be $13.20/yr per $1000 of initial vehicle cost.

To summarize the cost side, the pool alternative (Alt#1) buys only one car at a time compared to 2 for Alt#2, but replacement is twice as frequent with pool as with assigned cars. Parking costs are twice as high with assigned as with pooled, but repair costs are lower. Maintenance costs are essentially irrelevant because in Tacoma, they are proportional to mileage.

Now we consider the benefit side. The main tradeoff with the two alternatives is that with assigned cars, officers do not have to spend time each day checking out/in and transferring their gear into and out of a pool car; they can go directly to their assigned car in the parking garage when they start work and can leave most of their gear in it from one day to the next. Nor do they face the risk of not having a pool car ready for use even after it is assigned (because it needs repair, or can't be found, or is still in use from the previous shift, or the keys can't be found, or is dirty (e.g. has blood or feces from prisoners), or has contraband, etc.) With assigned cars, the officers keep them clean and in working order, keep the keys under their own control, and take responsibility for them, which avoids the uncertainty that is associated with using pool cars. Whatever time is saved by having assigned cars makes it possible for the officers to be more productive by getting on the road or to their job sooner. Hence, the key tradeoff in this example is the cost of buying and parking more cars if they are assigned (Alt#1) weighed against the lower productivity of officers who use pool cars (Alt#2).

In the survey of police officers, an average of 28 minutes per day was spent by each officer checking out/in their pool car and loading/unloading their gear. In

[7] No cost would be incurred for parking if the city had excess parking space at its police stations, but that is not the case. Parking space is scarce, even though the Police Department has major expansions underway.

[8] In 12 months of 2003, repair costs were $70,000 for a fleet whose initial cost was $6.5 million ($11/yr per $1000 of vehicle cost). In 6 months of 2004, repair costs for the same fleet were $37,600 ($12/year per $1000 of vehicle cost).

addition, each officer spent an average of 8 minutes per day changing the pool car that was given to them because it was not ready for use. Thus, 36 minutes per day (0.6 hr) was spent just in the logistics of using pool cars, time that would otherwise be spent productively if such logistics could be avoided. This is a lower bound on the time savings with assigned cars because essentially all officers said that additional time would be spent unproductively while assembling to get pool cars, in chatting with colleagues, etc. In addition, assigned cars made it possible for each officer to have in his/her car a reliable working computer, which virtually eliminated turn-outs (frequent required meetings) in which officers got their assignments, making it possible for officers to begin work as soon as they get in their car, which was not the case with pool cars. Using the lower bound of time saved per workday, and with 4 work days per week, 50 weeks per year, and an average officer salary of $47 per hour, the productivity (social benefits) of officers with assigned cars amounts to about $93,000 per officer per year compared with productivity of about $87,000 per officer per year with pool cars.[9]

Another item on the benefit side of the ledger is the salvage value of cars at the end of their useful lives. Salvage value depends more on the car's mileage than its age according to Tacoma's Fleet Services unit; experience with Tacoma's police vehicles is that their salvage value is about 15% of initial cost ($4000 for vehicles that initially cost $27,000). Of course, pool vehicles are replaced (salvaged) every 3 years or so compared to every 7 years for assigned vehicles.

With these values, we are now ready to make a CB analysis of the 2 alternatives. A few comments, however, are pertinent regarding project inputs that were studied in this project but are negligible or not applicable. It was hypothesized that officers with assigned cars would not in addition need office space for completing reports, but in fact the needs for office space are about the same for both pool and assigned programs. It was also suggested that with assigned cars, no time would be spent each day in loading and unloading personal gear, which is not true. However, the amount of required time with assigned cars is negligible. Finally, officers complained that pool cars frequently needed refueling, which took officers an average of 13 minutes on 12 work days per month. However, refueling has no bearing on costs or benefits because the time spent by one officer on fueling presumably was saved by the other officer who did not refuel.

A spreadsheet model was developed for analyzing the 2 alternatives described above. The assumed discount rate was 4% per annum (p.a.) and the period was 20 years. The figures in Annex C show setup of the model for the case of 2 officers described above. Table 6.1 lists the present value costs and benefits of the 2 alternatives in thousands of dollars. In the case of the pool alternative (Alt#1), PV benefits are $2415 thousand (K) over 20 years, and PV costs are

[9] A random sample was dawn of 40 patrol officers to estimate the average salary paid to them for the purpose of estimating the social benefits resulting from productive police work. Including fringe benefits, the average was about $47/hour. Variation from the average was small, the standard deviation was about $3.5/hour.

$227 K, making the net PV (NPV) of Alt#1 $2188 K. Table 6.1 shows corresponding values for the assigned alternative (Alt#2), which has NPV of $2331 K. Now consider the right-hand column of Table 6.1, which shows the differences in PV between the assigned alternative (#2) less the pool alternative (#1). The bottom row shows that the NPV of the assigned alternative is $143,000 more than the NPV of the pool alternative. That is, the alternative of assigning 2 vehicles produces $143,000 higher net benefits over a period of 20 years than the alternative of using a single pool vehicle for the 2 officers of this example.

Table 6.1: PV costs & benefits of pool and assigned vehicles for 2 officers

	Pool (#1)	Assigned (#2)	Assigned (#2) – Pool (#1)
PV Benefits, $1000	2,415	2,574	159
PV Costs, $1000	227	243	16
Net PV, $1000	2,188	2,331	143

The overall net advantage of $ 143,000 can be expressed as an equivalent annual saving of $10,500 per year using the capital recovery factor.[10] For this simple example with only 2 officers, the net advantage to the city of assigning each of them cars instead of requiring them to share a pool car is about $10,000 per year.

The main reason for the large saving with assigned cars is due to the increased productivity of the officers. They do not have to spend valuable time checking out/in pool cars nor loading/unloading them. Recall that the time saving is only 36 minutes per workday per officer. Had the saving been 1 hour instead of 0.6 hr/day, the net saving would jump from $10,000 to $18,000 per year, nearly double. Thus, the advantage of assigning instead of pooling cars is very sensitive to the amount of time saved. The reason for this is that the saving occurs each workday. Had the average time saved been 0.8 hr/day, the advantage of the assigned program would be more than $14,000/year, and with a 1.2 hr/day saving, it would be more than $22,000/year. Even if the saving were only 5 minutes per day per officer, NPV would still be positive, indicating that the AVP is preferable to a pool program if as little as 5 minutes are saved per day per officer.

