Clovis Fire Department

Community Risk Assessment & Standards of Cover

2017 - 2022

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Executive Summary

As part of the ongoing Accreditation process and to ensure compliance with adopted standards, the City of Clovis has actively worked to evaluate the department's operations, deployment, and staffing. The Fire Department uses risk-based data-driven staffing and deployment plans based upon the specific and unique profile in the City of Clovis. These analyses culminated in a comprehensive deployment and staffing plan referred to as a Standards of Response Coverage (SOC).

The Clovis Fire Department (CFD) is a paid career fire department that serves the community of Clovis with various core emergency response services, such as fire suppression, emergency medical services (EMS), hazardous materials mitigation and technical rescue . In addition to these core services, the Department also provides several other community supportive functions, such as fire prevention and emergency preparedness services. Twenty-four hours a day, 365 days a year, sixteen personnel are on duty serving the Community from five fire stations. These trained professional firefighters operate four engine companies staffed with three personnel each; one truck company staffed with three personnel; and one battalion chief command vehicle. In total, the Department employs 66 dedicated employees.

Like other business units of a municipality, the fire service must adequately define the levels of service for the community it protects based on the unique characteristics of the community and availability of fiscal resources. As part of the Commission on Fire Accreditation International (CFAI) process, a Standards of Cover (SOC) document adopted by the agency having jurisdiction sets the foundation for service level goals. In establishing those goals, the Clovis Fire Department used nationally recognized standards and best practices such as: the National Fire Protection Association (NFPA) Standards, the CFAI – 9th Edition Fire and Emergency Services Self-Assessment Manual, the Utstein Reporting Criteria, American Heart Association guidelines, and the Insurance Services Office – Fire Suppression Rating Schedule. It also included input from a representative group of stakeholders from the community on the levels of service they want as residents.

A Community Risk Assessment involves the analysis of risk for fire and non-fire emergencies (i.e., emergency medical services, hazardous materials and technical rescue). Impacts to life safety, assets and the environment are measured along with an incident's relative probability. In summary, low risk is defined as incidents having low probability and low consequences; moderate risk is comprised of incidents having high probability with low consequences; high risk is defined as incidents having high probability and high consequences.

Within the categories of fire suppression, emergency medical services, hazardous materials and technical rescue, the Department has established specific risk classifications and has conducted critical task analyses to determine appropriate response levels. Critical tasking analysis determines how many personnel, and what apparatus/equipment, are necessary to mitigate a variety of emergency situations.

For low risk fires, three personnel will respond; moderate risk structure fires will have a response of sixteen personnel and high risk structure fires will have a response of nineteen personnel. Three personnel will respond to all low and moderate risk EMS incidents. Low and moderate risk technical rescue and hazardous materials (HazMat) incidents will receive three personnel; ten personnel will respond to high risk technical rescue and HazMat incidents.

The Department has established both baseline and benchmark performance measures. Baseline measures reflect historical performance and benchmarks are Total Response Time (TRT) goals. TRT is measured in two ways: first-arriving unit and effective response force (ERF), i.e., total number of personnel necessary to address the emergency situation. TRT is comprised of call processing time, turnout time, and travel time. The Department observes the 90th percentile of performance as opposed to the 50th percentile (i.e., average) response time. In other words, the Department observes what it is doing the majority of the time as opposed to what it is doing half of the time.

Based on the City of Clovis's adopted General Plan, comprehensive risk assessment that included historical datasets, fiscal resources and input from community stakeholders, the Standards of Cover document establishes three (3) primary benchmark performance measures in terms of deployment and emergency response.

Fire Department Response Goal: First Unit – Total Response Time – EMS Calls for Service = **6 Minutes & 30 Seconds at 90 Percent**

Fire Department Response Goal: First Unit – Total Response Time – Fire, Hazardous Material and Technical Rescue Calls for Service = **7 Minutes at 90 Percent**

Fire Department Response Goal: Effective Response Force – Fire Calls for Service = **10 Minutes & 30 Seconds at 90 Percent**

EMS benchmarks are 6 minutes and 30 seconds for the first-arriving unit and 10 minutes and 30 seconds for the ERF. Fire suppression, HazMat, and technical rescue benchmarks have been set at 7 minutes for the first-arriving unit and 10 minutes and 30 seconds for the ERF. Baseline performance measures for EMS for the last five years is 6 minutes and 47 seconds for the first-arriving unit and 9 minutes and 7seconds for the ERF. Baseline performance measures for fire suppression are 6 minutes and 35 seconds for the first-arriving unit and 10 minutes and 42 seconds for the ERF. Baseline performance measures for Hazardous Materials and Technical Rescue is 7 minutes and 47 seconds for the first-arriving unit.

Previously, turn out and travel times were the sole parameters on which the Department measured its performance, but this measurement has become obsolete. The Department currently does exceedingly well when considering only turn out and travel times. Turn out and travel times conform to industry best practices of 5 minutes or less 90 percent of the time. As the CFAI requires that fire departments take a holistic approach to response time measures, the Department now measures call processing time, turnout time and travel time to obtain a total response time.

After reviewing the Department's five-year baseline performance as compared to our established benchmarks, a significant area for improvement stood out. Call processing times have steadily increased over the past several years as a result of several internal changes. During this time, the Department realized it could no longer service all of the citizens the way we have for the past twenty years. The main reason for this is the lack of units or stations to meet demand. In an effort to make sure the Department has the right resources available for when a priority call is received, the Department evaluated all of the types of calls for service which it has historically responded to. In conjunction with our local emergency medical services agency, the Department reviewed approximately 385,000 medical aid calls and determined which emergency requests actually required the need for a Code 3 (lights and sirens) response and which ones could be handled by just an ambulance. This now requires the Communications Center to ask additional questions of the calling party to determine if a fire response is required. This questioning greatly increased the Department's call processing times in 2016. As a result of this review, significant changes were made in the questions asked, the order and improvements to CAD to dispatch fire units more rapidly. The Department is already seeing improvement in the first quarter of 2017 and expects additional improvements to be made. Future plans are in place as well as a compliance methodology to ensure continued improvement.

The second area of concern for the Department is the Southeast area of the City. In 2016, there were over 3,770 residences and the Department responded to over 325 calls for service. After looking at the Department's historical benchmarks for opening a new station it was determined when a new station response area has call demand greater than 350 calls for service, developed more than 50%, and response times are exceeding the Department's established benchmark by greater than 1 minute. We have met the threshold for design and anticipated staffing the new station within three years of the start of design.

The purpose of this document is to provide elected officials, cooperating agencies, Department members and, most importantly, residents an overview of the assets at risk (people, possessions, homes, businesses, cultural assets, environment, etc.), and the methods the Clovis Fire Department will employ to protect those assets. It is not intended to be a stand-alone document but to be used in conjunction with the Department's Strategic Plan 2017-2022. While the SOC provides an overview of risk assessment, deployment of resources and an analysis of current performance, the Strategic Plan outlines the resources needed to address the current service demands, departmental improvements, and anticipated changes within community.

Description of Community Served

Location

Clovis is located within northeast Fresno County, approximately seven miles southeast of Madera County. Situated in the northeast quadrant of the Fresno-Clovis Metropolitan Area, Clovis is in the midst of the agriculturally rich San Joaquin Valley. Since its incorporation in 1912, Clovis has been known locally as the "Gateway to the Sierra".

Geography/Climate

The City of Clovis is approximately 24.36 square miles serving a population of 110,776 as of 2016. Its service area encompasses the City of Clovis and unincorporated Fresno County, inclusive of the City's Sphere of Influence (31.67 square miles). All lands outside of the City's Sphere of Influence are regulated by the Fresno County General Plan and zoning designations. However, State law requires that a city plan for areas outside of its immediate jurisdiction if the areas have a direct relationship to planning needs.

Clovis consists of three distinct geographical areas: 1) The City, which represents the incorporated City defined as area within the City limit boundaries; 2) The Sphere of Influence, which corresponds to the City's existing Sphere of Influence; and 3) The Study Area, which includes unincorporated Fresno County lands outside of the City's Sphere of Influence. Immediately beyond Clovis to the northeast are the western foothills of the Sierra Nevada Mountains. The City of Fresno and its Sphere of Influence are located to the southwest of Clovis. The southwestern portion of Clovis is characterized by urbanized land uses, whereas the northern and eastern portions of Clovis are predominantly rural in nature, comprised of agriculture, rural residential, and vacant land uses.

Clovis experiences annual average temperatures of 63.2 degrees Fahrenheit and 10.2 inches of rain. While the average is relatively temperate, summer and winter months can bring extreme weather patterns to the region. During the winter, the high temperatures hover around 55 degrees. Combined with the regional geography and precipitation during this time, Clovis experiences numerous days with dense fog. This fog has the largest impact on transportation where accident rates jump 50% during those foggy days. Historically, Clovis has been impacted by severe freezing during the winter. Most notable were the winter freezes of 1990, 1997/1998, 2001 and 2006/2007. These freezes affected local agriculture and City infrastructure. Estimated agricultural losses in 2006/2007 totaled $1M which does not include the additional financial losses resulting from damaged infrastructure.

During the summer months, the Region receives extended periods of 100+ degrees Fahrenheit days, well above the national average. While the average summer temperature is 90 degrees Fahrenheit, these extended heat waves affect the medically fragile, elderly, and animal populations. The City staffs cooling centers to protect the vulnerable populations. In addition to heat waves, the Fresno County Region continues to suffer regular drought due to lower than normal snowpack in the Sierra Nevada Mountains that supplies water for agricultural use and replenishes the below-ground water table. Continued periods of drought are expected to periodically influence the Region.

Community Boundaries/Auto Aid

Description

Clovis shares a western and southwestern border with the City of Fresno. To the east, Fresno County contracts fire protection to CalFire serving primarily rural and suburban areas and fifteen communities.

