Data Assessment Report
Alameda, CA Public Safety Services

Fire/EMS

FIRE/EMS OPERATIONS

ICMA CONSULTING SERVICES

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ICMA
Leaders at the Core of Better Communities

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.

Executive Summary

This is a report on fire/EMS operations for Alameda, California, conducted by ICMA Consulting Services. This report looks at the calls for service and focuses its analysis on what calls the department receives, the time it takes for emergency responders to deliver assistance, and the time that is spent by unit and in total by the department to deliver service.

All information in this report was developed directly from data recorded in the department's dispatch center. The purposes of this report are to provide the city with our findings and to allow the fire department to review and bring to our attention any dispatch information that may be inconsistent with other internal records of the agency.

From the data provided, we learned that fire calls are a minority of the calls to which the Alameda Fire Department responds. The majority of the calls for service are medical, which are further dissected to determine the time spent by the department. One item that is not tracked and that cannot be created is the outcome of the investment of time. As the city moves forward with improvement suggestions, this piece of information is key to quality control.

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

Part I. Aggregate Call Totals and Dispatches

The data includes calls between 12/1/2007 and 11/30/2008. In a year, 5,649 non-canceled calls were received. Of these, 264 (5%) were structure fire or outside fire calls, and 4,163 (74%) were EMS calls. The dispatches of battalion chief were not included in call, workload, and response-time

analysis. The activity of the battalion chief unit (2710) is reported in Appendix I.

We categorize the call type based on type description. For the correspondence between type description and call type, see Appendix II. The analysis of call types is captured in a set of seven tables and figures.

Table 1. Call Types
Figure 2. Fire Calls Partitioned by Type and Duration (Branched Diagram)
Figure 3. Fire Calls by Type (Pie Chart)
Figure 4. Calls by Month
Figure and Table 5. Calls by Hour of Day
Figure and Table 6. Calls by Hour of Day by Station
Table and Figure 7. Number of All Units Dispatched to Calls

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

A total of 767 out of 12,841 (6%) dispatches were excluded for analysis. They include 358 out of 12,841 (2.7%) dispatches with unique IDs that do not exist in the call data. Another 124 duplicated unit dispatches with later dispatch time for the same call were excluded. A total of 12 unit dispatches were excluded for having the same unique ID with call data but a different call-received time and ACREE number. Another 271 dispatches of non-primary units, including battalion chief (2131, 2552, 2700, 2702, 2704, 2706, 2710, 2720, 2741A, 2798, Alachaplin, and Alastaff), were removed.

Response time was calculated as the difference between unit on-scene arrival time and call-received time. The total on-scene time was calculated as the difference between unit transport to hospital time and unit on-scene arrival time. For non-EMS calls that do not have unit transport to hospital time, on-scene time was calculated as the difference between unit available

time and unit on-scene arrival time. Total busy time was calculated as the difference between unit available time and unit dispatch time.

We report two types of statistics: dispatches and workloads. In Part I, we reported that there were 5,649 non-canceled calls, but because multiple units were often sent, the total number of dispatched units we analyze here is 12,037. We also look at the actual time spent by each unit at every call. The average time from dispatch until the unit was available for next dispatch was 28 minutes per run. The total unit workload in a year for all units combined was 5,625 hours. After the introductory table, we present run data and workload data for every unit as well as the daily average for engine and rescue units.

Table 8. Annual Total Busy Time by Call Type
Figure 9. Total City: Average Busy Hours per Day by Call Type
Table 10. Workload by Unit
Table 11. Fire Units: Total Annual and Daily Average Number of Runs by Call Type
Table 12. Fire Units: Daily Average Busy Minutes per Day by Call Type
Table 13. Ambulance Units: Total Annual and Daily Average Number of Runs by Call Type
Table 14. Ambulance Units: Daily Average Busy Minutes per Day by Call Type

Part III. Dispatch Time and Response Time

Dispatch-processing time is the difference between unit dispatch time and call-receipt time. Response time includes dispatch-processing time, en route time, and travel time. We are interested in the dispatch time and response time of mainly the first-arriving units. Overall, the average dispatch-processing time was 0.6 minutes, and the average total response time was

4.9 minutes. However, for structure fire calls, we analyze the response time of the first, second, and all arriving fire equipment.

Table and Figure 15. Average Dispatch Time, En Route Time, Travel Time, Response Time, and Travel Time to Hospital of First Arriving Units by Call Type

Table and Figure 16. First Arriving Unit for Each Call Type

Figure and Table 17. Average Dispatch Time, Travel Time, and Response Time of First Arriving Units by Hour of the Day

Figure and Table 18. Cumulative Distribution Function (CDF) of Response Time of First Arriving Unit for EMS Calls

Table 19. Average Response Time of First Arriving Fire Equipment for Structure Fire and Outside Fire Calls by Unit

Table 20. Average Response Time of All Arriving Fire Units for Structure Fire and Outside Fire Calls

Figure and Table 21. Cumulative Distribution Function (CDF) of Response Time of First and Second Arriving Fire Equipments for Structure and Outside Fire Calls

Appendices

Appendix A. Battalion Chief (2710) Activity Analysis

Appendix B. Correspondence between Type Description and Call Type

Table 1. Call Types

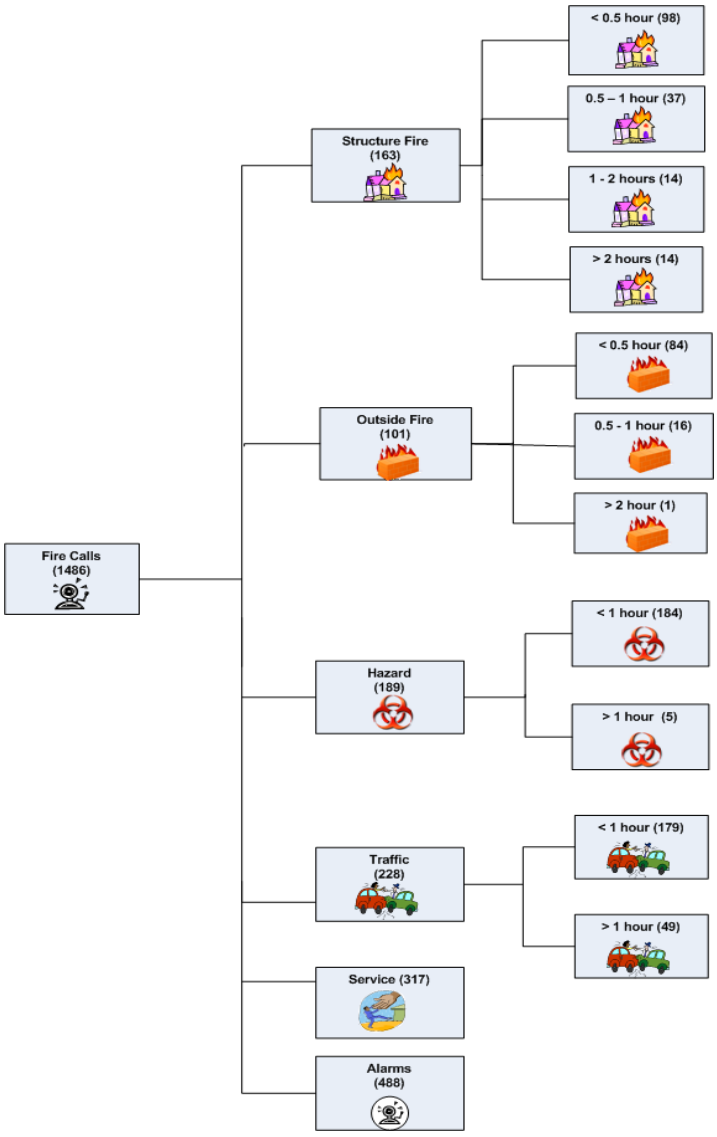
	Call Type	No. of Non-Canceled Calls	Calls/Day	Calls %	No. of Canceled Calls	Canceled %
EMS	EMS	3,875	10.6	68.6%	34	0.9%
	Psychiatric	288	0.8	5.1%	6	2%
	EMS Total	**4,163**	**11.4**	**73.7%**	**40**	**1%**
Fire	Outside Fire	101	0.3	1.8%	5	4.7%
	Structure Fire	163	0.4	2.9%	4	2.4%
	Hazard	189	0.5	3.3%	2	1%
	Traffic	228	0.6	4%	1	0.4%
	Service	317	0.9	5.6%	319	50.2%
	Alarm	488	1.3	8.6%	31	6%
	Fire Total	**1,486**	**4.1**	**26.3%**	**362**	**19.6%**
Total		**5,649**	**15.5**	**100%**	**402**	**6.6%**

Note. The 402 canceled calls include 365 calls that have no unit information and 37 calls with total busy time of less than a minute for all dispatched Alameda units.

Observations:

- About 6.6% of calls were canceled in a year.
- On average, the city received 16 non-canceled calls per day between December 2007 and November 2008, with an average of slightly more than 0.6 calls per hour citywide.
- Medical calls totaled 4,163 (74%), about 12 per day.
- Fire category calls totaled 1,486 (26%), about 4 per day.
- Structure and outside fire combined averaged 0.7 calls per day, 4.7% of total calls.
- There were 189 hazard calls in a year, about 0.5 per day.
- There were 228 traffic calls in a year, about 0.6 per day.
- There were 488 alarm calls in a year, about 1.3 per day.
- There were 317 non-canceled service calls and 319 canceled calls in a year.

Figure 2. Fire Calls Partitioned by Type and Duration (Branched Diagram)

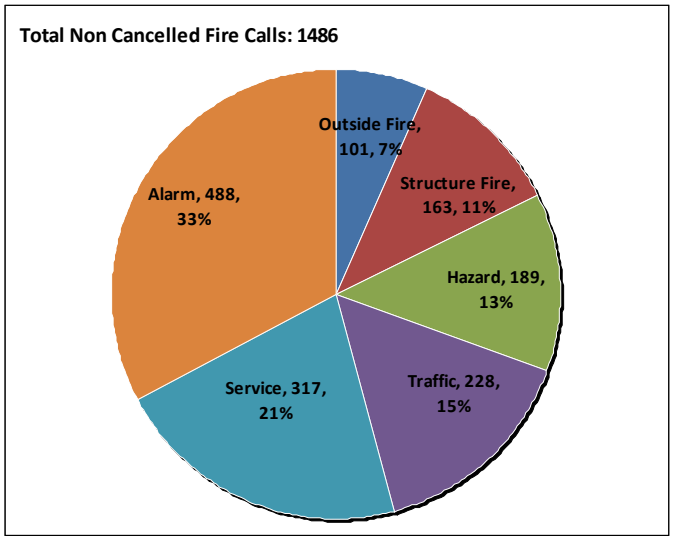


Observations:

- Of the 163 structure fire calls, 14 lasted more than 2 hours, 14 lasted between 1 and 2 hours, and 135 lasted less than 1 hour.
- Of the 101 outside fire calls, 100 (99%) lasted less than 1 hour.
- Of the 189 hazard calls, 184 (97%) lasted less than 1 hour.
- Of the 228 traffic calls, 179 (79%) lasted less than 1 hour.

- In all, the department handled 104 calls (28 structure fires, 1 outside fires, 5 hazard, 49 traffic, 17 service, and 4 alarm) that lasted more than 1 hour, about 2 per week.

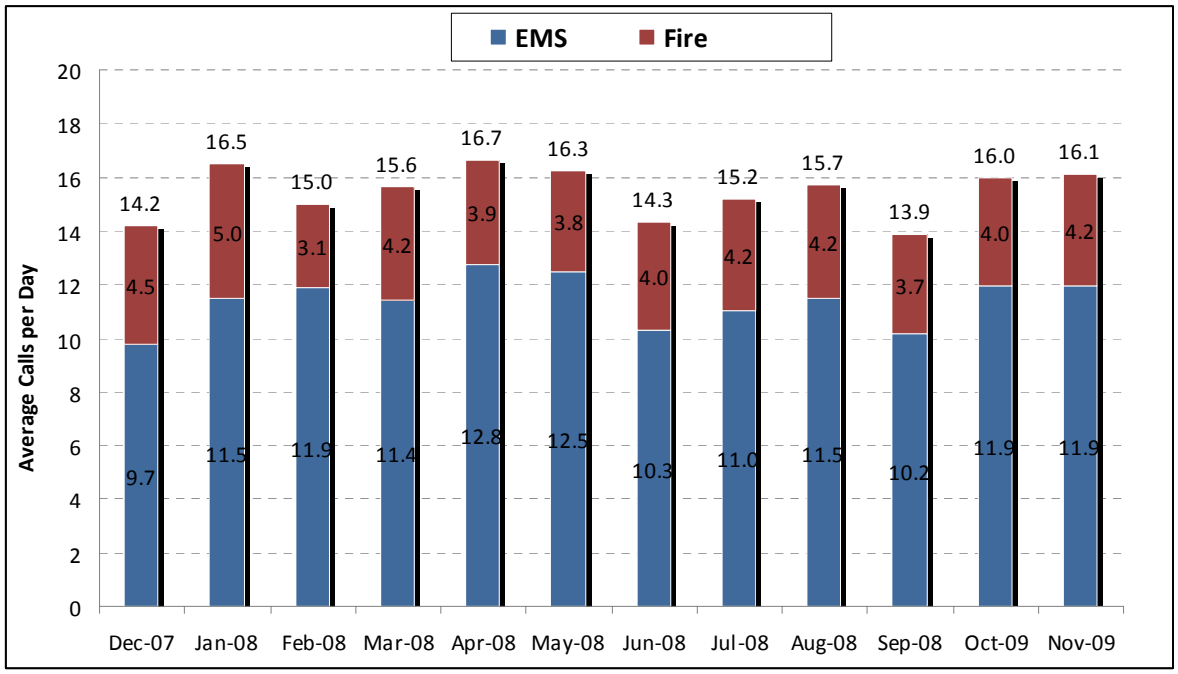
Figure 3. Fire Calls by Type (Pie Chart)



Observations:

- Structure and outside fire calls accounted for 18% of the fire category total.
- The largest category was alarms, which made up 33% of the total.
- Service calls accounted for 21% of this total, while traffic calls were 15% and hazard calls were 13%.

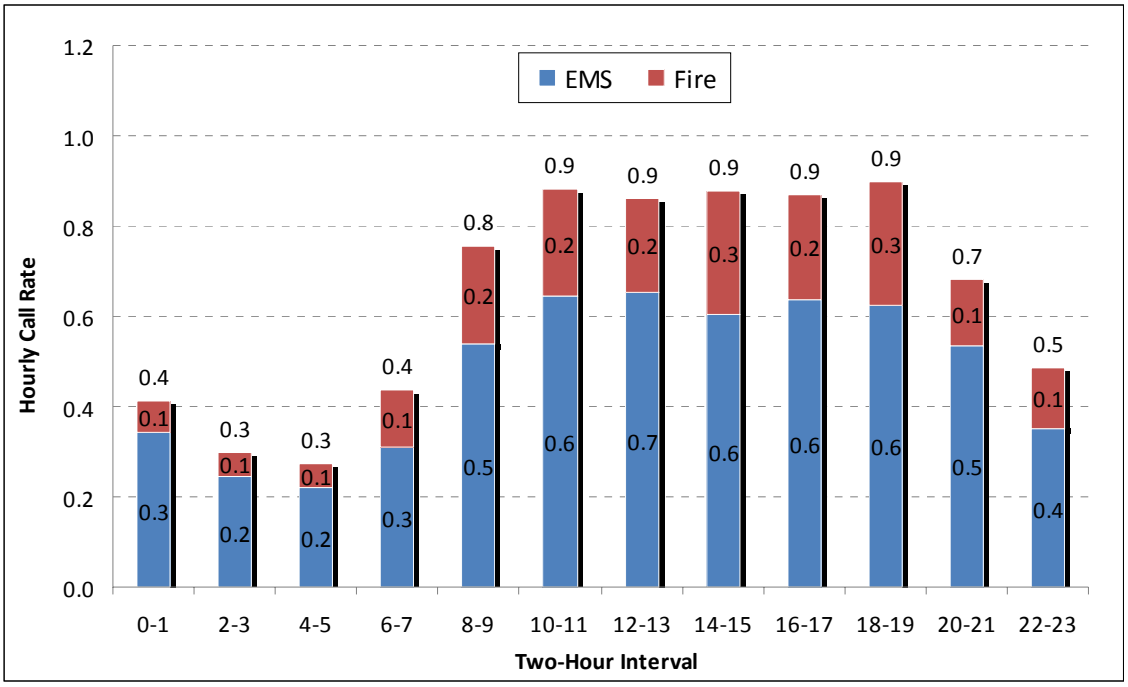
Figure 4. Calls by Month



Observations:

- The average number of calls per day varied by month and ranged from a low of 13.9 in September to 20% more than that in April, which had a high of 16.7 calls per day.
- The average number of EMS calls per day varied between 9.7 (in December) and 12.8 (in April).
- The average number of fire category calls per day varied between 3.1 (in February) and 5 (in January).