A sensitivity analysis was made by changing some of the input parameters in the CB model, as shown in Table 6.2, but the different values had virtually no effect on the outcome. As the parameters were changed one at a time from their low values to the high values in Table 6.2, never did the net advantage of the assigned program fall below $10,000/year nor did it rise above $11,000/yr. Note in particular that even if the repair costs of pool cars is twice as high as assigned

[10] The annual equivalent of a present value is obtained by multiplying the present value by the capital recovery factor (crf). This is the same procedure used for calculating payments (debt service) on house mortgages and car loans. The crf for a period of n years and an interest rate of r% p.a. (as a decimal) is $r/[1-(1+r)^{-n}]$. If n=20 and r=4% p.a., crf= 0.0736.

cars, the disadvantage of the pool program would not be significantly affected; the assigned vehicle program is best under a robust set of conditions.

Table 6.2: Sensitivity analysis of CB example with 2 officers

	Base Case	Low	High
Maintenance Cost of Assigned Vehicles, $/mo	290	250	400
Capital Cost Per Parking Space, $	9,000	6,000	12,000
O&M Cost of Parking Garage, $/yr per space	300	200	400
Repair Cost Per Pool Vehicle, $/yr per $K initial cost	12	0	24
Interest Rate, % per year	4	2	6

The task now is to scale up from 2 officers to the (roughly) 264 police officers in Tacoma who presently have assigned vehicles. If the inputs of the previous case are held constant and only the number of officers is increased, then the number of vehicles for the assigned program would be 264, the number for the pool program would be 132, and the advantage of the assigned vehicle program in present value terms compared to the pool program would be nearly $20 million over a planning period of 20 years, which is equivalent to about $1.4 million per year. However, such scaling is a little too simplistic.

Some officers (special teams, administrative officers, officers who work in vehicles with special equipment, etc.) need assigned vehicles for various reasons and could not participate in a pool program. If the present AVP were replaced with a pool program, then about 70 officers would need assigned vehicles and about 130 pool vehicles would be needed for the other 194 (mostly patrol) officers who would share them. These estimates are based on the current 4 workdays per week 10-hr per day schedule that most officers who could share vehicles are currently working. With this schedule, there is a 2-hr overlap at shift change on most days that (roughly) requires 2 cars for serving 3 shifts per day.[11] Under this scenario, NPV of the pool program would be about $287 million for the 20-yr planning period, NPV of the AVP would be $308 million, and the net advantage of the assigned program over the pool program would be about $21 million, which is equivalent to about $1.5 million per year.

Under a robust set of conditions using data obtained from this study for project inputs and outputs, an assigned vehicle program is much more advantageous to the city than a pool program. The main reason for this is the time saved by each officer each day in not having to check-out/check-in pool vehicles and transfer their gear. The savings would be more modest if officer salaries were lower or if vehicle costs were higher, but the fact is that the cost of officer time (i.e. the willingness of citizens to pay for police services) is relatively high compared to the cost of vehicles. This is not unique to Tacoma. It is common experience, for

[11] Without an overlap, one car in principle could serve all 3 shifts, although the logistics of transfer at shift change would probably cause increased delay of checking out cars and loading gear, making the AVP all the more attractive.

example, that the equipment cost of replacing a timing belt on a personal car is a small fraction of the labor cost of installing it. The same principle pertains to police vehicles; equipment and maintenance costs of police cars are a small fraction of the salaries of the police officers who drive them. What this points up is the importance of facilitating the efficient use of officer time. In general, when in doubt about the tradeoff between hardware costs and personnel time, hardware costs are almost always less expensive, partly because they are typically incurred on an irregular basis whereas personnel costs are incurred day-in and day-out.

Some caveats are in order. Any mathematical model is an abstraction of reality and must be used accordingly. For example, the model assumes that the entire fleet of assigned vehicles is purchased in the same year and will be retired 7 years later, which is not true. It is more likely that about one-seventh of the fleet will be replaced each year, and for pool vehicles, about one-third or fewer will be replaced each year. The pertinent question is whether these and similar details (e.g. the exact size of the fleet, the precise number of officers who need assigned vehicles and cannot share, the exact salaries of officers, etc.) have a significant effect on the outputs and conclusions derived from the model of this section. This question is equivalent to asking: Has the model captured the most essential ingredients of the Tacoma situation? Has something major been overlooked, or has something important been misrepresented? The answers to these questions are matters of professional judgment. In the case of this model, our professional judgment is that it has in fact captured the essence of the Tacoma situation and that the benefits to Tacoma of an assigned vehicle program outweigh by a substantial amount its costs. The argument is all the more compelling because the model has only quantified the major impacts of the situation and has overlooked the smaller benefits that are more difficult to quantify.

6.2 To Take Home or Not To Take Home: That is the Question

With strong evidence that police vehicles should be assigned and not pooled, the next question is whether they should be taken home or parked in a city garage or lot when officers are off-duty. We begin as before by examining tradeoffs. The main economic issue is not the length of the commute in taking cars home or whether officers should reimburse the city for commuting but rather the cost of parking v. the cost of commuting.

Suppose that a hypothetical police department has 100 vehicles that are assigned to its officers. Assume that all vehicles work within city limits, and all officers live within city limits close to their work. Assume the city has just decided to assign vehicles to its officers; now it must decide where to park them when they are not in use. They need secure parking places because of the equipment that is left in them when officers are off duty.

Assume Option #1 is to build a secure parking garage in the city, which will cost $900 per vehicle per year in debt service, operation, and maintenance, bringing

total parking cost to $90,000/year. This is attractive for the officers because they will incur no commuting cost to get their vehicles since they can walk from home to the parking garage in a few minutes. However, the city is not too keen on spending $90,000/yr on parking its vehicles.

