

FIRE SERVICES ANALYSIS REPORT

Union City, California

Draft



CPSM[®]

CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC
475 K STREET NW, STE 702 • WASHINGTON, DC 20001
WWW.CPSM.US • 716-969-1360

ICMA

Exclusive Provider of Public Safety Technical Services for
International City/County Management Association

THE ASSOCIATION & THE COMPANY

The International City/County Management Association (ICMA) is a 103-year old, non-profit professional association of local government administrators and managers, with approximately 13,000 members located in 32 countries. Since its inception in 1914, ICMA has been dedicated to assisting local governments and their managers in providing services to its citizens in an efficient and effective manner. ICMA advances the knowledge of local government best practices with its website, www.icma.org publications, research, professional development, and membership. The ICMA Center for Public Safety Management (ICMA/CPSM) was launched by ICMA to provide support to local governments in the areas of police, fire, and Emergency Medical Services.

The Center also represents local governments at the federal level and has been involved in numerous projects with the Department of Justice and the Department of Homeland Security. In 2014 as part of a restructuring at ICMA the Center for Public Safety Management, (CPSM) spun out as a separate company and is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA, PERF, IACP, IFCA, IPMA-HR, DOJ, BJA, COPS, NFPA, etc.

The Center for Public Safety Management, LLC maintains the same team of individuals performing the same level of service that it had for ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis, using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs as well as industry best practices. We have conducted over 315 such studies in 42 states and provinces and 220 communities ranging in size from 8,000 population Boone, IA to 800,000 population Indianapolis, IN.

**Note: This report has not been edited and is being produced to secure additional input and comment by the elected officials of Union City. Those comments and concerns will be addressed in the final, edited report.*

CENTER FOR PUBLIC SAFETY MANAGEMENT PROJECT CONTRIBUTORS

Thomas J. Wieczorek, Director

Leonard A. Matarese, Director, Research & Project Development

Dov Chelst, Ph.D. Director of Quantitative Analysis

Ryan Johnson, Data Analyst

Dennis Kouba, Senior Editor

CONTENTS

Contents.....	iii
Tables	v
Figures	vi
Introduction	7
Recommendations/considerations.....	8
Station analysis.....	10
EMS.....	12
Sprinklers.....	13
Financial.....	15
Analysis of Calls Affected by the Removal of Station 30	16
Introduction	31
Methodology	32
Aggregate Call Totals and Runs	33
Overview of Calls	33
Calls by Type	34
Calls by Type and Duration.....	37
Average Calls per Day and per Hour	39
Units Dispatched to Calls	41
Workload: Runs and Total Time Spent.....	44
Runs and Deployed Time.....	44
Workload by Station	48
Analysis of Busiest Hours.....	50
Response Time.....	52
Response Time by Type of Call.....	52
Response Time by Hour	56
Response Time Distribution	58
Work Outside of Union City	61
Attachment I: Actions Taken	62
Attachment II: Administrative Workload.....	63
Attachment III: Fire Loss.....	64
Attachment IV: Transport Call Analysis.....	65
Transport Calls by Type	65
Transport Calls by Type and Duration	66

Transport Time Components67

TABLES

TABLE 1: Overview of Calls, by Grand Call Type and Location	33
TABLE 2: Call Types	34
TABLE 3: Calls by Type and Duration	37
TABLE 4: Calls by Call Type and Number of Units Dispatched	41
TABLE 5: Annual Runs and Deployed Time by Run Type.....	44
TABLE 6: Average Deployed Minutes by Hour of Day.....	47
TABLE 7: Call Workload by Station/Agency	48
TABLE 8: Total Annual Runs by Run Type and Station/Agency.....	48
TABLE 9: Daily Average Deployed Minutes by Run Type and Station/Agency	48
TABLE 10: Frequency Distribution of the Number of Calls	50
TABLE 11: Frequency of Overlapping Calls	50
TABLE 12: Station Availability to Respond to Calls.....	51
TABLE 13: Top 10 Hours with the Most Calls Received.....	51
TABLE 14: Average Response Time of First Arriving Unit, by Call Type (Minutes)	53
TABLE 15: 90th Percentile Response Time of First Arriving Unit, by Call Type (Minutes)	54
TABLE 16: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day	56
TABLE 17: Cumulative Distribution of Response Time – First Arriving Unit – EMS	59
TABLE 18: Cumulative Distribution of Response Time – First Arriving Unit – Fire	60
TABLE 19: Work – Runs	61
TABLE 20: Work – Hours	61
TABLE 21: Actions Taken Analysis for Structure and Outside Fire Calls	62
TABLE 22: Workload of Administrative Units	63
TABLE 23: Content and Property Loss – Structure and Outside Fires	64
TABLE 24: Total Fire Loss Above and Below \$20,000.....	64
TABLE 25: Transport Calls by Call Type.....	65
TABLE 26: Transport Call Duration by Call Type	66
TABLE 27: Time Component Analysis for Ambulance Transport Runs by Call Type (in Minutes)	67

FIGURES

FIGURE 1: EMS Calls by Type	35
FIGURE 2: Fire Calls by Type	35
FIGURE 3: Average Calls per Day, by Month	39
FIGURE 4: Calls by Hour of Day	40
FIGURE 5: Calls by Number of Units Dispatched – EMS	42
FIGURE 6: Calls by Number of Units Dispatched – Fire	42
FIGURE 7: Average Deployed Minutes by Hour of Day	46
FIGURE 8: Average Response Time of First Arriving Unit, by Call Type – EMS	53
FIGURE 9: Average Response Time of First Arriving Unit, by Call Type – Fire	54
FIGURE 10: Average Response Time of First Arriving Unit, by Hour of Day	57
FIGURE 11: Cumulative Distribution of Response Time – First Arriving Unit – EMS	58
FIGURE 12: Frequency Distribution of Response Time – First Arriving Unit – Fire	59

APPENDIX

Tulsa, Oklahoma White Paper and Report

INTRODUCTION

The first portion of the comprehensive analysis report will examine the services provided from the four fire stations located within Union City.

CPSM evaluated the station locations using travel times, overall response times, historical information, and the potential for future demand.

CPSM reviewed work done by CityGate Associates, LLC. CPSM found that CityGate's study of the Alameda County Fire Department followed recognized criteria established by the Insurance Service Offices (ISO), the National Fire Protection Association (NFPA), and criteria used by the Center for Public Safety Excellence, Inc. (CPSE) for accreditation of fire departments. CPSM also conducted several days of on-the-ground reviews of station locations, property development, traffic patterns, and other community demographics.



RECOMMENDATIONS/CONSIDERATIONS

1. CPSM reviewed the locations of the various stations and found that Station 30 is poorly located for Union City. However, CPSM would note that in the deployment of all units for Alameda County Fire Department, Station 30 is critical to achieving response times for Newark and other portions of the Alameda Fire District. Station 30 is also well positioned for mutual aid response to Fremont, with its location almost on the City limit. This is a common problem when the service areas of individual participants are matched against the larger deployment objectives of a consolidated agency; ideally a station can service a 1 ½ mile radius (approximately) rather than being located on a city limit unless there is opportunity for expansion. In Union City, there is no opportunity for expansion to maximize the service area of Station 30.

Alameda allows each of their communities the opportunity to determine the level of service they desire. Alameda County Fire Department provides all fire services while EMS utilizes a two-tiered system with transport by private provider. In the 337 ambulance service zones in California, 220 are currently being serviced by private ambulance companies (65.3%). A nationwide survey of the 200 largest cities in the United States, 34.6 percent utilized fire-based ambulances, 33.7 percent used private ambulance service providers and 14 percent used a third-party service provider. This type of approach is covered under NFPA 1710 and recognizes the Authority Having Jurisdiction (AHJ) is the ultimate arbiter of costs and service delivery. Modern fire service deployment relies on managing the risk in a community: no community mitigates 100% of the risk but makes a determination about what is acceptable to its citizens, businesses, and visitors.

For this reason, Station 30 is critical to Alameda County Fire Department meeting its stated Standard of Response Coverage of four-minute travel times, but the location is poorly placed for Union City. CPSM looked at the opportunity for growth in the area of Station 30 and, of all station locations in Union City, Station 30's area has the least opportunity for continued development. If Station 32 is ever replaced, it is suggested a slight move to the south would achieve travel time objectives without any traffic modifications and without station 30.

- The station is located within yards of the political subdivision boundary between Union City and Fremont. There is no opportunity for Union City to annex unincorporated lands into the City.
- The station is surrounded by undevelopable property – largely wetland and marshland – that cannot be developed.
- The existing footprint of land in Station 30 coverage area is built out.
- The remaining three stations are likely to see considerable redevelopment with adjacent rail, highway, and re-use of property. Station 30 did not exist for many years and from a Union City standpoint, makes little financial sense.
- The majority of calls in the city are for EMS services. Alternatives to keeping Station 30 open and staffed for fire would be to equip all patrol cars in Union City with Automatic Electronic Defibrillators (AED's) to handle sudden cardiac arrest calls and/or determine the appropriateness of a part-time EMS unit station at Station 30 by the Alameda County Health.

2. In addition to the change in deployment, the City should evaluate the ability to upgrade its existing traffic signal interruption equipment to a newer generation that uses cloud-based technology. Existing technology using Traffic Interruption devices are along key routes in the city. The older equipment relies on signal from approaching emergency equipment to change the traffic signal. The newer generation of technology is cloud-based and allows clearing of intersections to improve safety for responders, the public, and allow lower travel times for equipment. During a recent project in Placentia, California, the manufacturer indicated that properly placed Opticon devices could not only reduce response times by 25% but they also reduced the occurrence of traffic crashes at intersections. Station 32 has considerable congestion issues in the morning and evening rush hour periods. Responders and the public may benefit from clearing the intersections as they approach. The estimated cost of upgrading the older technology is \$4,000 per signal. Approximately 10 signals would need upgrading in the station 30/32 area for a cost of approximately \$40,000.

CPSM reviewed both on-the-ground and land use maps that indicate the northwest and northeast portions of the city may undergo considerable redevelopment and growth. These patterns would indicate that additional staffing may be needed in the future at these locations, particularly for EMS response.

3. CPSM found that closing Station 30 would have the following impacts for Union City:

a. There are 6,558 Service Runs* by ACFD Stations within Union City

***Runs are defined as apparatus responding to a call for service**

Station	30	31	32	33	Other	Total
Yearly Runs	636	1,872	1,728	1,980	372	6,588
Avg./Day	1.7	5.1	4.7	5.4	1.0	18.0

b. Travel Times

During the years that were analyzed, travel time (defined as the point at which vehicles leave the station to arrival on scene) for vehicles was:

- 4,006 -- less than 4 minutes
- 1,138 -- 4 to 6 minutes
- 63 -- 6 to 8 minutes
- 171 -- above eight minutes

c. A breakdown of calls responded to by Union City Stations showed:

5,378 calls for service in Union City	399 calls for service outside Union City
<ul style="list-style-type: none">• 4,008 EMS• 111 outside fire• 49 structure fire• 55 hazard• 205 other	<ul style="list-style-type: none">• 141 EMS• 161 Fire• 97 other

d. Service Runs Provided by Fire Station 30

- 78% percent of Station 30 runs were to locations within Union City

- 22 percent of Station 30 runs were to locations outside Union City, mostly Newark
- \$3.2 million annual operation cost to Union City General Fund

e. If Station 30 were closed:

Travel time changes within Union City would result in the following:

- 3,768 responded to in less than 4 minutes
- 1,375 calls responded to in 4 to 6 minutes (238 calls where Station 30 had responded)
- 64 calls responded to in 6 to 8 minutes
- 171 calls above eight minutes

f. Travel time changes:

- 237 calls that had a less than 4 minute travel time would not increase to 4 to 6 minutes
- 1 call once responded to in less than 4 minutes would be responded to in 6 to 8 minutes
- 177 EMS calls will have slightly increased response time

STATION ANALYSIS

CPSM provided bleed maps that indicate the response time areas achieved by the current station deployment models. If substantial development occurred in the northwest portion of the city near Station 32, it may be desirable to relocate that station further south that would more than adequately cover the response zone now assigned to 32 and 30.

Service Area based upon standards

Union City has an estimated population of approximately 73,877 people and a total service area of 19.4 square miles. However, approximately 9.5 square miles are in the Hillside area which is largely undeveloped. The urbanized area of Union City is approximately 9 square miles. Excluding hillsides and wetlands, the average service area for each of the existing stations is approximately 2.25 square miles.

In an FY 2011 *ICMA Data Report*, ICMA tabulated survey information from 34 municipalities with populations greater than 100,000 people. In this grouping the average fire station service area

was 13.1 square miles.¹ The median service area for this grouping was 7.17 square miles per fire station.²

In addition, the NFPA and ISO have established different indices in determining fire station distribution. The ISO Fire Suppression Rating Schedule, Section 560, indicates that first-due engine companies should serve areas that are within a 1.5-mile travel distance.³ The placement of fire stations that achieves this type of separation creates service areas that are approximately 4.5 square miles in size, depending on the road network and other geographical barriers (rivers, lakes, railroads, limited access highways, etc.). The National Fire Protection Association (NFPA) references the placement of fire stations in an indirect way. It recommends that fire stations be placed in a distribution that achieves the desired minimum response times. NFPA Standard 1710, Section 5.2.4.1.1, suggests an engine placement that achieves a 240-second (four-minute) travel time.⁴ Using an empirical model called the "piece-wise linear travel time function" the Rand Institute has estimated that the average emergency response speed for fire apparatus is 35 mph. At this speed the distance a fire engine can travel in four minutes is approximately 1.97 miles.⁵ A polygon based on a 1.97-mile travel distance results in a service area that on average is 7.3 square miles.⁶

From these comparisons, the average 2.25 square-mile service area per station in Union City is much lower than the noted references. A three-station configuration would result in an average service area of 3.0 square mile, still lower than the references provided.

¹ *Comparative Performance Measurement*, FY 2011 Data Report - Fire and EMS, ICMA Center for Performance Measurement, August 2012.

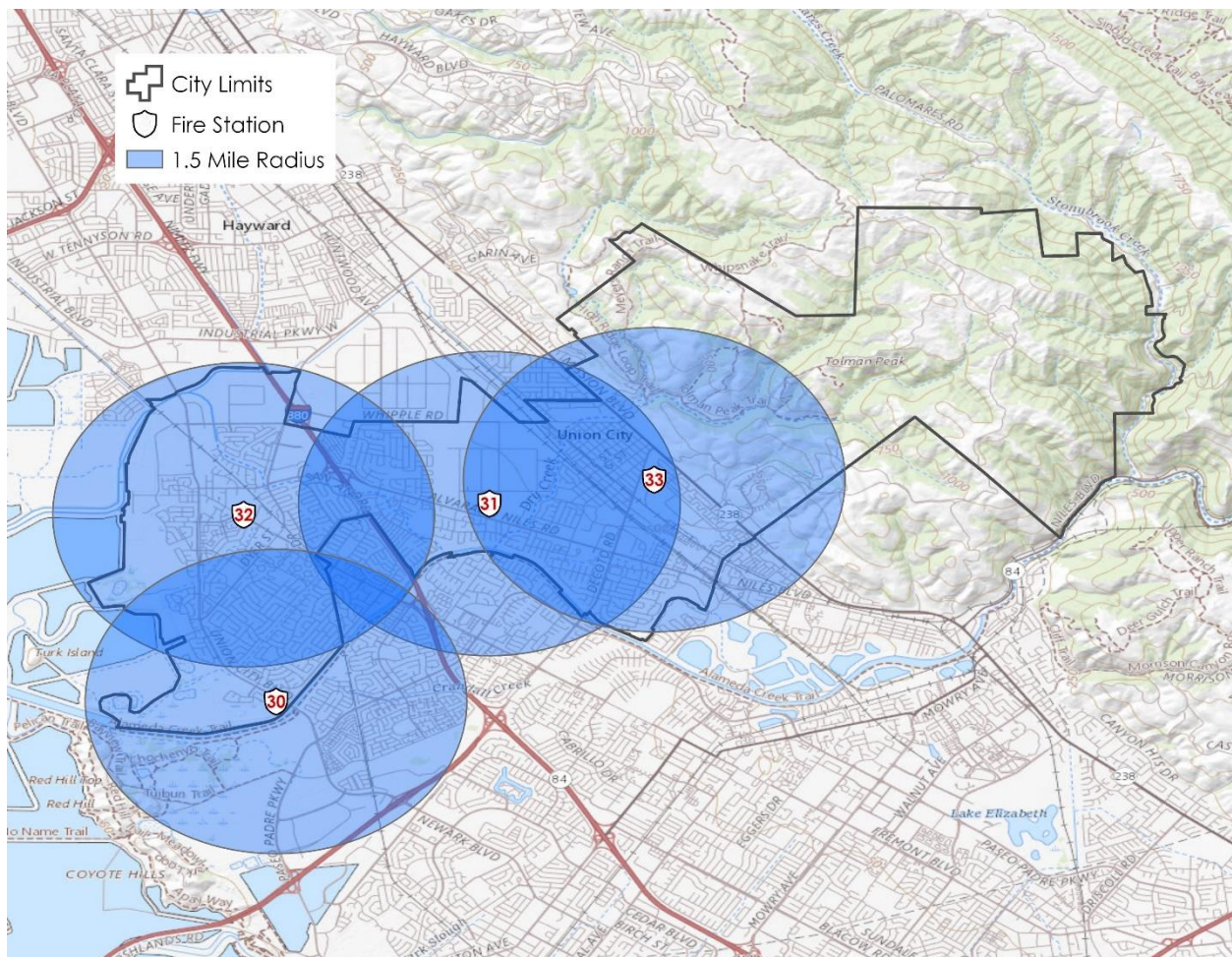
² Ibid.

³ Insurance Services Office. (2003) *Fire Protection Rating Schedule* (edition 02-02). Jersey City, NJ: Insurance Services Office (ISO).

⁴ National Fire Protection Association. (2010). *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. Boston, MA: National Fire Protection Association.

⁵ University of Tennessee Municipal Technical Advisory Service, *Clinton Fire Location Station Study*, Knoxville, TN, November 2012. p. 8.

⁶ Ibid., p. 9.



Using a 1 ½ mile station radius, more than half of Station 30's productive service area is outside the Union City limits.

EMS

Like most fire departments today, the Alameda County Fire Department deploys most of its time and resources to handling calls for Emergency Medical Services and not for actual fires. Alameda County operates on a two-tier system with a private provider deploying for transport while the fire department responds to answer calls.

CPSM has found and the results well documented in an exhaustive study in Tulsa, Oklahoma, that approximately 80 to 85% of the calls for service to fire departments are not true emergencies and require Basic Life Support transport services. In other words, most calls received do not require lights and siren or "hot" response. In the data section, most calls for Union City follow this pattern with approximately 25% dispatched as breathing, breathing and beating (cardiac, stroke) and 75% illness and other diagnostic response groups.

The American Heart Association indicates that for every minute after the onset of Sudden Cardiac Arrest (SCA) where intervention does not occur (CPR, defibrillation), the chances of survival decrease 10%. In other words, 10 minutes after the onset of a SCA incidence, some intervention should take place to prevent death significant health impacts.

CPSM recommends that regardless of whether Station 30 is closed, staffed only with EMS, or utilizes a two-person squad during peak call volume hours, the police department should train and be equipped with AED's in all road vehicles. Such programs have been in use for decades in southern Florida (one of the first in the nation took place in Dade County). AED use has become more common with units placed in public buildings, airports, restaurants, and other locations that often experience episodes of SCA. CPSM worked with Rocky Mount, North Carolina on a first-in-the-country project to identify locations and place AED's through a program funded by a rural initiative within the National Institute of Health. It recorded several saves as a result of having the units available and personnel trained to respond.