Figure and Table 5. Calls by Hour of Day



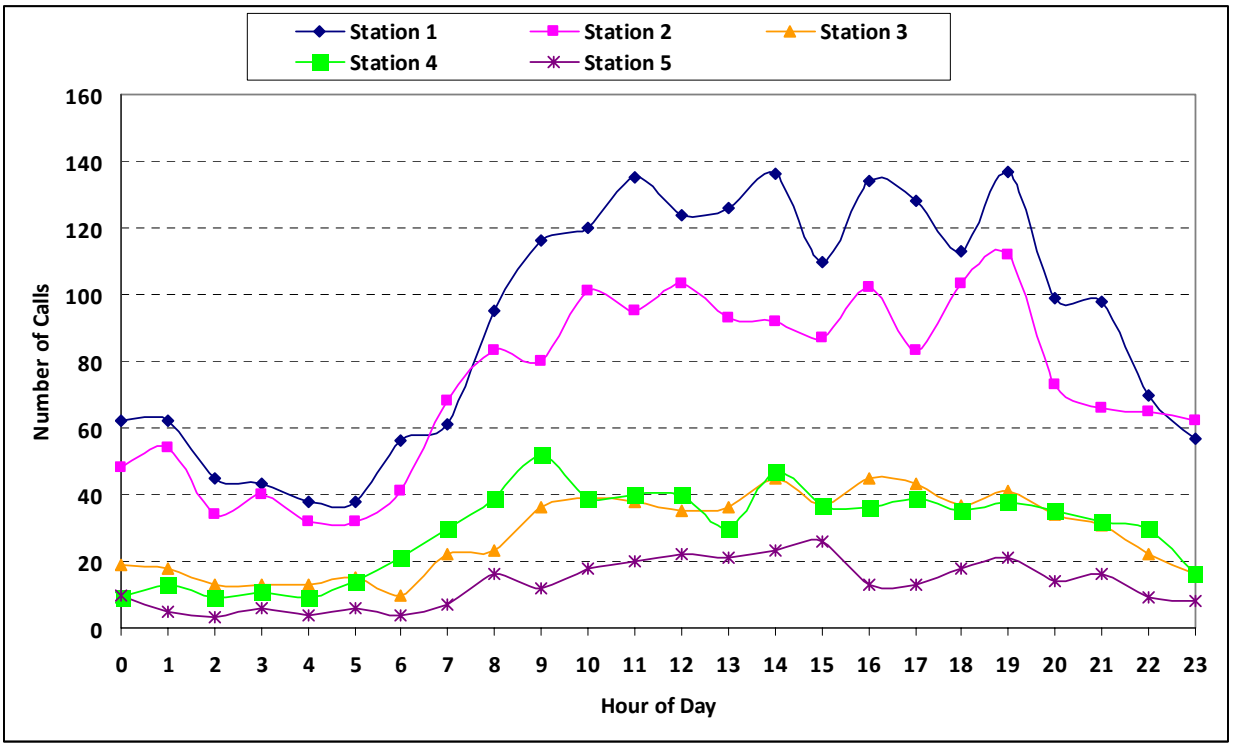
	Hourly Call Rate		
2-Hour Interval	**EMS**	**Fire**	**Total**
0-1	0.3	0.1	0.4
2-3	0.2	0.1	0.3
4-5	0.2	0.1	0.3
6-7	0.3	0.1	0.4
8-9	0.5	0.2	0.8
10-11	0.6	0.2	0.9
12-13	0.7	0.2	0.9
14-15	0.6	0.3	0.9
16-17	0.6	0.2	0.9
18-19	0.6	0.3	0.9
20-21	0.5	0.1	0.7
22-23	0.4	0.1	0.5
Calls / Day	11.4	4.1	15.5

Observations:

- Hourly total call rates averaged slightly fewer than 1 call per hour between 8 AM and 10 PM, the 2200 hour.

- The call rate was lowest between 10 PM and 7 AM, with fewer than 1 call every 2 hours.

Figure and Table 6. Calls by Hour of Day by Station



Note. The number of calls was counted based on the station of first dispatched units.

	Where the First Dispatched Unit Came From					
Hour	**Station 1**	**Station 2**	**Station 3**	**Station 4**	**Station 5**	**Total**
0	62	48	19	9	10	148
1	62	54	18	13	5	152
2	45	34	13	9	3	104
3	43	40	13	11	6	113
4	38	32	13	9	4	96
5	38	32	15	14	6	105
6	56	41	10	21	4	132
7	61	68	22	30	7	188
8	95	83	23	39	16	256
9	116	80	36	52	12	296
10	120	101	39	39	18	317
11	135	95	38	40	20	328
12	124	103	35	40	22	324
13	126	93	36	30	21	306
14	136	92	45	47	23	343
15	110	87	37	37	26	297
16	134	102	45	36	13	330
17	128	83	43	39	13	306

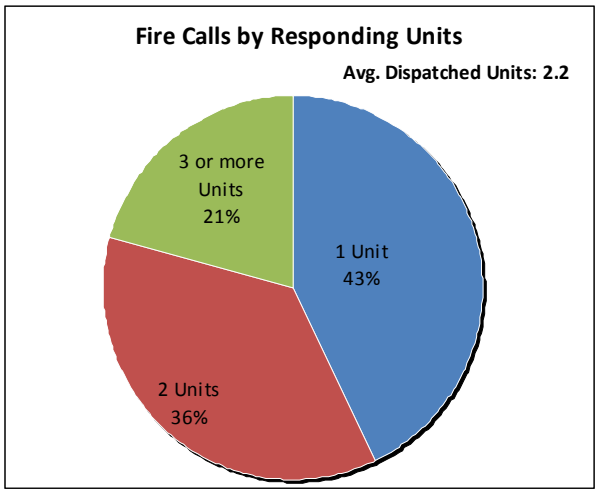
18	113	103	37	35	18	306
19	137	112	41	38	21	349
20	99	73	34	35	14	255
21	98	66	31	32	16	243
22	70	65	22	30	9	196
23	57	62	16	16	8	159
Total	**2,203**	**1,749**	**681**	**701**	**315**	**5,649**
Per Day	**6**	**4.8**	**1.9**	**1.9**	**0.9**	

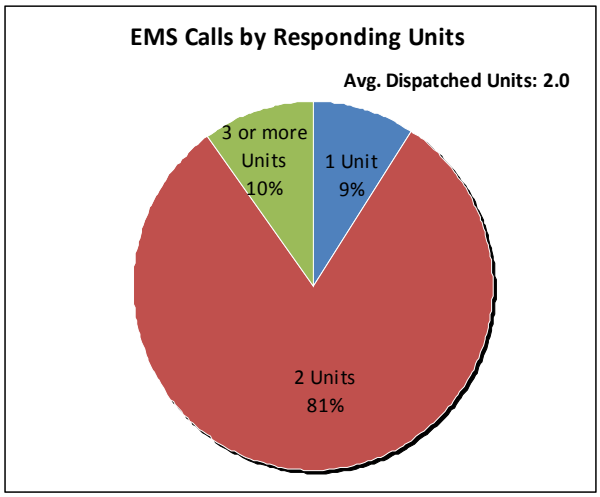
Observations:

- The call rate was lowest between 10 PM (the 2200 hour) and 5 AM for all stations.
- The number of received calls by time of day varied the most for stations 1 and 2.
- A unit from station 1 was dispatched first more than 6 times a day, compared 4.8 times per day for station 2.
- Units from stations 3 and 4 were the first dispatched less than twice a day.
- Units from station 5 were dispatched first less than once a day.

Table and Figure 7. Number of All Units Dispatched to Calls

Call Type	1 Unit	2 Units	3 or More Units	Total
EMS	178	3,295	402	3,875
Psychiatric	202	77	9	288
EMS Total	**380**	**3,372**	**411**	**4,163**
Outside Fire	93	4	4	101
Structure Fire			163	163
Hazard	152	8	29	189
Traffic	9	151	68	228
Service	258	38	21	317
Alarm	122	341	25	488
Fire Total	**634**	**542**	**310**	**1,486**
Grand Total	**1,014**	**3,914**	**721**	**5,649**
Percentage	**18%**	**69.3%**	**12.8%**	**100%**





Observations:

- Overall, 69% of calls were dispatched 2 units.
- On average, 2 units were dispatched per EMS call.
- On average, 2.2 units were dispatched per fire call.
- Of the 163 structure fire calls, 100% were dispatched 3 or more units.
- Of the 101 outside fire calls, 93 (92%) were dispatched only 1 unit.

Table 8. Annual Total Busy Time by Call Type

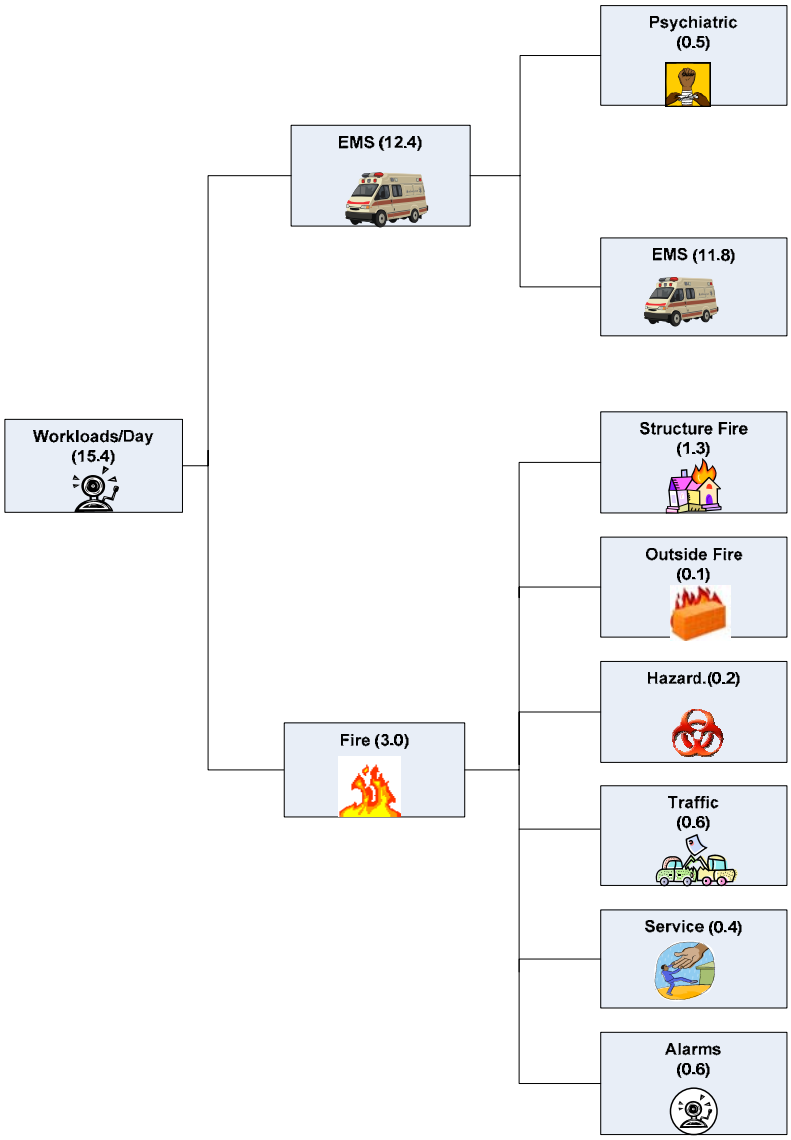
Call Type	Avg. Busy Minutes/Run	Total Busy Hours	%	Avg. Busy Hours/Day	No. of Runs	Avg. Runs/Day
EMS	31.3	4,317	76.8%	11.8	8,272	22.7
Psychiatric	30	199	3.5%	0.5	397	1.1
EMS Total	**31.3**	**4,516**	**80.3%**	**12.4**	**8,669**	**23.8**
Outside Fire	19.1	39	0.7%	0.1	122	0.3
Structure Fire	26.6	458	8.1%	1.3	1,033	2.8
Hazard	16.3	87	1.5%	0.2	319	0.9
Traffic	24	218	3.9%	0.6	545	1.5
Service	18.1	132	2.4%	0.4	439	1.2
Alarm	11.5	175	3.1%	0.5	910	2.5
Fire Total	**19.8**	**1,109**	**19.7%**	**3**	**3,368**	**9.2**
Grand Total	**28**	**5,625**	**100%**	**15.4**	**12,037**	**33**

Note. This table excludes canceled calls.

Observations:

- The various units were busy a combined 5,625 hours, excluding canceled calls. The average total department workload per day was 15 hours and 24 minutes. This is the total time of all the units that were busy at calls for service.
- There was a total of 12,037 runs excluding canceled dispatches for canceled calls, an average of 33 runs per day.
- Medical calls accounted for 80% of the total workload.
- The average time spent on a medical call was 31 minutes per run.
- Structure and outside fire calls combined were 9% of the workload. The average time spent on a structure fire was 27 minutes per run, and the average time spent on an outside fire call was 19 minutes.
- Alarm calls had the smallest average busy minutes per run, 12 minutes.

Figure 9. Total City: Average Busy Hours per Day by Call Type



Observations:

- The various units combined spent 3 hours for fire-classified calls per day, including 1.3 hours for structure fire calls and 0.1 hours for outside fire calls.
- The various units spent 12.4 hours on EMS calls per day, including 0.5 hours for psychiatric.

Table 10. Workload by Unit

Station	Unit ID	Unit Type	Busy Min./ Run	No. of Runs	No. of Runs/ Day	Busy Min./ Day	Total Busy Hours	
1	2741	Engine	17.4	1,775	4.9	84.6	515	620
	2751	Reserve Engine	15.7	401	1.1	17.2	105	
	2771	Truck	16.5	551	1.5	24.9	152	
	2790	Reserve Ambulance	39.8	476	1.3	51.8	315	1409
	2791	Ambulance	41.3	1,589	4.4	179.8	1,094	
	Station 1		**27.3**	**4,792**	**13.1**	**358.3**	**2,180**	
2	2742	Engine	19.2	1,522	4.2	80.2	488	
	2772	Truck	16.4	600	1.6	26.9	164	
	2792	Ambulance	45.9	1,459	4	183.6	1,117	1341
	2796	Reserve Ambulance	43.4	310	0.8	36.9	224	
	Station 2		**30.7**	**3,891**	**10.7**	**327.5**	**1,993**	
3	2743	Engine	19.1	1,183	3.2	61.8	376	386
	2753	Reserve Engine	10.7	55	0.2	1.6	10	
	27F3	Fire Boat	5.1	4	0	0.1	0	
	Station 3		**18.7**	**1,242**	**3.4**	**63.5**	**386**	
4	2744	Engine	21.1	647	1.8	37.4	228	250
	2754	Reserve Engine	17.5	74	0.2	3.5	22	
	2793	Reserve Ambulance	42.4	90	0.2	10.5	64	643
	2794	Ambulance	48.9	711	1.9	95.2	579	
	Station 4		**35.2**	**1,522**	**4.2**	**146.6**	**892**	
5	2745	Engine	18.2	459	1.3	22.9	139	174
	2755	Reserve Engine	16.4	127	0.3	5.7	35	
	2795	Reserve Ambulance	0.5	4	0	0	0	
	Station 5		**17.7**	**590**	**1.6**	**28.6**	**174**	
	Total		**28**	**12,037**	**33**	**924.6**	**5,625**	

Observations:

- All ambulance units combined (2791, 2792, 2794, and 2795) were busy 3,393 hours in a year. Ambulance 2791 (combined with reserved unit 2790) was the busiest unit, with 1,409 hours in a year, averaging 5.7 runs and 3.9 hours per day.
- All engine units combined (2741, 2742, 2743, 2744, and 2745) were busy 1,916 hours and had 6,243 runs in a year. The engines in station 1 were busiest, with a total of 620 hours during the year for an average of 1.7 hours per day.