Fresno Fire Department Facts

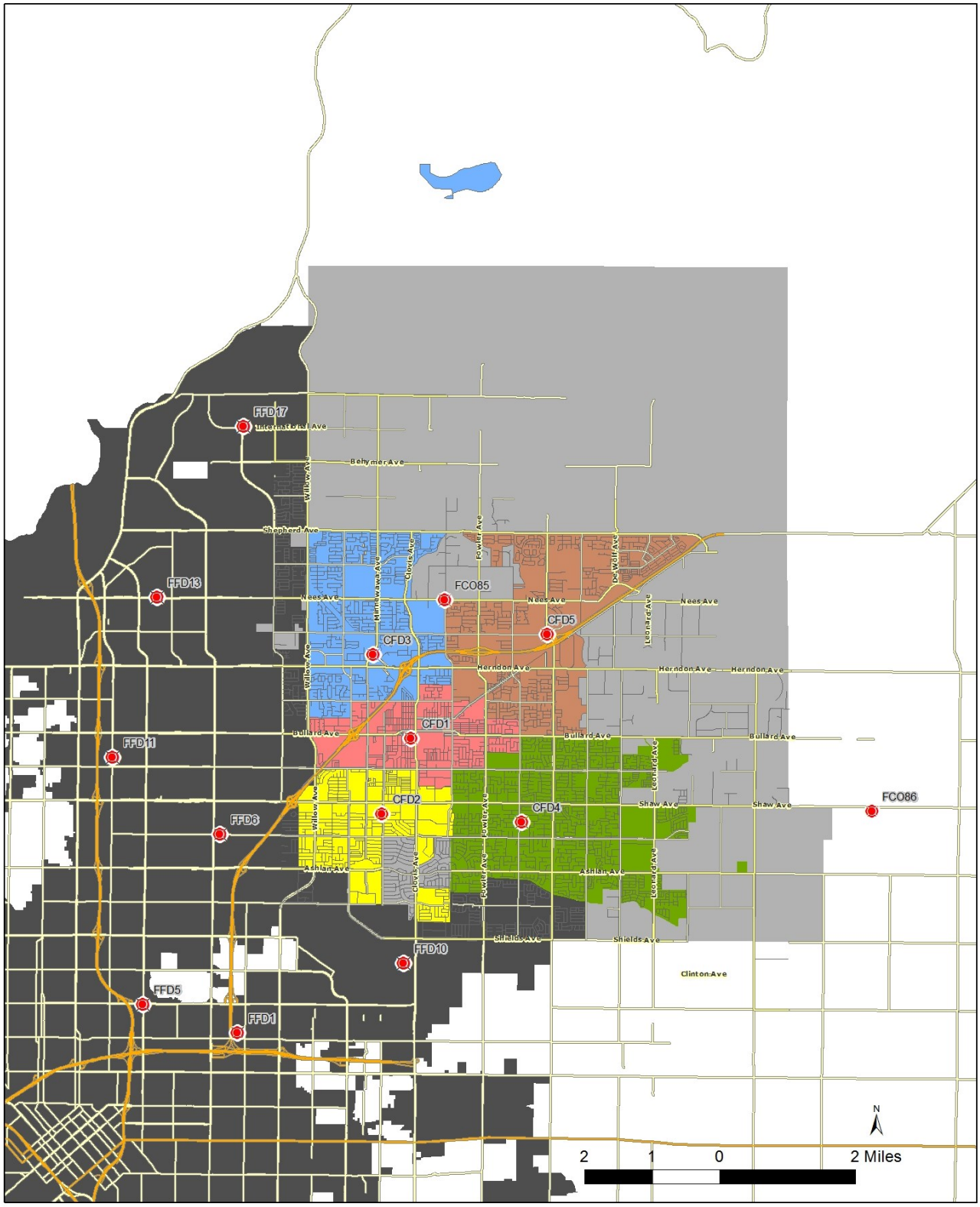
- Population: 520,159
- Land Area: 115 sq. miles
- Population Density: Urban
- Stations: 24
- Daily Staffing: 89

Fresno County Fire Protection District

- Population: 240,000
- Land Area: 2,655 sq. miles
- Population Density: Rural/Suburban
- Stations: 18
- Daily Staffing: 48

Geography/Climate

California's 10th largest county, Fresno County covers an area of over 6,000 square miles in Central California. It is approximately 200 miles north-northwest of Los Angeles and approximately 160 miles southeast of San Francisco. The County is located near the center of California's San Joaquin Valley and is part of the Great Central Valley, one of the State's distinct physical regions. The County's topography is characterized by broad, flat valley floors that generally slope from southeast to northwest; foothills and moderately high mountains (Coast Ranges) in the west; and foothills and high mountains (Sierra Nevada) in the east. Approximately 55 percent of the County is mountainous and 45 percent is valley land. Elevations range from 100 to 400 feet on the Valley floor to 4,000 feet in the Coast Ranges and more than 14,000 feet in the Sierra Nevada. There are two major rivers in Fresno County, both of which originate in the Sierra Nevada, the San Joaquin and Kings rivers. The climate varies among the County's three regions. Summers are long, hot and dry in the valley moderate to hot in the Coastal Ranges; and relatively cool in the high elevations of the Sierra Nevada. There is little precipitation in the County during the summer. Winters in the valley and Coast Ranges are short and mild with light rain in the valley and moderate rainfall in the Coastal Ranges. In the Sierra Nevada, winters vary from short and mild with frequent rain and some snow to moderately severe with frequent snow. Most of the seasonal precipitation occurs between October and April.



Clovis Fire Department
Service Area Boundaries
2017

1 3 5 Fresno
2 4 County Tarpey

Topography
The topography of Clovis is generally flat with very little elevation change throughout the City. It is important to note that the City of Clovis is located within the central portion of California's San Joaquin Valley (27,280 square miles in size). Although Clovis is generally flat in elevation, the eastern border of the City is beginning to encroach upon the foothill areas that will pose a wildland urban interface hazard in the future.

Transportation Networks
The City is generally broken into a transportation pattern with major streets at the one-half mile mark. State Route 168 bisects the City diagonally from the southwest to the northeast and provides quick access to other major freeways that serve the central part of the state.

Population
Current population for the City of Clovis is 110,776. Over the last 20 years, Clovis has become the premier choice for housing developers and homebuyers in the Fresno/Clovis metropolitan area. The City has been aided by an outstanding school district that ranks among the best in the Nation. The City has a reputation as being a safe and friendly community in which to raise a family. However, vacant land is expensive. As Clovis strives to be more than a bedroom community, attention needs to be given to preserving land for job generating activity in order to meet the jobs/housing balance.

Land Use and Development
Adopted in 1993 and last updated in 2014, the Clovis General Plan provides comprehensive planning for the future. It encompasses what the City is now, what it intends to be, and provides the overall framework of how to achieve this future condition. Estimates are made about future population, household types and employment base so that plans for land use, circulation and facilities can be made to meet future needs. The General Plan represents an agreement on the fundamental values and a vision shared by the residents and the business community of Clovis and the surrounding area of interest. Its purpose is to provide decision makers and the staff of the City of Clovis direction for confronting present issues as an aid in coordinating planning issues with other governmental agencies and for navigating the future.

- The Land Use Element provides the central policy context on which to base all land use decision making in Clovis. It is through the implementation of the goals and actions that the future land use pattern of Clovis will continue to be shaped.

- Transportation routes (including the proposed beltway and tiered transportation system), design standards for streets, the transit corridor and current and future traffic levels on city streets are among the issues covered in the circulation section of the General Plan.

- The housing section looks at current and future need for housing units, the capacity in the City for additional units, the types of households that will need some form of assistance or special housing and ways to perpetuate existing housing.

- Conservation issues include strategies for an orderly transition from agriculture to urban uses, re-use of water and wastewater, conservation of ground water resources, and commitment to conservation of agricultural lands in a regional context.

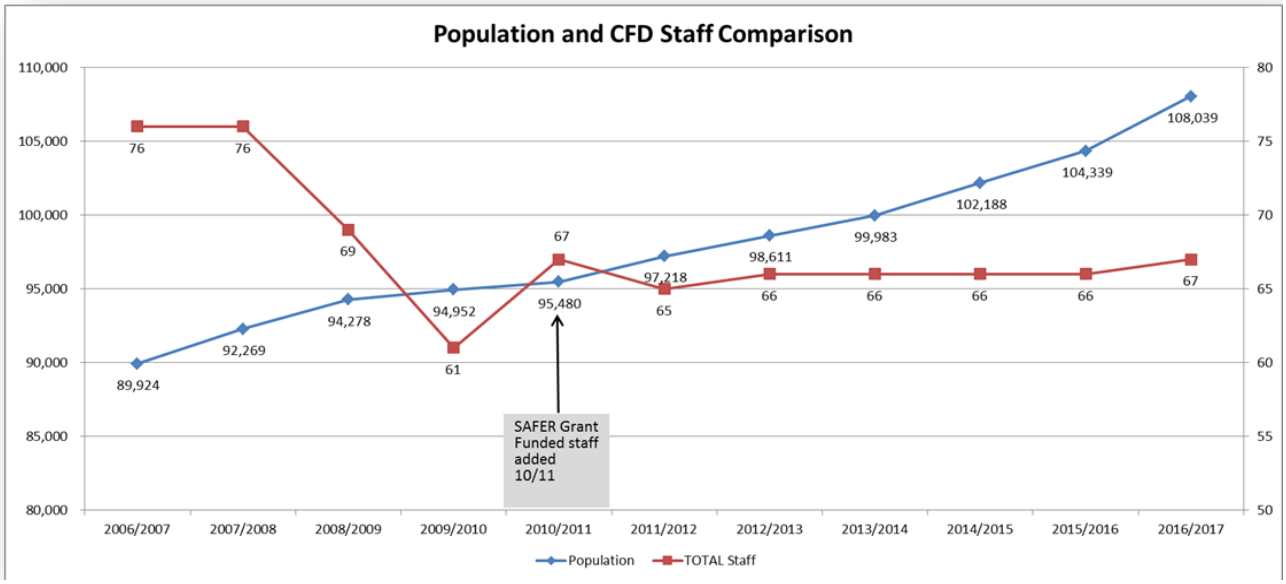
- Open space and conservation issues include discussion of parks and recreation resources, targeted growth of these facilities and targeting open space to function in a multi-use capacity.
- Existing and future noise from traffic and other activities are issues discussed in the noise section.
- The safety section of the General Plan analyzes conditions in the City and surrounding study area that may be hazardous to those who live and work there, such as flood inundation, fire and hazardous materials.