Assume Option #2 is to park police vehicles outside the city for free. Assume that the city owns a large garage on an island some miles from the city that is used by different city departments for parking, and it has enough unused space to house all the police vehicles. Furthermore, the city runs a barge for transporting vehicles between the city and the garage on the island; the barge has enough excess capacity to transport the police vehicles and drivers at essentially no cost. Because the vehicles are barged and not driven to the island, Option #2 incurs no operating cost for police cars. However, the officers must drive their police vehicles onto and off the barge and stay with them while in transit. In addition, they must drive their own cars between home and the island and park them while at work, which costs $200 per officer per year. The barge trip requires 2 hours per day of the officers' time. Hence, Option #2 is free for the city but costs the officers $20,000 per year for driving and parking plus many hours of their time for which they are not compensated.

Assume that the city has a third alternative, Option #3, which is to let each officer take his/her police vehicle home and park it there when off duty, free of charge to the city. The officers have secure parking places at their homes, and no cost is incurred for parking. The commuting costs for this option are essentially zero because all the officers live in the city near their work.

In summary, Options 2 and 3 are both free for the city, making the city indifferent between them. Options 1 and 3 incur no costs to the officers, and hence they are indifferent between them. Option 1 is expensive for the city, and Option 2 is expensive for the officers. Only Option 3 is free for both parties.

The question for this example is: What plan is best?

Option #3 clearly seems best, it is a win-win situation. Recognizing this has an important implication: Selection of the best alternative depends not solely on minimizing the cost to the city nor solely on minimizing the cost to the officers. The optimal solution requires minimizing the total cost of all resources involved in putting police vehicles on city streets *regardless of who incurs them*. The central issue here is called *standing*, it is the first item in the CB summary of section 6. A 'global' cost-benefit analysis considers all the costs and benefits to society as a whole. In this case, both the city and the officers have standing, costs and benefits for both parties must be jointly considered. In economic parlance, officers and their police vehicles are bundled goods. Vehicles without drivers or drivers without vehicles can render no service to the city, both are necessary, similar to telephones and telephone users.

It would be a mistake to focus only on costs to the city or only on costs to the officers when deciding an optimal plan. The correct approach is to identify the values of all resources involved in each alternative and to select the one for which the costs of all resources are lowest, assuming that each option renders similar benefits. This is called the economically efficient solution. Once it is selected, then determining how to allocate the costs of the best solution among the stakeholders is a separate matter for decision making.

The Tacoma situation is like the example presented above. Two options need to be compared: One in which police cars are parked in the city at city expense and officers drive their POV from their homes each workday to access them, and the other in which police cars are driven by officers to and parked for free at their homes. Suppose that parking police cars in a city garage when officers are off-duty costs $900 per vehicle per year for debt service, operation and maintenance, which is incurred if officers cannot take them home. With an average round trip commute of about 20 miles and a cost of operating, maintaining and replacing (OMR) privately owned vehicles of about $0.40 per mile (the approximate IRS rate), the average annual commuting cost incurred by officers using their personal vehicles is about $1600 per officer if they commute on average 200 days per year. In addition, the officers would incur parking costs of their POV while on-duty, which are assumed to be about $500 per year ($2.50/day). Hence, the approximate annual cost of not allowing officers to take their police vehicles home is about $3000 (=900+1600+500) per vehicle per year.

Compared with this is the alternative of parking for free at the homes of the officers to whom the cars are assigned, an alternative that involves using police vehicles for commuting instead of POV. The cost of accessing the free parking spaces at officers' homes using police vehicles is higher than $0.40 per mile. Assuming police vehicles have initial cost of $27,000 and useful lives of about 7 years, the annual depreciation cost of a police car is about $4000. With average maintenance cost of $290 per month, the annual maintenance cost of a police vehicle is about $3500. With a replacement cycle of 7 years and 100,000 miles, cars are driven an average of about 14,000 miles per year, and if they get about 15 miles per gallon, they consume about 1000 gallons of fuel per year, which costs about $1,500 if the average price of fuel is $1.50 per gallon. Hence, the annual operating, maintenance and replacement (OMR) cost of a police vehicle is about $9,000, which is roughly equivalent to $0.64 per mile (=9,000/14,000). With average round trip commuting distance of 20 miles per day for 200 days per year, the annual miles driven in commuting are about 4,000 per vehicle, which amounts to about $2,500 in average annual commuting cost using police vehicles.

Two additional items need to be considered, both of which are on the benefit side of the ledger. Fifty-eight percent of respondents to the police questionnaire said they were able to reduce their insurance premium as a result of being able to take their police vehicle home. More than half did not know the amount of saving,

but if responses from those who did know are typical for all officers who saved on insurance, then the average saving is about $35/year per officer with an assigned car (not just those who saved). Another saving relates to the personal care officers take of their assigned vehicles, which averaged about 10 minutes/day per officer; on an annual basis, this amounts to about $270 per officer if their labor is valued at $8/hour. These two items are benefits and hence appear as negative costs, amounting to about -$300/year per vehicle, which reduces the average annual cost of the take-home program using police cars to about $2,200 per vehicle.

Hence, Tacoma's take-home policy costs about $800/year per vehicle less than the no-take-home policy, which gives the take-home policy an economic advantage. However, the take-home policy provides additional benefits not quantified in this analysis such as: 1) contacts that officers make on their way to/from work while off-duty, 2) rapid response to call outs, 3) a sense of security by citizens to have police cars visibly parked in their neighborhoods, and 4) savings on insurance that would be needed if POVs were used to respond to callouts from home. Thus the take-home policy is clearly best for society as a whole. City-owned vehicles get more wear and tear with a take-home policy compared to no-take-home, and POVs get less, but the differences in who pays are not of importance in a CB analysis because concern is with society as a whole.

The analysis above is based on averages, which is revised to consider each take-home car in Figure 6.1. From the police questionnaire, data were obtained on the one-way commuting distance for each officer and the frequency with which each police car is taken home, which were used to calculate the total annual commuting distance for each officer. For the take-home option, the OMR cost for police vehicles of $0.64/mile was multiplied by total annual commuting distance for each officer to obtain the annual cost of commuting from which $300/year of benefit due to car care and reduced insurance premiums was subtracted. The vehicles were sorted in increasing order by one-way commuting distance, and the cumulative take-home cost was calculated (i.e. the summation of cost car-by-car), which is shown in the bottom curve of Figure 6.1. Note that for the entire fleet, the total annual cost of taking police vehicles home is about $400,000 per year.