- The two truck units (2771 and 2772) were busy 315 hours and had 1,151 runs in a year. Each truck was in use less than half an hour per day.

Table 11. Fire Units: Total Annual Number and Daily Average Number of Runs by Call Type

Runs	Engine					Truck	
	2741	**2742**	**2743**	**2744**	**2745**	**2771**	**2772**
EMS	1,469	992	754	469	323	136	94
Psychiatric	124	65	63	23	28	2	2
EMS Total	**1,593**	**1,057**	**817**	**492**	**351**	**138**	**96**
Outside Fire	31	31	19	11	18	2	5
Structure Fire	140	114	153	45	92	143	151
Hazard	87	54	48	28	31	21	18
Traffic	88	68	55	25	8	20	37
Service	87	41	55	40	25	82	70
Alarm	150	157	91	80	61	145	223
Fire Total	**583**	**465**	**421**	**229**	**235**	**413**	**504**
Total	**2,176**	**1,522**	**1238**	**721**	**586**	**551**	**600**
Average Runs/Day	**6**	**4.2**	**3.4**	**2**	**1.6**	**1.5**	**1.6**

Note. The reserved units are counted as part of their primary units (2751 = 2741, 2790 = 2791, 2796 = 2792, 2753 = 2743, 2754 = 2744, 2793 = 2794, and 2755 = 2745).

Observations:

- Engine 2741 responded to 2,176 calls in a year, averaging 6 runs per day.
- Engine 2742 responded to 1,522 calls in a year, averaging 4.2 runs per day.
- Engine 2743 responded to 1,238 calls in a year, averaging 3.4 runs per day.
- Engine 2745 responded to 586 calls in a year, averaging 1.6 runs per day.
- Trucks 2771 and 2772 responded to fewer calls than engine units did, averaging about 1.5 runs per day.

Table 12. Fire Units: Daily Average Busy Minutes per Day by Call Type

Avg. Minutes/Day	Engine					Truck	
	2741	**2742**	**2743**	**2744**	**2745**	**2771**	**2772**
EMS	64.7	50.5	37.5	27	15.6	5.2	3
Psychiatric	8.4	4.5	4.5	2	1.8	0.1	0.1
EMS Total	**73**	**54.9**	**41.9**	**29**	**17.5**	**5.3**	**3.1**
Outside Fire	1	1.9	0.9	0.6	1.1	0.1	0.5
Structure Fire	12.3	9.2	9.9	3.5	5.4	10	10.1
Hazard	4.4	2	2.4	1.6	1.2	0.9	0.7
Traffic	3.3	3.6	2.8	1.5	0.4	0.7	2.2
Service	3.7	2.3	2.6	1.9	0.9	4.3	3.2
Alarm	4.1	6.2	2.8	2.8	2.2	3.6	7.1
Fire Total	**28.8**	**25.3**	**21.5**	**11.9**	**11.1**	**19.6**	**23.8**
Total	**101.8**	**80.2**	**63.4**	**41**	**28.6**	**24.9**	**26.9**

Observations:

- The busiest engine company, 2741, averaged 102 minutes on calls per day and spent an average of 13.3 minutes on structure and outside fire calls.
- Engine company 2742 averaged 80 minutes on calls per day and spent an average of 11.1 minutes on structure and outside fire calls.
- Engine company 2743 averaged 63 minutes on calls per day and spent an average of 10.8 minutes on structure and outside fire calls.
- Engine company 2744 averaged 41 minutes on calls per day and spent an average of 4.1 minutes on structure and outside fire calls.
- Trucks 2771 and 2772 averaged about 25 minutes and 27 minutes, respectively, on calls per day and spent an average of 10.1 and 10.6 minutes, respectively, on structure and outside fire calls.

Table 13. Ambulance Units: Total Annual and Daily Average Number of Runs, by Call Type

	Ambulance		
Runs	**2791**	**2792**	**2794**
EMS	1,795	1,534	702
Psychiatric	44	31	15
EMS Total	**1,839**	**1,565**	**717**
Outside Fire	1	4	
Structure Fire	88	75	32
Hazard	14	12	5
Traffic	104	100	40
Service	17	12	7
Alarm	2	1	
Fire Total	**226**	**204**	**84**
Total	**2,065**	**1,769**	**801**
Average Runs/Day	**5.7**	**4.8**	**2.2**

Observations:

- Ambulance 2791 responded to 2,065 calls, averaging 5.7 runs per day. A total of 1,839 calls (89%) were EMS calls.
- Ambulance 2792 responded to 1,769 calls, averaging 4.8 runs per day. A total of 1,565 calls (88%) were EMS calls.
- Ambulance 2794 responded to 801 calls, averaging 2.2 runs per day. A total of 717 calls (89%) were EMS calls.

Table 14. Ambulance Units: Daily Average Busy Minutes per Day by Call Type

Avg. Minutes/Day	Ambulance		
	2791	**2792**	**2794**
EMS	209.9	198.7	97.7
Psychiatric	5.3	4.2	1.8
EMS Total	**215.2**	**202.9**	**99.5**
Outside Fire	0	0.3	
Structure Fire	7.2	5.5	2.2
Hazard	0.4	0.5	0.1
Traffic	7.7	10.2	3.4
Service	1.1	1.1	0.5
Alarm	0	0	
Fire Total	**16.4**	**17.6**	**6.2**
Total	**231.6**	**220.5**	**105.7**

Observations:

- The busiest ambulance unit, 2791, averaged 232 minutes—almost 4 hours—on calls per day and spent an average of 215 minutes (93%) on EMS calls.
- Ambulance unit 2792 averaged 221 minutes on calls per day and spent an average of 203 minutes (92%) on EMS calls.
- Ambulance unit 2794 averaged 106 minutes on calls per day and spent an average of 100 minutes (94%) on EMS calls.

Table and Figure 15. Average Dispatch Time, En Route Time, Travel Time, Response Time, and Travel to Hospital Time of First Arriving Units by Call Type

Call Type	Dispatch Time	En Route Time	Travel Time	Response Time	Travel to Hospital Time	Number of Calls
EMS	0.6	1.6	2.4	4.6	1.8	3,875
Psychiatric	0.6	1.7	3.7	6	0.3	288
EMS Total	**0.6**	**1.6**	**2.5**	**4.7**	**1.7**	**4,163**
Outside Fire	0.7	1.8	3.1	5.6	0	101
Structure Fire	0.8	1.8	2.3	4.9	0	163
Hazard	1	1.9	3.6	6.4	0	189
Traffic	0.5	1.6	2.1	4.2	0.9	228
Service	1	1.8	4	6.8	0	317
Alarm	0.6	1.7	2.5	4.8	0	488
Fire Total	**0.7**	**1.7**	**2.9**	**5.4**	**0.1**	**1,486**
Total	**0.6**	**1.7**	**2.6**	**4.9**	**1.3**	**5,649**

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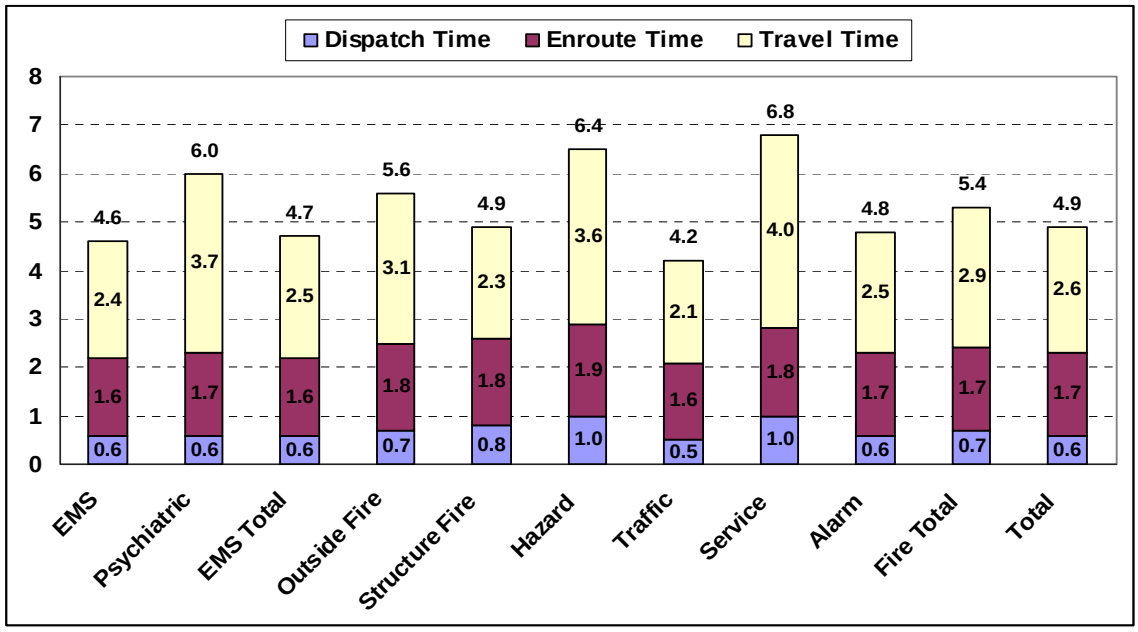
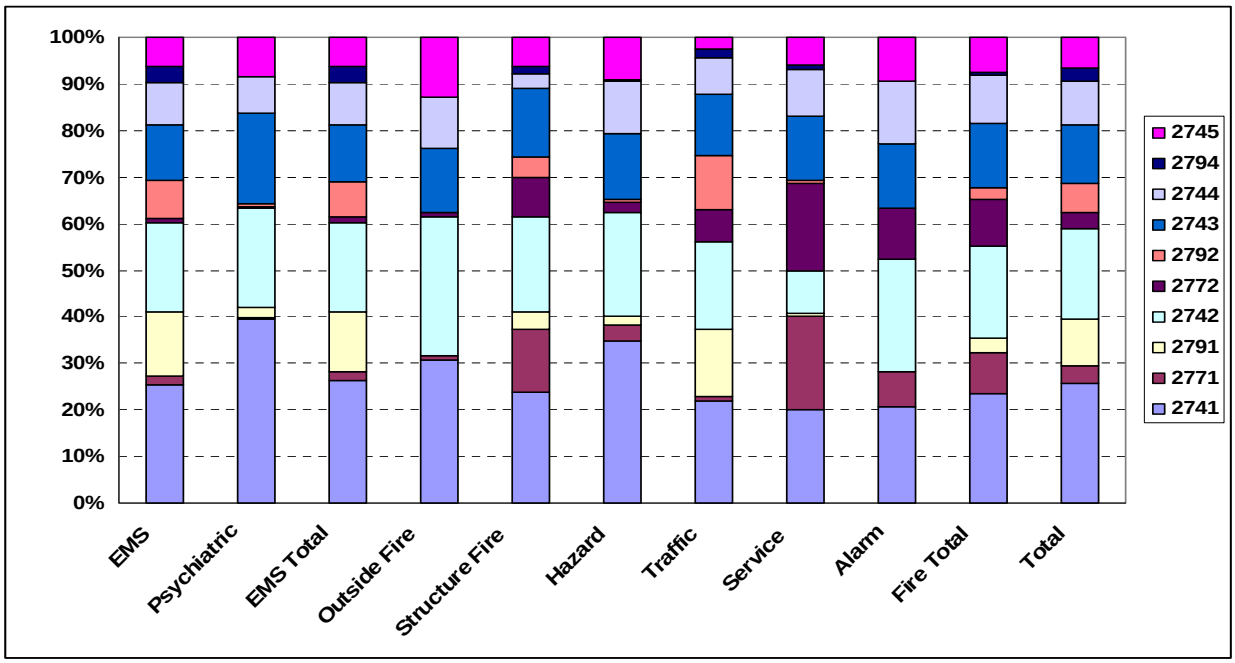


Observations:

- The average dispatch time for all calls was 0.6 minutes.
- The average en route time was 1.7 minutes, and the average travel time was 2.6 minutes.
- The average response time for all calls was 4.9 minutes.

- The average travel time from on-scene to hospital for EMS calls was 1.7 minutes.
- For actual fires, the average response time for structure fire calls was 4.9 minutes; for outside fire calls, it was 5.6 minutes.

Figure and Table 16. First Arriving Unit for Each Call Type



Station	**1**			**2**			**3**	**4**		**5**
Unit Type	**E**	**T**	**A**	**E**	**T**	**A**	**E**	**E**	**A**	**E**
Unit	**2741**	**2771**	**2791**	**2742**	**2772**	**2792**	**2743**	**2744**	**2794**	**2745**
EMS	25%	2%	14%	19%	1%	8%	12%	9%	4%	6%
Psychiatric	40%	0%	2%	21%	0%	1%	19%	8%	0%	8%
EMS Total	**26%**	**2%**	**13%**	**19%**	**1%**	**8%**	**12%**	**9%**	**3%**	**6%**
Outside Fire	31%	1%	0%	30%	1%	0%	14%	11%	0%	13%
Structure Fire	24%	13%	4%	20%	9%	4%	15%	3%	2%	6%
Hazard	35%	3%	2%	22%	2%	1%	14%	11%	1%	9%
Traffic	22%	1%	14%	19%	7%	11%	13%	8%	2%	3%
Service	20%	20%	1%	9%	19%	1%	14%	10%	1%	6%
Alarm	21%	8%	0%	24%	11%	0%	14%	13%	0%	9%
Fire Total	**24%**	**9%**	**3%**	**20%**	**10%**	**2%**	**14%**	**10%**	**1%**	**7%**
Total	**26%**	**4%**	**10%**	**19%**	**3%**	**6%**	**13%**	**9%**	**3%**	**7%**

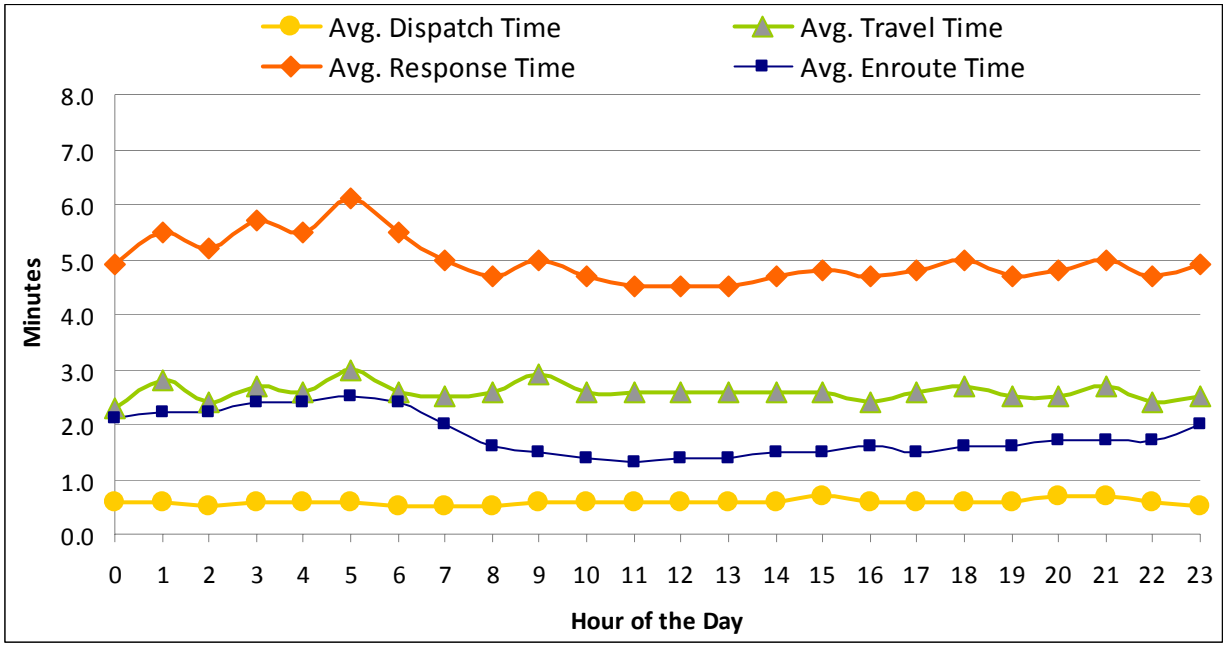
Note: In this table, each row sums to 100%.