Each of these issue areas have goals, policies and implementation measures designed to provide a safe and pleasant environment in the future. The City of Clovis General Plan contains not only the seven issue components required by state law, but also several chapters that detail the City's plan for the future. Included among these are chapters regarding public facilities and air quality. Each General Plan chapter covers an aspect of the City's growth and development. Components of each section are interrelated and therefore must be consistent with each other. Taken together, they provide the guidance as a comprehensive planning tool for the future.

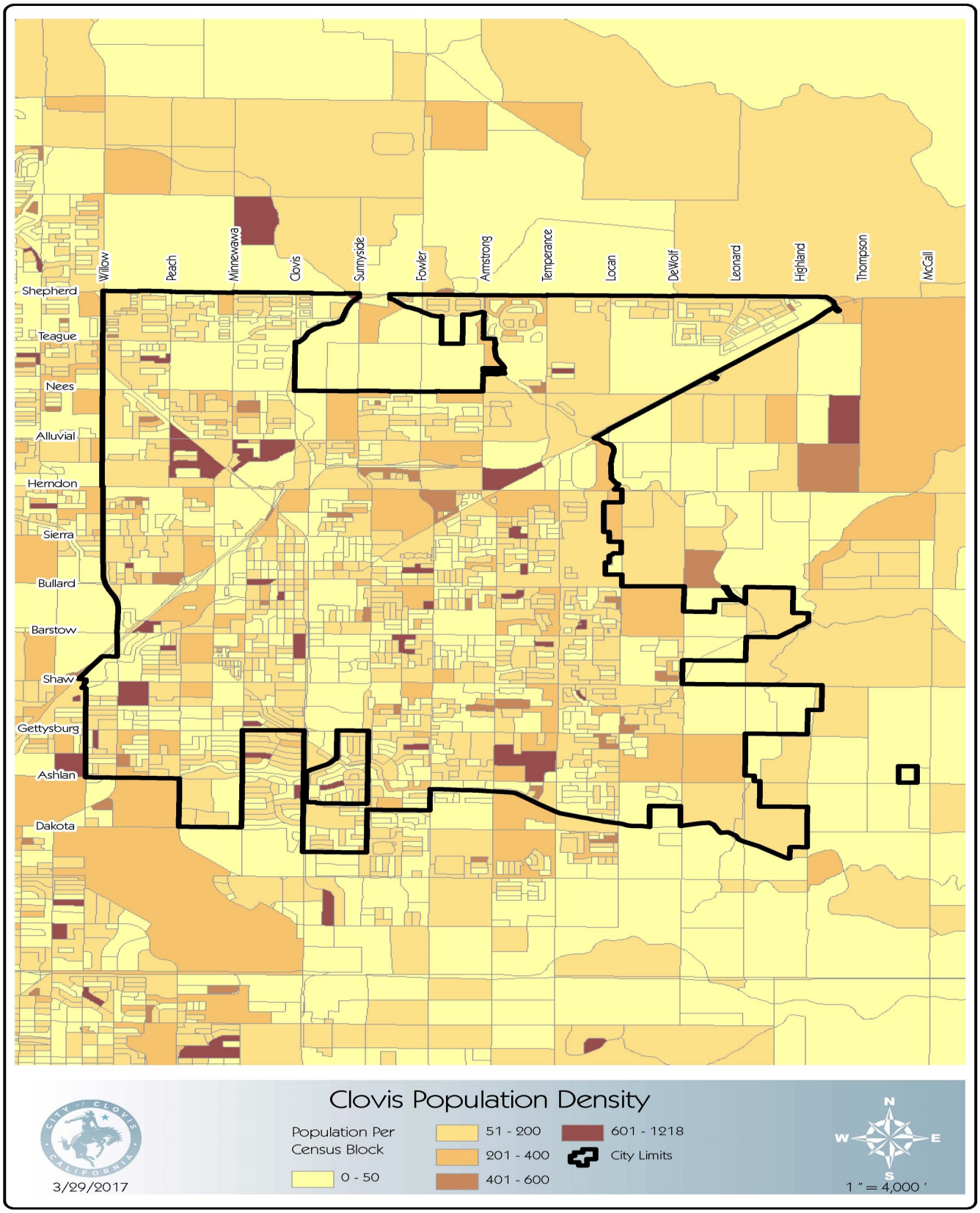
Projected Growth

The City of Clovis is experiencing modest growth, primarily in single family detached residential occupancies. Growth rates since 2006, show year to year changes from 1% - 4% with that same trend expected to continue. The Department boundaries are expected to change substantially through continued annexation within the sphere of influence over the next 20 years with 700 units of single family occupancies annually. From this perspective, increases in population density will require a greater concentration and distribution of resources to meet the demand, particularly in the southeast and northwest areas.

Three years of historical call volume were utilized to identify any general trends in community demands for service. Since the Great Recession of 2008-2011, the Department has managed call volume through greater use of auto/mutual aid agreements and eliminating non-emergency calls for service. Even before the recession, the Department wisely used available resources by moving one of the two companies at Station 2 to Station 5 when it was opened. This model is unsustainable if established service levels are to be maintained. The chart below shows population growth and Fire Department staffing since 2006.



The map below provides an overview of population density within city boundaries and is given consideration in establishing response areas and planning zones.



Governance

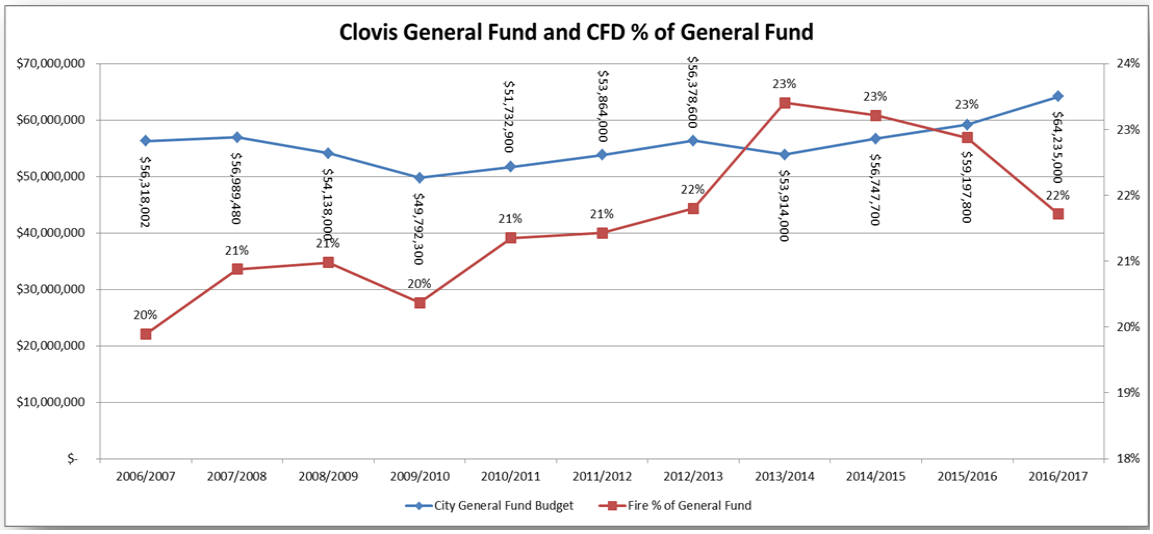
The City of Clovis has adopted a "council-manager" form of government. The governing board of the Clovis Fire Department is made up of the five (5) member Clovis City Council (Council) that is responsible for the appointment of the City Manager based on an individual's executive and administrative qualifications. The City Manager is the administrative head of the City government under the direction and control of the City Council. The City Council may not give direction to or have control of any subordinates of the City Manager. The members of the City Council elect, among themselves, one member to serve as Mayor for a two year term, who performs strictly ceremonial duties and acts as a member and presiding officer of the Council.

The positions of City Manager and City Council are governed by the Clovis Municipal Code that also defines the auspices of the City Manager and the City Council. The Clovis Municipal Code provides general policies that guide the City of Clovis, approved programs and services, and appropriated financial resources.

Finance

The City Council for the City of Clovis provides the direction to the City Manager to develop an annual budget, that is reviewed and adopted by the City Council. The City Manager delegates the responsibility and authority to the Fire Chief to plan for and budget for the funds to provide fire protection and other emergency services to the citizens of Clovis. The City Municipal Code outlines the budget process. The annual City Budget document provides a plan and the needed funding for the Clovis Fire Department to carry out its mission.

The financial resources that are used to fund Fire Department operations come from the City's General Fund. There is a distinction between the two types of revenue that make up the General Fund, discretionary and non-discretionary revenues. Non-discretionary revenue has restrictions on its use and the City must use it on the programs for which it was intended. An example would be gas taxes that must be used on street repairs. Discretionary revenues are those that the City can determine, without restriction, how they want to expend those funds. Examples of these revenues include property taxes and most sales taxes. The City provides a detailed summary of discretionary and non-discretionary revenues in the budget document. The Fire Department is primarily funded by discretionary revenue. A use of discretionary revenue summary report is also provided in the budget document. An analysis of Fire Department Funding demonstrates usage of 20% - 23% over a 10-year period.