According to the Union City Police Chief, the department currently provides first aid/AED training every two years. The last training occurred in May 2019. To add AED's to the fleet (marked units primarily), the cost would be \$46,000.

The added benefit is that patrol cars are mobile and do not respond from fixed station locations, so they are likely to be closer to a caller and/or able to maneuver in traffic conditions better than a larger fire truck or ambulance.

SPRINKLERS

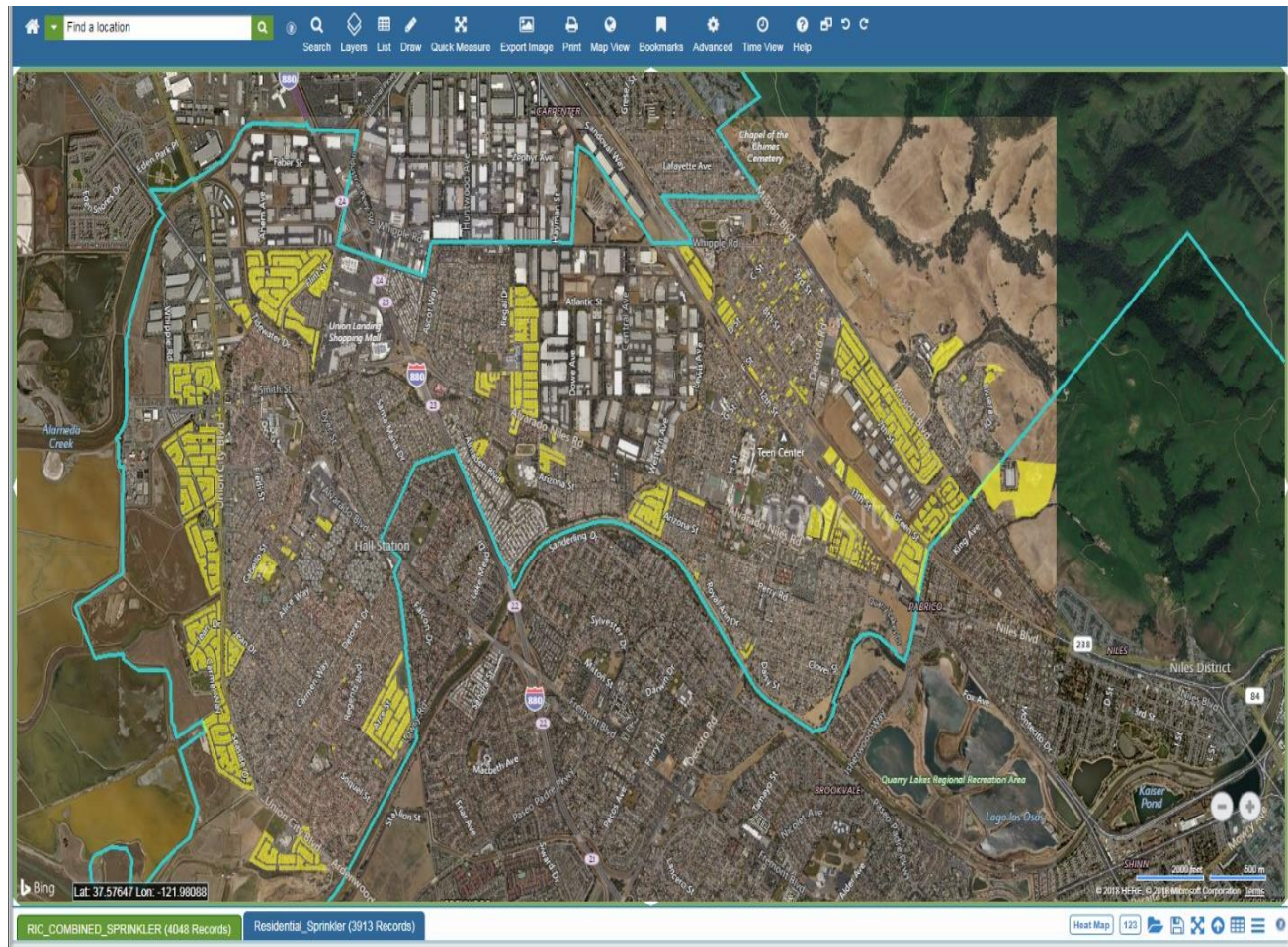
The Sylmar Earthquake of 1971 led to a rewrite of building codes which required sprinkler systems, smoke detectors, and other building modifications. Union City was one of the early promoters of sprinkler systems and considerable portions of the city have installed systems.

While the northeast and northwest quadrants of the city are slated for considerable development and redevelopment, the area around Station 30 is unlikely to see much change in the coming years because of the inability for land to be developed.

CPSM reviewed sprinkler installations as recorded by the city and found that the southern tip of the Station 30 area is largely sprinkler protected. Station 32 has considerable property already protected by sprinkler systems to its north.

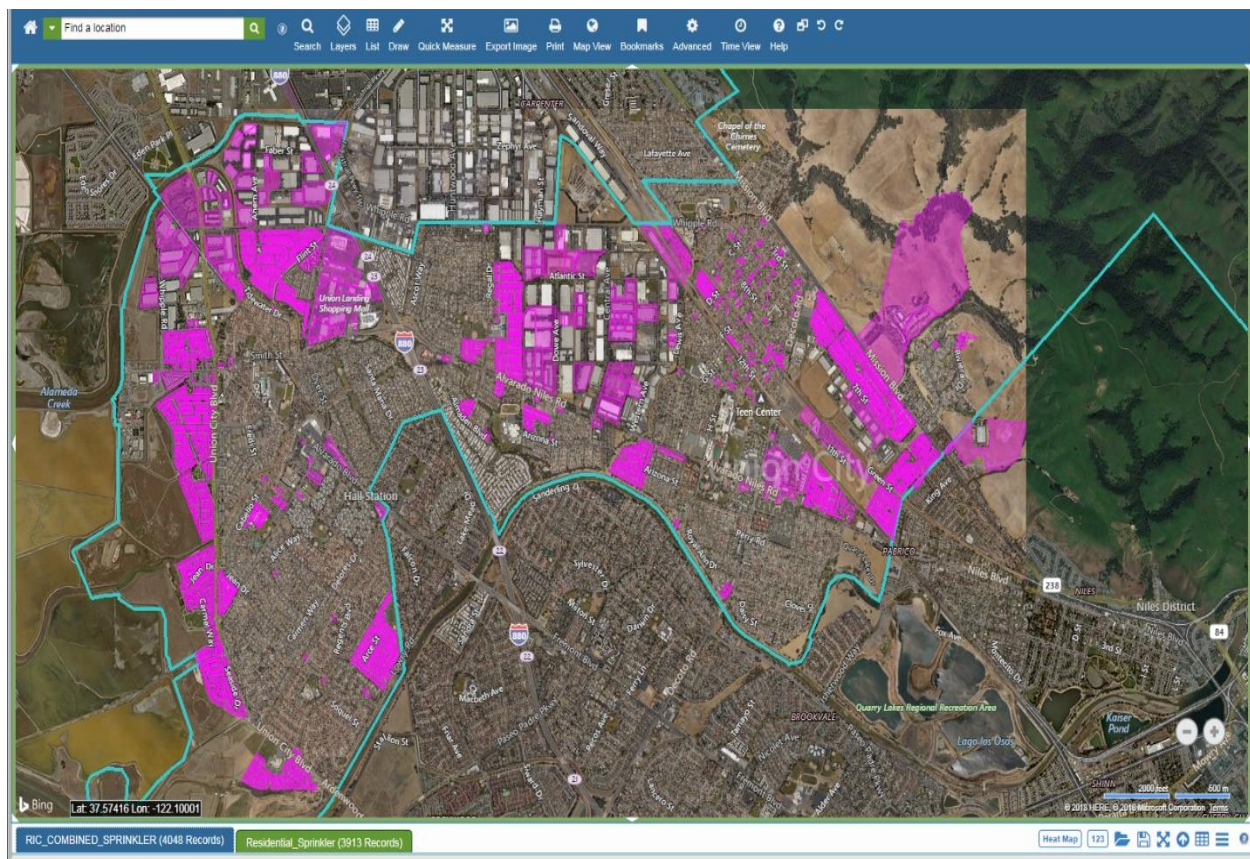
The installation of sprinkler systems reduces the risk of uncontrolled and undetected fires progressing into larger incidents. The City is to be commended for its progressive stance in this area.

Figure 1-1 Residential Sprinkler Systems



Records from Union City illustrate residential sprinkler systems that have been installed across the City. Building codes now require residential sprinklers in all construction.

Figure 1-2 Residential and Commercial Sprinkler Systems



Records from Union City illustrate the residential and commercial properties that are protected by sprinkler systems throughout the City. Redevelopment is likely to increase the properties protected by sprinkler systems throughout the city because of building code requirements.

FINANCIAL

In this analysis, we conducted a short analysis to determine how the costs for fire and EMS related to the General Fund of Union City.

In 2008, Union City operated its own fire department for approximately \$12,411,100 per year. In 2009/10, that cost was \$12,173,601.

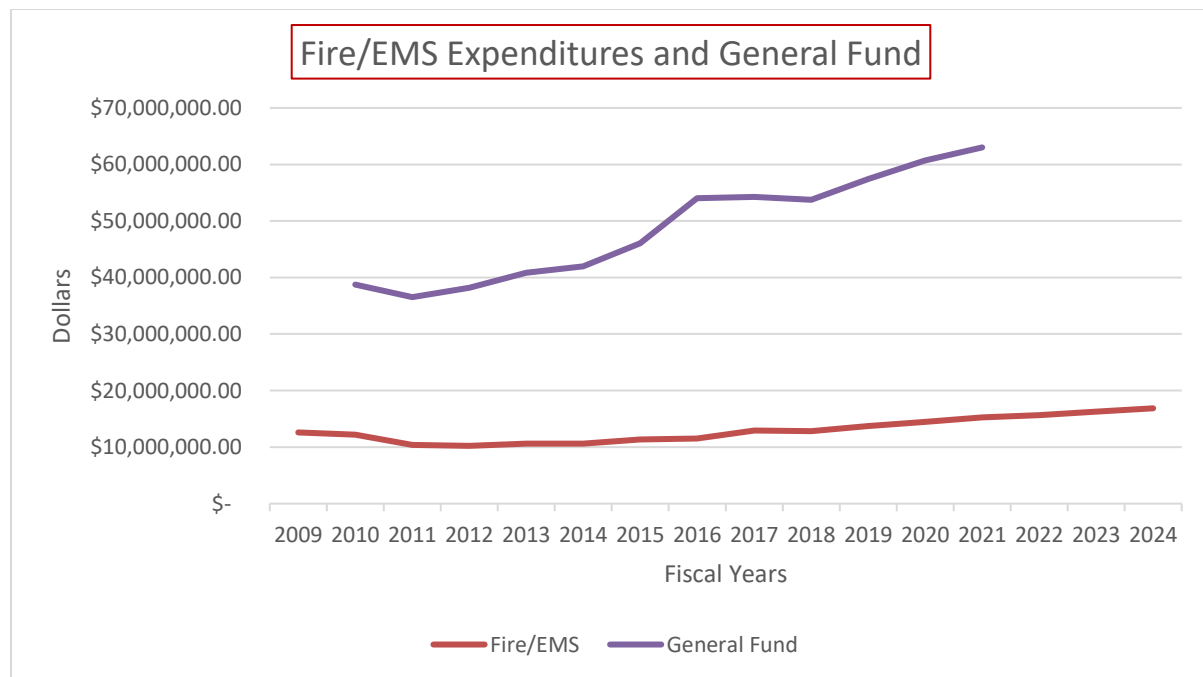
When Union City became part of the Alameda County Fire Department in 2010/11, the cost lowered to \$10,357,603. The costs since are:

- 2011/12 \$10,217,799
- 2012/13 \$10,604,424
- 2013/14 \$10,618,821
- 2014/15 \$11,321,370

- 2015/16 \$11,541,809
- 2016/17 \$12,913,584
- 2017/18 \$12,806,002
- 2018/19 \$13,737,242
- 2019/20 \$14,435,543 (Proposed)
- 2020/21 \$15,247,385 (Proposed)
- 2021/22 \$15,659,553 (Proposed)
- 2022/23 \$16,286,382 (Proposed)
- 2023/24 \$16,860,361 (Proposed). It should be noted that proposed budget amounts were provided by Alameda County Fire Department.

Thus, since Union City was transitioned to the Alameda County Fire Department, the change in budget has been \$4,889,782 or 47.21% (since 2010 to 2021). Looking at future projections through 2024, that gross percentage change will be 62.78%.

Should the City look at closing Station 30, the result would be a reduction to what it approximately spent on its own fire department in 2009 and 2010. That number may be reduced through the addition of an EMS unit, purchase of AED's, or traffic interruption technology.



ANALYSIS OF CALLS AFFECTED BY THE REMOVAL OF STATION 30

In this analysis, we conducted a short analysis to determine how travel times to the 5,378 recorded calls within the city would be affected by the removal of station 30. We relied on our

bleed map calculations to determine estimated travel times from each station to each call's location. We then determined the shorted travel time with or without station 30. We grouped travel times into the 4 amounts matching our bleed maps: within 4 minutes, between 4 and 6 minutes, between 6 and 8 minutes, and above 8 minutes.

Table 1 determines the number of calls with travel times within each of the 4 groups. It also identifies calls whose travel time would extend if station 30 were removed. Table 2 shows the new travel times of these calls. As you will see, only 238 calls would have longer travel times, representing 4% of total calls. In addition, nearly all new travel times would remain within 6 minutes.

Table 1: Distance of Calls from Nearest Station

Travel Time	Current	Unchanged	Changed
Less than 4	4,006	3,768	238
4 to 6	1,138	1,138	0
6 to 8	63	63	0
Above 8	171	171	0
Total	5,378	5,140	238

Table 2: Calls with Extended Time by Amount

Travel Time	Calls
4 to 6	237
6 to 8	1
Total	238

Table 3 examines the types of calls that whose travel times would change.

Table 3: Calls with Extended Travel Time, by Type

Call Type	Amount
Breathing Difficulty	31
Cardiac and Stroke	28
Fall and Injury	22
Illness and Other	57
MVA	4
Overdose and Psychiatric	5
Seizure and Unconsciousness	30
EMS Subtotal	177
False Alarm	21
Good Intent	5
Hazard	1
Outside Fire	7
Public Service	19
Structure Fire	2
Fire Subtotal	55
Canceled	6
Other Subtotal	6

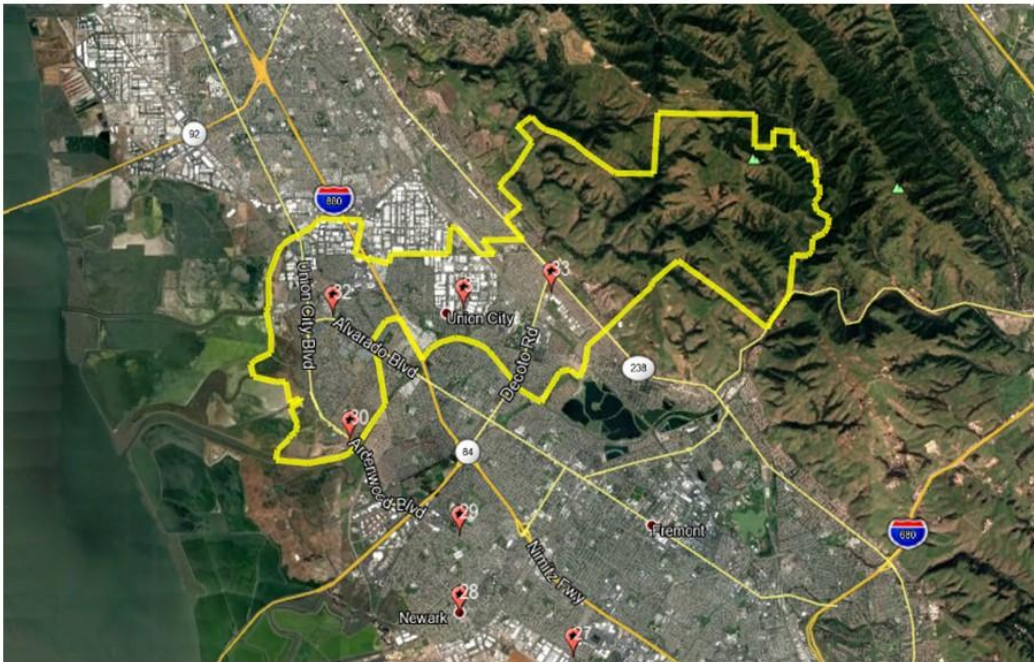
Figure 1-3 compares the existing performance of the Alameda County Fire Department with the guidelines and goals of NFPA 1710, the Deployment of Career Fire Departments.

This performance report card indicates that Union City does not now meet the 90th percentile of 4 minute travel time which is the goal of ACFD. Closing Station 30 will have minimal affect on response times to that portion of the city. However, it may impact other areas of the Alameda County Fire Department and those travel time goals.

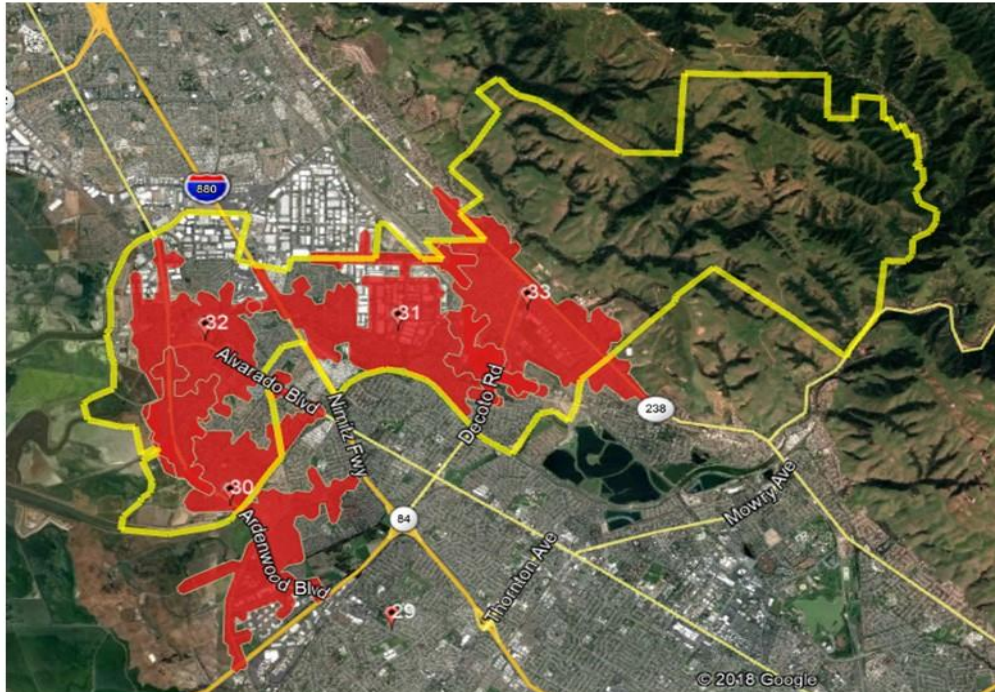
If Opticon or similar cloud-based system were installed (a diagram of how it works) in the joint Station 30-32 area and response times were reduced by 25%, the closure would have little, if any affect on responding units.