Observations:

- For all EMS calls combined, engine 2741 arrived first on-scene 26% of the time, followed by engine 2742 with 19% of the time and ambulance 2791 with 13% of the time.

- For structure fire calls, engine company 2741 was the first unit on-scene 24% of the time, followed by engine company 2742 with 20% of the time.
- For outside fire calls, engine company 2741 was the first unit on-scene 31% of the time, followed by engine company 2742 with 30% of the time.

Figure and Table 17. Average Dispatch Time, Travel Time, and Response Time of First Arriving Units by Hour of the Day

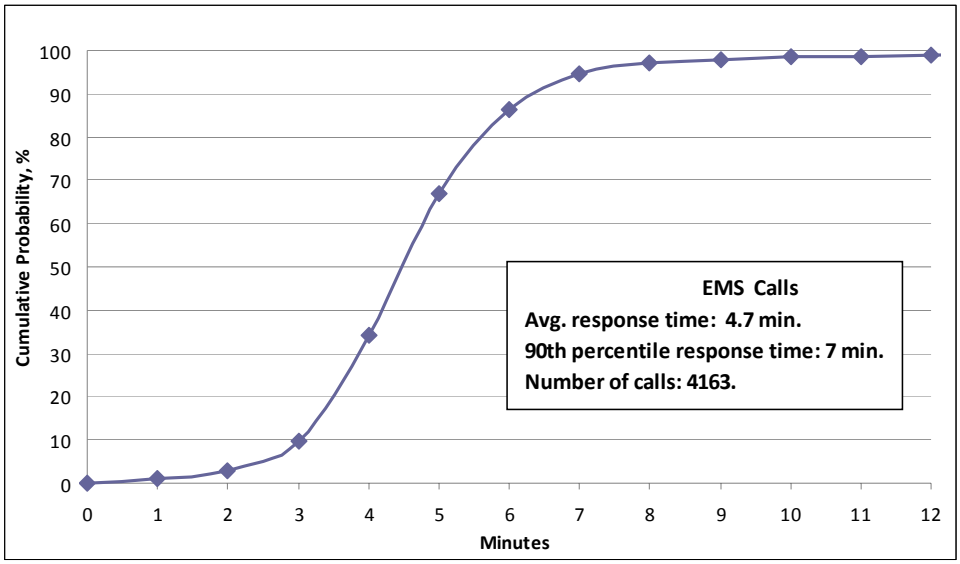


Hour	Avg. Dispatch Time	Avg. En Route Time	Avg. Travel Time	Avg. Response Time	No. of Calls
0	0.6	2.1	2.3	4.9	148
1	0.6	2.2	2.8	5.5	152
2	0.5	2.2	2.4	5.2	104
3	0.6	2.4	2.7	5.7	113
4	0.6	2.4	2.6	5.5	96
5	0.6	2.5	3	6.1	105
6	0.5	2.4	2.6	5.5	132
7	0.5	2	2.5	5	188
8	0.5	1.6	2.6	4.7	256
9	0.6	1.5	2.9	5	296
10	0.6	1.4	2.6	4.7	317
11	0.6	1.3	2.6	4.5	328
12	0.6	1.4	2.6	4.5	324
13	0.6	1.4	2.6	4.5	306
14	0.6	1.5	2.6	4.7	343
15	0.7	1.5	2.6	4.8	297
16	0.6	1.6	2.4	4.7	330
17	0.6	1.5	2.6	4.8	306
18	0.6	1.6	2.7	5	306
19	0.6	1.6	2.5	4.7	349
20	0.7	1.7	2.5	4.8	255
21	0.7	1.7	2.7	5	243
22	0.6	1.7	2.4	4.7	196
23	0.5	2	2.5	4.9	159

Observations:

- Dispatch time was consistently between 0.5 and 0.7 minutes.
- En route time was the longest between 23 PM and 7 AM, at 2 minutes or longer, which leads to longer response times in the period. The difference between the fastest (11 AM) and slowest (5 AM) average response times was more than a minute.
- Travel time was consistently under 3 minutes.
- Average response time peaked between 1 AM and 6 AM, at more than 5 minutes. The difference between the fastest and slowest average response times was 1.5 minutes.

Figure and Table 18. 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 the response time. For example, with regard to EMS calls, the 0.9 probability line intersects the graph at a time mark at about 6.2 minutes. This means that 90% of these calls were reached in less than 7 minutes.

Response Time	Response Time Code	Frequency	Cumulative Percent
0 min.	0	0	0
0-1 min.	1	40	1
1-2 min.	2	73	2.7
2-3 min.	3	287	9.6
3-4 min.	4	1,030	34.4
4-5 min.	5	1,360	67
5-6 min.	6	799	86.2
6-7 min.	7	342	94.4
7-8 min.	8	105	96.9
8-9 min.	9	44	98
9-10 min.	10	21	98.5
10-11 min.	11	7	98.7
11-12 min.	12	11	98.9
12-13 min.	13	7	99.1
13-14 min.	14	6	99.3
14-15 min.	15	7	99.4
15-20 min.	16	14	99.8
More than 20 min.	17	10	100

Observations:

- The average response time for EMS calls was 4.7 minutes.
- The response time for 86% of EMS calls was less than 6 minutes.
- The response time for 90% of EMS calls was less than 7 minutes.

Table 19. Average Response Time for Structure Fire and Outside Fire Calls by First Arriving Fire Units

First Arriving Unit		Outside Fire		Structure Fire		Total	
		Avg. Response Time	No. of Calls	Avg. Response Time	No. of Calls	Avg. Response Time	No. of Calls
Engine	2741	4.8	31	4.6	43	4.7	74
	2742	5	30	5.3	33	5.2	63
	2743	4.4	14	4.9	26	4.7	40
	2744	9.7	11	5.6	7	8.1	18
	2745	6.6	13	4.8	11	5.8	24
Truck	2771	6.8	1	5	25	5	26
	2772	5.6	1	5.8	18	5.5	19
	Total	5.6	101	5	163	5.2	264

Observations:

- Engine 2743 had the shortest response time, 4.4 minutes, for outside fire calls when they arrived first.
- Engine 2741 had the shortest response time, 4.6 minutes, for structure fire calls when they arrived first.
- The first arriving fire equipment for structure and outside fire calls ranged from 4.4 minutes (engine 2743 for outside fire call) to 9.7 minutes (engine 2744 for outside fire call).
- The overall average response time of the first arriving fire equipment for outside fire calls was 5.6 minutes.
- The average response time of the first arriving fire equipment for structure fire calls was 5 minutes.

Table 20. Average Response Time of All Arriving Fire Units for Structure and Outside Fire Calls

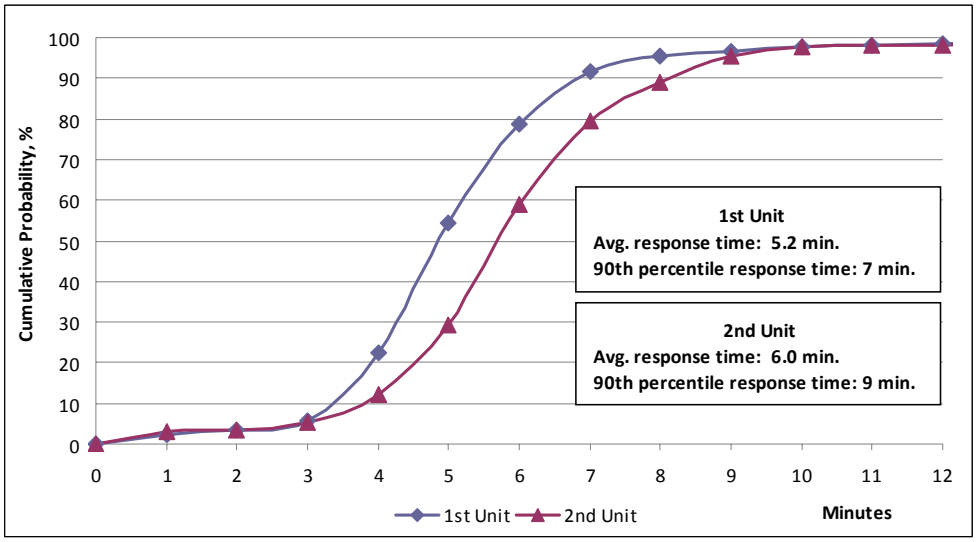
All Runs		Outside Fire		Structure Fire		Total	
		Avg. Response Time	No. of Runs	Avg. Response Time	No. of Runs	Avg. Response Time	No. of Runs
Engine	2741	4.8	31	6.1	140	5.9	171
	2742	5	31	6.8	114	6.4	145
	2743	4.7	19	6.6	153	6.4	172
	2744	9.7	11	8.7	45	8.9	56
	2745	8.5	18	7.1	92	7.3	110
Truck	2771	7.9	2	6.1	143	6.1	145
	2772	12.3	5	6	151	6.2	156
Total		6.2	117	6.5	838	6.5	955

Note. This table includes all runs of fire equipments.

Observations:

- For all engine companies, engine 2741 had the shortest response time, 6.1 minutes, for structure fire calls, and engine 2743 had the shortest response time, 4.7 minutes, for outside fire calls.
- For structure fire calls, the average response time of the first-arrived unit was 5 minutes. The overall average response time of all fire equipment sent to the same call was 6.5 minutes,
- For outside fire calls, the average response time of first-arrived unit was 5.6 minutes. The average of all units sent to the same call was 6.2 minutes.

Figure and Table 21. Cumulative Distribution Function (CDF) of Response Time of First Arriving and Second Arriving Fire Equipment for Structure and Outside Fire Calls



Response Time	Response Time Code	First Unit		Second Unit	
		Frequency	Cumulative Percent	Frequency	Cumulative Percent
0 min.	0	0	0	0	0
0-1 min.	1	6	2.3	5	2.9
1-2 min.	2	3	3.4	1	3.5
2-3 min.	3	6	5.7	3	5.3
3-4 min.	4	44	22.3	12	12.4
4-5 min.	5	85	54.5	29	29.4
5-6 min.	6	64	78.8	50	58.8
6-7 min.	7	34	91.7	35	79.4
7-8 min.	8	10	95.5	16	88.8
8-9 min.	9	3	96.6	11	95.3
9-10 min.	10	3	97.7	4	97.6
10-11 min.	11	1	98.1	1	98.2
11-12 min.	12	1	98.5	0	98.2
12-13 min.	13	1	98.9	1	98.8
13-14 min.	14	1	99.2	0	98.8
14-15 min.	15	0	99.2	0	98.8
15-20 min.	16	0	99.2	0	98.8
> 20 min.	17	2	100	2	100

Observations:

- The average response time of first arriving fire units for structure and outside fire calls was 5.2 minutes.
- The first fire unit arrived on scene in 6 minutes or less 79% of the time.
- The first fire unit arrived within 7 minutes 90% of the time.
- The response-time pattern of the second arriving unit, on average, was 0.8 minutes longer than the first arriving unit.

Appendix A. Battalion Chief (2710) Activity Analysis

Call Type	Avg. Busy Min./Run	No. of Runs	Total Busy Hours	Avg. Busy Minutes/Day
EMS	10.2	2	0.3	0.1
Psychiatric	3.9	1	0.1	0
EMS Total	**8.1**	**3**	**0.4**	**0.1**
Outside Fire	33.4	4	2.2	0.4
Structure Fire	29.9	162	80.7	13.3
Hazard	22.1	29	10.7	1.8
Traffic	15	22	5.5	0.9
Service	22.5	17	6.4	1
Alarm	6.7	3	0.3	0.1
Fire Total	**26.8**	**237**	**105.9**	**17.4**
Total	**26.6**	**240**	**106.3**	**17.5**

Appendix B. Correspondence between Type Description and Call Type

Type Description	Call Type	Grand Call Type
EMS Response	EMS	EMS
EMS Response-Staging Required	EMS	EMS
Medical Transport	EMS	EMS
AMR Ambulance	EMS	EMS
Psychiatric Hold	Psychiatric	EMS
Alarm Sounding Commercial	Alarm	Fire
Alarm Sounding Residential	Alarm	Fire
MDT Testing	Alarm	Fire
Odor Investigation	Hazard	Fire
Level 1 Hazmat	Hazard	Fire
Natural Gas Leak (Inside)	Hazard	Fire
Smoke Investigation	Hazard	Fire
Natural Gas Leak (Outside)	Hazard	Fire
Wires Down	Hazard	Fire
Carbon Monoxide Detector	Hazard	Fire
Explosion	Hazard	Fire
Aircraft Emergency	Hazard	Fire
Fire Outside a Building	Outside Fire	Fire
Vehicle Fire	Outside Fire	Fire
Boat Fire Docked	Outside Fire	Fire
Move Up	Service	Fire
Lift Assist	Service	Fire
Water Removal	Service	Fire
Citizen Assist	Service	Fire
Lock In/Out	Service	Fire
Hydrant Problem	Service	Fire
Elevator Problem	Service	Fire
PD Assist	Service	Fire
Water Rescue	Service	Fire
Vegetation Response	Service	Fire
Boat Taking on Water	Service	Fire
Structure Response (Residential)	Structure Fire	Fire
Working Structure Fire	Structure Fire	Fire
Structure Response (Apartment)	Structure Fire	Fire
Structure Response (Commercial)	Structure Fire	Fire
Traffic Collision	Traffic	Fire
Traffic Collision with Rescue	Traffic	Fire
Traffic Collision (Building)	Traffic	Fire

Leaders at the Core of Better Communities

Operational Assessment

Alameda, CA, Public Safety Services

Fire / EMS

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Executive Summary

This report presents findings on the current delivery of services for fire and EMS in Alameda, California, and offers recommendations for future service delivery.

During an on-site visit, a number of persons were interviewed concerning the delivery of safety services in Alameda. A brief overview of the responses and a more detailed report follow.

Interviews indicated that employees in the fire department care about their jobs and the quality of delivery of services to the citizens of Alameda. There was agreement that the departments' response to service calls was good or excellent.

Alameda faces a fiscal crisis because of the convergence of falling property values, decreasing state revenues, and exploding operational costs—particularly in the area of employee benefits, which average more than $50,000 per employee. As the current housing downturn subsides and the opportunity to develop the former military base occurs, the location of people should drive where to deploy resources. Property, on the other hand, should be sprinkler-protected and should not be the focus of deployment. All deployment should be based on life safety—for the citizen (customer) as well as the responder. Emergency Medical Vehicles should be mobile—in other words, not in fixed fire stations—to both provide for rapid response and avoid the cost of constructing fixed facilities.