The budget document provides specific budget detail for each Fire Department section including Emergency Services, Life Safety and Enforcement, Emergency Preparedness, and Administration Support Services. This detail includes the previous fiscal year's actual expenditures, the revised estimate of expenditures for the current fiscal year and the requested budget amount.

The City also charges a development fee, equal to $706 per residential unit. This fee is specifically established to construct, equip and furnish fire stations and is a source of non-discretionary revenue. The City also collects for new areas of development a Community Facilities District Fee that is used to fund police and fire deployment. The current rate for 2016 was $187 per residential unit.

The City's Finance Department has projected revenue for fiscal year 2016-2017 to increase 4% over 2015-2016. The City has assumed an industry-wide assumption of 19% for revenue growth between 2017 and 2021. For the same timeframe, total expenditures are projected to increase by 18%.

CITY OF CLOVIS

General Fund Financial Forecast - Summary

	ACTUALS			ESTIMATED	PROJECTED				
	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Beginning Available Fund Balance	1,140	1,610	3,780	2,930	1,180	1,010	920	1,360	760
Reappropriation/Encumbrances	(110)	(50)	130	550					
REVENUES									
Discretionary	42,280	44,560	46,900	49,840	52,070	54,690	57,480	60,320	63,160
Non-Discretionary	13,580	14,610	14,800	15,100	14,810	15,240	15,600	15,950	16,320
Total Revenues	55,860	59,170	61,700	64,940	66,880	69,930	73,080	76,270	79,480
EXPENDITURES									
Public Safety	38,500	40,770	43,140	46,170	47,790	50,640	53,130	56,490	58,520
Public Utilities	7,800	8,070	8,330	9,220	9,220	9,500	9,700	9,910	10,100
General Government	6,400	6,560	6,660	8,650	7,860	8,370	8,440	8,880	8,930
Total Expenditures	52,700	55,400	58,130	64,040	64,870	68,510	71,270	75,280	77,550
Resources Above/(Below) Operating Expenditures	3,050	3,720	3,570	900	2,010	1,420	1,810	990	1,930
ADDITIONAL ITEMS									
Transfers Out to Government Facilities	(800)	(750)	(2,500)	(2,000)	(1,000)	(500)	(500)	(500)	(1,000)
Transfers Out to PDS/Fleet	(320)	(300)	(1,000)	(1,000)	(1,000)	(300)	(300)	(300)	(300)
Total Additional Items	(1,120)	(1,050)	(3,500)	(3,000)	(2,000)	(800)	(800)	(800)	(1,300)
Net Increase/(Decrease) to Fund Balance	1,930	2,670	70	(2,100)	10	620	1,010	190	630
OTHER ITEMS									
(Use of)/Addition to Emergency Reserve	1,460	500	920	200	180	710	570	790	490
Total Other Items	1,460	500	920	200	180	710	570	790	490
Ending Available Fund Balance	1,610	3,780	2,930	1,180	1,010	920	1,360	760	900
Sales Tax Triple Flip Designation	860	860	0						
Emergency Reserve-(Dollars)	8,820	9,320	11,100	11,300	11,480	12,190	12,760	13,550	14,040
Emergency Reserve as a % of Expenditures	16.70%	16.80%	19.10%	17.60%	17.70%	17.80%	17.90%	18.00%	18.10%

Community Expectations and Performance Goals

Stakeholder Input Process
Clovis Fire updated its Strategic Plan in 2017 to help develop this document. This update included input from both inside and outside the organization and a summary of the results of the stakeholder input process for the Strategic Plan.

Community Expectations
Community expectations were evaluated through structured interviews and interaction with chief officers, City Staff, key community stakeholders and line personnel. In 2014 an external stakeholder group participated in a multi-day process that included review and analysis of services offered by Clovis Fire along with the fiscal resources available to support operations. At the conclusion, stakeholders provided input that assisted in establishing response goals, prioritization of services provided and general feedback for the Department. A small group of the community stakeholders were brought back in early 2017 to revisit the original results and confirm if they are still valid today.

Guiding Principles and Internal Performance Expectations and Goals

Our Mission
The Mission of the Clovis Fire Department is to provide for the fire and life safety of the community in the most professional, courteous and efficient manner possible.

Prevent Harm	Be Professional	Use Resources Wisely
· To our Community	· In our Appearance	· With our Budget
· To our Firefighters	· In our Performance	· With our Time
· To our Environment	· In our Reputation	· With our People

Our Vision
The Clovis Fire Department is dedicated to serving the people of our community and we will work to continue to exceed community expectations. We will provide leadership locally, regionally and nationally. We will establish and strengthen partnerships and cooperate with allied agencies to enhance our service. We will provide the best service possible within the fiscal opportunities available. We will exercise foresight in planning, preparing and auditing for the safety and well-being of the community. We will promote confidence, trust and self-reliance through personal and professional growth. We will support our workforce to maintain a healthy lifestyle and perform duties in a safe and responsible manner.

Our Values
We Value the Clovis Way of Life Through…

Teamwork	Empowerment of our personnel to provide quality customer service
Traditions	Remembering the past
Innovation	Always seeking to acquire knowledge and skill
Integrity	Adherence to moral and ethical principles
Honor	Integrity in one's beliefs and actions
Respect	Deference to the rights or opinions of others
Creativity	Transcending traditional ideas or patterns to create meaningful new ideas
Courage	Facing difficulty without fear

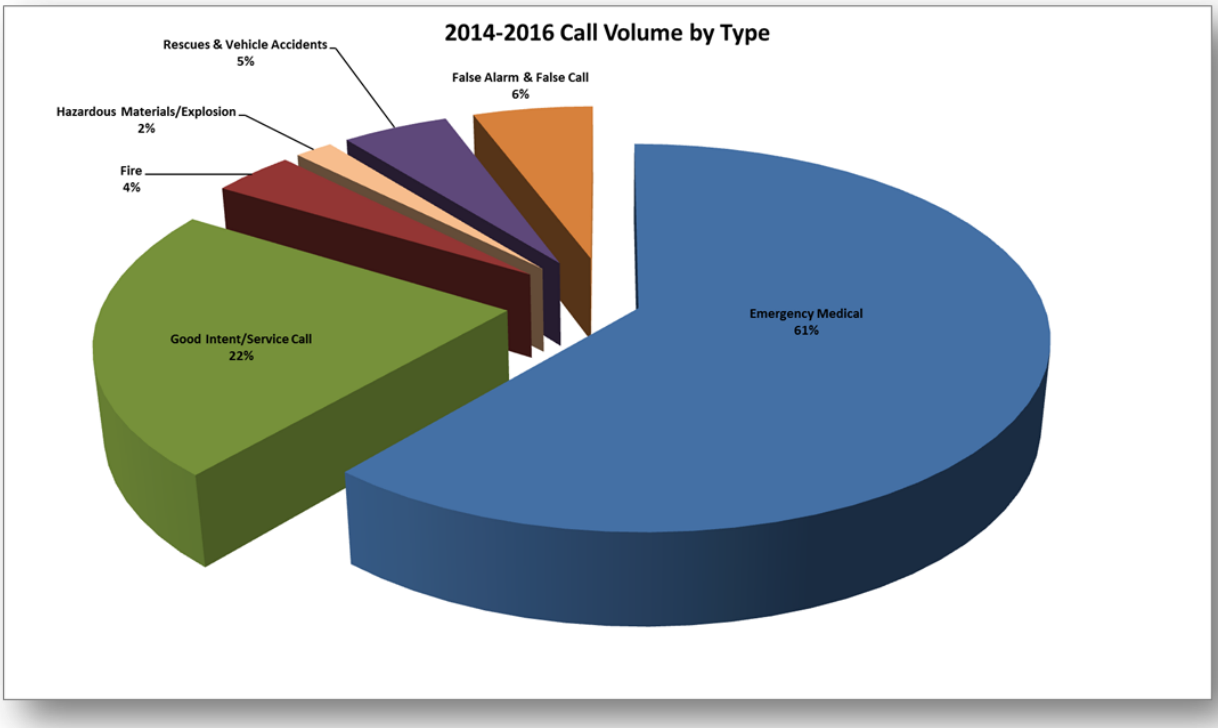
Community Response History

Methodology

We collected data directly from CAD, NFIRS and processed that information through two software packages to develop a comprehensive profile unique to the hazards and call types present in the City of Clovis. In this report, we primarily focused our analysis on the three-year period of 2014-2016. We utilized two distinct measures of call volume and workload. First, is the number of requests for service that are defined as either “dispatches” or “calls”. Dispatches/calls are the number of times a distinct incident was created involving Clovis Fire Department units deployed within the city limits or two neighboring auto/mutual aid partners. Conversely, “responses” are the number of times that an individual unit (or units) responded to a call. Responses will be utilized on all Unit and Station level analyses, which account for all elements of workload and performance. Calls have been categorized as Fire, EMS, Rescue/MVA, Hazardous Condition, Good Intent/Service Call and False Alarm respectively.

Overview of Community Response Performance

The following chart demonstrates workload by call type. When accounting for call types over the past three years, EMS service requests accounted for 61% of the total number of incidents. Fire-related calls represented 4% and the remaining balance falling into four other categories.



The number of individual unit responses will be more reflective of total department workload since 8% of the calls resulted in multiple units dispatched. As summarized below, all units in the Fire Department combined made 21,359 responses within Clovis over the three-year period, with 90% of those calls taking 22:10 minutes.