For the no-take-home option, the cost calculation was similar but it included 3 components: the cost of commuting using POV at $0.40/mile, the cost of parking POV at $2.50/day, and the cost of parking police vehicles in the city at $900/year per vehicle. The result is shown in the top (higher) curve of Figure 6.1. Note that for the entire fleet, the economic cost of the no-take-home option is about $200,000 per year higher than the economic cost of the take-home option.

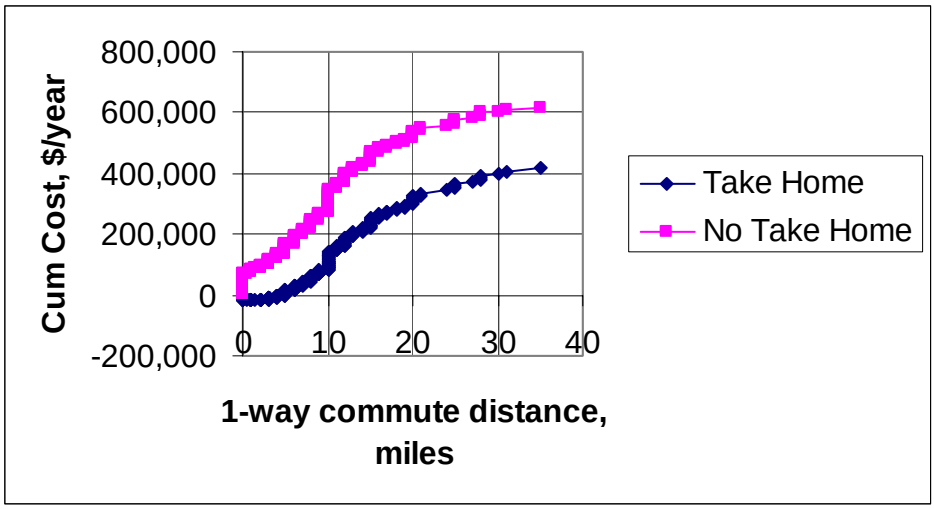

Figure 6.1: Economic costs of taking and not taking police cars home

6.3 Policy on Commuting

The city's policy of subsidizing commuting costs has at least 2 perverse incentives, which are addressed in this section: 1) officers have the incentive to use their police cars for personal business, and 2) officers have the incentive to live outside Tacoma, possibly because living costs might be cheaper than in the city. Regarding the first negative incentive, in an extreme situation and without adequate enforcement, officers could avoid buying personal cars altogether. The city in fact has policies that prohibit using police cars for personal use, the system is largely self enforcing, and officers are left mostly on their own to see that the policy is not violated. In focus groups, numerous officers said that regardless of the policy, they were reluctant to use police cars, even unmarked ones, for personal use because they did not want to draw attention to themselves as police officers. In the questionnaire that was administered to Neighborhood Councils, 79 percent of the respondents said that they never saw an officer use his/her police car in what they would consider an inappropriate way, and only 18 percent said they seldom saw what they thought was inappropriate use of police vehicles. The police department has procedures for taking away assigned vehicles or otherwise reprimand officers who violate the policy of taking vehicles home. The study obtained anecdotal evidence on a recent case where the assigned vehicles was taken away for infraction of the rules.

However, the Police Department needs to be as sensitive to the public perception of misdeeds as to their reality. Although there does not seem to be a history or pattern of policy abuse, the results from the Neighborhood Council questionnaires suggest that citizens have some concerns about the Police Department in light of which strong steps should be taken to guard against perceptions as well as against actual abuse.

Regarding a criterion for how much commuting cost the city should subsidize, the approach in this section is to make a financial analysis. The previous section

shows that economic costs of a take-home policy are lower than those of a no-take-home policy, but that may be poor consolation to the City of Tacoma because it is paying most of the cost. Using a financial rather than an economic approach, the city might reason as follows: If the cost of a commute that is paid for by the city is more expensive than parking the assigned vehicle in a city lot or garage, then it is to the city's advantage to provide in-city parking. On the other hand, if parking in the city is more expensive than paying the costs of commuting to free parking at officers' homes, then it is to the city's advantage to pay for commuting. A criterion for how much commuting to subsidize can be based on the break-even point between these two alternatives. The financial analysis is similar to the economic analysis of the previous section except that only the costs incurred by the city are included; the costs of officers using their POV, costs of parking them while on-duty, and the benefits of car care and reduced insurance premiums are ignored because they are not incurred by Tacoma. Using a mileage rate of $0.64/mile for commuting with police cars and an annual cost of parking police cars in the city of $900, the results of the financial analysis are shown in Figure 6.2.

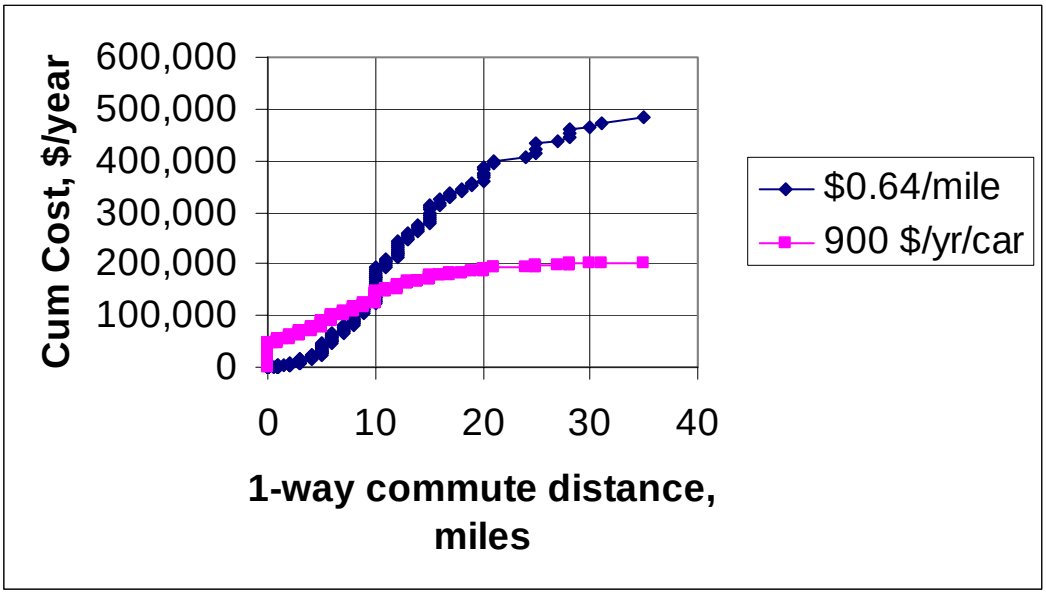

Figure 6.2: Break-even financial analysis of taking and not taking police cars home

Notice in Figure 6.2 that the cumulative cost of parking lies above the aggregate cost of commuting up to a 1-way distance of about 9 miles. From the police questionnaire results, about 60% of the officers with assigned vehicles commute no more than 9 miles one-way. Thus, 40% have a longer commute, and they would lie beyond the cut-off distance.