Moving from the traditional, silo-functioning centralized command department focused on tactical deployment to a flexible, mobile, and decentralized agency operating strategically with a mission focus requires management. Managing such a department can be a challenge, but it is not insurmountable. Tools such as Automatic Vehicle Locators (AVL) and closest

dispatch integrated into Computer Aided Dispatch (CAD) software enable command to know where resources are and to deploy in an efficient, effective, and safe manner.

According to interviews conducted with other agencies providing support to the fire department, Alameda has a very good water-delivery system with some specific shortcomings. There is a specific recommendation under the equipment section of this report that relates to water department functions.

This report seeks to move Alameda away from a philosophy of a series of outputs to one of delivery of outcome-based services. Most fire and EMS systems focus on outputs. Outputs aim to measure the level of response in terms of speed and quantity of delivery. The measures are usually rigid and unbending. Outcome service delivery focuses on measures that determine how effective an agency is, what it actually achieves, and how the public values the services it receives.

Determining public appreciation or customer satisfaction can be done by surveying patients and others receiving fire and EMS services. Public comments and feedback, citizen surveys, and community council interaction with citizens can be used for this purpose.

A great deal of angst and anticipation has focused on the possibility of creating a public safety department from the separate police and fire disciplines. Quite frankly, much can be done with the existing department to preclude such a move. The city is paying for more than 180,000 hours of work time. A portion of that time is spent on calls for service, and another portion is spent sleeping in accordance with rules governing the traditional 24-hour work schedule. Getting production out of the remaining hours may alleviate service cuts that will likely take place in other areas. The critical factor is getting the resources matched with the work.

Fire departments are capable of delivering professional services; the challenge requires a paradigm shift from one of reactive response to one of proactive service. One needs to look only at the way cities design fire stations with large-screen televisions, sleeping quarters, and kitchens as the focal points instead of virtual reality training centers and computer work stations, which are required to produce professional products.

Recommendations are summarized in the following section, with discussion in the pages that follow.

Recommendation Summary

A. Eliminate compartmentalization that is prevalent in the department through Information Technology, employee teams, and flexible command structures. See Attachment I for the existing and proposed organizational structures.

B. Conduct an all-hazard risk assessment with a focus on mitigating/preventing situations before they arise to an incident level. The risk assessment should be updated regularly to reflect changes in demographics, ages of buildings, and improvements that have been made. Future deployments should be made on the basis of risk as well as what risks can be eliminated; this can only be done by regularly reviewing the risk assessment. The risk assessment will be done by stations within their response areas.

C. Install AEDs in all public buildings and in all police vehicles. Register all AEDs with the National Registry and integrate the registry with the communication center's CAD system for added effectiveness.

D. The city has more stations than recommended by the Insurance Standards Organization (ISO). GIS analysis shows that two stations could service the city and would meet the ISO recommendation of a

station servicing a 1.5-mile service area for travel time purposes. We recommend closing station 3, which needs to be reconstructed. Station 5 could be closed or limited to 12 (daytime) hours per day of staffing with the resources shifted to remaining stations.

If the city closes one station, the deployment recommendation would be:

- Have station 5 staffed by a lieutenant and five firefighters: two on an ambulance and three on an engine, with the lieutenant making four on the engine.
- Have station 1 staffed by a lieutenant and seven firefighters: three on the truck, three on an engine, and two on an ambulance (the lieutenant would make four on either the engine or truck). During daytime hours, the chief, two deputy chiefs, and three captains would be available to expand the complement at this station to 10 and total response force of possibly 32 when fully staffed—normally 27.
- Have station 2 staffed by a lieutenant and five firefighters, with three on an engine and two on an ambulance.
- Have station 4 staffed by a lieutenant and five firefighters, with three on an engine and two on an ambulance. The backup truck would be located in station 4, and staff would be cross-trained to operate the truck.

E. Restructure the department with 78 station personnel, a chief, two deputy chiefs, and five captains, for a total of 86. The restructuring would allow the department to meet tactical benchmarks such as NFPA 1710 (which calls for 15 on a structure fire), with at least six personnel in reserve at a 21-person-minimum staffing schedule. When

shifts are fully staffed, each would have 26 persons and a captain. During daytime hours, six additional people would normally be available for response. Since the calls for service show the heaviest demand during the day hours, two full-structure fires could be handled and an ambulance kept available.

F. Utilize employee teams to activate mobile data terminals in fire service as well as AVL and communication upgrades. All employees should have radios, with all vehicles located for command at all times as well as employees.

G. Realign the health and wellness program with an outcome focus as well as accountability.

H. Train firefighters on Geographic Information System technology (GIS) and work to consolidate records into management systems.

I. Expand alarms and sprinkler suppression systems throughout the community; inspect all occupancies on a regular basis to form comprehensive mitigation and prevention plan. Map where sprinklers have been installed and link to the CAD dispatch system. A model ordinance exists; records on where sprinklers are located do not.

J. Cite properties with repeated false alarms, as is currently being done, and adjust response to alarms to reflect the risks.

K. Monitor and adjust ambulance fees for service to reflect cost of the program; initiate billing on accident insurance for cost recovery of responding units.

L. Bill for maintenance of fire hydrants by fire personnel; coordinate actions using GIS and color code to meet NFPA guidance.

M. Initiate inventory control system throughout the department. Track all purchases and distribution of equipment as well as replacement for liability purposes.

N. Create competency testing to ensure staff is learning from the training given.

O. Identify a training center location. Sell the existing training tower and center area along with station 3, with the proceeds used toward beginning the training center. Ideally, this would be adjacent to the administrative headquarters area. Seek federal funds under the stimulus plan to build/rebuild and incorporate the existing burn trailer.

P. Realign functions to more fully utilize the available and paid resource time. The city pays for more than 180,000 hours, and those hours are currently being used for response, training, and station duties. Greater utilization of those hours can be made for data analysis, GIS, training programming, maintenance, prevention, inspection, and other service delivery.

Q. Integrate public education and prevention throughout all areas of the department; utilize station hours to provide additional opportunities to educate the community.

R. Increase level and amount of inspections; mitigate and cite repeat offenders. Train personnel in each station as deputy fire marshal, reporting to one command but eliminating current centralized approach. At the same time, empower organization to enforce codes through intensive inspection program.

S. Review fees for inspections that are not set by the state.

T. Inspect all rental properties and ensure that violations are corrected.

U. Use civilians in positions that do not require a sworn, certified firefighter–for example, possibly integrate the building department under the captain in the inspection area for seamless service and plan review delivery.

V. Create outcome-focused department instead of output-focused department. Track results of the work and actions that are being taken by the department and adjust the actions if desired or no results are produced. Responding to fires and calls for emergency medical should be viewed as response to failure; the goal of the organization should be outcome-focused on preventing and mitigating calls for service wherever and whenever possible.

I. Administration and Finance

In meetings with the commanders in the fire department, it became apparent that there is a communication system between command and city administration.

However, there is a great deal of compartmentalization within the fire department, which is exacerbated by the number of buildings in which services are housed. Most private sector companies have flattened the top command structure and utilized the numerous talents of persons serving within the ranks. For the most part, the fire service has continued to create silos for each operation and rarely uses the hours and talents of the rank-and-file personnel. Examples of departments in the United States and the United Kingdom have removed the compartmentalization and utilize stations to inspect all buildings in their district, conduct prevention and education programs, update policies and procedures, and assist other departments with functions such as GIS and data analysis.

Locating commanders of the police and fire in the same building may allow for more shared use of civilian support hours. Payroll functions, report filing, and other clerical duties are not so unique that support personnel cannot be trained to provide such service to both disciplines and maximize the use of time. An alternative may be to share hours for a person in the finance department and eliminate the need for these functions in the fire department. Every effort should be made to keep personnel available for services in their station districts—much like community policing is for law enforcement. To accomplish this, the agency needs to use civilians, technology, and existing personnel for support. By utilizing computer systems, data can be managed across disciplines of the fire, police, and finance department if there is an issue with sharing joint spaces.

The city has connected all of its buildings with an intranet service; live conferencing, e-mail, and other communications should be expanded between the fire stations, among various buildings that house fire department command and functions, and with other entities to provide for training in the station versus leaving the community or going to central facilities.

Challenges are not in short supply for the City of Alameda or its emergency services. An easy approach would be simply to cut staff or eliminate functions, which is the traditional method of managing public services. However, by utilizing an asset-management approach and drawing from best practices used in the United States and elsewhere, the department can use the challenge as an opportunity to reinvent itself with an eye focused on outcome service delivery.

The department has something that will be critical not just to its survival but also to other departments meeting customer-service needs and

demands: It has 180,000 hours of time that may be better utilized. As it looks at uses for time, the department should begin the process of managing its assets by starting at the mission and definitions it uses to describe service delivery.

The use of the term *firefighter* should be evaluated. First, the majority of work that the department is doing is medical, with fire being a minority of calls and operations. Second, the members of the department should be viewed as professionals in a successful public service. “Fighting” a fire, while common nomenclature in the fire service, actually focuses on failure—to prevent an event that, in many cases, can in fact be prevented. Instead, focus should be on enhancing the safety for citizens, visitors, and businesses in Alameda, which would result in the professionals being “safety specialists” charged with a mission of protecting life and property.

In law enforcement, protection means that an event is prevented; fire needs to make the same effort but also should be staffed to mitigate an event when it does occur with a positive resolution.

Once the mission of the department is established, the approach by which it utilizes its assets—people, stations, and equipment—needs to be deployed using the latest techniques and processes. The U.S. fire service has traditionally (for the past 12 years) used an approach referred to as Standard of Response Coverage (SOC) to deploy resources. The SOC required agencies to conduct a risk assessment and deploy resources to reach the risk in a given value of time. From that tactical style of approach, standards such as NFPA 1710 and 1720 were developed. However, NFPA 1710 (which pertains to career fire departments) actually requires nothing except for analyzing and developing an annual report on the ability to reach locations within given periods of time; in other words, a tactical solution to a strategic problem.

The SOC process is actually a development of the United Kingdom, which began using the model to deploy its resources prior to the outbreak of World War II. The goal of the initial SOC process was to survive the initial attack that would come from the Germans but was developed through additional research to incorporate risk approaches. The last update of the SOC process was in 1985-1987, about the time it began to find its way into the American service.

In 2000, a U.K. report was produced that recognized that fire losses—in both value of property and lives—had reached a plateau. Studies showed that simply deploying personnel and equipment contained a problem; it did not eliminate the problem. Instead, the research pointed the U.K. to a new concept known as Integrated Risk Management Planning and was adopted nationally for enactment nationwide by April 1, 2004.

The London Fire Brigade, in the introduction to its IRMP, stated, "There can be little doubt that former advocates of the 1936, 1955, and 1985 Standards of Fire Cover would have anticipated outcomes that, with each revision, moved progressively closer to the anticipated outcomes of integrated risk management planning." It went on to note that this was not the case because the SOC process is one-dimensional and omits prevention and mitigation. Omitting prevention and mitigation leaves a service that simply responds to failures, whereas conducting comprehensive all-hazard risk assessments and mitigating hazards that are found during review prevent events requiring emergency services.

The results of this significant paradigm shift in the U.K. have shown that events occur less frequently, are less severe, result in less injury and fatality for citizens as well as responders, and require less personnel when an event occurs because plans have been prepared as well as CASt-ing (Critical Attendance Standards). CASting is simply identifying what

tasks would be needed if a variety of events occurred and then staffing for those needs.

A comprehensive all-hazard risk assessment should be conducted utilizing staff, command, and city officials. Partial risk assessments have been conducted in the past based on the outdated process of Standards of Response Coverage. All reports that were reviewed stated that conclusions were difficult to report because of insufficient data. None were comprehensive.

In order to deploy resources, a comprehensive risk assessment should be conducted and linked to existing data within the city. It also must be maintained on an annual basis, and financial issues should not be a limiting factor. Without a risk assessment, deployment cannot be efficient, effective, and safe for responders and citizens. Mitigation and prevention must be part of the assessment process in order to maximize the investment as well as the safety aspects. Only after a risk assessment can resources be maximized; without it, resources are likely wasted or improperly located at the incorrect times.

The risk assessment should look at the areas of the city that are likely to grow and what growth is expected. For instance, the proposed redevelopment of the former military base could greatly impact the amount of retail and commercial development that would be located in a portion of Alameda. If the buildings are sprinkled and alarmed, less staffing for fire may be required, but EMS may have to be increased during the periods of the day that the new commercial or retail area is open. At night, however, when the commercial and retail area is closed, there is no need to staff the EMS as heavily, and transport units could be redeployed.

By conducting the risk assessment, efforts to prevent and mitigate incidents can be undertaken, and data can be gathered on what buildings and areas are sprinkled. This differs substantially from recommendations and analysis done in earlier studies for Alameda. The earlier studies utilized the SOC approach and the RHAVE software model. That software has been found to be deficient, and an attempt was made to upgrade it by the Center for Public Safety Excellence. After considerable expense, it was found that the methodology utilized a linear approach to risk management and was not suitable for anything beyond a very basic fire analysis. Alameda's workload is largely in EMS, and the RHAVE program does not provide any means for analyzing and developing all-hazard risk-management plans. It also provides no cost-benefit or incident-benefit analysis.

An emergency management position has remained vacant in the department and should be left that way. The job of coordinating resources on a daily basis should be no different from the coordination that takes place in emergencies. By conducting an all-hazard risk assessment and utilizing deployment methods on a daily basis, during an emergency, resources should be more easily managed because all department personnel are familiar with what will or should take place. Emergency management is based on risk; thus, the two are connected.

One of the deputy chiefs can be the contact in the fire department, but all personnel must be trained to handle an emergency, whether natural or human-created.

The one critical mistake identified by the London Fire Brigade in its report was that line personnel were not charged with developing the IRMP; rather, it was developed by leadership, and then line officers were given a chance to comment. In the completed document, the LFB states that the

implementation probably would have been more completely embraced had there been more opportunity to invest in both time and expertise through inspections, prevention, and mitigation.

Financially, one issue that should be reviewed is charging for fire and medical runs to accidents and structure responses. In addition, it is encouraged to start a subscription program for residents that will offset uninsured medical amounts. In the case of accidents and fires, funds are paid as part of a person's automobile or homeowners insurance, and by not collecting the allowed costs, the city transfers the support of operations to the taxpayer instead of taking advantage of dollars that are otherwise left with insurers.

In earlier studies mentioned, one key issue identified was the condition and quality of records and data. This has not improved despite the passage of time. A management team involving command officers and station personnel should be immediately assigned to rewrite and codify all of the rules, regulations, policies, procedures, bulletins, and other material. The codification should include placing the material in digital format and sharing via the intranet. A review of the rules and regulations showed that they were effective in 1965 with a revision in 1973; other policies indicated similar time frames.

The dating of these policies showed, with some referring to signing time sheets, requiring residency, and other similar statements. Several portions of the rules directly conflicted with contractual and policy statements.

Policies and procedures should be recodified no less frequently than city ordinances, with a recommendation of yearly updates and complete review/revision every five years. By adopting the IRMP process, a yearly

strategic plan is required, along with a report that focuses on accomplishments of the prior year.

Because of the condition of rules, regulations, and policies, the ability to manage the department is compromised. Rules and regulations along with policies and procedures form the basis for applying disciplinary action. If many of the management documents are invalid or non-applicable, the remaining could be easily questioned if a choice is made to enforce. Administration has stated that work has begun on updating these critical items, but until they are put in place and properly adopted, the city is put at a serious disadvantage.

The city should also look at enabling legislation to require that redevelopment areas provide AEDs and training staff to respond as the first responder so that viable patients are delivered to the emergency personnel upon arrival. An additional recommendation is made under the following section to recording locations of AEDs into the CAD system of dispatch using GIS.

II. Communications

The communication system of Alameda is very well managed, and times are reviewed to ensure consistency, efficiency, and effectiveness. The times for dispatch are well within national benchmarks; they are actually on the low end and among the best that have been reviewed by ICMA.