Incident Category	Process Time	Turnout Time	Travel Time	Response Time	Total Reflex Time	Total Resource Time	First-In Units	All Unit Responses
FIRE, EXPLOSION	01:29	01:35	04:29	05:38	06:54	120:12	544	1,024
OVERPRESSURE,EXPLOSION	06:56	01:30	05:29	06:39	12:46	16:35	3	3
RESCUE, EMS	01:38	01:26	04:33	05:29	06:33	20:43	16,802	16,887
HAZARDOUS CONDITION	01:52	01:35	05:12	06:10	07:37	47:15	418	519
SERVICE CALL	02:10	01:33	05:50	06:51	08:30	28:13	732	756
GOOD INTENT CALL	01:49	01:29	05:26	06:24	07:39	21:17	563	692
FALSE ALARM, FALSE CALL	01:29	01:38	05:31	06:33	07:47	23:59	1,444	1,471
SPECIAL OR OTHER	01:26	01:27	05:29	06:18	07:40	123:08	6	7
Total	**01:39**	**01:28**	**04:42**	**05:40**	**06:49**	**22:10**	**20,512**	**21,359**

A reliable and accurate measure of performance is the fractal or percentile. This measure is an industry best practice and is more robust, or less influenced by outliers, than measures of central tendency such as the mean or average. Best practice is to measure at the 90th percentile. In other words, 90% of all performance is captured expecting that 10% of the time the department may experience abnormal conditions that would typically be considered an outlier. For example, if the department were to report an average response time of six minutes, then in a normally distributed set of data, half of the responses would be longer than six minutes and half of the responses would be less than six minutes. The 90th percentile communicates that 9 out of 10 times the Department performance is predictable and, thus, more clearly articulated to policy makers and the community.

The performance for dispatch time at the 90th percentile was 1 minute and 39 seconds, turnout time at the 90th percentile was 1 minute and 28 seconds, travel time was 4 minutes and 42 seconds, turnout and travel time was 5 minutes and 40 seconds. Please note that the summation of 90th percentile turnout time and 90th percentile travel time is not the same as 90th percentile turnout and travel time combined, and also the summation of 90th percentile dispatch time, 90th percentile turnout time and 90th percentile travel time is not the same as 90th percentile response time.

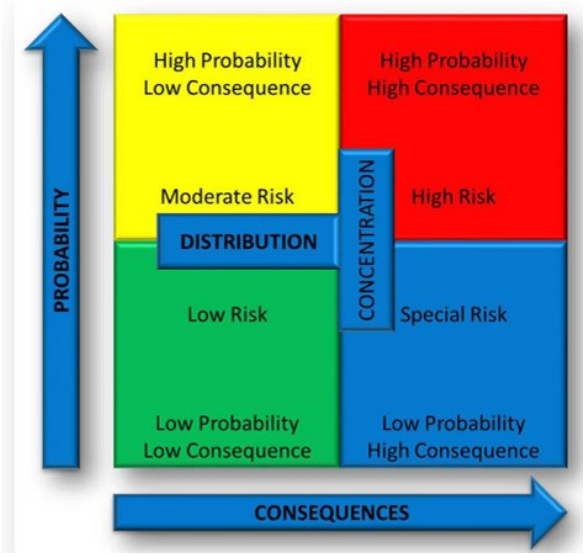
Typically, performance varies across call types or categories due to a variety of reasons. For example, the turnout time may be longer for fire-related calls because the crews must dress in their personal protective ensemble (bunker gear) prior to leaving the station whereas on an EMS incident, they do not. In addition, the larger fire apparatus may require longer response times due to their size and lack of maneuverability, specifically noted in Station 1's area where the ladder truck handles most responses.

Community Risk Assessment and Risk Levels

Risk Assessment Methodology

The risk assessment process utilized a systematic methodology to evaluate the unique risks that are specific to the Clovis Fire Department. This process evaluated risk from two broad perspectives. First, risk is identified through retrospective analyses of historical data. Second, risk is evaluated prospectively providing the necessary structure to appropriately allocate personnel, apparatus, and fire stations that afford sufficient distribution and concentration of resources to mitigate those risks. This methodology also provides information for the Department to consider alternative solutions to assist in the mitigation of risks. Service areas that had little quantitative data, or did not require that level of analysis, were evaluated through both retrospective analysis.

Community service demands were analyzed by the incident history, type, locations, and incident frequencies. Within this process, a temporal analysis was completed for each major program area and evaluated by station demand zone and the frequency of incidents. Community risks were evaluated by each program area and risks were identified in each demand zone. This methodology not only provides for sufficient allocation of resources to manage the readiness or preparedness aspects of the deployment strategy, but also balances the costs of readiness with an in-depth understanding of the probability of events through historical analyses. The combined results of this process were utilized to classify risk by severity utilizing a probability and consequence matrix for each program/risk area. Finally, the critical tasks required for each level of risk were identified. An example of the overall probability and consequence matrix is provided below:



The City of Clovis consists of a variety of risks the Department is routinely called upon to respond to. The service area encompasses over 24 square miles, not including areas served through automatic and mutual aid. These areas include both a structural and non-structural risk in this evaluation. Non-structural risks include emergency medical, hazardous materials, technical rescue, water rescue, wildland/urban interface, and disasters. Structural risks evaluated included all structures within the service area, major highways and roadways that transverse the area, water, power, communications and other critical infrastructure, as well as items of historical and cultural significance. In order to determine the extent of various risk factors, the Department analyzed the demographics in the area protected, the building stock, historical call volume, and the existing deployment of resources.

Fire Department Services

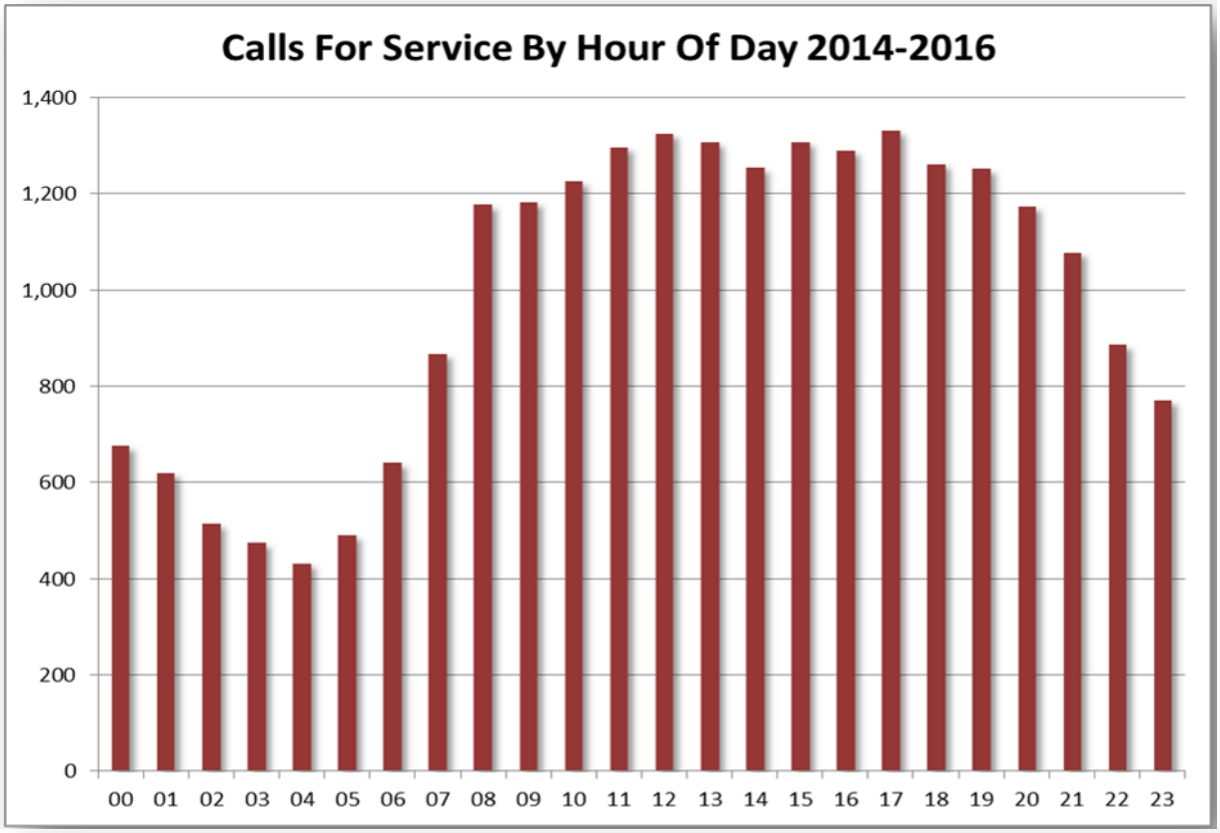
The Department provides services for the suppression of fires using a minimum of five fire stations, four fire engines fully equipped with water supply, hoses, portable ladders, and various tools such as axes. In addition, a dedicated ladder truck is deployed for operating at incidents where elevated fire streams and rescuing trapped victims from upper floors is needed. There is one Battalion Chief assigned each day that provides command and control activities at significant fires. Finally, the Department provides response capabilities and personnel for wildland fire risks through the California Office of Emergency Services.