A sensitive analysis was made of this example by systematically changing the rates used for the cost of parking in a city garage and the cost of commuting

using police cars. The results are in Table 6.3, which shows the 1-way break-even commute distances under different combinations.

Table 6.3: Sensitivity analysis of break-even commuting distances

Police Car Mileage Rate $/mile	Annual Debt Service & O+M Cost of Parking, $/yr/car			
	600	800	1000	1200
0.40	9	11	15	24
0.50	8	9	12	14
0.60	7	9	10	11
0.70	6	8	9	10

Consider the row in which the mileage charge for commuting using a police car is $0.40/mile. If the cost of building and operating a parking garage is relatively expensive (say, $1200/yr per vehicle), the break-even distance within which it is advantageous for the city to subsidize commuting is relatively large (24 miles). However, as the cost of parking becomes less expensive, the distance decreases. Consider the bottom two rows, which suggest that for a wide range of parking costs, the break-even criterion is in the range of about 7-10 miles. Now consider any column: As the cost of commuting becomes more expensive, the break-even distance decreases. Note how much more sensitive the break-even distance is to expensive than to inexpensive parking. For example, if parking could be provided at a capital cost of about $6000 per vehicle with $150/yr per vehicle O&M cost, the total annual parking cost would be about $600 per vehicle, and the cut-off distance for subsidized commutes would be 6 to 9 miles, which is more or less independent of the mileage rate for commuting. Table 6.4 shows the percent of assigned vehicles that lie within the cut-off distances in Table 6.3.

Table 6.4: Percent of assigned vehicles within break-even commuting distances

Mileage $/mile	Annual Debt Service & O+M Cost of Parking, $/yr/car			
	600	800	1000	1200
0.40	60	73	85	95
0.50	53	60	80	82
0.60	50	60	72	73
0.70	45	53	60	72

Consider the cell in Table 6.4 in which the annual cost of parking is $600/yr per vehicle and the mileage rate is $0.40/ mile. Table 6.4 indicates that 60% of the assigned vehicles have 1-way commute distances that do not exceed 9 miles, which is the value in Table 6.3 corresponding to $0.40 and $600. Hence, were 9 miles selected as the criterion for subsidizing the commute of assigned vehicles, 60% would qualify and the other 40% would not.

The question now is how to use these results for setting policy. If, say, 9 miles were selected as the cut-off limit, precluding anyone living beyond that distance

from taking his/her assigned car home, then the city would have to be prepared to provide parking for about 90 vehicles (40% of the take-home vehicles). The question for the city to consider in setting such a policy is whether it would be prepared to provide parking for 90 vehicles in a city garage? Other alternatives exist. For example, the city might want to negotiate an arrangement in which officers living beyond the cut-off distance could still take home their vehicles, but they would reimburse the city for the "excess" mileage charges. Alternatively, it could be decided that the excess mileage charges for those beyond the limit could be pooled and collectively paid by all officers with assigned vehicles, which would make the charge for any particular officer small and would provide a collective sense of ownership of the commuting problem. The downside of this alternative would be that the negative incentive for living outside Tacoma would not be effectively addressed. Another alternative is simply to ignore suggestions from the financial analysis; the economic analysis after all shows that society is better off with a take-home policy.

7. Concluding Comments

When the Tacoma Police Department used vehicles from a pool prior to its Assigned Vehicle Program, the pool vehicles had all the characteristics of what economists call common property resources for which there is a large technical literature. Typical examples of common property resources are of the environment such as clean air and water. They are owned by society at large, which for all intents and purposes makes them owned by no one. Because they are owned by no one, they tend to be abused; for example, municipalities and industries dump their wastes into rivers and the atmosphere causing their pollution and in extreme cases their destruction.

Tacoma's police officers described a similar situation when they used pool cars: They were given rough treatment, abused, dirty, and not very well maintained. Governments attempt to improve the quality of common property resources through regulations, which is what the Police Department did with its pool vehicles, but as the technical literature describes, regulations are expensive to implement and they are not particularly effective. By far, the most effective method for curtailing the abuse of common property resources is to move them into the realm of private property, which in a sense is what the Tacoma Police Department did by switching to an Assigned Vehicle Program, i.e. by giving officers more responsibility for the cars they use. When this is done with environmental resources, improvements are usually dramatic, and costs of regulation typically decrease, which is precisely what happened with Tacoma's AVP.

The Tacoma Police Department suffers from a generally poor public image; the fact that about half of the members of Neighborhood Councils who completed questionnaires during this study said that the department is only okay and the other half said it is poor is troublesome. Our findings during this study, on the other hand, were quite contrary to this widely held belief by citizens. Admittedly,

our study was narrowly focused, and it did not make a general examination of the Police Department. Nevertheless, in those areas which we studied, we were quite favorably impressed. For example, a widely used criterion by which the effectiveness of a public agency is gauged is its ability to produce data and information on its operations. Agencies that do a poor job are seldom able to produce data and information when asked, they usually have only a poor idea of what goes on in their own departments. The Tacoma Police Department was outstanding in its ability to produce excellent information in very short times. When asked to describe practices, procedures, policies, what was happening from day to day in different parts of the city, and when asked to support anecdotal information with data, the Police Department was excellent. We found no gaps in record keeping or retrieval of information.