The following maps demonstrate:

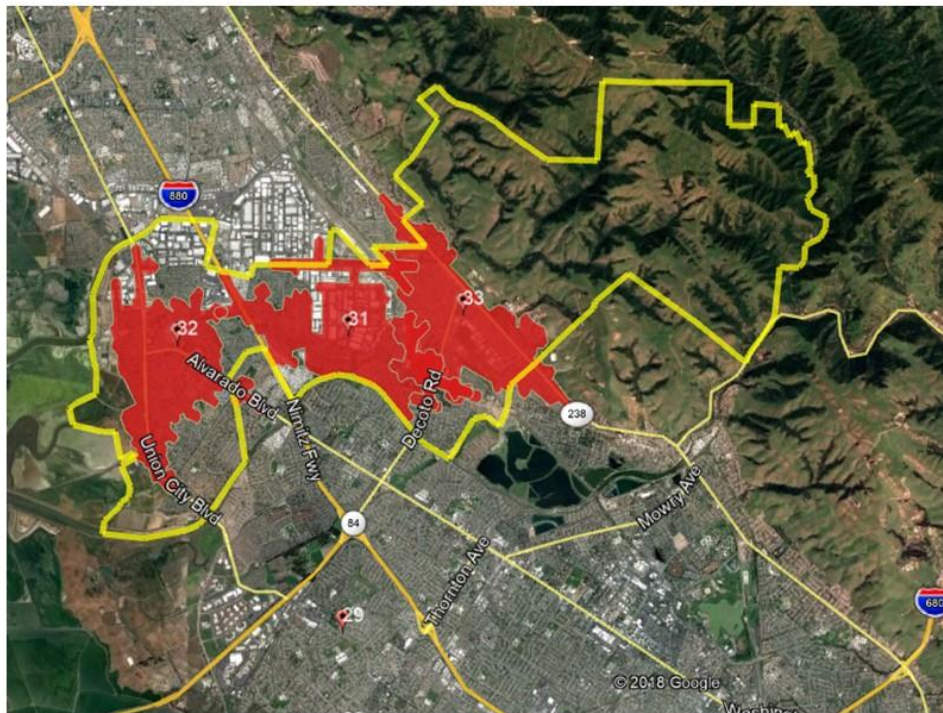
1. Location of existing stations showing Station 30 poorly positioned for Union City.
2. Map of four minute travel time from all Union City stations.
3. Map of four-minute travel time WITHOUT Station 30.
4. Map of six-minute travel time
5. Map of six-minute travel time without station 30
6. Map of eight-minute travel time
7. Location of Union City responded fire runs
8. Fire run density in Union City
9. Fire run density in the fire district using Station 30
10. EMS runs in the fire district using Station 30
11. EMS density in Union City
12. EMS density using station 30
13. Other runs in Union City
14. Other runs density in the fire district
15. Other runs density using station 30



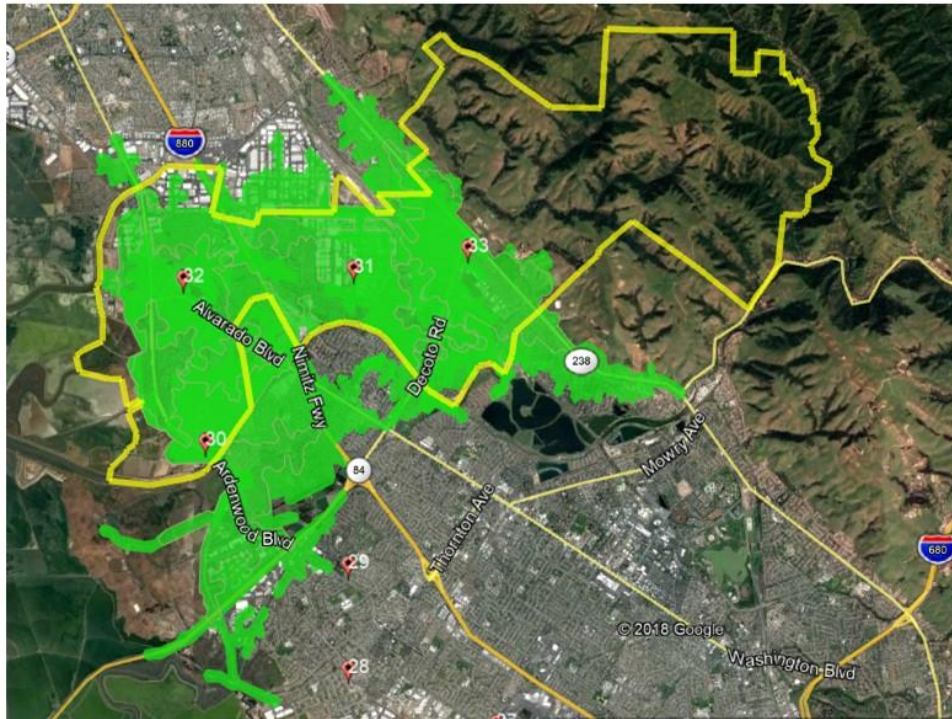
Stations



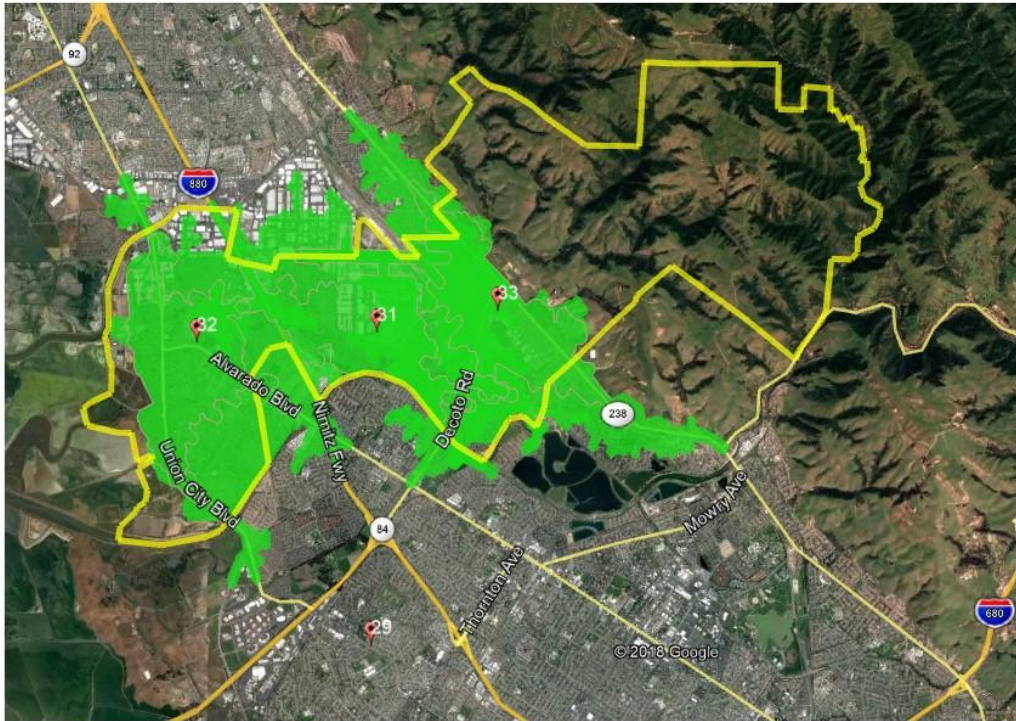
4 minutes



4 minutes (w/o Station 30)



6 min



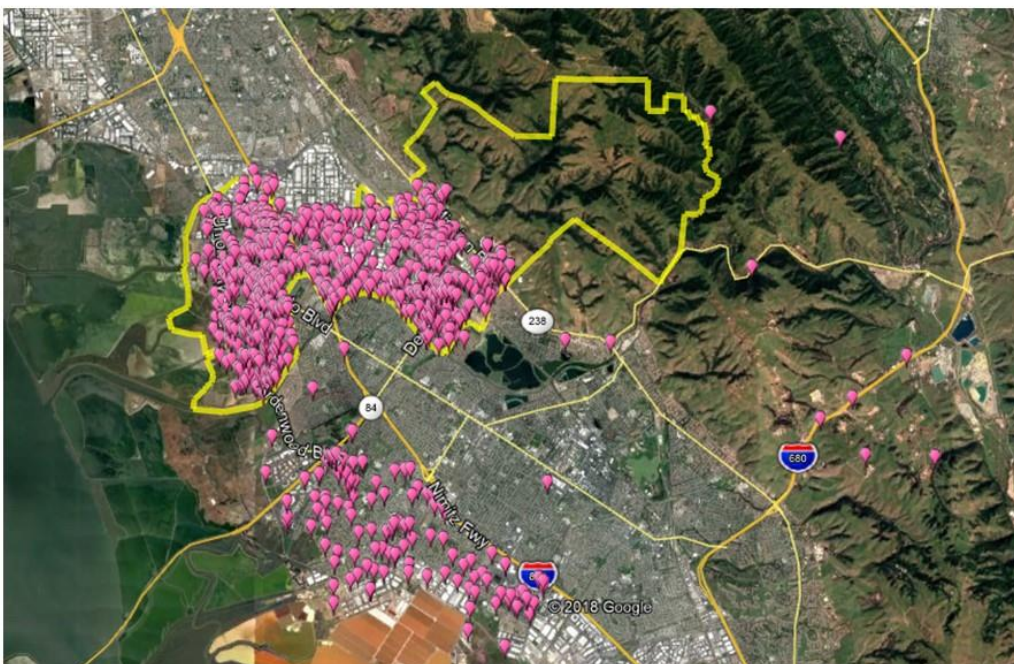
6 minutes (w/o Station 30)



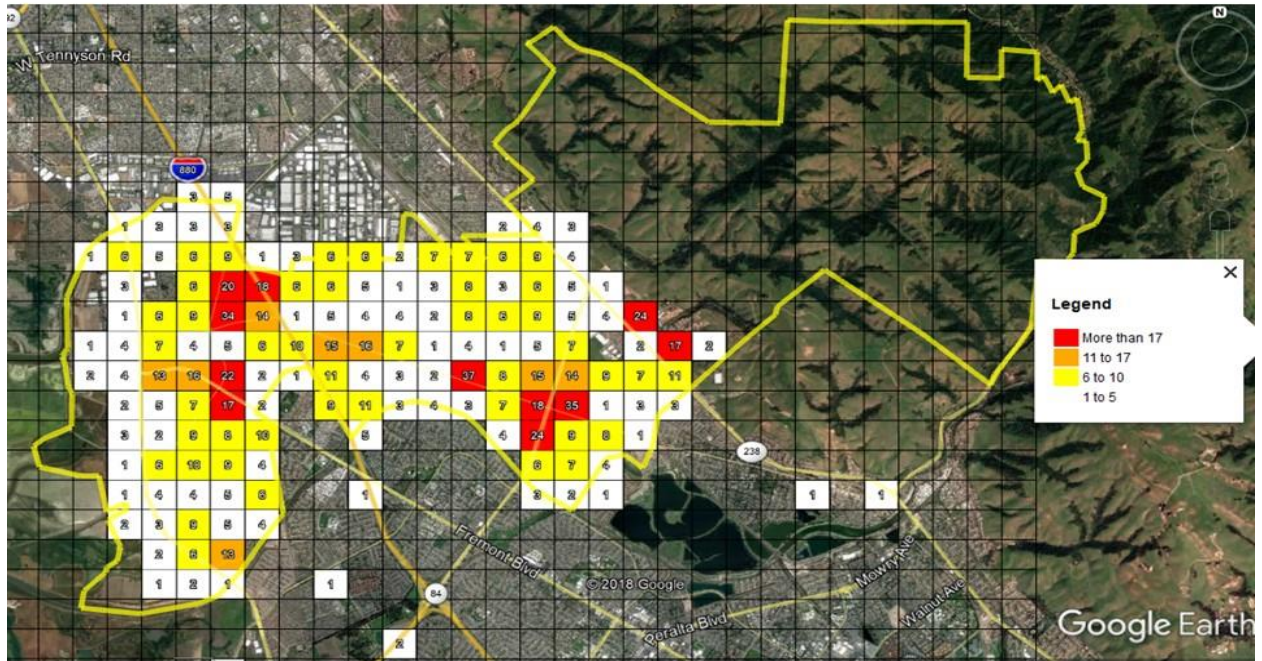
8 minutes (w/o Station 30)