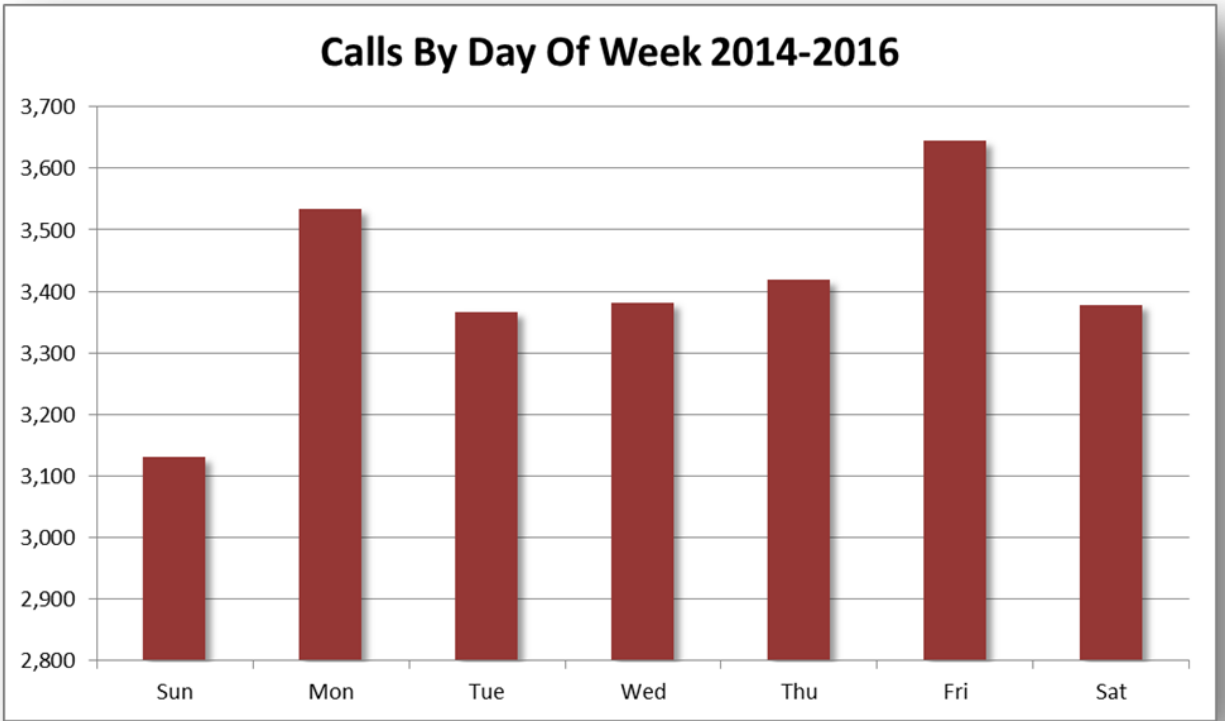
Community Service Demands

Over the three-year period of 2014-2016, the Department responded to a total of 29,684 requests for service, or dispatches including auto and mutual aid requests. The number of fire-related calls were 1,194, which accounted for 4.02% of the dispatched incidents. The number of individual unit responses will be more reflective of total department workload since 28% of the Department's responses include more than one unit. The tables and figures below summarize the Department's responses.

Incident Category	All Incidents	All Incidents Percent	First-In Units	First-In Units Percent	Unit Responses	Unit Responses Percent
FIRE, EXPLOSION	1,194	4.02%	1,205	4.86%	5,171	13.14%
OVERPRESSURE, EXPLOSION	8	0.03%	8	0.03%	19	0.05%
RESCUE, EMS	19,452	65.53%	19,365	78.13%	20,860	53.00%
HAZARDOUS CONDITION	531	1.79%	530	2.14%	1,031	2.62%
SERVICE CALL	814	2.74%	806	3.25%	960	2.44%
GOOD INTENT CALL	6,012	20.25%	1,203	4.85%	9,361	23.79%
FALSE ALARM, FALSE CALL	1,663	5.60%	1,659	6.69%	1,941	4.93%
SEVERE WEATHER	1	0.00%	1	0.00%	1	0.00%
SPECIAL OR OTHER	9	0.03%	9	0.04%	11	0.03%
Report Totals	**29,684**	**100%**	**24,786**	**100%**	**39,355**	**100%**

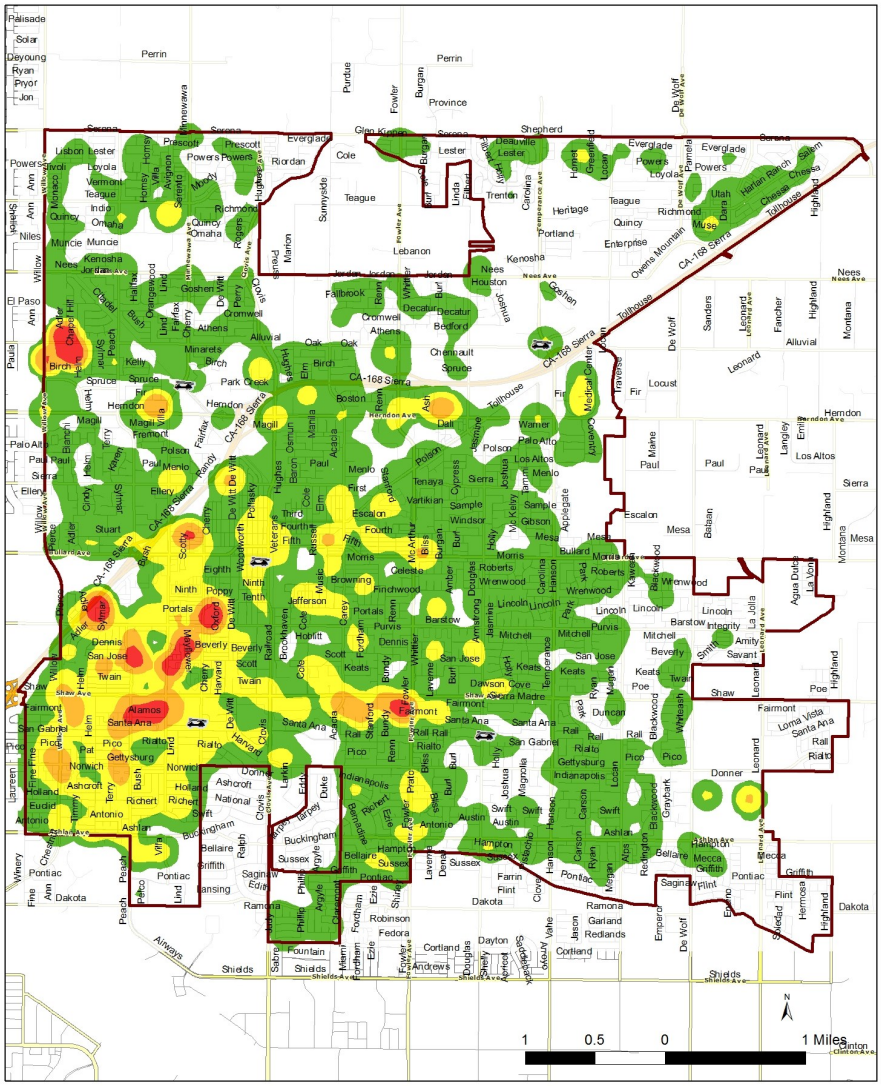
Temporal analyses were conducted to evaluate patterns in community demands for fire-related services. These measures examined the frequency of requests for service from 2014-2016 by day of week and hour of day. Results below show that peak demand for fire calls occurs between 8am – 9pm and greater call volume on Fridays.





For these analyses, “Fire Related” incidents are an aggregated category of the various final incident types available in the NFIRS databases. EMS/Rescue was the most frequent community demand (averaging seventeen requests per day), followed by Good Intent (averaging at 5.4 requests per day). Responses to structure, outside, and vehicle fires totaled 1,194 (averaging about 1.09 per day).

A geospatial analysis was conducted utilizing the community’s historical service demand for fire-related incidents from 2014-2016. These are for all fire related incidents and not specifically any sub-determinant of fire risk. It is evident that the Department’s fire-related historical risks are concentrated most heavily in the Southwest portions of the City, and in the Old Town area, served primarily by Stations 1 and 2. Two other areas are beginning to appear, one in the southeast and one in the northwest with both being near assisted living facilities. The remaining fire-related incidents are generally distributed throughout the center core of the City with the least frequent events at the perimeter. This analysis is provided below:



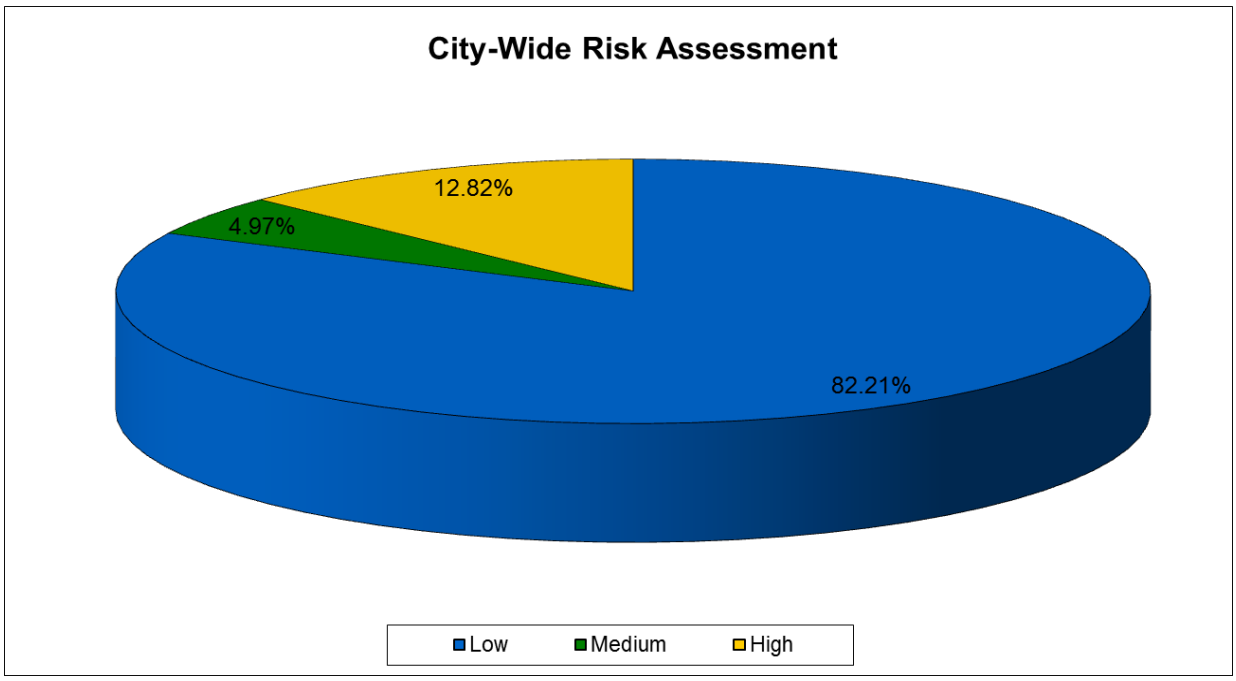
2014 - 2016
Clovis Fire Department
Service Demand Concentration

Very High | High | Moderate | Low | None

Comprehensive, data-based, quantitative, and geospatial analyses were utilized to objectively evaluate the historical community demand for services by type and severity. Occupancy level data was obtained from inspection results, call history and Building Department information systems to assess occupancy level risk within the community.