The Police Department needs to work on its public image. Its website, for example, can be improved, and although Neighborhood Council members told us that Police Liaison Officers have helped improve the department's image and communication, there is still room for improvement. Public service agencies such as water and electric companies have the advantage of sending out monthly bills to their customers, which can be used for including public information flyers. Police departments unfortunately do not have such opportunities, but Tacoma's should explore suitable mechanisms to provide the public with better information about its operations.

An example in point is that the public's perception of maintenance costs for police vehicle are far too high; they can get an oil change for $20 and hence are outraged to learn that it costs many times this amount for police vehicles. The problem seems all the more troublesome because maintenance is performed by the Fleet Services unit in city government rather than by an outside private contractor. Fleet Services and the Police Department in fact have quite plausible explanations for the costs of such services, but the information is not getting to the public.

The findings of this study are basically consistent with those reported in the *ex ante* study by *Economic Consulting Services* in 1998. Financial costs of the AVP are higher than of a pooled program, mainly because the AVP needs more hardware and resources. However, the benefits of increased productivity and the time distribution of resources needs far outweigh the financial costs, making the AVP much more attractive on economic grounds than a pooled program.

8. Acknowledgments

Particular thanks are due to Lt. Bob Sheehan of the Tacoma Police Department and his co-workers for their superb assistance. They gave of themselves generously during the study, provided enormous help, and immediately responded to every request for data, reports and information in ways that are uncommon in the author's experience. Similarly, Steve Hennessey and his co-

workers from Tacoma's Fleet Services unit were excellent in assisting the study. Ms. Ginny Eberhardt took the lead in working with Tacoma's Neighborhood Councils, including facilitating the questionnaire that was administered to their members for which the author is very grateful. The author acknowledges with thanks the help he received from his colleague at the University of North Carolina, Professor Dale Whittington.

Annex A

Police Questionnaire

Tacoma Police Department Assigned Vehicle Program (AVP)

Instructions:

This questionnaire is for all Police personnel who have an assigned vehicle.

Please: 1) do not identify yourself; 2) answer all questions truthfully; 3) complete this questionnaire by 0600 hours July 3; 4) do not discuss it with other officers.

There are no right or wrong answers.

Answer this questionnaire using your computer. Do not use a paper copy. Type your answers in the yellow boxes at the end of each question. Most questions require you to insert a number, but some ask you to type words.

Instructions are highlighted in green. Cells in red automatically show previous answers.

If you want to make a comment, enter it in the blue cell to right of the yellow cell

Your answers are important for making the Police Dept as good as it can be and for rendering the best possible service to Tacoma.

Submit your completed questionnaire by 0600 hours July 3 using the SUBMIT button at the end of the questionnaire

This is part of the Assigned Vehicle Program study by Mercury Associates.

Your Position

What is your rank?

What is your current assignment? (1= Administration, 2= Operations, 3= Investigations)

List your present collateral duties: (e.g. DRT, SWAT, METH, etc.)

What is your current duty assignment (Patrol, Traffic, CID, SID, ARU, etc.)

In what year did you join the Tacoma Police Dept.?

What are your current days off? (1= SS; 2= SMT; 3= FSS; 4= MTW; 5= Other)

What hours are you presently working? (use military hours)

What is the zip code where you live?

What percent of your on-duty workday do you normally spend in your vehicle?

(1= 0-25%; 2= 25-50%; 3= 50-75%; 4= 75-100%)

Your Police Vehicle

What is the one-way driving distance from your home to the city limits?

What is the one-way commuting time from your home to the city limits?

Is your vehicle presently assigned to you? (1= Yes; 2= No)

What is the year of your police vehicle?

What type is it? (1= Sedan, 2= Motorcycle, 3= Other)

What is its make?

What is its model?

Is your vehicle marked? (1= Yes; 2= No)

How difficult would it be for you to meet your work obligations using a pool instead of an

assigned vehicle? (1= Not very difficult; 2= Somewhat difficult; 3= Very difficult)

If it would be **very difficult** to use a pooled vehicle, explain the reasons:

How many days per week do you usually take your assigned vehicle home?

Where do you normally park it at home? (1= In my garage; 2= In my driveway;
3= On the street; 4= Other)

Since January 1, 2004, how many "Off-Duty Employment Permits" have you filed?

Since Jan 1, 2004, how many of your "Off-Duty Employment Permits" have been disapproved?

On average, how many separate off-duty employment engagements do you have per week?

Past Experience with Pooled Vehicles

The questions in this section ask about your past experience using pooled vehicles in the Police Department. If you used pooled vehicles under different circumstances (e.g. Patrol and CID), give your answers for the circumstance with which you had most experience.

When you used a pooled vehicle, was it marked? 1= Yes, it was marked; 2= No, unmarked

For how many years did you use pooled police vehicles?

How familiar are you with using pooled vehicles for your police work on a routine basis?
(1= Very familiar; 2= Somewhat familiar; 3= Not very familiar)

Did you use a pool car: 1= Every workday day; 2= Most workdays; 3= Fewer than half of the workdays

Did you have a computer that you had to load and unload from your pooled car each day:
(1= Yes, most days, 2= About half the time; 3= Seldom or never)

Did you have specialty equipment that you had to load and unload each day:
(1= Yes, most days, 2= About half the time; 3= Seldom or never)

List the main items that you had to load and unload from your pooled car each day

Could you carry all these items to and from your car in a single trip? (1= Yes; 2= No)

Describe the items carried in your car that had to be dispensed to you each day by an officer:

How many minutes did it normally take to check-out, load, unload, and check-in your pool car each day?

How many days per month, on average, did the assigned pool car need to be changed, e.g. because it needed repair, needed cleaning, had contraband, was in shop, was still on duty from previous shift, keys not found, etc.

How many minutes did it normally take to change the car and get a new one?

How many days per month, on average, did the assigned pool car need fuel when you got it?

How many minutes did it normally take to fuel the car before you could start work?

Did you use office space in addition to your pool car for performing your duties?
(e.g. completing forms, writing reports, etc.) 1= Yes; 2= No

How did you get to/from work when you used a pool vehicle? (1= Drove own car;
2= Public transportation; 3= Car pool; 4= Other)

If you drove your own car, where did you park it when you got to work? (1= On street;

2= At police station; 3= Parking garage or other secure location)

Assigned Vehicles-Not Taken Home

In this section, please assume an arrangement where you have an assigned vehicle but cannot take it home. It would be parked in a secure lot or garage at the Tacoma Police Station where you would get it at the beginning of your workday and leave it at the end. A weapon could be left in the car, and the car would not have to be loaded and unloaded each day; most or maybe all the items you presently carry could remain in your car.