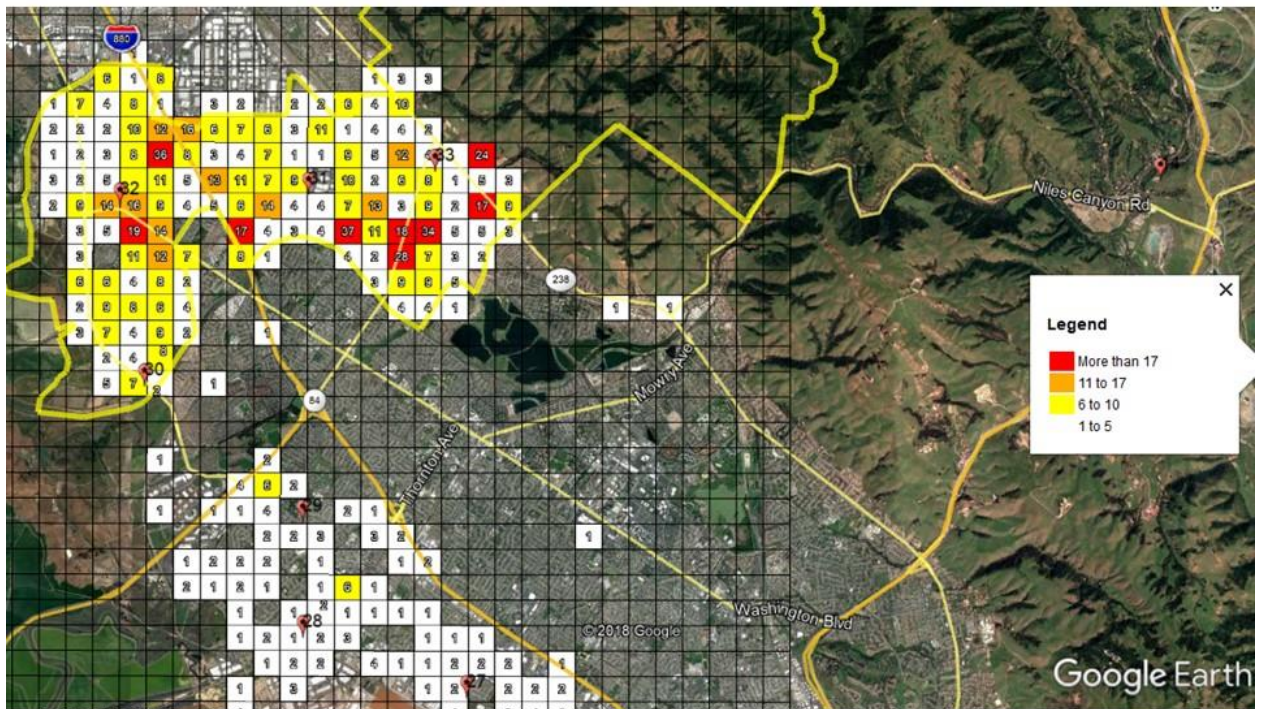
8 min

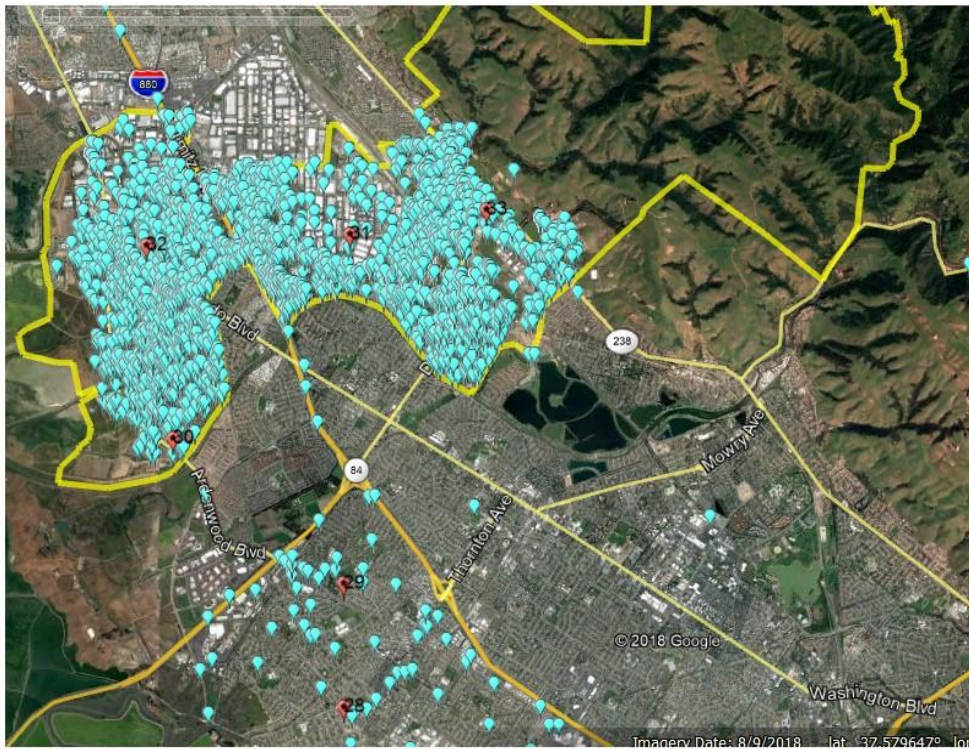


Fire Runs

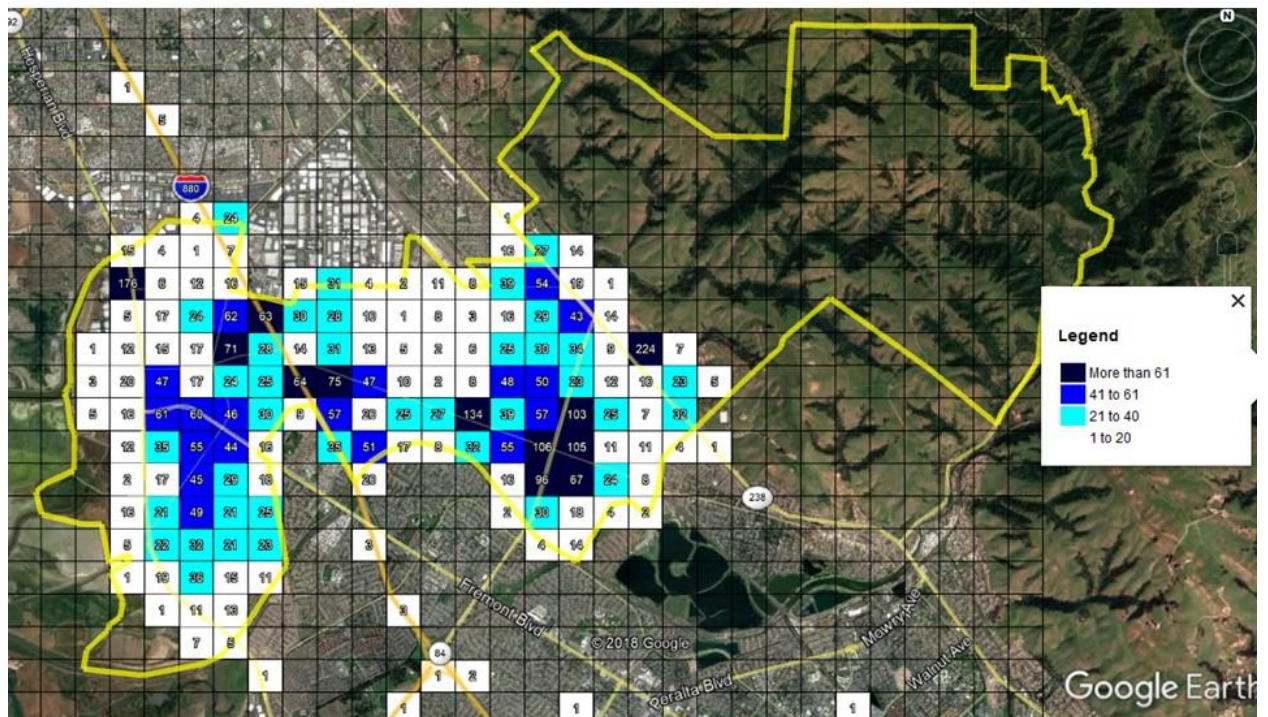


Fire Run Density

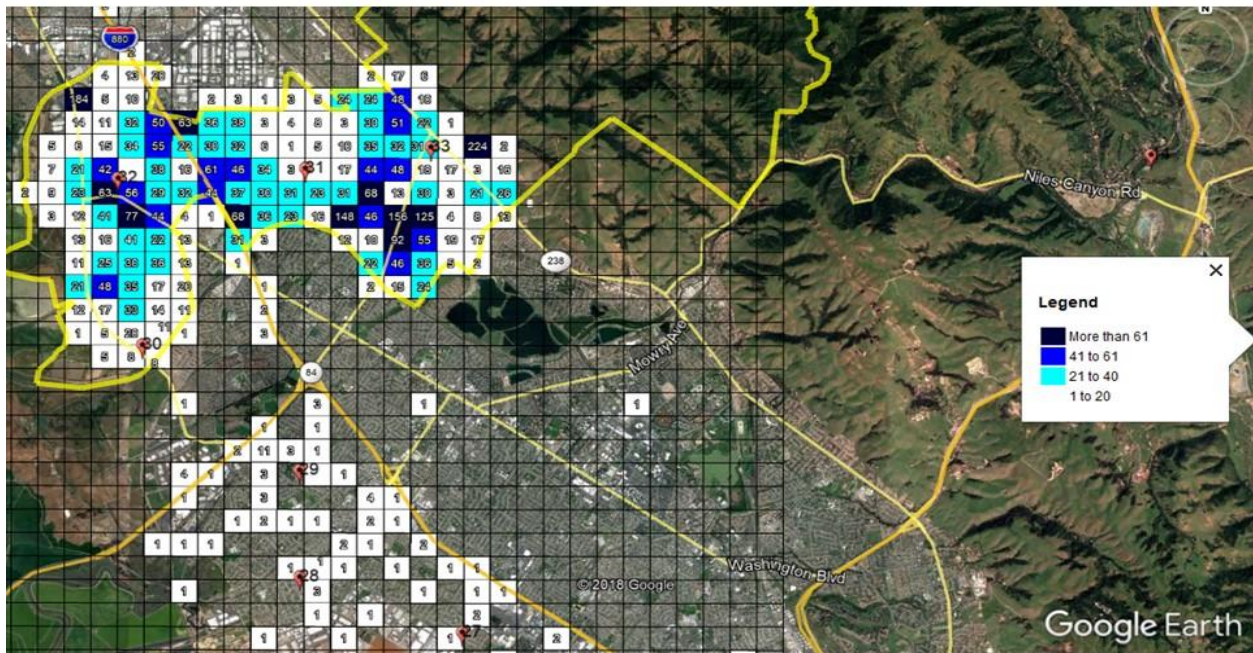




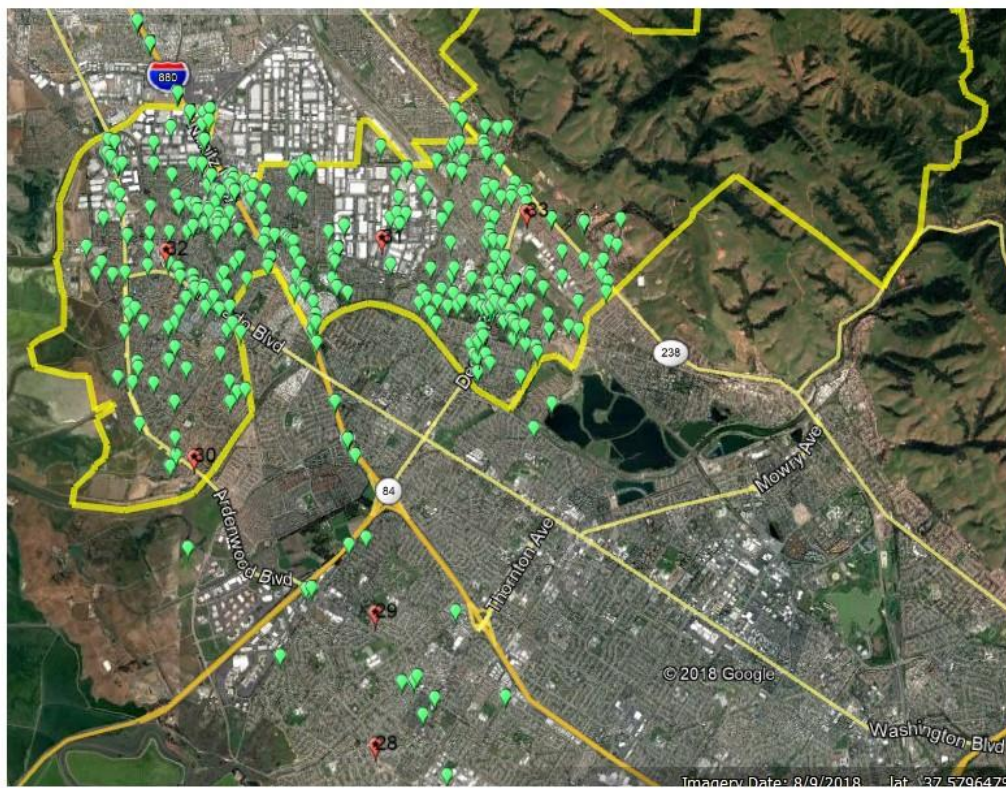
EMS Runs



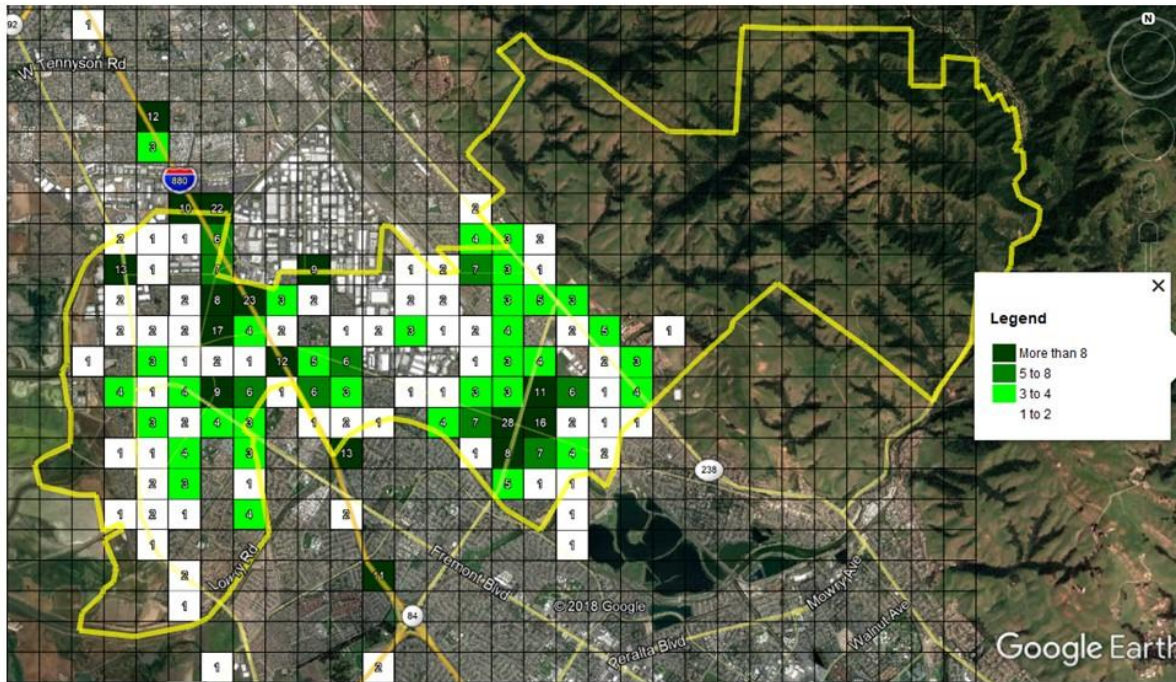
EMS Run Density



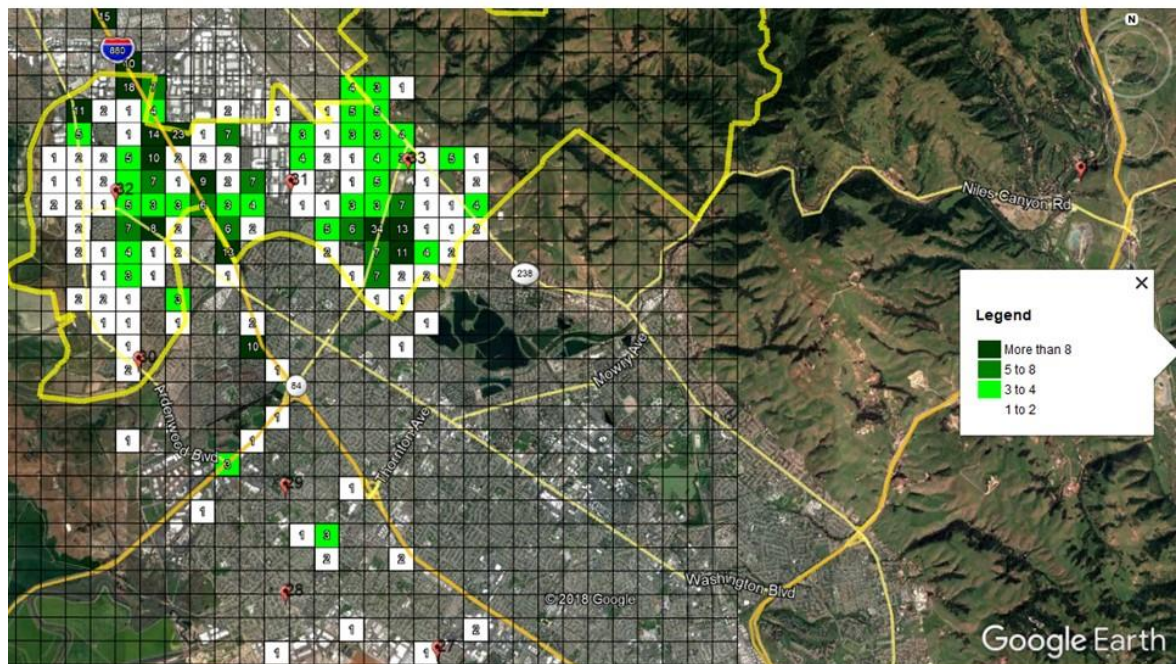
EMS Run Density



Other Runs



Other Run Density



Other Run Density

Opticon or Connected Signals Systems

The following diagram explains how an Opticon-type system functions. Union City has been working with Connected Systems to upgrade the existing technology (first generation) with a cloud-based system. The existing technology relies on receiving a signal from responding units as they approach the intersection whereas the next generation utilizes a cloud-based pre-emption and traffic clearing methodology that is more effective. CPSM has worked with Placentia, California on development of a similar system and the results identified time savings of nearly 25% as well as significant reductions in risk at intersections for emergency vehicles. The company reports that the risk of collision is reduced by 71% using the technology. This is significant and it should be noted that nearly 50% of responders killed in the line of duty were responding to or from emergencies. This improves safety for the public as well as responders and reduces the overall risk in the community.

The cost of upgrading each intersection is approximately \$4,000. Approximately 60 intersections would need to be upgraded to the next generation technology for a one-time cost of approximately \$240,000. This generational change in technology will allow pre-emptive change in traffic lighting to clear intersections prior to the arrival of responding units. Because Union City has the underlying infrastructure in place, the cost is significantly less per intersection.

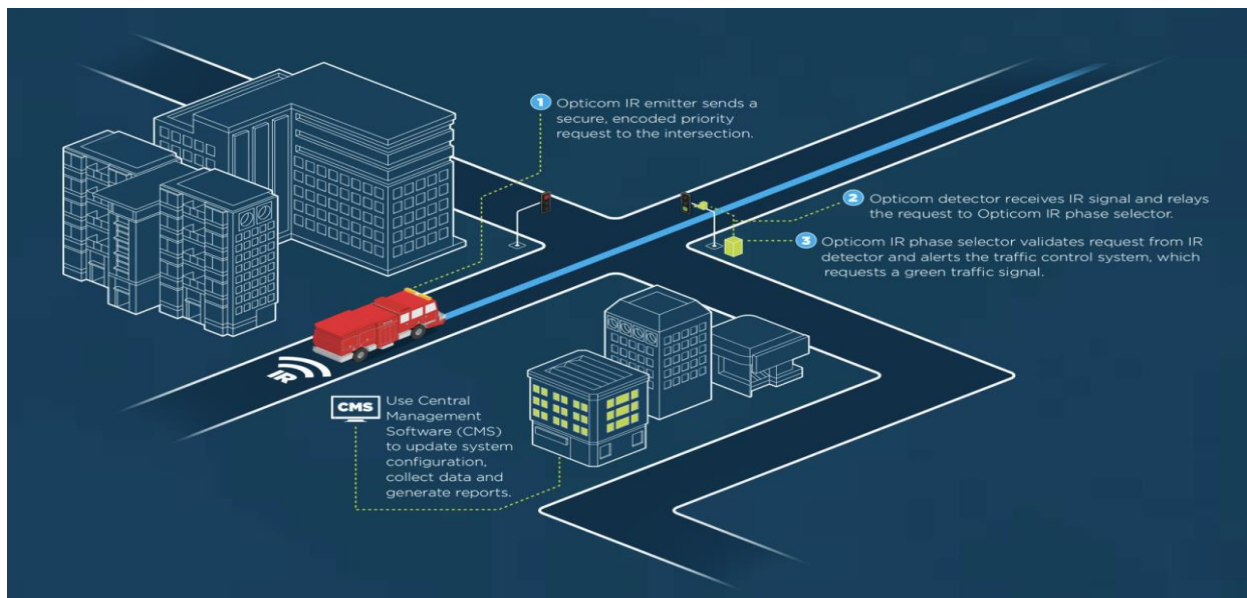


Figure 1-3 90th Percentile Time Comparison

The following chart outlines the existing performance of the Alameda County Fire Department on calls in Union City. The times are compared with existing performance guidelines established by NFPA 1710 for Career Fire Departments.

The reason that NFPA and other guidelines use the 90th percentile is because reporting and results are tracked with more certainty. Using an average travel, dispatch, or turnout time could show a department is closer to achieving results but could include high outliers. The 90th percentile was originally created and used in the Accreditation Models to show a department achieving a "Grade A" achievement mark or 90%.

NFPA 1710 is not a "Standard" but rather a performance objective that seeks to guide departments on deployment of resources. For instance, in most communities with service populations between 50,000 and 100,000, the average crew size for engines and ladders is 3 personnel while NFPA 1710 would suggest 4. Similarly, NFPA 1710 would suggest a compliment of

14 is needed for a single family, 2,000 square foot home while ACFD responds with 21, according to the CityGate study.

Alameda County notes in its own overall study that it does not achieve a 90% percentile response that meets or exceeds NFPA 1710, particularly in the travel times. It does not meet its stated 4.0 minute travel time at any of the Union City Stations to the 90th percentile.

When looking at a flow chart for NFPA 1710, there are only three areas that can reduce overall response time: dispatch, turnout, and travel. There is no way to measure one of the most critical elements to either a fire or EMS outcome determining factor: the time from onset of a health incident or ignition to the point that an alarm is raised. Without wired alarms, detectors, or other early warning systems, most discovery of fire occurs when smoke or flames are observed coming from structures by passerby, neighbors, or emergency patrols.

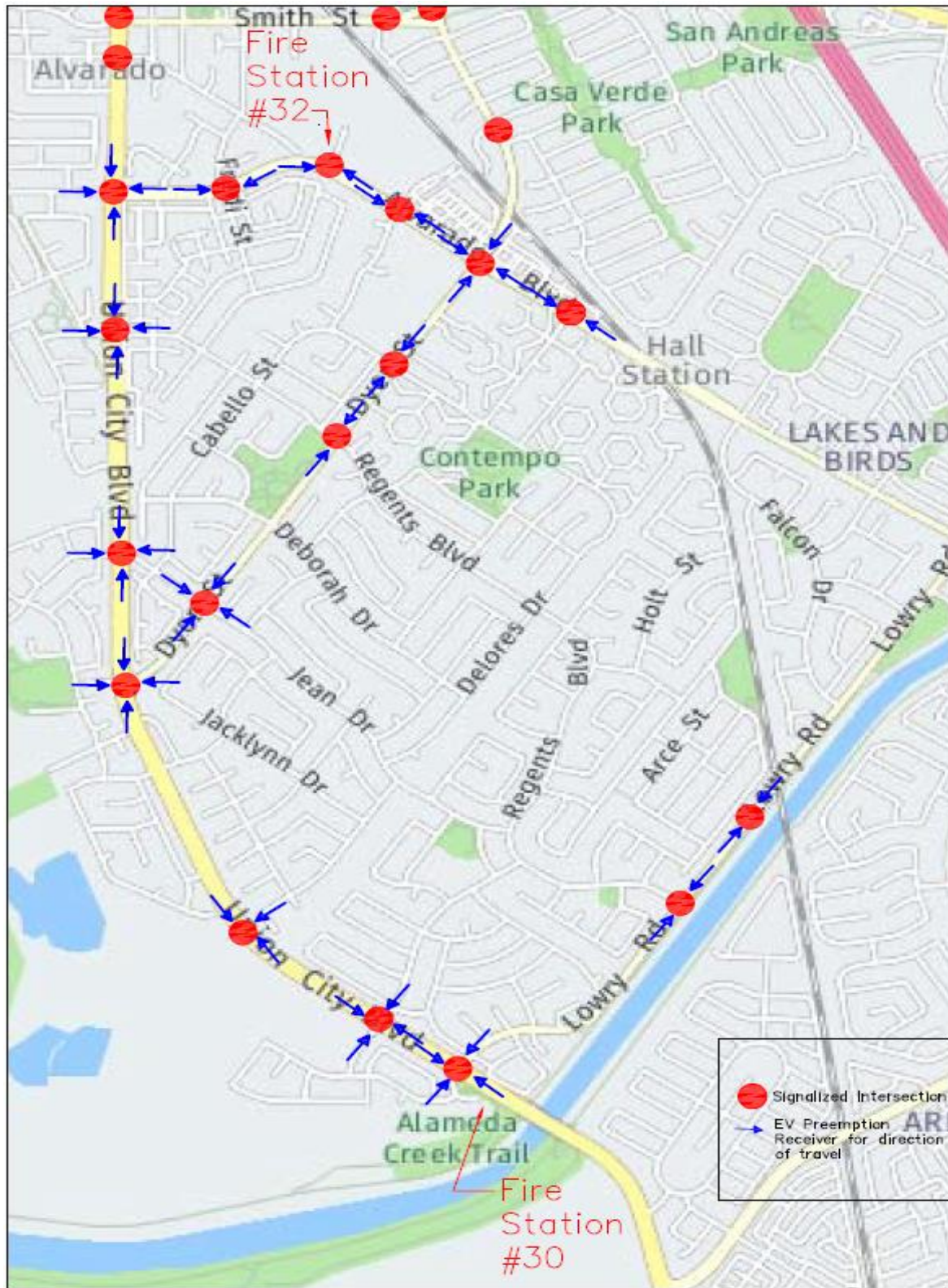
For the Alameda Fire Department services to Union City, dispatch times for serious events are within the guidelines of NFPA. It should be noted that the time to transfer a call from the primary PSAP to fire/EMS dispatch was not captured. NFPA standards call for a 30 second transfer time although CPSM regularly has seen much higher times for transfers.