Significance:

1. **Low -** Minimal potential impact. The occurrence and potential of extensive damage to property and the risk of life loss is minimal.
2. **Medium -** Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is isolated to the primary structure and there is a risk of life loss.
3. **High -** Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage to property is large and possibly beyond the building of origin. The option for life loss is higher and can be multiple victims.

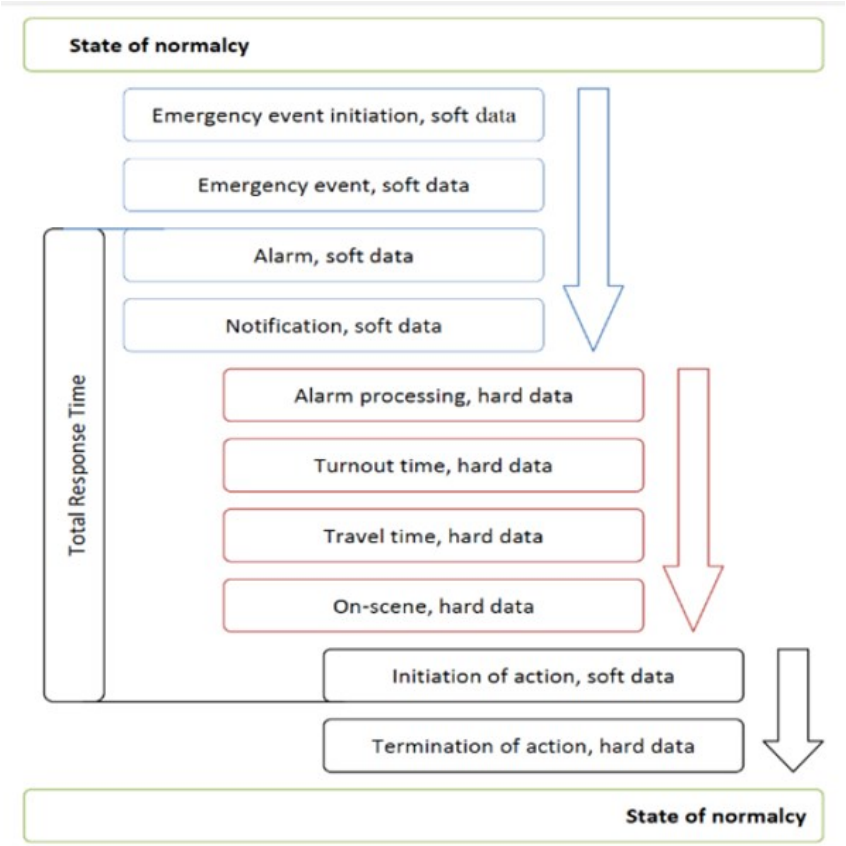


Review of System Performance

The first step in determining the current state of the Clovis Fire Department's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be looked at in terms of total response time, which includes the dispatch or call processing time, turnout time, and travel time, respectively.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again returned through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first on-set of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for manual recognition or the choice to request assistance. Therefore, the Clovis Fire Department utilizes quantifiable "hard" data points to measure and manage system performance. These elements include call processing time, turnout time, travel time, and the time spent on-scene. An example of the cascade of events and the elements of performance utilized by the Department is provided in the figure below:



Detection

Is defined as the element of time between the time an event occurs and someone detects it and the emergency response system has been notified. This is typically accomplished by calling the 911 Public Safety Answering Point (PSAP). The City of Clovis PSAP is the Police Department, with calls being transferred to the Fresno County EMS Communications Center for call processing and unit alerting. Clovis still has a significant number of structures that are either not monitored by automatic alarm systems or are unprotected by sprinkler systems. A greater opportunity for success would be achieved with nearly immediate detection and notification (alarm) and/or mitigation (sprinkler systems).

Call Processing

This is the element of time measured between when the EMS Communication Center answers the 911 call, processes the information, and subsequently dispatches Department resources. As previously discussed, the Department does not capture 100% of all call time interval from the pick up of the phone line to the time the call is created. The reason for this is only 76% of all calls are received by the City of Clovis primary PSAP. The remainder are transferred from other PSAPs such as California Highway Patrol or Cal Fire.

Turnout Time

This is the element of time that is measured between the time the Department is dispatched or alerted to the emergency incident and the time when the fire apparatus is en-route or traveling to the call. Depending on the call type, it requires the crew to put on protective clothing prior to leaving the station. This is why fire calls have longer turnout times as compared to medical aids.

Travel Time

The travel time is the element of time between when the unit went en-route, or began to travel to the incident, and their arrival on-scene.

Total Response Time

The total response time is the total time required to arrive on-scene beginning with the call coming into the EMS Communication Center and the time that the first to last units arrive on scene.

911 Alarm Handling Time Discussion

While the 911 dispatch processing time target is 1 minute and 30 seconds 90 percent of the time, the Department's processing time may be greater than this depending on how the call is received. The advent of technology and the widespread use of cell phones have had a dramatic impact on all dispatch centers. Currently, when a 911 call is received from a cell phone, the address information may not be captured. At some time in the future this may be the case, however, the majority of dispatch centers are currently not equipped with this technology. When you compare this to the past when someone dialed 911 from a hard line, the address was automatically displayed in the PSAP and the call went to the correct PSAP for where the 911 caller was located. Therefore, a passerby who reports a fire, an accident, or some type of emergency on a cell phone, the dispatch is often required to ask a series of questions to determine the correct location to dispatch the appropriate equipment. Changing the location of the caller by just a few feet can mean the difference between the call being picked up by the Clovis Police Department, Fresno Police Department, Fresno County Sheriff's Department or the California Highway Patrol dispatch centers. These 911 cell phone calls require extensive questioning to determine location and nature of the emergency so that the caller can be transferred to the appropriate Fire or EMS secondary PSAP dispatch center (Fresno County EMS or CAL FIRE).

Tracking any phone call through the system is also difficult due to the number of primary dispatch centers it could originate from, plus the difference in computer aided dispatch software, phone systems software and timing clocks. Therefore, a few things must be done to the data to properly account for actual performance. The first step is to aggregate all 911 transfers from the primary dispatch center (law enforcement) to the secondary (Fire/EMS) into one data set. Then break the answering and transfer times down into one set of fractal numbers. We can then use this aggregate number to add to our internal data sets to get a more accurate picture of the full Alarm Handling Time, thus giving us a more accurate picture of the Total Response Time. In short, the measurement for all 911 calls that are received into the Fresno County EMS center is highly accurate; measured at the 90th percentile. Call processing times from the primary PSAP is only measurable for calls coming from the Clovis Police Department, which is still a majority of calls received. However, because of difficulty in tracking any call through the many primary PSAP dispatch centers and transferring it to the Fresno County EMS dispatch center makes determining call processing and total response time difficult at the 90% level. The Department was able to analyze some of the data and determine an average processing time of 39 seconds for all calls originating in Clovis PD Dispatch. Therefore, all baseline performance measurements for All Emergency Services performance are using a plus 39 seconds (mean) of call processing time.

Previously the Clovis Fire Department responded to every call with lights and sirens whether it was an actual emergency or not. The process was rather simplified as compared to today but not very efficient or safe. Today, the Clovis Fire Department responds to only high priority (1 and 2) medical calls. Statistically it has been determined for minor medical emergencies, the risk/benefit of responding to an emergency vehicle Code 3 is not warranted, nor does it have any impact on the patient's outcome. Therefore, more screening is required to determine whether a call should be dispatched as an emergency or not.

Turnout Time Discussion

The NFPA 1710 standard for Turnout Time to structure fires was modified from 60 seconds to 90 seconds in 2010 after extensive internal review and testing. Many years ago, firefighters had much less gear to put on (don) before they left the station and they rode in seats that we would consider outside the enclosed portion of the vehicle. In addition, many firefighters did not wear their seatbelts so they could still be putting on protective gear while responding. The modern fire service has taken a more balanced approach between rapid response and the safety of the firefighters. Today's firefighters have a greater array of personal protective equipment (turnouts) that must be donned before they enter fully enclosed cabs, are seated, then fasten their seatbelts prior to leaving the station. These extra steps have been quantified into the 90-second Turnout Time standard. Response to EMS calls does not require the same amount of protective equipment which allows a slightly shorter Turnout Time standard of 60 seconds.

Travel Time Discussion

Travel time within the City of Clovis is fairly consistent. Streets are laid out in a uniform manner, well maintained, with most signal lights incorporating the use of traffic signal preemption technology. The topography is essentially flat and weather is usually not a factor in response times. The primary constraints for travel time are traffic patterns, barriers to access and the growing distance between fire stations and location demanding service. Traffic preemption helps but with areas of congestion due to activities around school sites, during peak commute times and after special events, response speeds are negatively impacted. Access is of concern as more developments utilize gates, fencing and other security measures. Also, high-density development creates narrower streets, which adds more people and less available parking. This often results in people parking in unauthorized areas, impacting response times for large fire apparatus. As the service area grows to the north and east, travel times from existing fire stations will get longer until new fire stations can be built and staffed.