How difficult would it be for you to meet your work obligations with this arrangement?

(1= Not very difficult; 2= Somewhat difficult; 3= Very difficult)

If it would be **very difficult,** please explain:

How would this arrangement affect the police services you could provide compared to

using a pool car? My services would be: 1= Better with an assigned car;

2= about the same with either arrangement; 3= worse with an assigned car

If your services would be **better** with this arrangement (assigned car), list the reasons:

If your services would be **worse** with this arrangement (assigned car), list the reasons:

What items do you now carry in your car above and beyond those that you usually carried

in a pool car? (refer to your answer in row 67)

Under this arrangement, are there any items needed for your work that could not be left in

your car and would have to be loaded and unloaded each day?

1= No, there are no items that would have to be loaded and unloaded each day;

2= Yes, some items would need to be loaded and unloaded each day

If Yes, please list the items that would have to be loaded and unloaded each day

under this arrangement

Would you need office space with this arrangement or could your assigned vehicle serve

as your office? (1= Yes, I would need an office; 2= No, I don't need an office)

If you would need office space, please describe how you would use it:

1= Yes, much better; 2= About the same; 3= No, better with pool program

If **Yes, much better**, please explain:

Assigned Vehicles-Take Home

This section asks questions about the present Assigned Vehicle Program (AVP) in which you can take your vehicle home. The questions ask for comparisons between the present AVP and the previous arrangement (having an assigned vehicle that cannot be taken home); none of the questions in this section pertains to a program that uses pooled vehicles. Information is needed on how the present AVP affects YOU, not on how you think it affects fellow officers.

How does the present arrangement affect the police services you can provide compared to

My services are: 1= Better with the present arrangement; 2= About the same with

either arrangement; 3= Worse with the present arrangement

If your services are **better** with a Take-Home car, list the reasons:

If your services are **worse** with a Take-Home car, list the reasons:

Anytime in the past 60 days, were you unable to make stops (contacts) on your way to/from work while off duty to render police service (because of light duty, vacation, etc.)?

1= Yes; 2= No If Yes, go to row 140. If No, continue.

How many times (contacts) in the past 60 days did you render police service on your way to/from work while off-duty?

How many of these contacts (0) were outside the city limits of Tacoma?

How many of these contacts (0) resulted in arrests?

How many of these contacts (0) resulted in written reports?

How many of these contacts (0) resulted in written warnings?

What is the total amount of time you spent on these contacts, both on and off-duty?

How many times in the past 60 days were you called out for service while off duty?

How many total minutes did you spend in the past 60 days responding to call outs while off duty?

How many minutes did you spend in the past 60 days while off-duty caring for your assigned police vehicle (washing it, cleaning it, etc.)?

Can your assigned take-home vehicle lower the insurance premiums you pay on your privately owned vehicle (POV)? 1= Yes; 2= No; 3= Don't Know.

If you pay a lower insurance premium, how much did you save per year?

1= $1-$100; 2= $100-$200; 3= Don't Know

Attitudes and Preferences

How much does having an assigned vehicle contribute to your job satisfaction?

1= A great deal; 2= Somewhat; 3= Not too much

Does having an assigned vehicle make you more productive than if you had to use a pool vehicle? 1= Yes; 2= No; 3= Don't Know.

Did the AVP affect your decision to take employment with the Tacoma Police Dept?

1= Yes, a great deal; 2= Yes, somewhat; 3= No, not at all; 4= Not applicable

1= Pay none of the commuting cost; 2= Pay some of the cost; 3= Pay all of the cost

Suppose the present arrangement of taking assigned vehicles home was terminated. Which of the following two options would you prefer:

POVs; 2= An AVP with Take-Home priviledges in which officers reimburse the city for commuting beyond city limits (about 38 cents/mile)

Please check to see that you have answered all questions. Your accurate answers will help you, the department, and the city. Please click the SUBMIT button using the Enter key to submit your questionnaire. All questionnaires are anonymous and strictly confidential.

Annex B

Neighborhood Councils Questionnaire

Questionnaire - Paper Version
Cost-Benefit Analysis of Tacoma's Assigned Vehicle Program

Instructions:

- The Assigned Vehicle Program of Tacoma's Police Department faces 2 main issues: 1) Should each officer have an assigned vehicle or should officers use vehicles from a common pool? 2) If vehicles are assigned, should officers be allowed to take them home?
- Please read the questions carefully because some pertain only to the first issue, some pertain only to the second, and some pertain to both issues.
- This questionnaire is for members of Neighborhood Councils in Tacoma. Your answers are important for helping the city make best use of its police resources.
- Please: 1) do not identify yourself; 2) answer all questions truthfully; 3) complete and submit the questionnaire per instructions from Ginny Eberhardt by Monday July 26. Submissions after the deadline will not be counted.
- There are no right or wrong answers.
- This is the paper version of the questionnaire; please circle the number for each question that corresponds to your answer. (computer users received an identical electronic version) Please do not discuss the questionnaire or collaborate with others in answering it.
- Answer either the paper or computer version but not both.
-This questionnaire is part of a study that is being made for the city by Mercury Associates, Inc.

Question 1: What is your overall perception of police services in Tacoma:
1= Police services are excellent, little improvement is needed; 2= police services are okay, but some improvement is needed; 3= police services are poor, much improvement is needed.

Question 2: How good is your knowledge of the Tacoma Police Department's Assigned Vehicle Program?
1= Very good; 2= Fair; 3= Not too good

Question 3: From the following list please select the single item that you think is the most important benefit of the Police Department's Assigned Vehicle Program, which allows officers to take their assigned cars home:
1= vehicles parked at officers' homes deter crime and improve security; 2= police cars dispersed throughout the city are less vulnerable to attack than if they were kept at a single location; 3= take-home cars improve officer morale and productivity; 4= parking for free at officers' homes saves the city from building parking lots or garages; 5= officers can respond more quickly to emergencies.