Turnout time is slightly higher than the guidelines of NFPA but many factors may account for differences: station design, equipment storage (particularly PPO), etc.

In the Standard of Coverage document prepared for the ACFD, it was noted that a travel time of 4.0 was the goal of the department. However, only one station currently achieves the 4 minute or less response time and the 90th percentile is reached at 5.12 across the fire district. CityGate found that Station 30 had a travel time of 4.47; Station 31 6.43; Station 32 5.37; and Station 33 5.49.

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
NFPA 1710	1.65-2.0	1-1.2	4.0	6.65-7.2	
Breathing difficulty	1.6	1.8	5.5	7.8	488
Cardiac and stroke	1.8	1.8	5.2	7.6	531
Fall and injury	1.8	1.7	5.6	8.0	758
Illness and other	1.7	1.7	5.8	8.1	1,412
MVA	1.6	1.6	5.7	7.7	221
Overdose and psychiatric	1.8	1.6	5.2	7.8	96
Seizure and unconsciousness	1.5	1.7	5.5	7.5	468
EMS Total	1.7	1.7	5.6	7.9	3,974
False alarm	1.5	1.8	6.2	8.6	373
Good intent	1.9	1.7	6.5	8.4	83
Hazard	2.7	1.6	5.4	8.3	53
Outside fire	1.9	1.7	6.3	9.2	110
Public service	2.2	1.9	6.6	9.2	264
Structure fire	2.0	1.5	5.3	7.0	48
Fire Total	1.9	1.8	6.3	8.7	931
Total	1.8	1.7	5.8	8.1	4,905

Existing Traffic Control Pre-emption



INTRODUCTION

This data analysis examines fire suppression services provided by Alameda County Fire Department (ACFD) for Union City. This analysis is made up of two components. The first is composed of all fire agency activity within Union City. The second part is comprised of activity associated with units from ACFD's resources located in Union City and housed in stations 30, 31, 32, and 33, as they respond to calls outside the city. We label these as Union City's "contracted stations." This analysis examines all calls for service between October 1, 2017, and September 30, 2018, as recorded in the Alameda County Regional Dispatch center's computer-aided dispatch (CAD) system and the ACFD's National Fire Incident Reporting System (NFIRS).

The Alameda County Regional Emergency Communications Center's (ACRECC) computer-aided dispatch data serves as the primary data source for the study but is the secondary public safety answering point (PSAP) for Union City residents. Fremont Police Dispatch is the city's primary PSAP. In other words, all Union City 911 calls are first handled by the City of Fremont's Police Dispatch center and then fire/EMS calls are transferred to the ACRECC for dispatch.

This analysis consists of five parts. The first part focuses on call types and dispatches. The second part explores time spent and workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of the first arriving unit to calls in Union City. The fifth, and final, part looks at the activity of units responding from the contracted stations to incidents outside of the city.

During the year covered by this study, three type-3 engines, two type-1 engines, and one ladder truck operated out of the four contracted stations in Union City.

During the study period, there were 5,378 calls in Union City to which at least one ACFD unit responded and 399 calls outside of Union City to which a unit from one of the contracted stations responded. EMS calls accounted for 75 percent of incidents occurring within Union City and 35 percent of the calls responded to by the contracted stations outside of the city. The total combined workload (deployed time) for unit responses in the city was 2,126.4 hours. The average dispatch time for the first arriving unit was 1.0 minutes and the average response time of the first arriving unit between ACFD and mutual aid agencies was 5.9 minutes. The 90th percentile dispatch time was 1.8 minutes and the 90th percentile response time was 8.1 minutes.

METHODOLOGY

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

We received CAD data and NFIRS data for calls in Union City and calls outside of Union City to which units from the contracted stations responded. We first matched the NFIRS and CAD data based on incident numbers provided. Then, we classified the calls in a series of steps. We first used the NFIRS incident type to identify canceled calls and to assign EMS, motor vehicle accident (MVA), and fire category call types. EMS calls were then assigned detailed categories based on their EMS Clawson codes.

Finally, units with no corresponding call, and units with no en route or arrival time, were removed. Then, calls with no responding fire units were removed. In addition, one incident in Union City to which the command or administrative unit was the sole ACFD responder is not included in the analysis sections of the report. However, the workload of administrative units is documented separately in Attachment II.

In this report, canceled calls are included in all analyses other than the response time analyses.

AGGREGATE CALL TOTALS AND RUNS

During the year studied, there were 5,777 calls either occurring in Union City or involving units from stations housed in Union City. There were 399 calls outside of Union City to which units from contracted stations responded.

OVERVIEW OF CALLS

Table 1 shows the number of calls by grand call type and location.

TABLE 1: Overview of Calls, by Grand Call Type and Location

Call Type	Outside Union City	Inside Union City	Total
EMS	141	4,008	4,149
Fire	161	952	1,113
Other	97	418	515
Total	399	5,378	5,777

Note: Calls outside Union City are limited to calls where a unit from a contracted station responded.

CALLS BY TYPE

There were 5,378 calls in Union City to which a fire agency responded. Of these, 49 were structure fire calls and 111 were outside fire calls. This analysis focuses on the 5,378 ACFD calls in Union City however, the workload from the 399 calls outside of Union City to which units from the contracted stations responded is included in Table 19 and Table 20, the workload of administrative units is contained in Attachment II, and an analysis of private ambulance units and their workload is included in Attachment IV.

Table 2, Figure 1 and Figure 2, all show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12-month period studied.

TABLE 2: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	491	1.3	9.1
Cardiac and stroke	532	1.5	9.9
Fall and injury	764	2.1	14.2
Illness and other	1,425	3.9	26.5
MVA	229	0.6	4.3
Overdose and psychiatric	98	0.3	1.8
Seizure and unconsciousness	469	1.3	8.7
EMS Total	4,008	11.0	74.5
False alarm	384	1.1	7.1
Good intent	87	0.2	1.6
Hazard	55	0.2	1.0
Outside fire	111	0.3	2.1
Public service	266	0.7	4.9
Structure fire	49	0.1	0.9
Fire Total	952	2.6	17.7
Canceled	418	1.1	7.8
Total	5,378	14.7	100.0

FIGURE 1: EMS Calls by Type

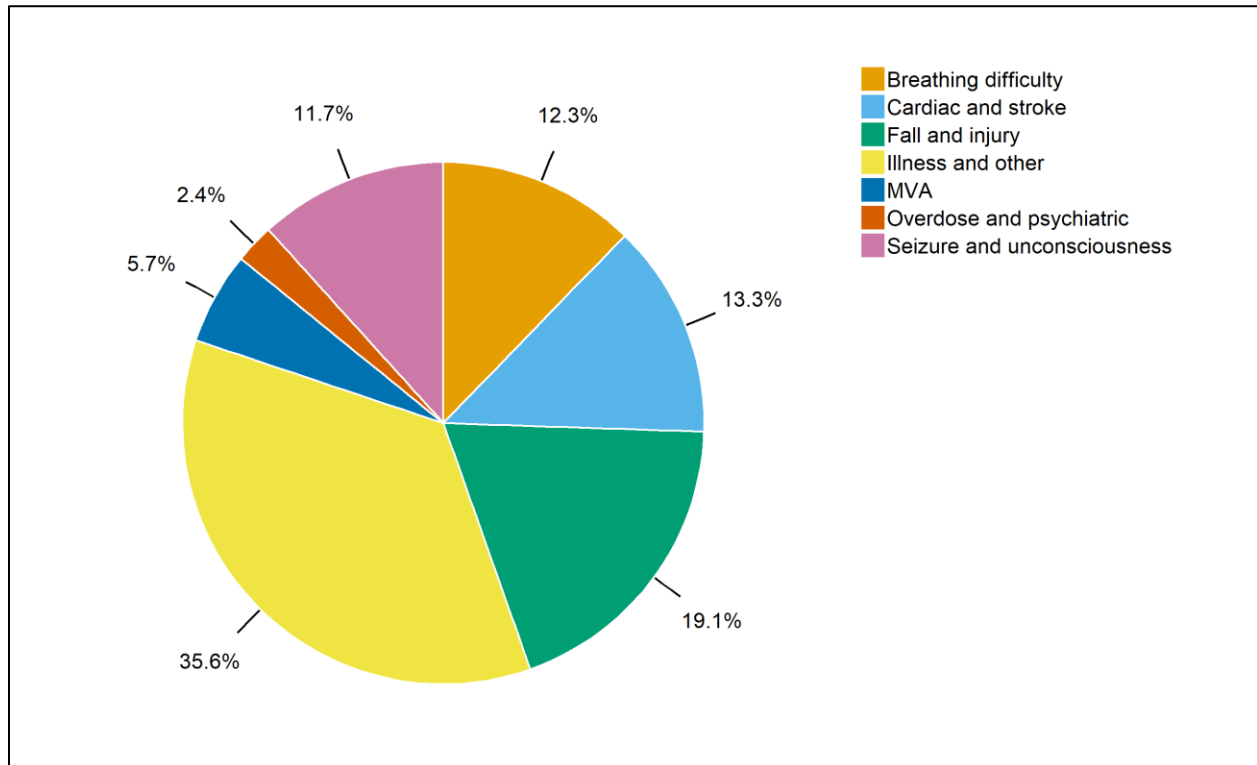
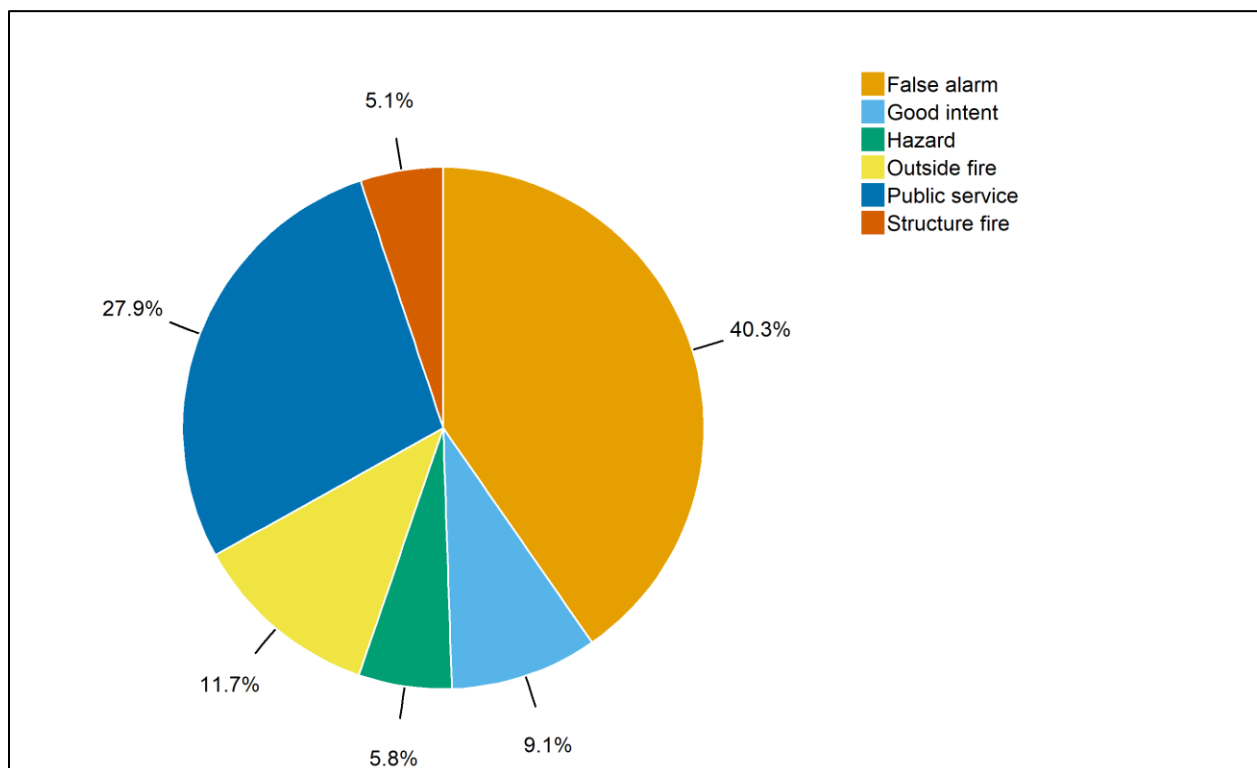


FIGURE 2: Fire Calls by Type



Observations:

Overall

- The department received an average of 14.7 calls per day, including 1.1 canceled calls.
- EMS calls for the year totaled 4,008 (75 percent of all calls), an average of 11.0 per day.
- Fire calls for the year totaled 952 (18 percent of all calls), an average of 2.6 per day.

EMS

- Illness and other calls were the largest category of EMS calls at 36 percent of EMS calls, an average of 3.9 calls per day.
- Cardiac and stroke calls made up 13 percent of EMS calls, an average of 1.5 calls per day.
- Motor vehicle accidents made up 6 percent of EMS calls, an average of 0.6 calls per day.

Fire

- False alarm calls were the largest category of fire calls at 40 percent of fire calls, an average of 1.1 calls per day.
- Structure and outside fire calls combined made up 17 percent of fire calls, an average of 0.4 calls per day, or one call every 2 days.

CALLS BY TYPE AND DURATION

Table 3 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than an hour.

TABLE 3: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	More Than Two Hours	Total
Breathing difficulty	446	38	7	0	491
Cardiac and stroke	450	53	29	0	532
Fall and injury	626	128	10	0	764
Illness and other	1,186	227	11	1	1,425
MVA	186	34	9	0	229
Overdose and psychiatric	81	17	0	0	98
Seizure and unconsciousness	396	58	15	0	469
EMS Total	3,371	555	81	1	4,008
False alarm	361	21	1	1	384
Good intent	79	5	2	1	87
Hazard	41	12	1	1	55
Outside fire	80	22	8	1	111
Public service	240	20	5	1	266
Structure fire	22	13	8	6	49
Fire Total	823	93	25	11	952
Canceled	411	5	1	1	418
Total	4,605	653	107	13	5,378

Observations:

EMS

- A total of 3,926 EMS calls (98 percent) lasted less than one hour, 81 EMS calls (2 percent) lasted one to two hours, and 1 EMS call (less than 1 percent) lasted two or more hours.
- On average, there were 0.2 EMS calls per day that lasted more than one hour.
- A total of 503 cardiac and stroke calls (95 percent) lasted less than one hour, and 29 cardiac and stroke calls (5 percent) lasted one to two hours.
- A total of 220 motor vehicle accidents (96 percent) lasted less than one hour, and 9 motor vehicle accidents (4 percent) lasted one to two hours.

Fire

- A total of 916 fire calls (96 percent) lasted less than one hour, 25 fire calls (3 percent) lasted one to two hours, and 11 fire calls (1 percent) lasted two or more hours.
- On average, there were 0.1 fire calls per day that lasted more than one hour.
- A total of 102 outside fire calls (92 percent) lasted less than one hour, 8 outside fire calls (7 percent) lasted one to two hours, and 1 outside fire call (1 percent) lasted two or more hours.
- A total of 35 structure fire calls (71 percent) lasted less than one hour, 8 structure fire calls (16 percent) lasted one to two hours, and 6 structure fire calls (12 percent) lasted two or more hours.
- A total of 382 false alarm calls (99 percent) lasted less than one hour, 1 false alarm call (less than 1 percent) lasted one to two hours, and 1 false alarm call (less than 1 percent) lasted two or more hours.

AVERAGE CALLS PER DAY AND PER HOUR

Figure 3 shows the monthly variation in the average daily number of calls Union City during the year studied. Similarly, Figure 4 illustrates the average number of calls received each hour of the day over the course of the year.

FIGURE 3: Average Calls per Day, by Month

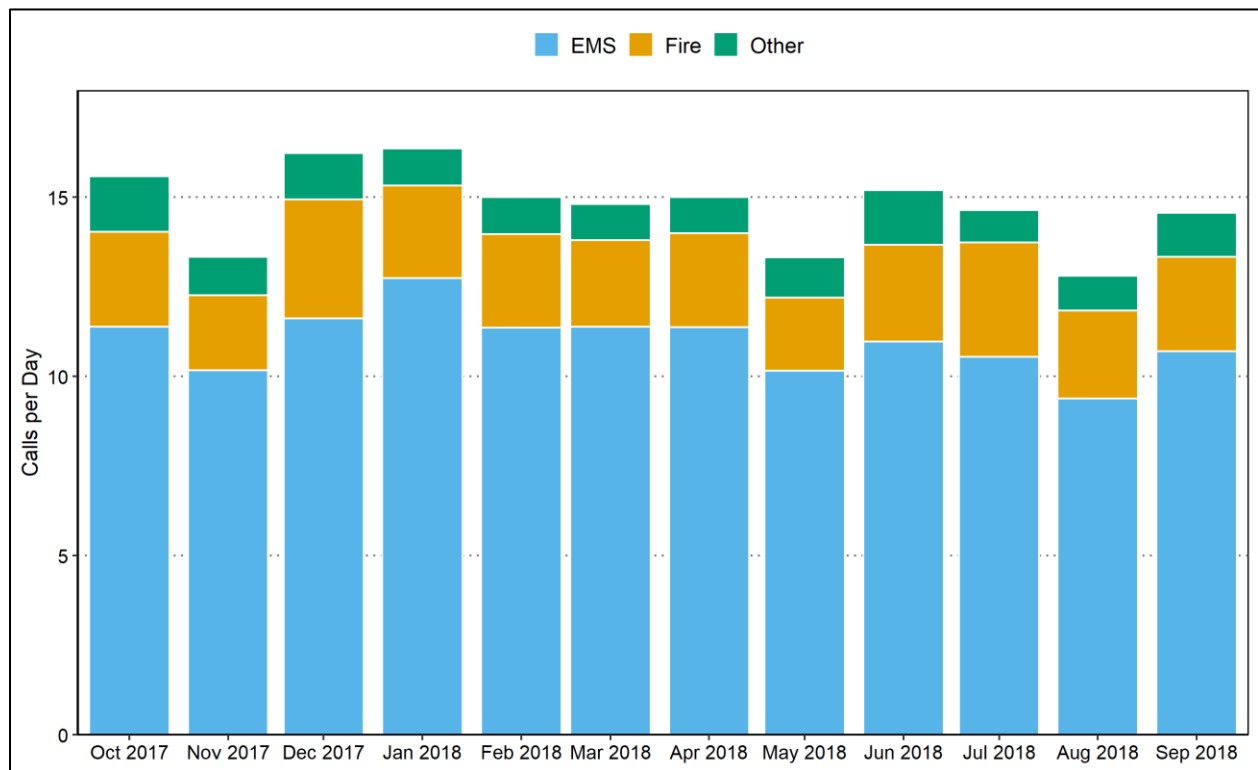
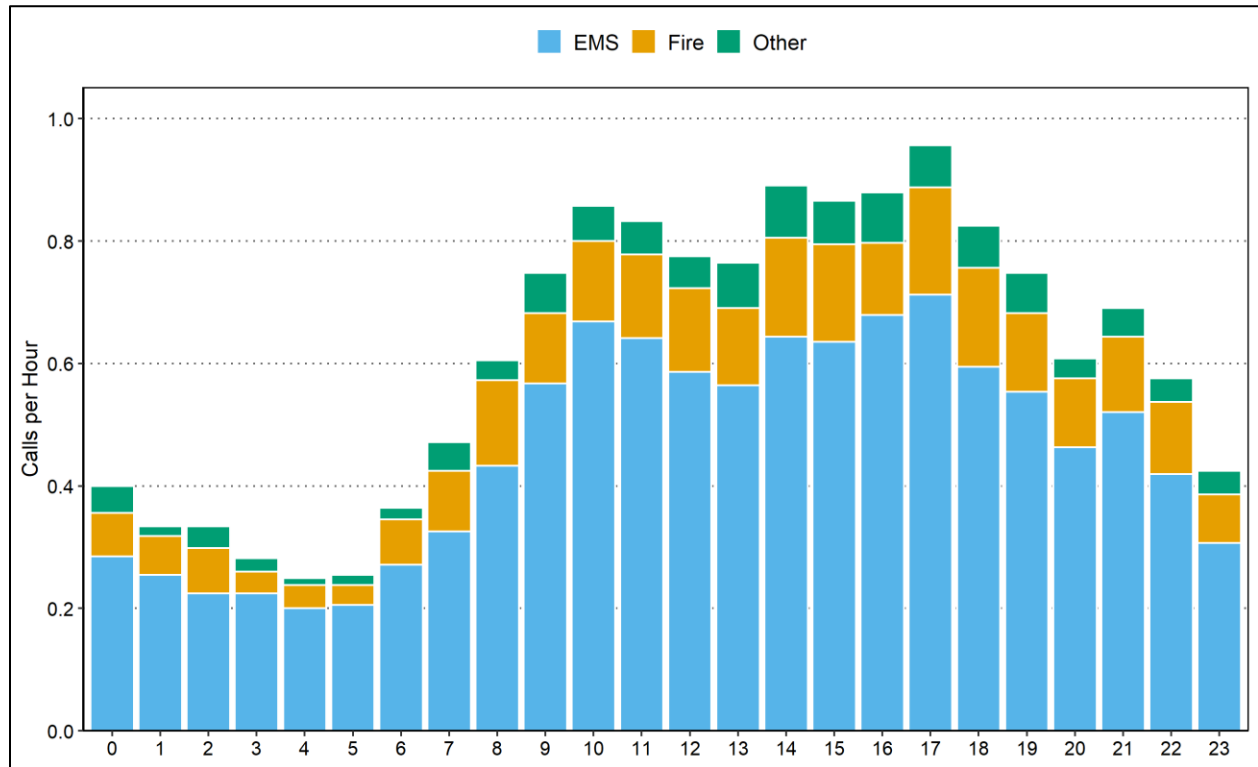