GIS records should be integrated into the dispatch center's CAD system so that when calls for service are received, responders have all the available data that is compiled. All hazardous material reports should be computerized and linked by geocodes to property files within the city and be immediately accessible to responders.

Because the various functions of the city—building department, inspections, records, GIS—are spread across a number of locations, incorporating all of these records into a computer service that could be shared at the station levels and on mobile data terminals is critical. A gradual movement toward this data sharing is under way; considerable work needs to be done.

Automatic vehicle locators (AVLs) have been installed on all vehicles so that the dispatch and command know where the resources are at any given time. They will not be activated until the summer of 2009. With the use of automated dispatching systems, the closest unit can be dispatched and additional units can be sent with predetermined protocols, thus avoiding dispatcher efforts. Again, because of the dispersion of command, officers would have access to locating vehicles and department calls, and management decisions could be automated with preprogrammed closest call units receiving the call for service. Because medical patients have to be transported off the island, the AVL may direct units responding back from the mainland to medical calls over fixed base units, thereby saving time.

Locations that experience false alarms have been promptly cited for violating the alarm ordinance; a review should be made to see what the collection rate is and if problems are corrected. The department should adopt national policy standards that are available from APCO, CALEA, NENA, and others.

All AEDs in the community should be located on a layer of the Geographic Information System and show when a call on dispatch consoles is received as part of an interlink with the CAD system. Today, there are more than 300,000 AEDs in locations around the United States, with a projection that more than 1 million will be located in 425,000 buildings by

2010, according to studies by Atrus Inc., which is working with the Sudden Cardiac Arrest Association. AEDs are used in only 0.5% of the Sudden Cardiac Arrest incidents reported, but the study indicated that one was typically within 50 feet. By linking to the CAD system for the dispatcher to relay to the caller, the effective useful range of each AED can be increased from less than 50 feet to more than 300 feet, a 3,500% increase in effective range.

The Sudden Cardiac Arrest Association research shows that by locating the AEDs, a viable patient is more likely delivered to responders.

II. Emergency Medical Services

The City of Alameda has a very good ambulance service and an efficient set of oversight mechanisms in place. The involvement of medical personnel and accountability is notable.

The proposed truck company should not be used for medical response; truck companies can be used for inspections, prevention efforts, and other services. If needed, one of the many excess vehicles could be assigned with the truck company, and response to medical calls should take place using that vehicle. A truck is neither efficient nor effective because of the size of the vehicle and the use for which it is designed.

The standard argument is that the truck is taken out of service if personnel respond in an SUV or similar vehicle. While this is true, it is much better than having the truck involved in a collision and taken out of service for months. An SUV also is quicker, is more maneuverable, and can be returned to service in far less time than a truck. The concept of a truck or engine going out on medical calls is that they can reach patients rapidly and before an ambulance (usually within 4 minutes). The

ambulance is to arrive within 8 minutes and transport the packaged patient to the proper trauma center.

The deployment of resources in Alameda allows for an ambulance in each station, and GIS analysis shows that the entire city can be reached within 4 minutes. Instead of being first response, the engines and truck serve as support rather than initial response.

There is excess capacity in the medical area now and under the proposed redeployment. However, that capacity serves as a buffer when patients must be transported off island. All staff should be cross-trained and tested and demonstrate competency on engines, reserve engines, and the two trucks, one of which will be in reserve so that in the event of a large fire event, all equipment could be deployed.

One key indicator that is not studied is the outcome of medical intervention. Fire departments traditionally report times of call, en route times, arrivals, and when clearing the scene. Other key indicators that need to be recorded: time from arrival at the address or call to the time at which help reaches the patient's side. The outcome of the intervention is the last review piece. If ambulance service is being provided and yet all patients expire or a low percentage recover (such as in cardiac defibrillation), the tactics that are being employed should be adjusted, which may include training.

There was not sufficient data to determine the appropriate number of paramedics on the department. If the majority of calls are BLS, having all staff be paramedic-trained is expensive and may actually be more dangerous because they will not use their skill sets in enough cases to remain competent in procedures. The command of the EMS said they believed training and calls for service were allowing enough opportunities to maintain skills; only through integration and quality review can this be

assured. If not needed, engine/truck staff could be trained to EMT levels with paramedics on transport ambulances, which is the methodology envisioned in tactical standards like NFPA 1710.

The city utilizes a third-party billing company for collections and will soon move to electronic billing. A quality-control program should ensure that all charges are being recorded with a goal of recovering costs.

A subscription system should be started for residents that will financially benefit the ambulance service while also providing a circuit breaker for uninsured costs.

III. Water System and GIS

The East Bay Municipal Utility District (EBMUD) delivers water to the City of Alameda via a serious of aqueducts, which service the island through five connection pipes. There was considerable confusion as to how many, locations, and other water data, which was supplied by the EBMUD.

The crossing locations are: Alice Street crossing, Blanding, Park, Derby, and near the Oakland airport. The oldest is the Park, which was built in 1916; the others are newer and built to withstand earthquakes and similar disasters. The crossings form three different sectors: Alice Street (the west end of the island); Derby, Blanding, and Park (the business district); and the Oakland Airport line to the east end of the city.

Contained in the city code for Alameda, under section 508.5.2, is a section titled “Inspection, Testing, and Maintenance of Hydrants.” During interviews, it was found that hydrants are not flowed and have not been painted or maintained and that there was even a question as to how the hydrants and water were supplied to the island. The fire department

should be well versed on the operations and connections, as hydrants are critical to the success or failure of deployment efforts.

There is no hydrant-maintenance program, and the city should pursue a maintenance contract with the regional provider to ensure that hydrants are painted, located, and checked for operations on a yearly basis. Efforts to extinguish fires without working hydrants will be futile and embarrassing to both the department and the regional provider. Similar contracts have been created in cities like Washington, D.C., following a disastrous fire at Georgetown Library, in which the closest hydrants did not work and maintenance records were nonexistent. The Alameda City Code even requires that hydrants be color-code painted to meet NFPA 291 and should enforce this provision with the regional water provider.

A question on the value of a fireboat for provision of water after an earthquake was answered on the basis of data from the water department; it is more likely that Alameda will be isolated because of bridge failure than of water failure. Still, the city should ask the water system to provide non-potable water pumps or drafting points at key locations on the island that could be used to connect to if the water line feed is severed.

If the city chooses to pursue a boat, a two- or three-year lead time would be necessary to complete the specifications, meet the lead time of grant applications, and actually submit and be awarded a grant. Additional months would pass for construction of such equipment. The Department of Homeland Security has provided funds for boats with East Providence, Rhode Island, receiving one and providing specs for other cities to successfully acquire the equipment. The boat would not need to be staffed but could be utilized in a disaster or major event. It would require

cross-training of personnel to operate the boat in a disaster situation. It would ideally be located and dry-docked for use by station 5.

The use of GIS will allow a history to be created on the assets of the water district that can prevent litigation in the future and also maintain the assets on a continual basis. Employees of the fire department could be trained and the data input on the GIS system as work progresses.

IV. Inventory Control

The department has a very good stock of equipment, such as hand tools, turnout gear, nozzles, and hoses. What it lacks is a good inventory control process. Using the city's computer system and a barcode reader, numbers should be assigned to all of the department's equipment, and the assets should be tracked on a continual basis. By having barcodes on the racks that store items, management can see when items are used and provide for regular replacement. Maintenance schedules can be created with prompts to command, and a record management system can be created.

With multiple stations, this control of inventory is critical to both achieving savings from bulk purchases and minimizing the stock that is kept.

The system should be expanded so that employees are checking personal items that are assigned to them and a regular reporting process is provided electronically. This would allow a timely replacement of turnout gear, gloves, and similar items and a tracking process to ensure that items are not forgotten or abused. The station information could be uploaded to one level of the inventory tracking system with a review by the "quartermaster" assigned personnel.

V. Fire Prevention, Public Education, and Employee Education

The captain position, which acted as the training director, is unfunded, and the training tower/area is condemned. At the same time, there is substantial open space available at the former military base, and some semblance of a training center has already been created.

The department should pursue from the Department of Homeland Security Assistance to Firefighters grant, which contains provisions for new stations and upgrades to existing facilities. The city has ample area in the former military base; an area should be established whereby a modular training facility can be constructed not just for the fire department but for all city services. By pursuing an all-hazard and multi-disciplinary approach, it is possible for the public works, public utilities, electrical department, and police department to access not only stimulus dollars but also other funding sources to contribute to creation of an integrated education area.

An example of such a facility exists in Glenview, Illinois, where all disciplines have contributed to development of a former military base. Contributions were also received from surrounding communities and colleges that now use the center. The village in that case uses the center in most cases at no cost, with the others paying for operations, props, and instruction.

The training director should have a citywide focus and thus may not be a sworn position in the fire department. The position could receive assistance from the division chiefs and should work with a committee of firefighters and command to establish a training schedule. Because many of the firefighters have undergraduate and graduate degrees, they can be tasked with developing the training at the station level or within station groupings as well as contributing to training both staff and public in areas

that were otherwise going to be eliminated. The fire stations and training center should be recognized as community centers and not just for housing fire trucks and staff.

An issue that is being seen more and more across the country is the diminishing competency in firefighting because staff simply is not exposed to fires. Keeping skill levels for the fires that do occur is a challenge and practicing may not make perfect, but it is critical to providing for the safety of both responder and citizen.

The new education should include mandatory competency testing on a yearly basis to ensure that the skills being taught are being retained. For those employees who do not demonstrate competency, remedial training should be provided, and if skills cannot be mastered, then other measures should be taken, including relieving them of duty. Firefighting can be dangerous, and training about the dangers that are likely to be encountered should have to be adopted by all staff. If a staff member is not capable of achieving competencies, then he or she becomes a liability to fellow staff members as well as the city.

The city operates a wellness program patterned after the Health and Wellness initiative of the IAFF and IAFC. The program was costly to introduce, and there was conflicting information given about the ongoing cost of the program from human resources and the fire department.

There needs to be a clear command established with human resources, risk management, and the individual departments in Alameda. Programs such as the wellness program are critical to minimizing claims for injuries in the future while enabling responders to enjoy a quality of life after retirement.

However, the costs of the program also need to be understood, and there should be negotiated conditions for continued employment that enforce the wellness-fitness initiative. Without comprehensive evaluations that are enforced with articulated conditions required for maintenance, the program is a great fitness club paid for by taxpayers and the department—something that is usually a condition of continued employment in other disciplines like law enforcement, public works, or administration. In those other disciplines, the fitness and wellness is expected to be performed after hours with reimbursement, and employees are expected to show competency at some adjusted level on an annual basis or the employment is discontinued.

Physicals should be conducted utilizing employee health benefit programs. Enhancements may be required to meet OSHA and other standards for use of breathing apparatus, but these should be negotiated with the local hospital that does benefit from continued transports via the EMS service. Health maintenance is the focus of all health plans today, and the city should partner with its insurance provider to ensure that concerns are evaluated. Employees should be required to undergo a baseline physical (before entering the department as a condition of employment). The yearly health screenings should provide a report back to the city with recommendations that have to be followed. At this time, the results of physicals are kept at the employees' doctors' offices and would hopefully be provided if an issue arose.

Trained professionals in the fire department may lend expertise to other disciplines as well as the private sector for consultation and review, thereby generating a fee for service.

Oversight has to be created by the city to enforce results of the physicals and the wellness program, or else the city is only providing a good set of

data for employees to file claims at some point when impairment occurs. Fire and EMS work is physically demanding; the city should be demanding that employees maintain health competency to perform the function, with failure leading to actions up to and including removal. If employees do not follow the recommendations, they should be taken out of service—a process no different than if a piece of equipment were found not to be functional.

Public education and prevention is one of those functions that must be forced from silos. The services operate out of other separate buildings and should not be the sole responsibility of a commanding officer but instead by the involvement of the total department.

A paradigm shift needs to occur in the department so that when a fire or medical incident occurs, it is a failure of prevention and mitigation efforts. Certainly accidents happen; however, many incidents can be prevented, and the job of the fire professional should be as a safety professional focused on mitigating risks and preventing occurrences. The old model of being a firefighter is responding in a reactive mode rather than focusing on the preventive strategy that truly saves lives and property and increases safety for both responder and citizen. This is also the difference between the old, traditional SOC process and the IRMP.

Another challenge is to dispel the notion that the prevention of incidents really cannot occur, is too much work, or requires too much effort. It took generations to effect changes such as seatbelt use, but the effort to encourage the wearing of belts had to begin at some point, and the same is true of fire-prevention programs.

Prevention should be everyone's job for all on-duty hours. Building inspections, residential inspections, and commercial inspections, along with fire systems, should be handled not just by a commanding officer

but by all members of the department, with coordination from the commanding officer.

The department should adopt a strategy to inspect every structure in the city, with violators targeted for action. When compared to industrialized cities in Europe, the United States has one of the worst loss rates in terms of life as well as property. The loss rate in the U.S. approaches that of developing countries, and the only way to change that dismal statistic is by adopting an aggressive prevention strategy and not the typical reactive to calls for service approach.

One of the significant failures found in the Charleston, South Carolina, fire that claimed the lives of nine firefighters was that inspections were not conducted, codes were not enforced, and companies had no idea what and how buildings had been constructed in their response areas. Not planning, not inspecting, and not enforcing are a prescription for failure.

The preventive work should be encompassing the work of the building department. Ideally, teams of fire specialists should be created to review and comment on plans, thereby building depth in the agency for future years. Truck company personnel are ideal for this assignment if not required to run medical calls; they also will need information if called upon to rescue or ventilate structures. If the department makes all staff be prevention-focused, mitigation of threats and hazards can take place before they lead to calls for service. These areas should not be limited to fire but should also include EMS.

If certain addresses are repeatedly calling for EMS response, alternatives can be developed, including using civilians to contact residents and alleviate problems before they result in calls for service. By inspecting all structures—a goal that should be part of the strategy developed for the

department—hazards that would result in EMS calls (trips and falls, poisons in unprotected or reachable areas, etc.) should be targeted for elimination.

To begin the process of adopting a fire-prevention strategy, the community should look at further strengthening strategies for installing sprinkler systems in all structures, including the possibility of tax credits for retro-fitting existing buildings. The city has an outstanding ordinance on the book, and by focusing efforts on sprinklers, future risks can be alleviated. If one thinks about sprinkler systems, which irrigate and keep lawns and plants from burning in the sun of summer, would not it be as wise to invest in systems that prevent occupants from burning if a fire occurs and that cost about as much to install and operate?

The final piece of this responsibility of the fire service is delivering targeted public education with an evaluation of the program to ensure that the message is being both delivered and received. Public education should be the focus of every member of the department, not just the commanding officer. One person, or even a handful of people, cannot deliver a public-education message to such a diverse and geographically large area. Rather, all of the fire companies should be expected to communicate with schools and other public group facilities in their district and to coordinate the delivery of public education to all levels. Like community policing in law enforcement, fire staff should be calling community groups and seeing if there are any issues, if there are problems that can be corrected, and if they need further action on the part of the city.

Public education should also not be limited to fire-prevention week. Fire prevention should be a year-round focus and should complement the

department education, fire prevention, and inspections. Only by having a total system can safety be impacted.

A goal of the department should be to train every child from third grade and up—as well as the rest of the community—in CPR. Joined with AEDs in all city vehicles and public buildings and the aggressive stance taken by EMS, Alameda should be an example of how to deliver a complete safety system.

The department employs people in a Fire Corp and is doing a good job at building the program. This should be expanded through CERT or other programs to enable functions to be turned over to civilians if they do not require sworn personnel. Sworn personnel can assist, but they could be called away if emergencies occur and not disrupt the delivery of services. Utilizing civilians and volunteers can allow staff to focus on critical service issues.

VI. Staffing and Buildings

The island of Alameda is 4 miles long, with a separate portion called Bay Farm Island. Using standards and recommendations developed by the ISO, a fixed station should be located every 1.5 miles with an engine company; every two miles with a ladder.