Question 4: From the following list, please select what you think is the second most important benefit of the Police Department's Assigned Vehicle Program.
1= vehicles parked at officers' homes deter crime and improve security; 2= police cars dispersed throughout the city are less vulnerable to attack than if they were kept at a single location; 3= take-home cars improve officer morale and productivity; 4= parking for free at officers' homes saves the city from building parking lots or garages; 5= officers can respond more quickly to emergencies.

Question 5: From the following list please select the single item that you think is the biggest problem or disadvantage of the Police Department's Assigned Vehicle Program:
1= it is unfair for the city to pay police officers for their commute while other city employees and private citizens must pay their own commuting costs; 2= the take-home program rewards city employees for living outside Tacoma; 3= the program encourages personal use of police cars and moonlighting; 4= taking vehicles home is not cost effective; 5= the take-home program shows that police unions are too strong and have too much influence in the city; 6= vehicles get too much extra wear and tear.

Question 6: From the following list, please select what you think is the second biggest problem of the Assigned Vehicle Program.
1= it is unfair for the city to pay police officers for their commute while other city employees and private citizens must pay their own commuting costs; 2= the take-home program rewards city employees for living outside Tacoma; 3= the program encourages personal use of police cars and moonlighting; 4= taking vehicles home is not cost effective; 5= the take-home program shows that police unions are too strong and have too much influence in the city; 6= vehicles get too much extra wear and tear.

Question 7: What is best for Tacoma: should each police officer have an assigned vehicle or should most officers use vehicles from a common pool?
1= I favor assigning a vehicle to each officer; 2= I am indifferent between assigned and pooled vehicles; 3= I oppose assigning a vehicle to each officer, a pool program would be better.

Question 8: If the Assigned Vehicle Program were abolished and officers had to use vehicles from a pool, what effect would it have on police services in the city?

1= large negative effect; 2= some negative effect but not too much; 3= little or no negative effect.

Question 9: If the Assigned Vehicle Program were modified so that each officer had an assigned vehicle but could not take it home, what effect would it have on police services in the city?

1= large negative effect; 2= some negative effect but not too much; 3= little or no negative effect.

Question 10: Who do you think benefits most from the policy that assigns a vehicle to each police officer?

1= mostly the city; 2= mostly the officers; 3= the city and officers benefit more or less equally

Question 11: Who do you think benefits most from the policy that allows officers to take their police vehicles home?

1= mostly the city; 2= mostly the officers; 3= the city and officers benefit more or less equally

Question 12: How often have you seen a police officer use his/her police car for what you are fairly sure was inappropriate personal business (e.g. shopping, running errands, transporting family members, etc.)?

1= sometimes; 2= seldom; 3= never

Question 13: Which one of the following alternatives do you favor for the Police Dept:

1= assigned vehicles that cannot be taken home; 2= assigned vehicles that can be taken home only by officers who live within city limits; 3= assigned vehicles that can be taken home by officers who live in Pierce County; 4= assigned vehicles that can be taken home only by officers who live within a certain distance of the city (e.g. 10 miles); 5= assigned vehicles that can be taken home by all officers regardless of where they live.

Annex C

Spreadsheet Model For CB Analysis

This sheet considers the alternatives of whether it's better to have assigned cars or use a pool		
Officers drive POVs to work each day, park them, and then drive police cars during workday		
The police cars need to be domiciled when officers are off-duty		
Assume:		
Total number of officers using pool cars	2	
Total number of officers using assigned cars	2	
Number of officers per pool car per day	2	
Number of officers per assigned car per day	1	
Number of pool cars	1	
Number of assigned cars	2	
Number workdays/week	4	days/week
Number work weeks per year	50	weeks/yr
Work hours per day	10	hr/day
Hourly wage rate of each officer, incl fringes	47	$/hr
Daily start-up (unproductive) time w/ pool car	0.6	hr/day
Daily start-up (unproductive) time w/ assigned cars	0	hr/day
Cost of a car	27,000	$
Average miles/year driven by each officer	14,000	miles/yr/driver
Maintenance Cost of Assigned Car	290	$/month
Maintenance Cost of Pool Car	580	$/month
Life of car	100,000	miles
Salvage value Assigned Car	15	% 1st cost
Salvage value Pool Car	15	% 1st cost
Discount rate	4	% p.a.
base year	2004	
Capital recovery factor (n=20 yrs, r=4% p.a.)	0.0736	
Capital cost of parking garage per car	9,000	per car
O&M cost of parking space	300	$/yr/space
Repair cost of a pool vehicle	0.0132	$/yr per $1 car cost
Repair cost of an assigned vehicle	0.0120	$/yr per $1 car cost

Alt #1 Shared Pool Car					
Year	2005	2006	2007	2008	
Elapsed years	1	2	3	4	
Benefits, $					
Productivity of officers using pool cars	176,720	176,720	176,720	176,720	
Salvage Value of cars				4,050	
PV Benefits	169,923	163,388	157,103	154,523	
Total PV Benefits	2,414,983				
Costs, $					
Pool Cars	27,000			27,000	
Maintenance Cost	6,960	6,960	6,960	6,960	

Capital cost of parking space			9,000			
O&M cost of parking space			300	300	300	300
Annual Repair Cost			356	356	356	356
PV Costs			41,939	7,042	6,771	29,590
Total PV Costs			226,792			
PV Benefits - PV Costs (NPV)			**2,188,191**			
Alt #2 Assigned Cars						
Year			2005	2006	2007	2008
Elapsed years			1	2	3	4
Benefits, $						
Productivity of officers using assigned cars			188,000	188,000	188,000	188,000
Salvage Value of cars						
PV Benefits			181,356	174,381	167,674	161,225
Total PV Benefits			2,573,688			
Costs, $						
Assigned Cars			54,000			
Maintenance Cost			6960	6960	6960	6960
Capital cost of parking space			18000			
O&M cost of parking space			600			
Annual Repair Cost			648	648	648	648
PV Costs			77,123	7,034	6,763	6,503
Total PV Costs			242,644			
PV Benefits - PV Costs (NPV)			**2,331,043**			
NPV(#2)-NPV(#1)=	**142,853**		=>	Equivalent annual savings = 10,514		