FIGURE 4: Calls by Hour Per Day



Observations:

Average Calls per Month

- Average EMS calls per day ranged from 9.4 in August 2018 to 12.7 in January 2018.
- Average fire calls per day ranged from 2.0 in May 2018 to 3.3 in December 2017.
- Average other calls per day ranged from 0.9 in July 2018 to 1.5 in October 2017.
- Average calls per day overall ranged from 12.8 in August 2018 to 16.4 in January 2018.

Average Calls per Hour

- Average EMS calls per hour ranged from 0.2 between 4:00 a.m. and 5:00 a.m. to 0.7 between 5:00 p.m. and 6:00 p.m.
- Average fire calls per hour ranged from less than 0.1 between 5:00 a.m. and 6:00 a.m. to 0.2 between 5:00 p.m. and 6:00 p.m.
- Average other calls per hour are always less than 0.1 throughout the day. a.m. and 5:00 a.m. to 0.1 between 2:00 p.m. and 3:00 p.m.
- Average calls per hour overall ranged from 0.2 between 4:00 a.m. and 5:00 a.m. to 1.0 between 5:00 p.m. and 6:00 p.m.

UNITS DISPATCHED TO CALLS

Figure 5, Figure 6, and Table 4 detail the number of calls with one, two, or three or more units dispatched overall and broken down by call type.

TABLE 4: Calls by Call Type and Number of Units Dispatched

Call Type	Number of Units			Total Calls
	One	Two	Three or More	
Breathing difficulty	477	14	0	491
Cardiac and stroke	512	20	0	532
Fall and injury	744	20	0	764
Illness and other	1,391	33	1	1,425
MVA	26	185	18	229
Overdose and psychiatric	96	2	0	98
Seizure and unconsciousness	461	8	0	469
EMS Total	3,707	282	19	4,008
False alarm	131	212	41	384
Good intent	57	7	23	87
Hazard	26	9	20	55
Outside fire	87	16	8	111
Public service	241	14	11	266
Structure fire	10	3	36	49
Fire Total	552	261	139	952
Canceled	345	61	12	418
Total	4,604	604	170	5,378
Percentage	85.6	11.2	3.2	100.0

FIGURE 5: Calls by Number of Units Dispatched – EMS

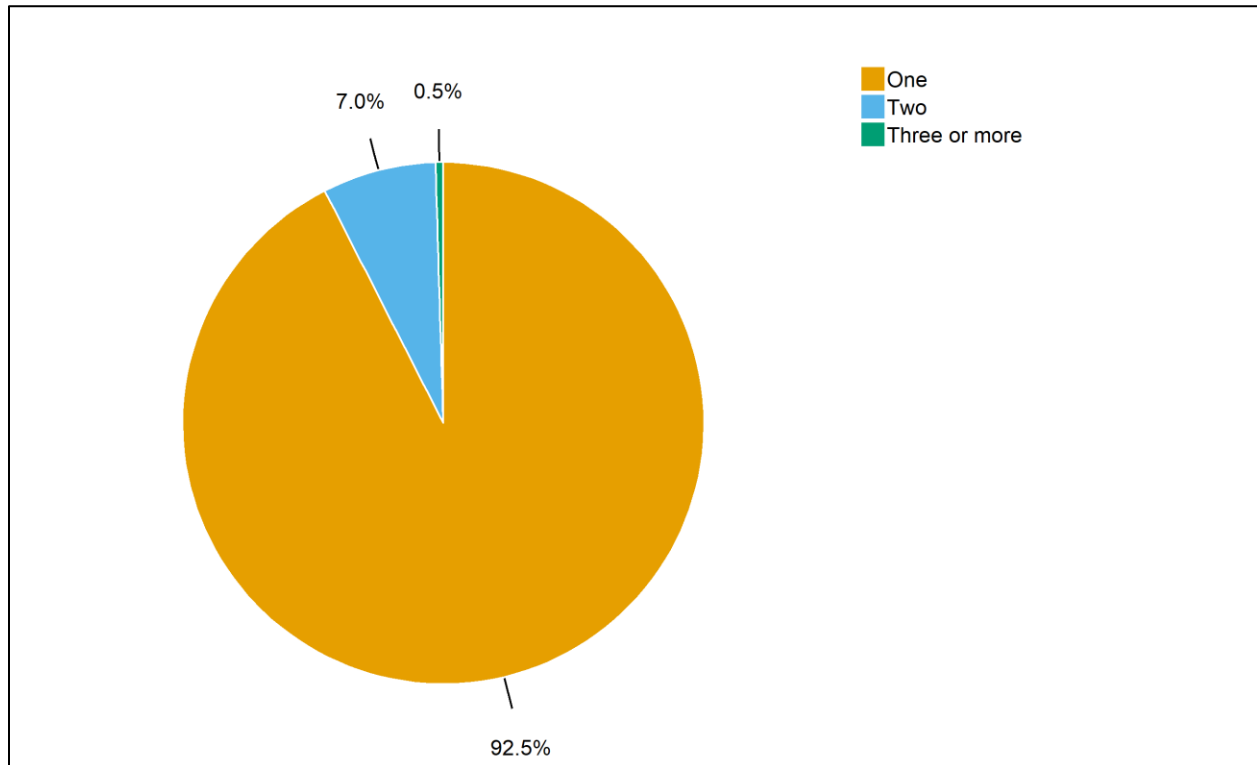
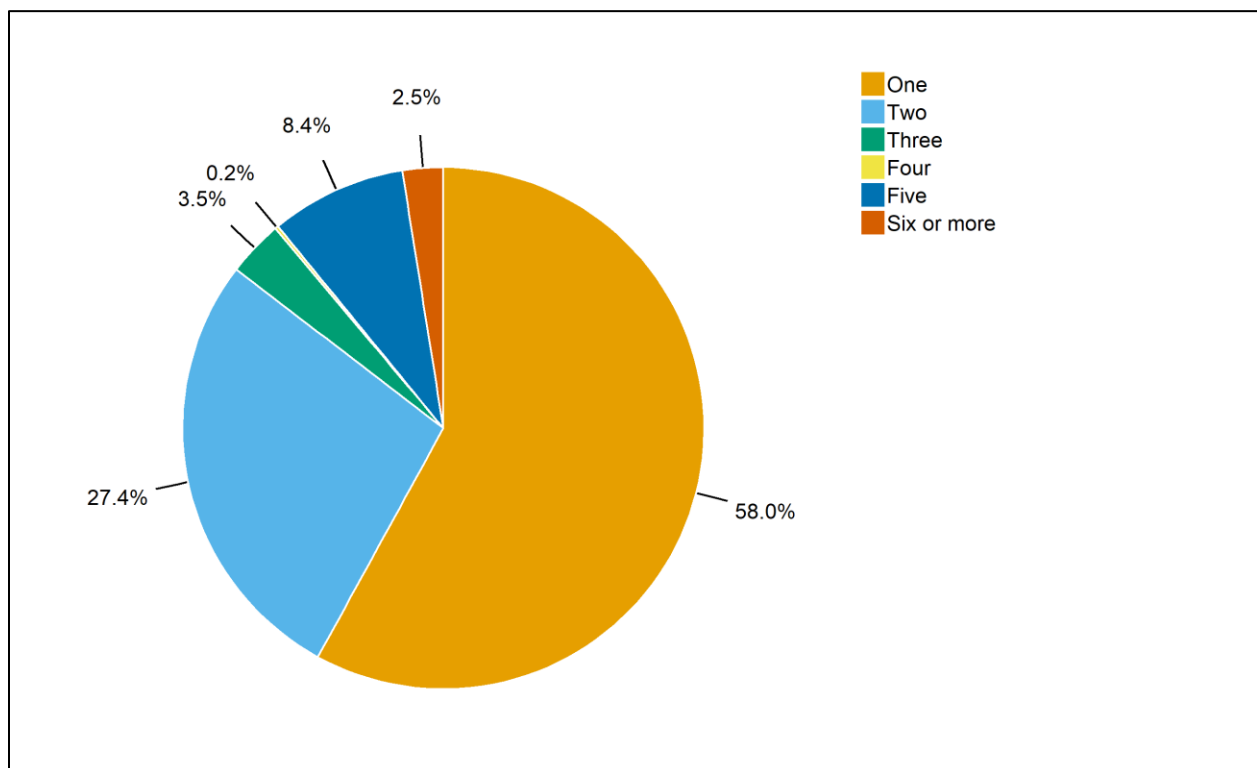


FIGURE 6: Calls by Number of Units Dispatched – Fire



Observations:

Overall

- On average, 1.2 units were dispatched to all calls; for 86 percent of calls only one unit was dispatched.
- Overall, three or more units were dispatched to 3 percent of calls.

EMS

- For EMS calls, one unit was dispatched 92 percent of the time, two units were dispatched 7 percent of the time, and three or more units were dispatched 1 percent of the time.
- On average, 1.1 units were dispatched per EMS call.

Fire

- For fire calls, one unit was dispatched 58 percent of the time, two units were dispatched 27 percent of the time, three units were dispatched 3 percent of the time, four units were dispatched less than 1 percent of the time, five units were dispatched 8 percent of the time, and six or more units were dispatched 3 percent of the time.
- On average, 1.8 units were dispatched per fire call.
- For outside fire calls, three or more units were dispatched 7 percent of the time.
- For structure fire calls, three or more units were dispatched 73 percent of the time.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of each unit is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs than calls and the average deployed time per run varies from the total duration of calls.

Workload analyses complements examining private ambulance activity in Union City and the activity performed by the contracted stations to calls outside of Union City are included in attachment IV, Table 19 and Table 20.

RUNS AND DEPLOYED TIME

Deployed time, also referred to as deployed hours, is the total deployment time of all units deployed on all runs. Table 5 shows the total deployed time, both overall and broken down by type of run, for ACFD units responding to incidents within Union City during the year studied.

TABLE 5: Annual Runs and Deployed Time by Run Type

Call Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Min. per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	20.7	174.1	8.2	28.6	505	1.4
Cardiac and stroke	23.4	214.8	10.1	35.3	552	1.5
Fall and injury	22.4	292.3	13.8	48.0	784	2.1
Illness and other	22.7	554.5	26.1	91.1	1,465	4.0
MVA	17.7	136.9	6.5	22.5	463	1.3
Overdose and psychiatric	21.1	35.1	1.7	5.8	100	0.3
Seizure and unconsciousness	23.4	186.0	8.8	30.6	477	1.3
EMS Total	22.0	1,593.6	75.1	262.0	4,346	11.9
False alarm	11.4	133.5	6.3	21.9	701	1.9
Good intent	12.4	40.2	1.9	6.6	194	0.5
Hazard	15.1	37.9	1.8	6.2	151	0.4
Outside fire	24.5	64.2	3.0	10.6	157	0.4
Public service	16.3	87.7	4.1	14.4	322	0.9
Structure fire	29.1	101.8	4.8	16.7	210	0.6
Fire Total	16.1	465.3	21.9	76.5	1,735	4.8
Canceled	7.4	62.5	2.9	10.3	507	1.4
Total	19.3	2,121.4	100.0	348.7	6,588	18.0

Observations:

Overall

- Total deployed time for the year was 2,121.4 hours.
- The daily average was 5.8 hours for all units combined.
- There were 6,588 runs, including 507 runs dispatched for canceled calls.
- The daily average was 18.0 runs.

EMS

- EMS runs accounted for 75 percent of the total workload.
- The average deployed time for EMS runs was 22.0 minutes.
- The deployed time for all EMS runs averaged 4.4 hours per day.

Fire

- Fire runs accounted for 22 percent of the total workload.
- The average deployed time for fire runs was 16.1 minutes.
- The deployed time for all fire runs averaged 1.3 hours per day.
- There were 367 runs for structure and outside fire calls combined, with a total workload of 166.0 hours. This accounted for 8 percent of the total workload.
- The average deployed time for outside fire runs was 24.5 minutes per run, and the average deployed time for structure fire runs was 29.1 minutes per run.

FIGURE 7: Average Deployed Minutes by Hour of Day

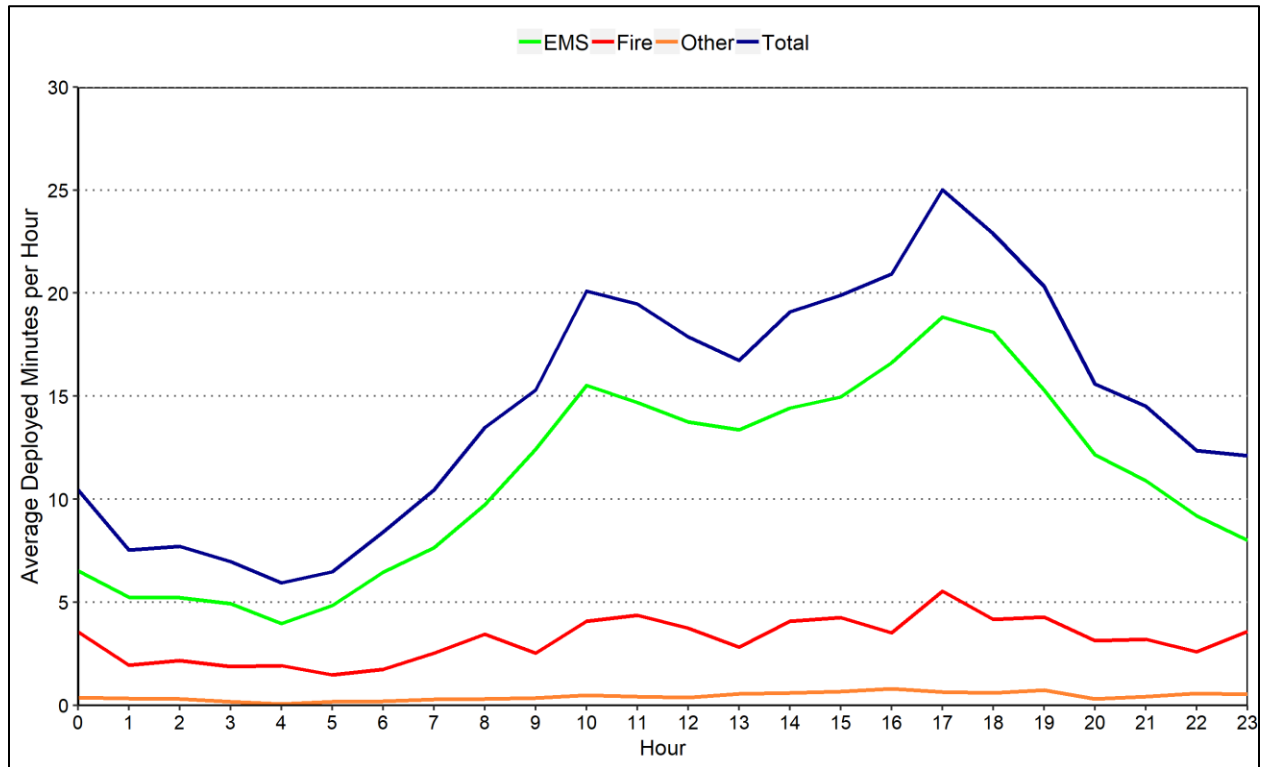


TABLE 6: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	6.5	3.6	0.4	10.4
1	5.2	2.0	0.3	7.5
2	5.2	2.2	0.3	7.7
3	4.9	1.9	0.2	7.0
4	4.0	1.9	0.1	5.9
5	4.8	1.5	0.2	6.5
6	6.5	1.7	0.2	8.4
7	7.6	2.5	0.3	10.4
8	9.7	3.4	0.3	13.4
9	12.4	2.5	0.3	15.3
10	15.5	4.1	0.5	20.1
11	14.7	4.4	0.4	19.5
12	13.8	3.7	0.4	17.9
13	13.3	2.8	0.5	16.7
14	14.4	4.1	0.6	19.1
15	15.0	4.2	0.7	19.9
16	16.6	3.5	0.8	20.9
17	18.5	5.5	0.6	24.7
18	17.8	4.2	0.6	22.6
19	15.3	4.3	0.7	20.3
20	12.1	3.1	0.3	15.6
21	10.9	3.2	0.4	14.5
22	9.2	2.6	0.6	12.3
23	8.0	3.6	0.5	12.1
Daily Avg.	261.9	76.5	10.3	348.7

Observations:

- Hourly deployed time was highest during the day from 10:00 a.m. to 8:00 p.m., averaging between 20 minutes and 25 minutes.
- Average deployed time peaked between 5:00 p.m. and 6:00 p.m., averaging 25 minutes.
- Average deployed time was lowest between 4:00 a.m. and 5:00 a.m., averaging 6 minutes.