Using that basis for fire deployment, which is a minority of the time spent by Alameda Fire Department, three stations on the larger island portion and one serving Bay Farm Island would satisfy the ISO Public Protection Classification Program (PPC). The PPC requires one truck company with a radius of 2 miles, and the proposal would station one staffed truck company with one in reserve at station 4—again meeting the ISO requirements. The second would require cross-staff by one of the engine companies and available for response to the Bay Farm Island area.

In other words, the brown-out of the truck is not necessary; it could be eliminated from full staffing without affecting the department. The following charts provide supporting data for this decision.

Calls With Both Truck Units Dispatched (2771, 2772)

Call Type	< 0.5 Hour	0.5 to 1 Hour	1 to 2 Hours	> 2 Hours	Total Calls	Avg. Dispatched Units
EMS	1	1			2	3.5
Psychiatric			1		1	6.0
Outside Fire	1	1			2	6.5
Structure Fire	**80**	**28**	**11**	**12**	**131**	**6.4**
Hazard	2				2	7.0
Traffic	1				1	4.0
Service	1				1	7.0
Alarm	8				8	3.0
Total	**94**	**30**	**12**	**12**	**148**	**6.2**

Observations:

- There are total 148 calls with both truck units dispatched, among which 145 were fire-related calls.

- A total of 131 out of 148 (89%) calls were structure fire calls.

- A total of 108 out of 131 (82%) structure fire calls lasted less than an hour. Another 23 out of 131 (18%) structure fire calls lasted longer than an hour.

Calls Where Both Trucks Were Busy

2771/2772	EMS	Structure Fire	Fire Other	Total
EMS	0	3	6	**9**
Structure Fire	1	**1**	3	**5**
Fire Other	1	2	12	**15**
Total	**2**	**6**	**21**	**29**

Notes: There are no outside fire calls 2771 and 2772 were busy at different calls.

If either unit's (2771, 2772) dispatched time was between the other unit's dispatch time and available time at another call or its available time was between the other unit's dispatch time and available time at another call, it is included.

Observations:

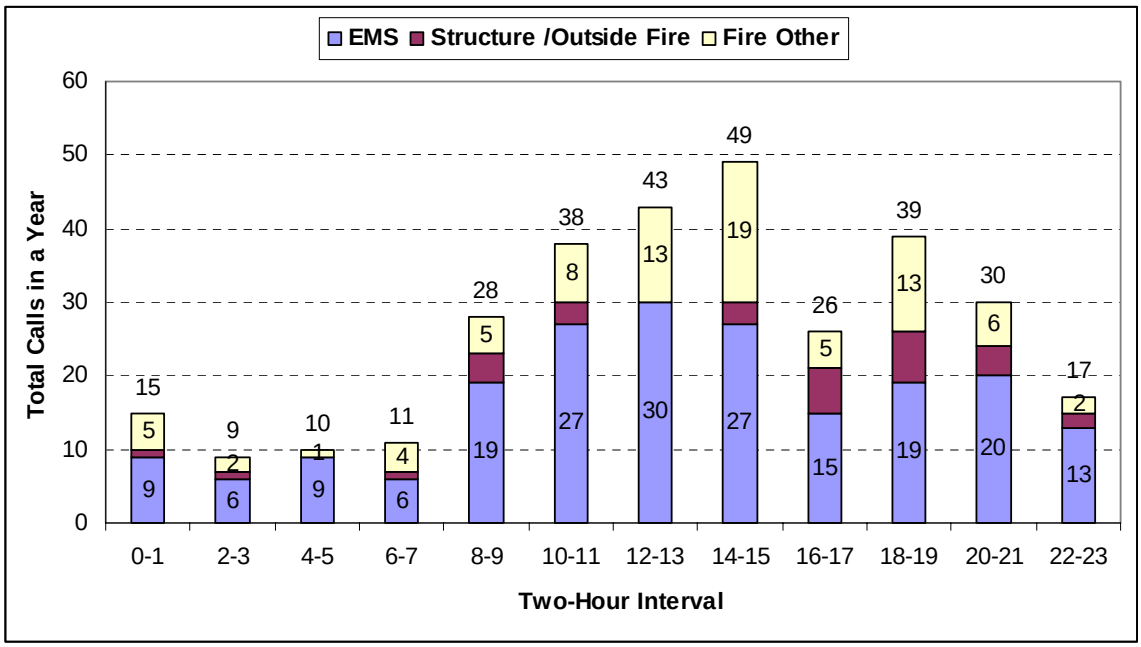
- Units 2771 and 2772 were sent to different calls at the same period 29 times in a year.

- Among those 29 times, both calls were structure fire calls only 1 time.

The redeployment envisions closing station 3. Another option that could be considered is closing station 5 on the former military base until sufficient development occurs in order to justify full staffing. Looking at calls for service, this station sees the fewest calls for service, and those calls for service drop off dramatically during night hours. However, realignment of calls and stationing specialized ops out of station 5 would increase the likelihood of deployment from that station and should be reviewed before further reductions are made. If the station were closed, the personnel could be redeployed in other stations and would not be eliminated, thus the benefit would be savings on operating and upgrade costs.

Station 5: Call by Type by Two-Hour Interval

	Total Calls in a Year for Station 5				
Two Hours Interval	EMS	Structure/Outside Fire	Fire Other	Total	Hourly Rate
0-1	9	1	5	15	0.021
2-3	6	1	2	9	0.012
4-5	9	0	1	10	0.014
6-7	6	1	4	11	0.015
8-9	19	4	5	28	0.038
10-11	27	3	8	38	0.052
12-13	30	0	13	43	0.059
14-15	27	3	19	49	0.067
16-17	15	6	5	26	0.036
18-19	19	7	13	39	0.053
20-21	20	4	6	30	0.041
22-23	13	2	2	17	0.023
Total Calls	200	32	83	315	



Because Alameda transports to the hospital, the city should pursue developing agreements that would provide the EMS director as part of the hospital staff with either the captains or division chiefs serving as liaisons. The hospital has a vested interest in having patients brought to them versus taken off the island; patient continuity of care is also provided if the responder and trauma center are closely affiliated and knowledgeable of what standard of care is being provided.

VII. Outcome-Focused Department

Alameda delivers many good services to its citizens. The department is under new leadership and was willing to undertake the comprehensive review. It has a younger staff that demonstrates a desire to train and improve.

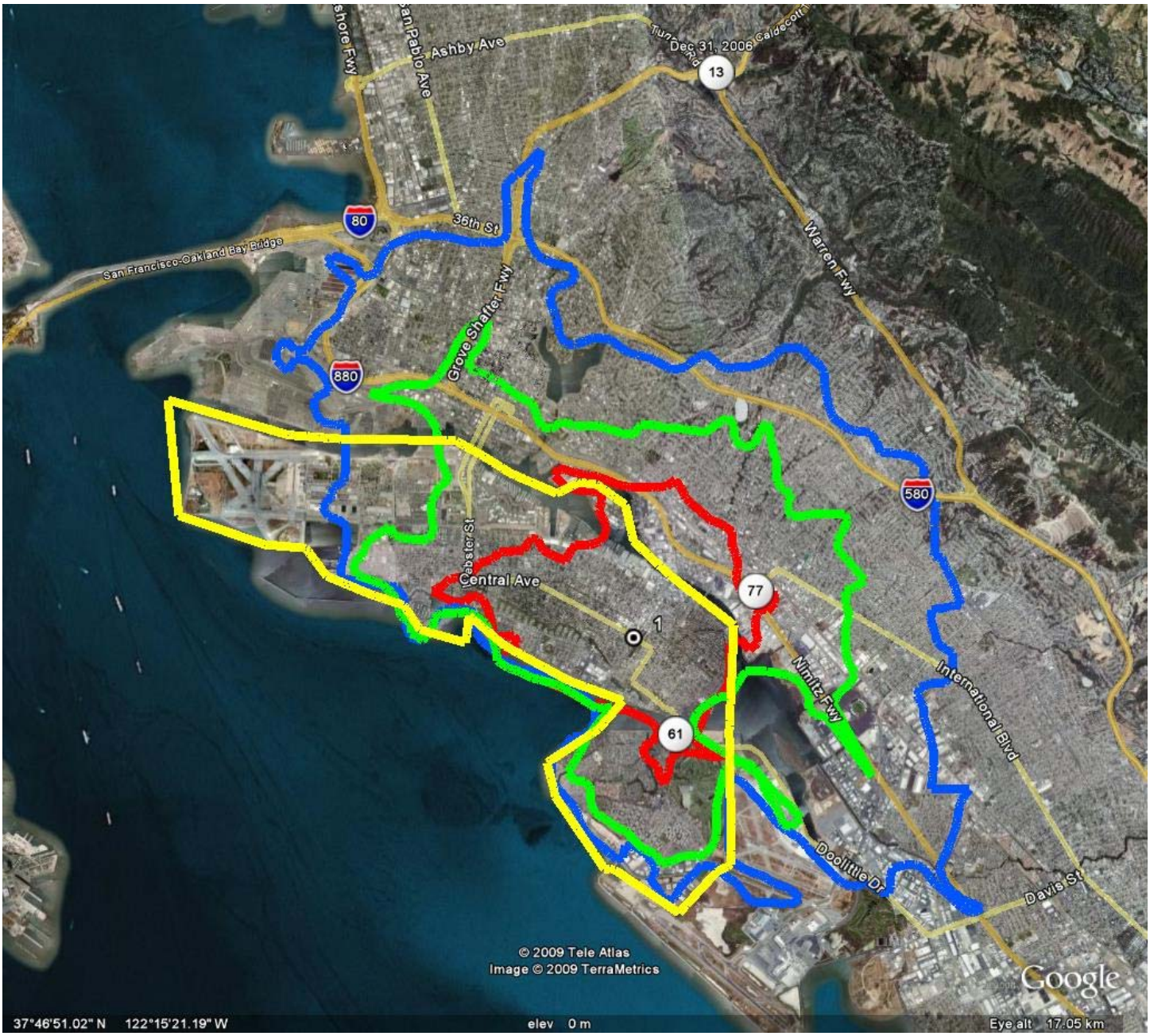
The challenge facing the department, and ultimately the city, is changing from a reactive, output-focused department to one that looks at outcomes. Central to becoming an outcome-focused department is developing a comprehensive mission, vision, and value that focus on key service delivery. The elected body and the citizens must agree with stated service delivery goals.

The next step is creating performance measures for goals that achieve the adopted strategies. The performance measures should evaluate outcomes. Instead of saying the department responded to 10 cardiac arrests last year, the question should be, “What was the outcome of those interventions?” If the strategy is to successfully treat and transport viable patients who recover from sudden cardiac onset, performance measures must be in place to determine if that is being achieved. HIPPA and other rules complicate the quality improvement- and performance-measuring aspects of departments, but they are not total roadblocks.

Similarly, if the strategy is to develop Alameda as a fire-preventive community, then all aspects of achieving that strategy need to be aligned and functioning.

The entire department, not only the commanders of the various units, should focus on outcomes. A significant number of hours is being paid by the city for work by various employees in the department. Not all of these hours are being used, and there is substantial talent within the ranks to deliver improved levels. If all personnel are involved, the workload can be

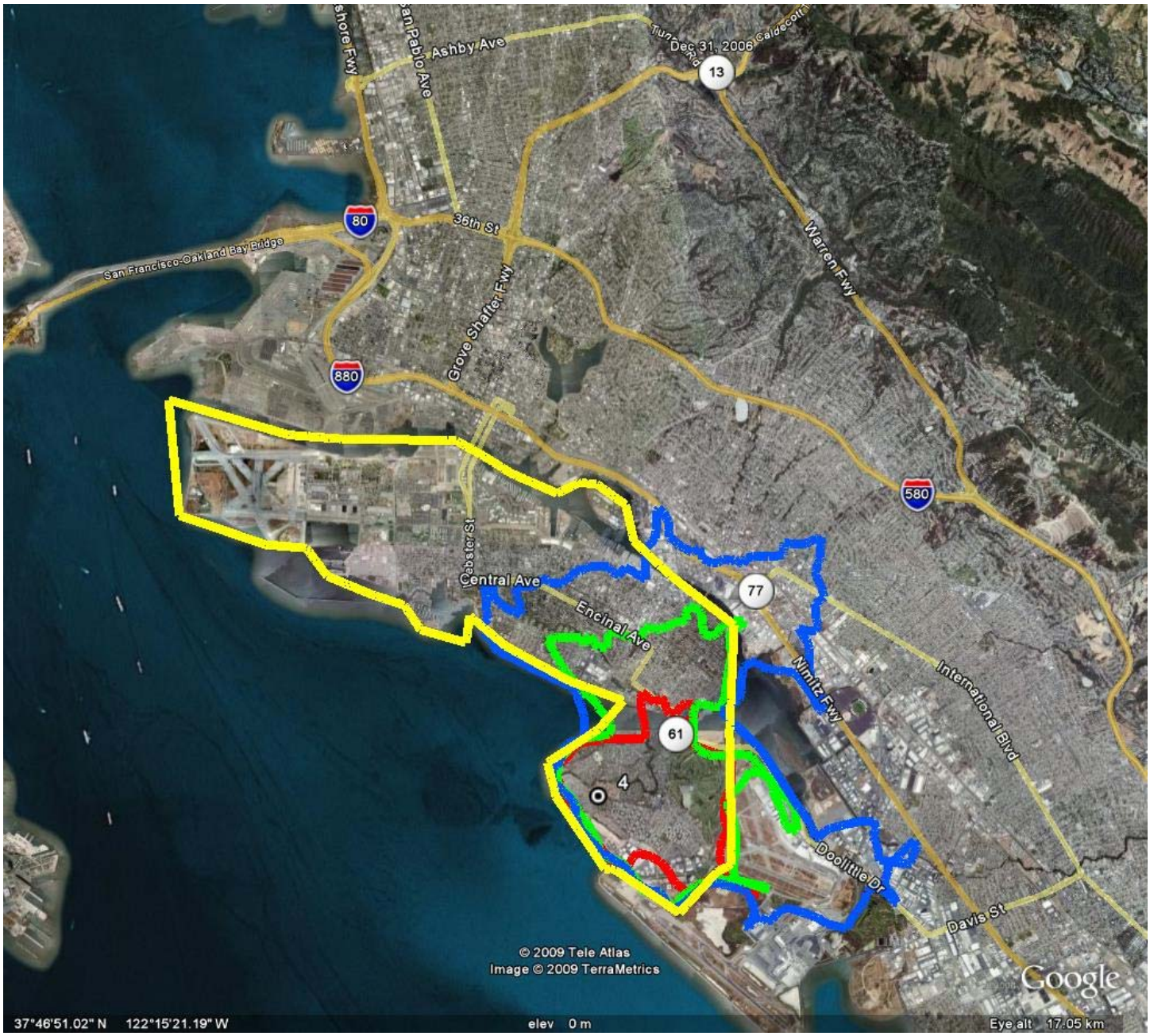
more appropriately assigned and not overwhelm the few who are currently trying to handle the functions. The challenge for the command then becomes managing and coordinating these efforts, not conducting the efforts themselves.