WORKLOAD BY STATION

Table 7 provides a summary of each of the contracted station's workload overall, along with the workload of aiding agencies and non-contracted ACFD stations. Tables 8 and 9 provide a more detailed view of workload, showing runs broken out by run type (Table 7) and the resulting daily average deployed time by run type (Table 9) for each contracted station and non-contracted ACFD station.

TABLE 7: Call Workload by Station/Agency

Station/Agency	Deployed Min. per Run	Annual Hours	Deployed Min. per Day	Annual Runs	Runs per Day
30	19.1	202.1	33.2	636	1.7
31	19.9	621.1	102.1	1,872	5.1
32	20.4	588.5	96.7	1,728	4.7
33	19.2	632.6	104.0	1,980	5.4
ACFD	12.4	77.2	12.7	372	1.0
Total	19.3	2,121.4	348.7	6,588	18.0

TABLE 8: Total Annual Runs by Run Type and Station/Agency

Station/Agency	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Total
30	398	69	26	16	21	38	29	39	636
31	1,232	256	41	33	30	107	37	136	1,872
32	1,196	152	44	30	54	74	32	146	1,728
33	1,423	168	38	31	34	85	35	166	1,980
ACFD	97	56	45	41	18	18	77	20	372
Total	4,346	701	194	151	157	322	210	507	6,588

TABLE 9: Daily Average Deployed Minutes by Run Type and Station/Agency

Station/Agency	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Total
30	24.5	1.6	0.9	0.4	1.1	1.9	2.2	0.6	33.2
31	76.3	8.4	1.4	2.0	2.2	4.7	4.6	2.5	102.1
32	73.5	5.2	2.1	1.6	3.8	3.3	3.5	3.7	96.7
33	82.1	5.8	1.4	1.3	3.0	4.0	3.3	3.2	104.0
ACFD	5.5	1.0	0.9	1.0	0.4	0.5	3.2	0.2	12.7
Total	262.0	21.9	6.6	6.2	10.6	14.4	16.7	10.3	348.7

Observations:

- Station 33 made the most runs (1,980 or an average of 5.4 runs per day) and had the highest total annual deployed time (632.6 or an average of 104.0 minutes per day).
 - EMS calls accounted for 72 percent of runs and 79 percent of total deployed time.
 - Structure and outside fire calls accounted for 3 percent of runs and 6 percent of total deployed time.
- Station 31 made the second most runs (1,872 or an average of 5.1 runs per day) and had the second highest total annual deployed time (621.1 or an average of 102.1 minutes per day).
 - EMS calls accounted for 66 percent of runs and 75 percent of total deployed time.
 - Structure and outside fires calls accounted for 4 percent of runs and 7 percent of total deployed time.
- Non-contracted ACFD stations made 372 runs into Union City (an average of 1.0 runs per day) and had 77.2 hours in total annual deployed time (an average of 12.7 minutes per day).
 - EMS calls accounted for 26 percent of runs and 44 percent of total deployed time.
 - Structure and outside fires calls accounted for 26 percent of runs and 28 percent of total deployed time.
- Engine E33 made the most runs (1,975 or an average of 5.4 runs per day) and had the highest total annual deployed time (631.4 or an average of 103.8 minutes per day).
 - EMS calls accounted for 72 percent of runs and 79 percent of total deployed time.
 - Structure and outside fires calls accounted for 3 percent of runs and 6 percent of total deployed time.
- Ladder truck T31 made the second most runs (1,872 or an average of 5.1 runs per day) and had the second highest total annual deployed time (621.1 or an average of 102.1 minutes per day).
 - EMS calls accounted for 66 percent of runs and 75 percent of total deployed time.
 - Structure and outside fires calls accounted for 4 percent of runs and 7 percent of total deployed time.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of 8,760 hours in the year. Table 10 shows the number of hours in the year in which there were zero to four calls during the hour. Table 11 shows number of calls occurring simultaneously by station area. Table 12 presents the percentage of calls occurring in a station's area and examines how often units from the nearest station respond, arrive, or arrive first to a call in their station area. Table 13 shows the 10 one-hour intervals which had the most calls during the year.

TABLE 10: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	4,873	55.6
1	2,727	31.1
2	892	10.2
3	210	2.4
4+	58	0.7

TABLE 11: Frequency of Overlapping Calls

Station	Scenario	Number of Calls	Percent of All Calls	Total Hours
Station 30	No overlapped call	537	99.4	188.1
Station 30	Overlapped with one call	3	0.6	0.6
Station 31	No overlapped call	1,281	99.4	471.2
Station 31	Overlapped with one call	8	0.6	0.8
Station 32	No overlapped call	1,536	99.0	552.3
Station 32	Overlapped with one call	15	1.0	1.7
Station 33	No overlapped call	1,881	98.3	633.1
Station 33	Overlapped with one call	32	1.7	5.8

Observations:

- Calls in station 33's first due area overlapped most often with one other call (1.7 percent of the time).
- Calls in station 30 and 31's first due area overlapped least often with one other call (0.6 percent of the time).

TABLE 12: Station Availability to Respond to Calls

Station	Calls in Area	First Due Responded	First Due Arrived	First Due First	Percent Responded	Percent Arrived	Percent First
30	540	530	477	472	98.1	88.3	87.4
31	1,289	1,264	1,182	1,176	98.1	91.7	91.2
32	1,551	1,540	1,440	1,420	99.3	92.8	91.6
33	1,913	1,878	1,730	1,670	98.2	90.4	87.3
Total	5,293	5,212	4,829	4,738	98.5	91.2	89.5

Note: For each station, we count the number of calls occurring within its first due area. Then, we count the number of calls to where at least one unit responded. Next, we focus on units from the first due station to see if any units responded, arrived, or arrived first. 85 calls did not record their first due station in the NFIRS data and as a result, were not included in the above analysis.

TABLE 13: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
10/2/2017 9:00 a.m. to 10:00 a.m.	6	6	2.3
2/20/2018 3:00 p.m. to 4:00 p.m.	5	10	2.8
6/14/2018 1:00 p.m. to 2:00 p.m.	5	6	1.8
7/6/2018 1:00 p.m. to 2:00 p.m.	5	5	2.3
10/17/2017 6:00 p.m. to 7:00 p.m.	4	10	5.7
10/26/2017 3:00 p.m. to 4:00 p.m.	4	10	3.1
12/19/2017 8:00 a.m. to 9:00 a.m.	4	9	2.5
9/7/2018 6:00 p.m. to 7:00 p.m.	4	9	2.1
3/21/2018 6:00 p.m. to 7:00 p.m.	4	8	2.3
5/5/2018 10:00 a.m. to 11:00 a.m.	4	8	2.0

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour, and which may extend into the next hour or hours. The number of runs and deployed hours only includes unit activity in Union City.

Observations:

- During 58 hours (0.7 percent of all hours), four or more calls occurred; in other words, the department responded to four or more calls in an hour roughly once every 6 days.
- The highest number of calls to occur in an hour was 6, which happened once.
- The hour with the most calls was 9:00 a.m. to 10:00 a.m. on October 2, 2017.
 - The hour's 6 calls involved 6 individual dispatches resulting in 2.3 hours of deployed time.
 - These 6 calls included one breathing difficulty call, one canceled call, one cardiac and stroke call, one fall and injury call, one illness and other call, and one overdose and psychiatric call.
- The hour with the second most calls was 3:00 p.m. to 4:00 p.m. on February 20, 2018.
 - The hour's 5 calls involved 10 individual dispatches resulting in 2.8 hours of deployed time.
 - These 5 calls included two illness and other calls, one cardiac and stroke call, one fall and injury call, and one motor vehicle accident call.

RESPONSE TIME

In this part of the analysis we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is en route to a call's location. *Travel time* is the difference between the time en route and arrival on scene. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, we included all calls to which at least one non-administrative fire agency unit responded, while excluding canceled calls. In addition, calls with a total response time of more than 30 minutes were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, we excluded 418 canceled calls, 17 calls where no units recorded a valid on-scene time, one call where the first arriving unit response was greater than 30 minutes, and 37 calls where one or more segments of first arriving unit's response time could not be calculated due to missing data. As a result, in this section, a total of 4,905 calls are included in the analysis.

RESPONSE TIME BY TYPE OF CALL

Table 14 provides average dispatch, turnout, travel, and total response time for the first arriving unit to each call in the city, broken out by call type. Figures 8 and 9 illustrate the same information. Table 15 gives the 90th percentile time broken out in the same manner. A 90th percentile time means that 90 percent of calls had response times at or below that number. For example, Table 15 shows a 90th percentile response time of 8.1 minutes which means that 90 percent of the time a call had a response time of no more than 8.1 minutes.

TABLE 14: Average Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	1.0	1.1	3.7	5.8	488
Cardiac and stroke	1.0	1.1	3.6	5.8	531
Fall and injury	1.0	1.0	3.8	5.8	758
Illness and other	1.0	1.1	3.9	6.0	1,412
MVA	0.8	1.0	3.6	5.4	221
Overdose and psychiatric	1.0	1.0	3.7	5.8	96
Seizure and unconsciousness	0.9	1.1	3.6	5.6	468
EMS Total	1.0	1.1	3.8	5.8	3,974
False alarm	0.9	1.2	4.0	6.1	373
Good intent	1.3	1.1	4.0	6.4	83
Hazard	1.4	1.2	3.7	6.3	53
Outside fire	1.2	1.1	4.1	6.5	110
Public service	1.2	1.2	4.2	6.6	264
Structure fire	1.1	1.0	3.6	5.7	48
Fire Total	1.1	1.2	4.0	6.3	931
Total	1.0	1.1	3.8	5.9	4,905

FIGURE 8: Average Response Time of First Arriving Unit, by Call Type – EMS

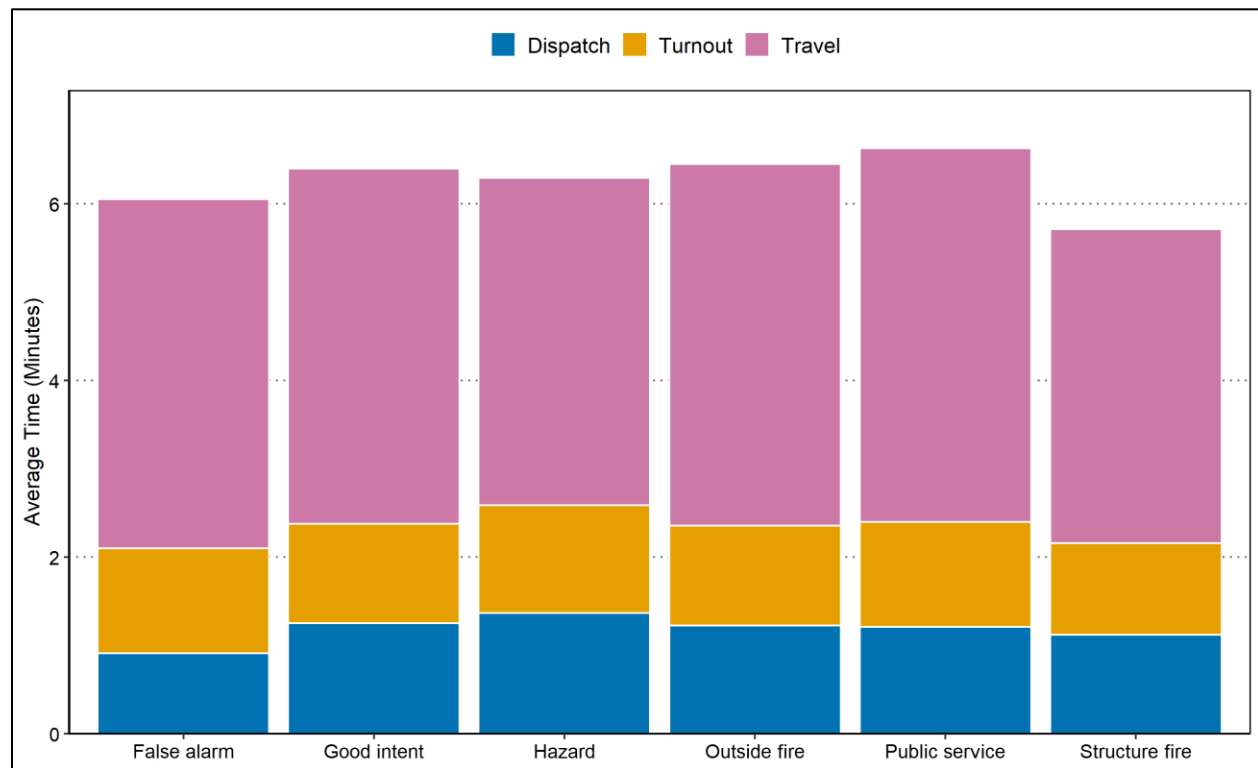


FIGURE 9: Average Response Time of First Arriving Unit, by Call Type – Fire

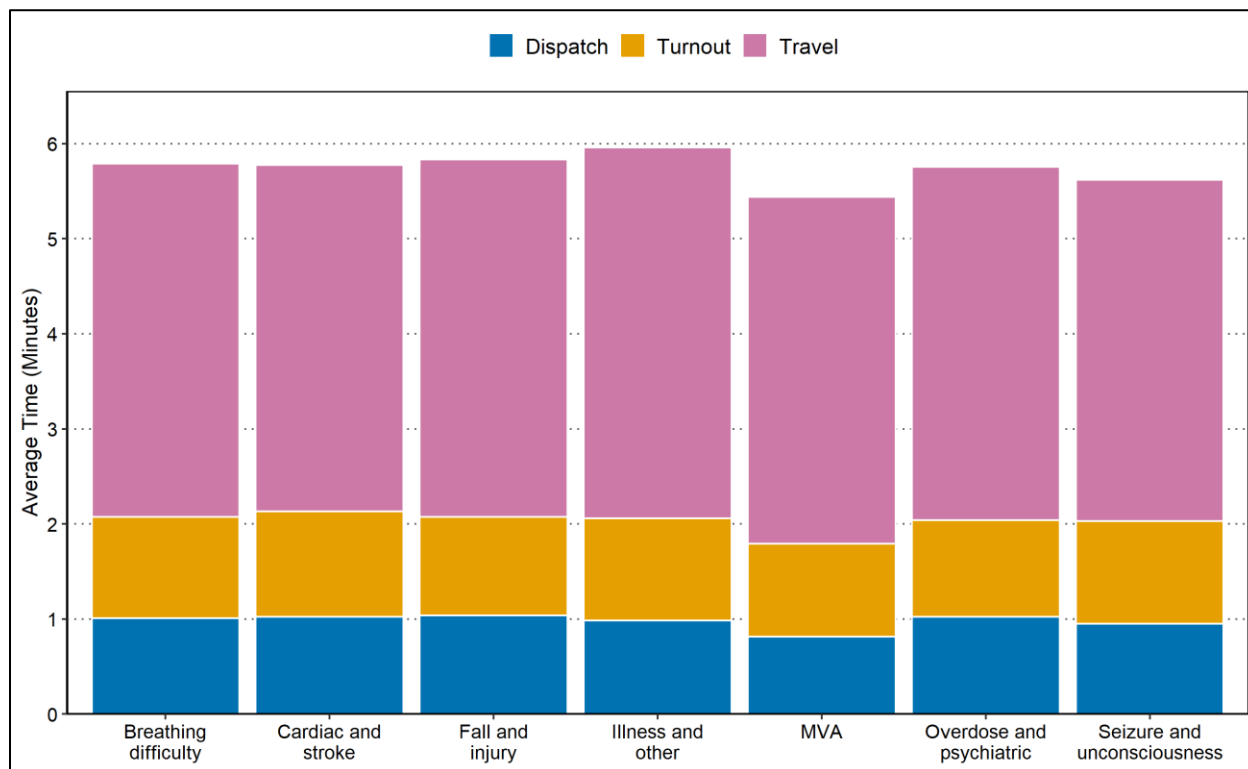


TABLE 15: 90th Percentile Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	1.6	1.8	5.5	7.8	488
Cardiac and stroke	1.8	1.8	5.2	7.6	531
Fall and injury	1.8	1.7	5.6	8.0	758
Illness and other	1.7	1.7	5.8	8.1	1,412
MVA	1.6	1.6	5.7	7.7	221
Overdose and psychiatric	1.8	1.6	5.2	7.8	96
Seizure and unconsciousness	1.5	1.7	5.5	7.5	468
EMS Total	1.7	1.7	5.6	7.9	3,974
False alarm	1.5	1.8	6.2	8.6	373
Good intent	1.9	1.7	6.5	8.4	83
Hazard	2.7	1.6	5.4	8.3	53
Outside fire	1.9	1.7	6.3	9.2	110
Public service	2.2	1.9	6.6	9.2	264
Structure fire	2.0	1.5	5.3	7.0	48
Fire Total	1.9	1.8	6.3	8.7	931
Total	1.8	1.7	5.8	8.1	4,905

Observations:

- The average dispatch time was 1.0 minutes.
- The average turnout time was 1.1 minutes.
- The average travel time was 3.8 minutes.
- The average total response time was 5.9 minutes.
- The average response time was 5.8 minutes for EMS calls and 6.3 minutes for fire calls.
- The average response time was 6.5 minutes for outside fires and 5.7 minutes for structure fires.
- The 90th percentile dispatch time was 1.8 minutes.
- The 90th percentile turnout time was 1.7 minutes.
- The 90th percentile travel time was 5.8 minutes.
- The 90th percentile total response time was 8.1 minutes.
- The 90th percentile response time was 7.9 minutes for EMS calls and 8.7 minutes for fire calls.
- The 90th percentile response time was 9.2 minutes for outside fires and 7.0 minutes for structure fires.

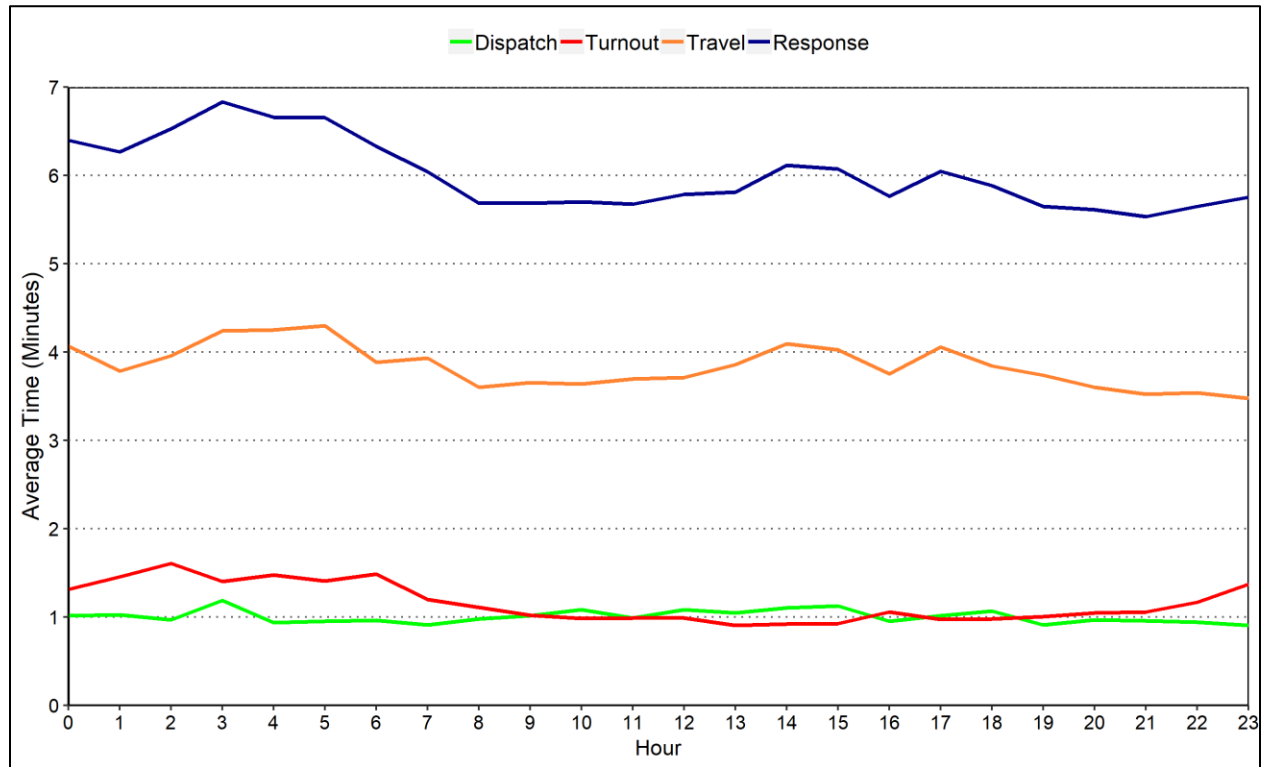
RESPONSE TIME BY HOUR

Average dispatch, turnout, travel, and total response time by hour for calls are shown in Table 16 and Figure 10. The table also shows 90th percentile response times.

TABLE 16: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	1.0	1.3	4.1	6.4	8.3	128
1	1.0	1.5	3.8	6.3	8.3	116
2	1.0	1.6	4.0	6.5	8.4	109
3	1.2	1.4	4.2	6.8	9.2	92
4	0.9	1.5	4.3	6.7	8.8	86
5	0.9	1.4	4.3	6.7	8.4	86
6	1.0	1.5	3.9	6.3	8.2	125
7	0.9	1.2	3.9	6.0	7.9	155
8	1.0	1.1	3.6	5.7	7.6	208
9	1.0	1.0	3.7	5.7	7.8	245
10	1.1	1.0	3.6	5.7	7.6	291
11	1.0	1.0	3.7	5.7	8.2	280
12	1.1	1.0	3.7	5.8	7.9	262
13	1.0	0.9	3.9	5.8	8.1	250
14	1.1	0.9	4.1	6.1	8.6	289
15	1.1	0.9	4.0	6.1	8.6	287
16	1.0	1.1	3.8	5.8	8.4	288
17	1.0	1.0	4.1	6.0	8.6	319
18	1.1	1.0	3.8	5.9	8.1	269
19	0.9	1.0	3.7	5.6	7.6	245
20	1.0	1.0	3.6	5.6	7.6	206
21	1.0	1.1	3.5	5.5	7.4	234
22	0.9	1.2	3.5	5.6	7.4	194
23	0.9	1.4	3.5	5.8	7.4	141

FIGURE 10: Average Response Time of First Arriving Unit, by Hour of Day



Observations:

- Average dispatch time was between 0.9 minutes (11:00 p.m. to midnight) and 1.2 minutes (3:00 a.m. to 4:00 a.m.).
- Average turnout time was between 0.9 minutes (3:00 p.m. to 4:00 p.m.) and 1.6 minutes (2:00 a.m. to 3:00 a.m.).
- Average travel time was between 3.5 minutes (11:00 p.m. to midnight) and 4.3 minutes (4:00 a.m. to 5:00 a.m.).
- Average response time was between 5.5 minutes (9:00 p.m. to 10:00 p.m.) and 6.8 minutes (3:00 a.m. to 4:00 a.m.).
- The 90th percentile response time was between 7.4 minutes (11:00 p.m. to midnight) and 9.2 minutes (3:00 a.m. to 4:00 a.m.).

RESPONSE TIME DISTRIBUTION

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 11 and Table 17. Figure 12 shows response times for the first arriving unit to EMS calls as a frequency distribution in whole-minute increments.

The cumulative percentages here are read in the same way as a percentile. In Figure 11, the 90th percentile of 7.9 minutes means that 90 percent of EMS calls had a response time of 7.9 minutes or less. In Table 17, the cumulative percentage of 90.9, for example, means that 90.9 percent of EMS calls had a response time under 8 minutes.

FIGURE 11: Cumulative Distribution of Response Time – First Arriving Unit – EMS

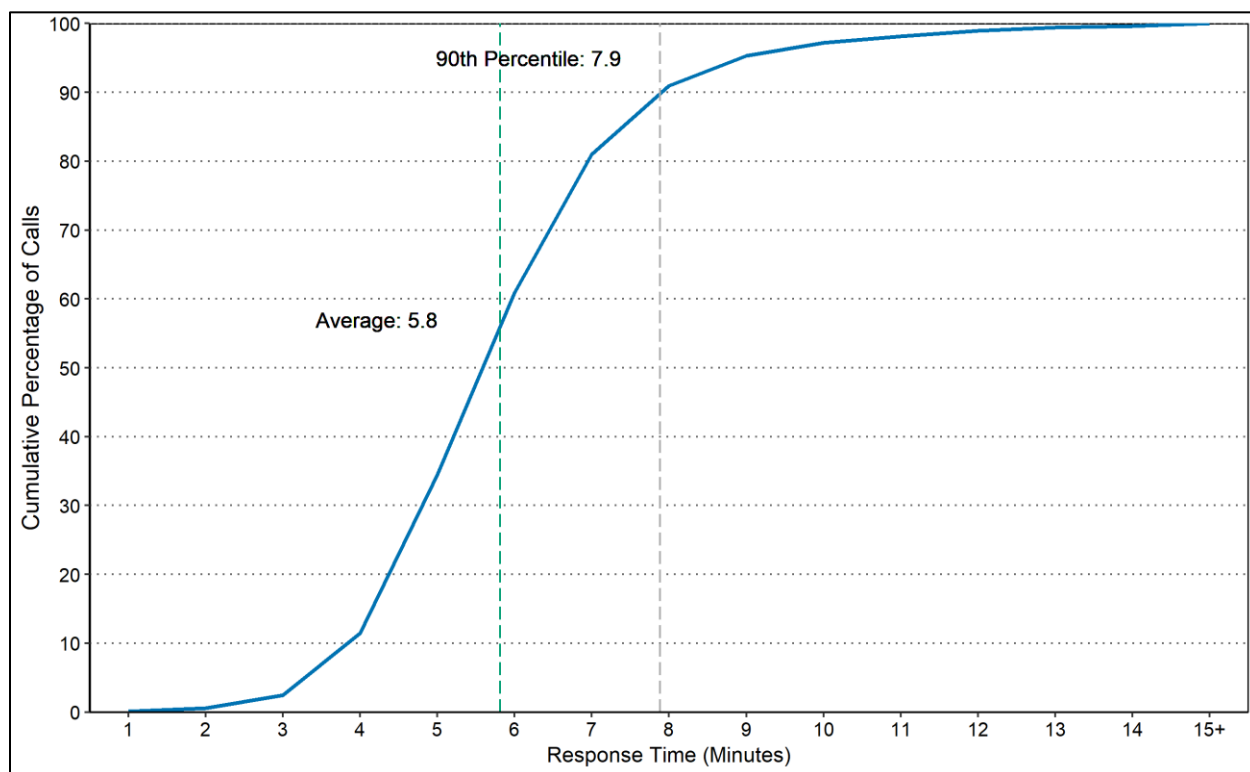


FIGURE 12: Frequency Distribution of Response Time – First Arriving Unit – Fire

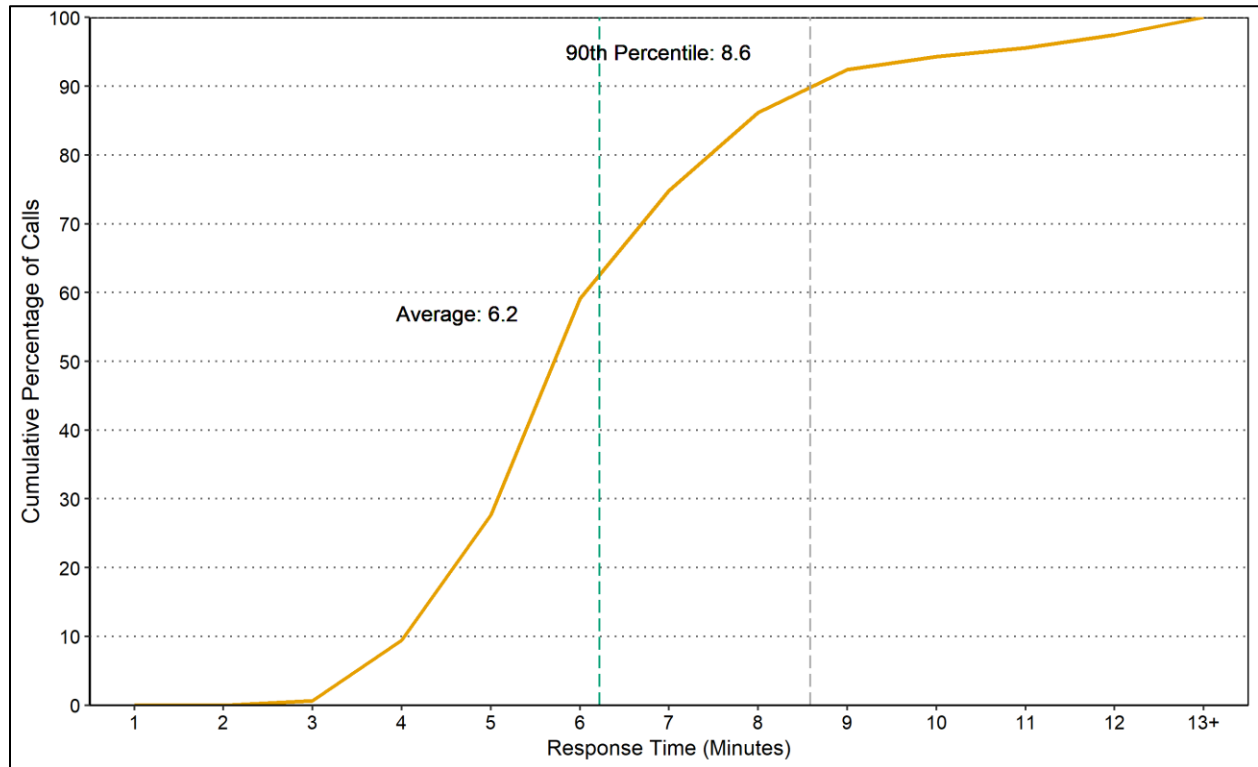


TABLE 17: Cumulative Distribution of Response Time – First Arriving Unit – EMS

Response Time (minute)	Frequency	Cumulative Percentage
1	3	0.1
2	19	0.6
3	75	2.4
4	359	11.5
5	914	34.5
6	1,050	60.9
7	799	81.0
8	395	90.9
9	174	95.3
10	74	97.2
11	39	98.2
12	31	98.9
13	20	99.4
14	8	99.6
15+	14	100.0

TABLE 18: Cumulative Distribution of Response Time – First Arriving Unit – Fire

Response Time (minute)	Frequency	Cumulative Percentage
1	0	0.0
2	0	0.0
3	1	0.6
4	14	9.5
5	28	27.2
6	50	58.9
7	25	74.7
8	18	86.1
9	10	92.4
10	3	94.3
11	2	95.6
12	3	97.5
13+	4	100.0

Observations:

- For 90.9 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 86.1 percent of structure and outside fire calls, the response time of the first arriving unit was less than 8 minutes.

WORK OUTSIDE OF UNION CITY

Tables 19 and 20 show the number of runs and total deployed time by contracted station and call location.

TABLE 19: Work – Runs

Agency/Station	Run Location		Total
	Outside of Union City	Union City	
30	177	636	813
31	138	1,872	2,010
32	122	1,728	1,850
33	60	1,980	2,040
ACFD	-	372	372
Total	497	6,588	7,085

Note: The workload of non-contracted station units was only evaluated for calls in Union City.

TABLE 20: Work – Hours

Agency/Station	Run Location		Total
	Outside of Union City	Union City	
30	62.0	202.1	264.1
31	25.1	621.1	646.2
32	33.3	588.5	621.8
33	35.0	632.6	667.6
ACFD	-	77.2	77.2
Total	155.4	2,121.4	2,276.8

Note: Workload of non-contracted station units was only evaluated for calls in Union City.

Observations:

- Units from contracted stations made 93 percent of their runs in Union City.
- Units from contracted stations spent 93 percent of their deployed hours in Union City.

ATTACHMENT I: ACTIONS TAKEN

TABLE 21: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Contain fire (wildland)	2	0
Extinguishment by fire service personnel	82	25
Fire control or extinguishment, other	1	0
Information, investigation & enforcement, other	1	0
Investigate	16	15
Investigate fire out on arrival	3	3
Provide apparatus	1	0
Provide manpower	2	0
Salvage & overhaul	3	3
Ventilate	0	1
Total	111	47

Observations:

- Out of 111 outside fires, 82 were extinguished by fire service personnel, which accounted for 74 percent of outside fires.
- Out of 49 structure fires, 25 were extinguished by fire service personnel, which accounted for 51 percent of structure fires.

ATTACHMENT II: ADMINISTRATIVE WORKLOAD

TABLE 22: Workload of Administrative Units

Unit ID	Unit Type	Annual Hours	Annual Runs
B02	Battalion chief	0.8	4
B04	Battalion chief	1.9	7
B07	Battalion chief	53.8	168
C14	Chief - administrative	0.0	1
C18	Chief - administrative	0.0	1
C23	Chief - administrative	0.0	1
CPT20	Training captain	1.0	1
CPT23	Training captain	0.0	1
FP13	Fire inspector	0.0	1
FP16	Fire inspector	1.7	1
Total		59.2	186

Note: The workload of administrative units was only evaluated for calls in Union City.

ATTACHMENT III: FIRE LOSS

TABLE 23: Content and Property Loss – Structure and Outside Fires

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Outside fire	\$68,250	14	\$31,450	10
Structure fire	\$381,750	23	\$124,700	21
Total	\$450,000	37	\$156,150	31

Note: This includes only calls with recorded loss greater than 0.

Observations:

Outside Fires

- Out of 111 outside fires, 14 had recorded property loss, with a combined \$68,250 in losses.
- 10 outside fires had content loss with a combined \$31,450 in losses.
- The highest total loss for an outside fire was \$31,000.

Structure Fires

- Out of 49 structure fires, 23 had recorded property loss, with a combined \$381,750 in losses.
- 21 structure fires had content loss with a combined \$124,700 in losses.
- Ignoring structure fires without a reported loss, the average reported total loss for structure fires was \$19,479.
- The highest total loss for a structure fire was \$170,000.

TABLE 24: Total Fire Loss Above and Below \$20,000

Call Type	No Loss	Under \$20,000	\$20,000 plus
Outside fire	94	15	2
Structure fire	23	22	4
Total	117	37	6

Observations:

- 94 outside fires and 23 structure fires had no recorded loss.
- 2 outside fires and 4 structure fires had \$20,000 or more in loss.

ATTACHMENT IV: TRANSPORT CALL ANALYSIS

In this section we present an analysis of private ambulance (mostly Paramedics Plus) activity that involved transporting patients from ACFD calls in Union City, the percentage of calls resulting in transport, and the average time for each stage of transport service. We identified transport calls by requiring that at least one responding private ambulance unit had recorded both “beginning to transport” time and “arriving at the hospital” time. Based on these criteria, note that 92 non-EMS calls that resulted in transports are included in this analysis.

TRANSPORT CALLS BY TYPE

Table 25 shows the number of calls by call type broken out by transport and non-transport calls. This includes calls where no ambulance responded along with 989 calls where an ambulance responded but did not transport a patient.

TABLE 25: Transport Calls by Call Type

Call Type	Number of Calls			Conversion Rate
	Non-transport	Transport	Total	
Breathing difficulty	48	443	491	90.2
Cardiac and stroke	92	440	532	82.7
Fall and injury	184	580	764	75.9
Illness and other	234	1,191	1,425	83.6
MVA	97	132	229	57.6
Overdose and psychiatric	24	74	98	75.5
Seizure and unconsciousness	79	390	469	83.2
EMS Total	758	3,250	4,008	81.1
Fire and Other Total	1,278	92	1,370	6.7
Total	2,036	3,342	5,378	62.1

Observations:

- Overall, 81 percent of EMS calls that ACFD responded to in Union City involved transporting one or more patients.
- On average, there were approximately 9.2 calls per day that involved transporting one or more patients.

TRANSPORT CALLS BY TYPE AND DURATION

Table 26 shows the average duration of transport and non-transport EMS calls by call type for private ambulance companies.

TABLE 26: Transport Call Duration by Call Type

Call Type	Non-transport		Transport	
	Average Duration	Number of Calls	Average Duration	Number of Calls
Breathing difficulty	18.7	48	90.5	443
Cardiac and stroke	29.5	92	91.4	440
Fall and injury	18.6	184	93.5	580
Illness and other	18.9	234	92.8	1,191
MVA	21.0	97	91.9	132
Overdose and psychiatric	20.5	24	91.5	74
Seizure and unconsciousness	21.3	79	92.6	390
EMS Total	20.7	758	92.3	3,250
Fire and Other Total	16.6	1,278	85.7	92
Total	18.1	2,036	92.1	3,342

Note: Duration of a call is defined as the longest deployed time of any of the units responding to the same call.

Observations:

- The average duration was 18.1 minutes for a non-transport EMS call.
- The average duration was 92.1 minutes for an EMS call where one or more patients were transported to a hospital.
- The average duration of a transport call is 5.1 times longer than a non-transport call.

TRANSPORT TIME COMPONENTS

Table 27 gives the average deployed time for an ambulance on a transport call, along with three major components of the deployed time: on-scene time, travel to hospital time, and at-hospital time.

The on-scene time is the interval from the unit arriving on-scene time through the time the unit departs the scene for the hospital. Travel to hospital time is the interval from the time the unit departs the scene to travel to the hospital through the time the unit arrives at the hospital. At-hospital time is the time it takes for patient turnover at the hospital.

The 3,342 transport calls resulted in 3,342 transports. 46 runs were excluded from this analysis due to missing hospital travel times and 1 run was excluded due to missing on-scene times, leaving 3,295 runs for analysis.

TABLE 27: Time Component Analysis for Ambulance Transport Runs by Call Type (in Minutes)

Call Type	Average Time Spent per Run				Number of Runs
	On Scene	Traveling to Hospital	At Hospital	Deployed	
Breathing difficulty	17.6	18.8	44.5	89.0	442
Cardiac and stroke	18.1	18.8	44.6	89.9	437
Fall and injury	19.1	20.2	43.3	92.0	567
Illness and other	17.8	20.3	42.8	90.9	1,173
MVA	17.6	21.2	46.5	93.4	126
Overdose and psychiatric	20.4	18.6	42.4	89.5	73
Seizure and unconsciousness	18.1	19.4	45.2	91.3	386
EMS Total	18.1	19.8	43.8	90.8	3,204
Fire and Other Total	18.1	18.1	44.1	85.6	91
Total	18.1	19.7	43.8	90.7	3,295

Note: Average unit deployed time per run is lower than average call duration for some call types because call duration is based on the longest deployed time of any of the units responding to the same call, which may include an engine or ladder. Total deployed time is greater than the combination of on-scene, transport, and hospital wait times as it includes turnout, initial travel, and hospital return times.

Observations:

- The average time spent on-scene for a transport call was 18.1 minutes.
- The average travel time from the scene of the call to the hospital was 19.7 minutes.
- The average deployed time spent during transport calls was 90.7 minutes.
- The average time spent at the hospital accounts for approximately 48.3 percent of the total deployed time for a transport call (43.8 minutes).

- END -