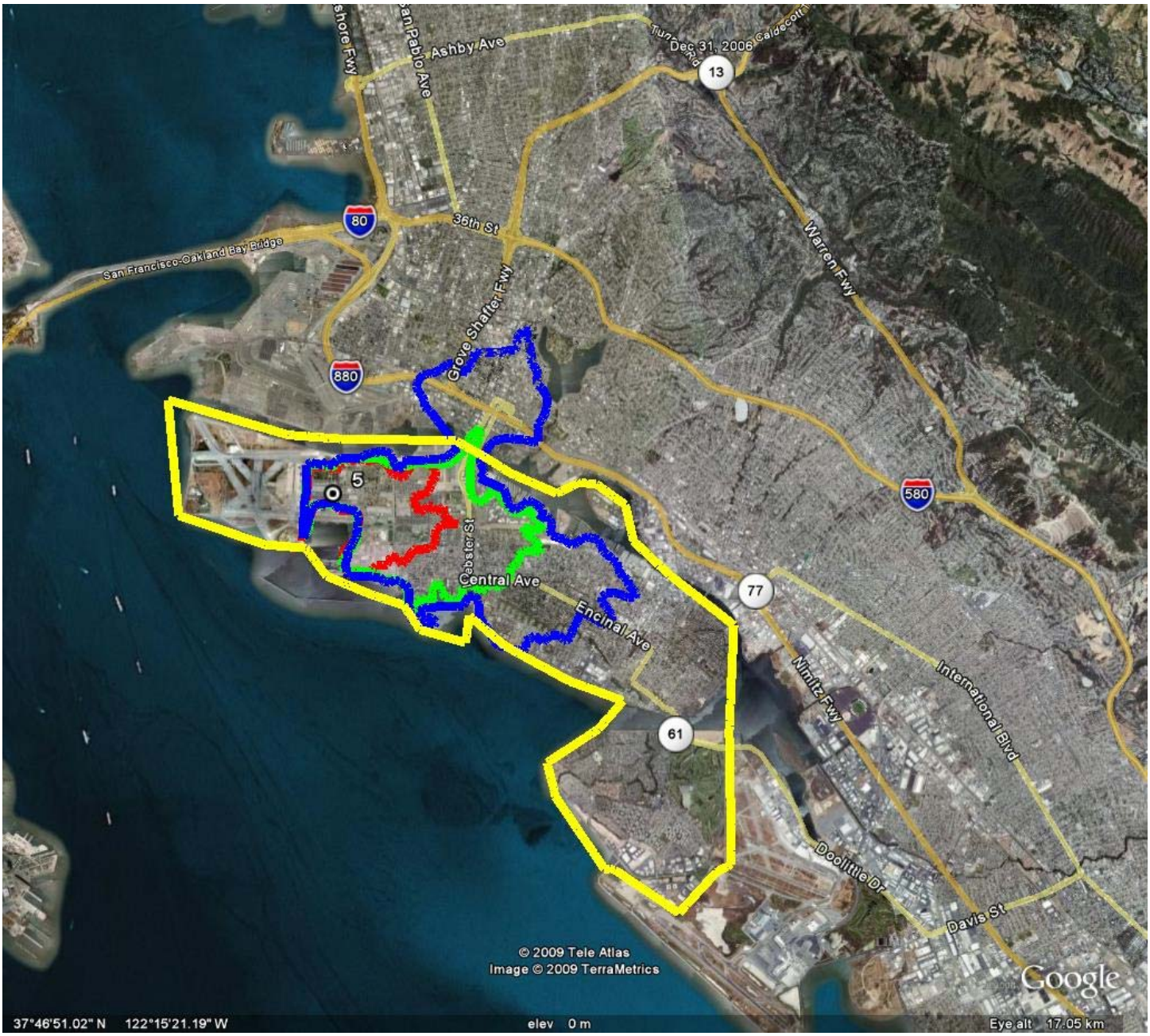
Map 1: Station 1 Response Coverage Area in 4, 6 and 8 minutes

Map 2: Station 2 Response Coverage Area in 4, 6 and 8 minutes

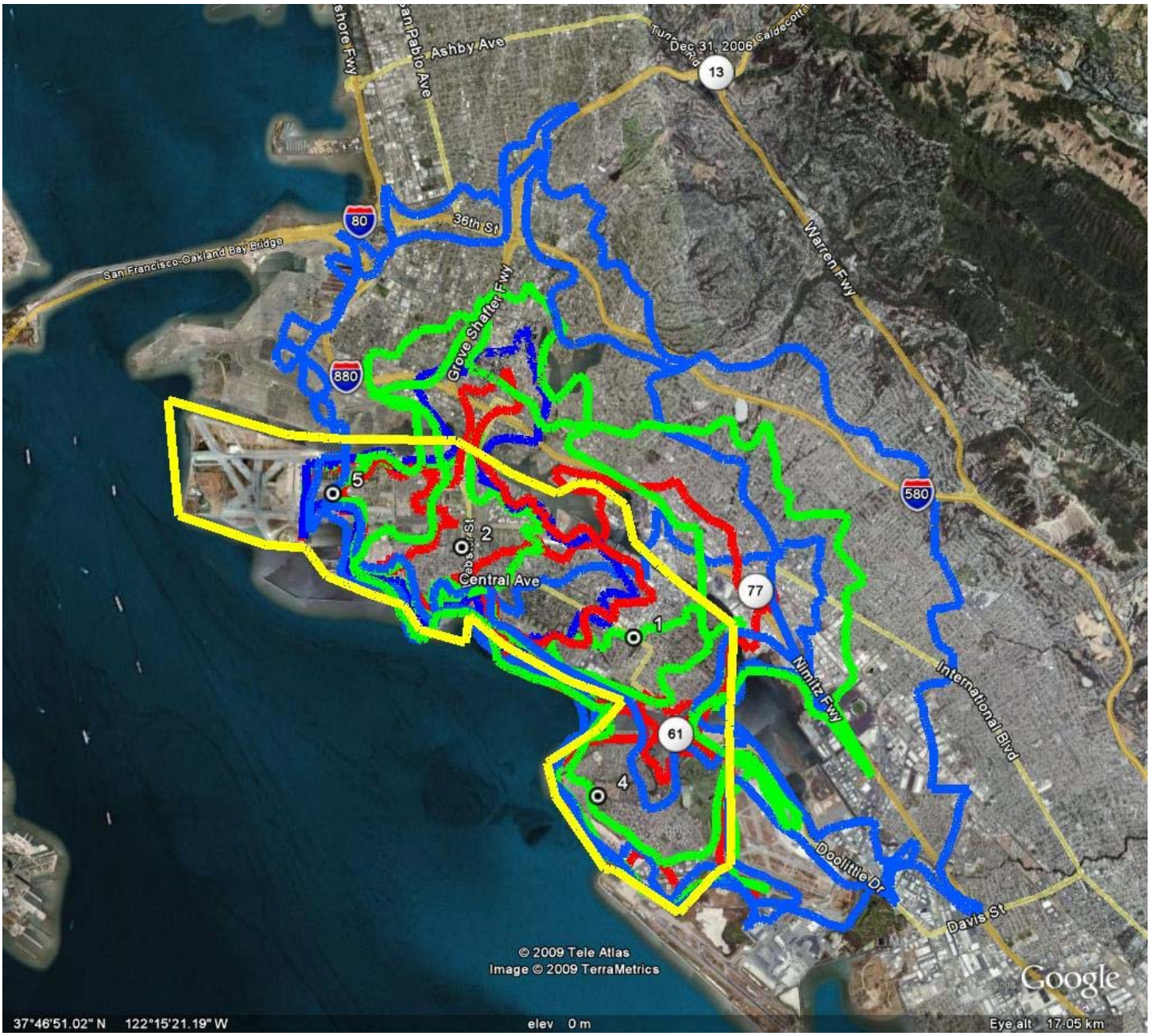
Map 3: Station 3 Response Coverage Area in 4, 6 and 8 minutes



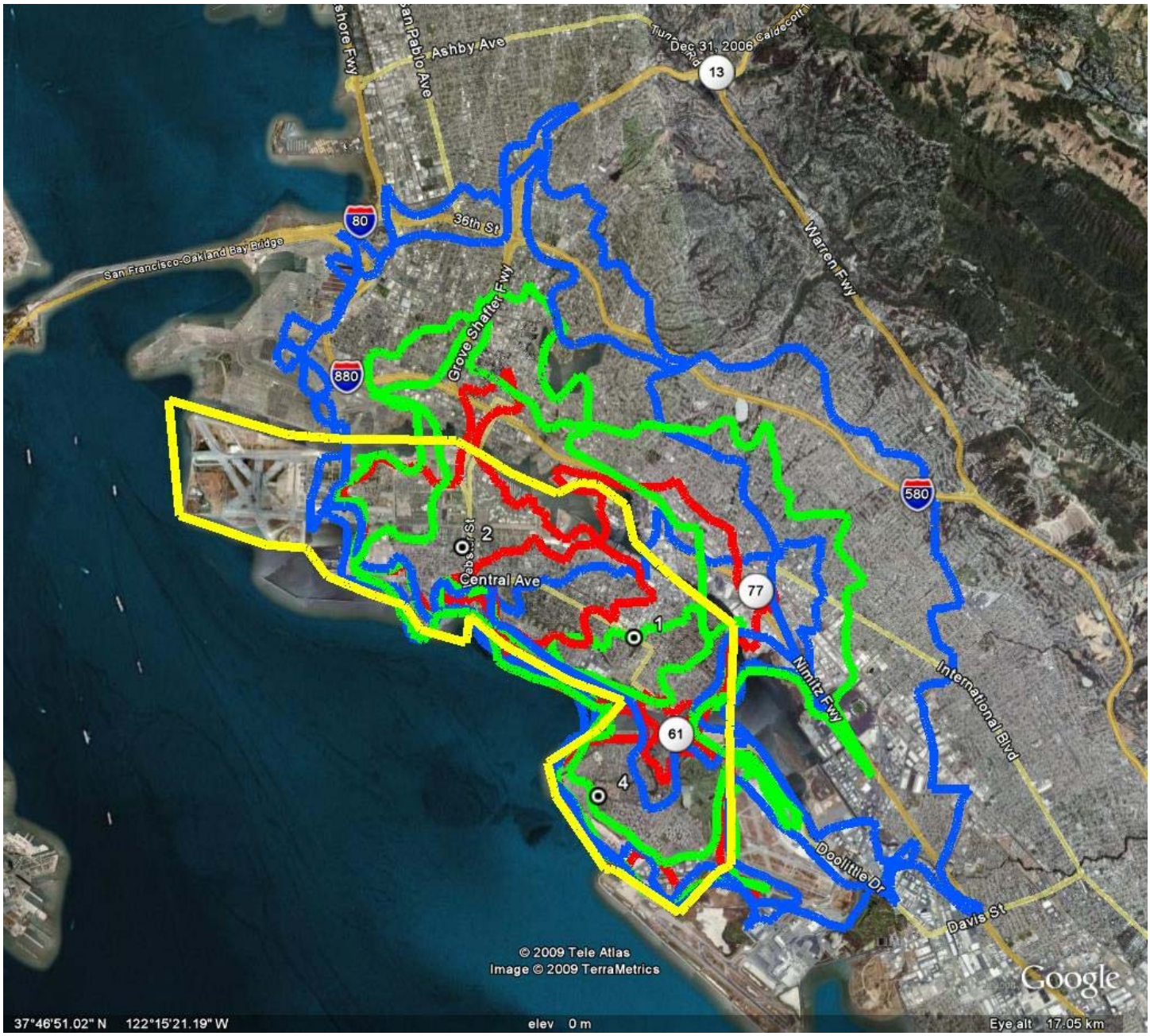
Map 4: Station 4 Response Coverage Area in 4, 6 and 8 minutes



Map 5: Station 5 Response Coverage Area in 4, 6 and 8 minutes



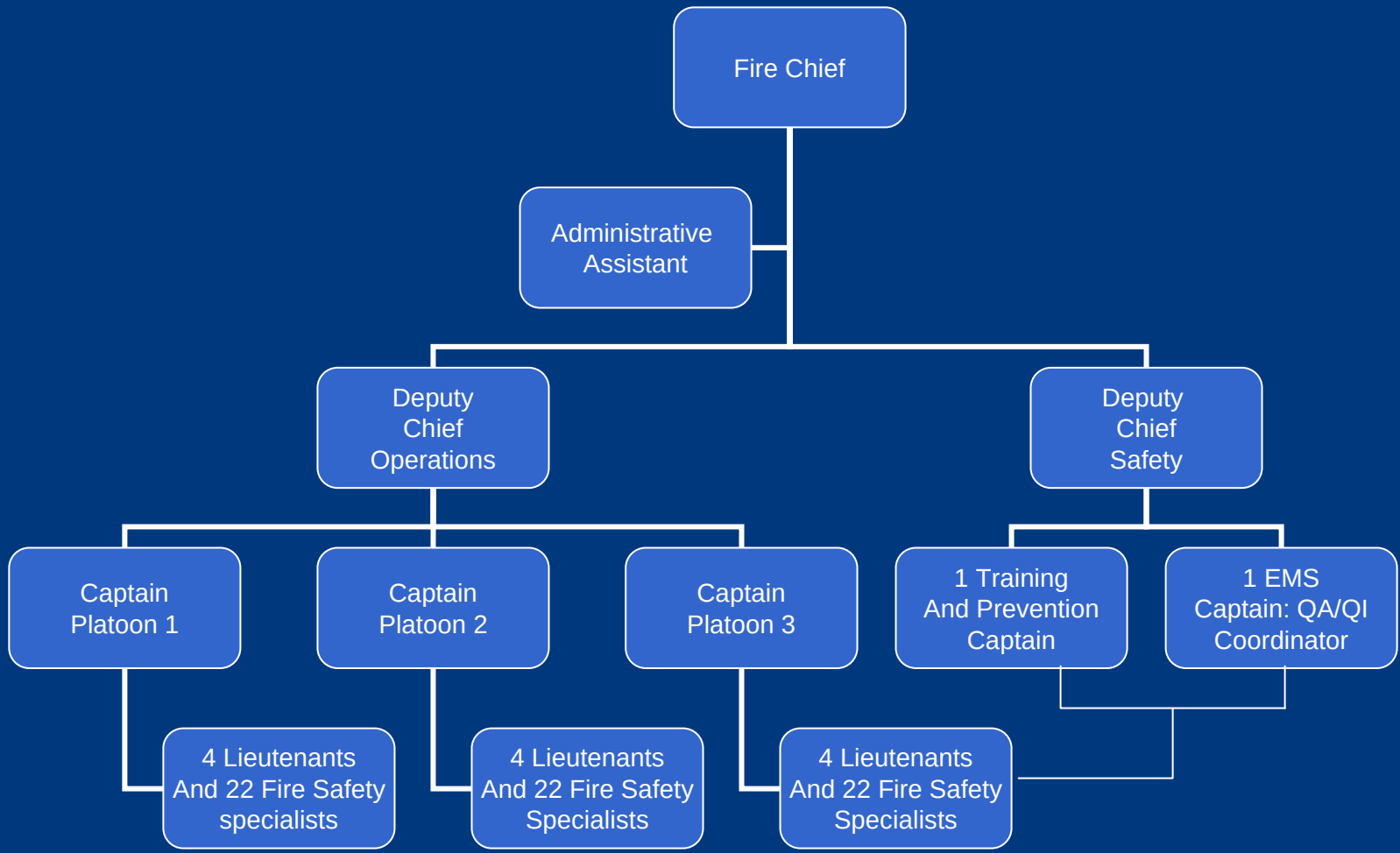
Map 6: Effect of closing Station 3



Map 7: Affect of Closing Stations 3 and 5

Map 8: Response Coverage Area Utilizing Two Stations -- 2 and 4

City of Alameda, CA



Organizational Chart for Alameda Fire Department

Staffing Analysis Utilizing 12, 24, and 10/14 Shifts for Alameda Fire Department

With Kelly Days

	Shift Description		
	12	24	"10/14
Average shift length HRS	12	24	12
hours per week	42	60	41
weeks	52	52	52
Total hours Scheduled	**2184**	**3120**	**2132**
Hours NOT Worked			
Holidays	0	0	0
Vacation	10	10	10
Kelley		9	
Sick days	12	12	12
Total Days Lost	22	31	22
Total Hours Lost	**264**	**744**	**264**
NET Hours Worked	**1920**	**2376**	**1868**
min manning	21	21	21
hours/day	24	24	24
days	365	365	365
total manhours needed	183,960	183,960	183,960
manpower for department	95.8	77.4	98.5
	4 shifts	3 shifts	4 shifts
Personnel per shift	24.0	25.8	24.6

KEY