Natural Hazards Risk Assessment

The natural hazards risk assessment consists of a vulnerability assessment to describe the impact that each priority hazard identified would have upon the City of Clovis Planning Area. This assessment is an attempt to quantify assets at risk, by jurisdiction where possible, to further define populations, buildings, and infrastructure at risk to natural hazards.

Data to support the vulnerability assessment was collected and compiled from the following sources:

- County/City GIS data (hazards, base layers, and Assessor's data);
- Statewide GIS datasets compiled by CalEMA-OES to support mitigation planning;
- FEMA's HAZUS-MH MR 2 GIS-based inventory data (January 2005); and
- Existing plans and studies.

City of Clovis—Natural Risk Profiles

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Agricultural Hazards	Unlikely	Limited	Limited	Low
Avalanche	N/A	N/A	N/A	N/A
Dam Failure	Unlikely	Extensive	Critical	Low
Drought	Occasional	Extensive	Critical	High
Earthquake	Occasional	Extensive	Critical	Medium
Flood	Occasional	Significant	Critical	High
Landslide	Unlikely	Limited	Negligible	Low
Severe Weather:				
Extreme Cold/Freeze	Occasional	Extensive	Negligible	Low
Extreme Heat	Highly Likely	Extensive	Negligible	Medium
Fog	Highly Likely	Extensive	Negligible	Low
Snow	Unlikely	Extensive	Limited	Low
Tornado	Occasional	Limited	Critical	Low
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Extensive	Limited	Medium
Soil Hazards:				
Erosion	Unlikely	Limited	Negligible	Low
Expansive Soils	Occasional	Limited	Negligible	Low
Land Subsidence	Occasional	Extensive	Negligible	Low
Volcano	Unlikely	Extensive	Critical	Low
Wildfire	Occasional	Limited	Limited	Low

Guidelines for Natural Risk Rankings

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential.

Frequency of Occurrence:
1. **Highly Likely**: Near 100% probability in next year.
2. **Likely**: Between 10 and 100% probability in next year or at least one chance in ten years.
3. **Occasional**: Between 1 and 10% probability in next year or at least one chance in next 100 years.
4. **Unlikely**: Less than 1% probability in next 100 years.

Spatial Extent:
1. **Limited -** Less than 10% of planning area.
2. **Significant -** 10-50% of planning area.
3. **Extensive -** 50-100% of planning area.

Potential Magnitude:
1. **Catastrophic -** More than 50% of the area affected.
2. **Critical -** 25 to 50%.
3. **Limited -** 10 to 25%.
4. **Negligible -** Less than 10%.

Significance:
1. **Low -** Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
2. **Medium -** Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
3. **High -** Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have already occurred in the past.

Summary of Natural Disaster Risk

Geologic/Seismic

The Clovis area is subject to relatively low seismic hazards compared to many other parts of California. The primary seismic hazard is ground shaking produced by earthquakes generated on regional faults lying outside the immediate vicinity of the Clovis area. The northwest-trending Clovis Fault is believed to be located approximately five to six miles east of the City of Clovis, extending from an area just south of the San Joaquin River to a few miles south of Fancher Creek. The Clovis Fault is considered a pre-quaternary fault, or a fault without recognized quaternary displacement. The most probable sources of earthquakes that might have a potential for causing damage in Clovis are: the Owens Valley Fault Group located about 68 miles to the northeast; the Foothills Suture Fault Zone located approximately 75 miles to the north; the San Andreas Fault located approximately 80 miles to the southwest; and the White Wolf Fault located about 120 miles to the south. A maximum probable earthquake on any of the three major faults closest to the Clovis Area would produce maximum ground acceleration of approximately 0.lg, as ground deceleration generally decreases with increasing distance from the earthquake source.

Soil Erosion

Slope stability is not a concern in the Clovis area. Clovis has a natural mild gradient from northeast to southwest. The highest elevation coincides with the Friant/Kern Canal north of Tollhouse Road at 460 feet, with the lowest elevation of 335 feet near the intersection of Winery and Ashlan Avenues. These flat slope characteristics, which exhibit natural slopes of less than .001 feet per foot, can make the control of drainage runoff difficult. Many natural depressions within the flat topography naturally collect and pond storm water runoff.

Flooding

Clovis is traversed by four natural stream systems. Each of these systems is comprised of sub-streams, or creeks, that collect together to discharge to a centralized natural drainage channel. These systems include the Red Bank, Fancher and Dog Creek system, the Dry and Dog Creek system, and the Pup Creek/Alluvial drain system. The latter is a tributary of the original Dry Creek Channel. These stream systems collect storm runoff from the foothills east of Clovis and convey the runoff through the Clovis/Fresno metropolitan areas to the Fresno Slough, which is located westerly of the City of Fresno.

Many of these channels have been modified over time and have become duel use storm water conveyance channels and irrigation water conveyance channels. Those streams that have not been used for irrigation purposes have essentially remained in their natural state and have historically flowed uncontrolled during storm runoff events. These stream channels have limited flow capacity. In some cases, the historical uncontrolled grading of land has obliterated or severely modified the natural channels to the extent that their flow capacity has been seriously limited. Flooding has been a serious problem in the Clovis/Fresno metropolitan area when these channel capacities are exceeded.

Portions of the City of Clovis, the existing Sphere of Influence areas and the unincorporated Fresno County area have been subject to historical flooding. Such flooding has been documented by the Federal Emergency Management Agency (FEMA) in their Flood Insurance Study (FIS) and Flood Insurance Rate Map(s) (FIRM) as published in 2005 for the City of Clovis and County of Fresno, respectively. The FIS and FIRM show the flooding in Clovis that could occur from a 1% (return frequency equals 100 years) rainfall event.

Other areas of flooding are related to the Alluvial Drain area and the Dry Creek Reservoir with its possible overflow areas. The major inundation areas from potential overflows from the Dry Creek Reservoir affect a majority of the northwesterly portion of Clovis, as well as the northwesterly portions of the current City Sphere of Influence and City boundaries.

The Big Dry Creek Dam impounds storm-water runoff from Big Dry Creek in the Big Dry Creek Reservoir. Big Dry Creek Reservoir is owned and operated by the Fresno County Metropolitan Flood Control District, and is intended primarily for flood control of winter runoff from the Dry Creek and Dog Creek watersheds. The Reservoir has a storage capacity of approximately 30,000 acre feet and a surface area of approximately 3,500 acres. The Reservoir was designed for a 200-year standard project flood, which is a design specification used by the Corps for reservoirs. The maximum height of the inundation pool is 432.7 feet above mean sea level.

Other areas of flooding occur along the Dog Creek Channel alignment and in low depressed areas along the easterly sides of the Enterprise Canal. The City of Clovis actively uses GIS and FEMA FIRM products to assess flood risk and infrastructure mitigation.

Extreme Heat

In a normal year, about 175 Americans succumb to the demands of summer heat. In the forty-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the affects of heat and solar radiation. In the disastrous heat wave of 1980, more than 1,250 people died. During the summer months in Clovis, it is not uncommon to experience multiple consecutive days with temperatures exceeding 100 degrees Fahrenheit.

Heat kills by taxing the human body beyond its ability to regulate temperature, resulting in heat exhaustion and heat stroke. Without immediate treatment, these conditions can result in death. During an extreme heat event, human safety, agricultural crops, and livestock are impacted. The City will continue to provide cooling centers during heat events and provide transportation to the cooling centers.

Cities pose special hazards during periods of extreme heat. Stagnant atmospheric conditions of a heat wave trap pollutants in urban areas and add the stresses of severe pollution to the already dangerous conditions of hot weather. The City of Clovis' air quality is exacerbated even more since it is located on the floor of the San Joaquin Valley. This topographic condition increases the stagnant atmospheric conditions and trapping of pollutants. Air conditioning can provide relief. However, many individuals and families choose not to use air conditioning due to rising energy costs, placing themselves at risk for heat-related illnesses.

Extreme summer heat has the greatest impact during the day from Noon – 8pm. During the summer months, a greater percentage of the population is potentially exposed to this type of extreme weather due to schools being out of session, potential loss of cooling due to limited electrical capacity, the physiological impact extreme heat has on the body, and the regional specific conditions that negatively influence the air quality. In response to extreme heat events of 2007, the City Implemented Phase II of the Heat Emergency Plan, opening facilities and using volunteer staff from Noon – 10pm to provide cooling for individuals impacted by the heat.

Drought

Drought is a condition of climatic dryness that is severe enough to reduce soil moisture levels and water levels below the minimum necessary for sustaining plant, animal and human life systems. Drought is a gradual phenomenon. One dry year does not normally constitute a drought in California, but rather serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure – reservoirs, groundwater basins, and interregional conveyance systems – generally mitigate the effects of short-term dry periods for most users.

Since 1976, Clovis has experienced one State declaration for drought within Fresno County and one USDA declaration for crop losses. Extended periods of drought will continue throughout the region. Since drought conditions are predicted to continue, the City of Clovis participated in the development of an Urban Water Management Plan in collaboration with the City of Fresno, County of Fresno, the Fresno Irrigation District, and the Fresno Metropolitan Flood Control District. As a regional partner in this plan, Clovis proactively manages water supplies and has policies in place to effectively deliver water to local residents.

Extreme Cold/Freeze

The potential for severe cold or freezing temperatures exists annually. Severe cold/freeze declarations occurred in 1990, 1998, 2001, and 2007. December and January have the greatest potential for extreme cold/freeze with an average minimum temperature of 37.5 degrees. In Clovis, it is not uncommon to have consecutive days with a minimum overnight low temperature of 32 degrees.

Extreme freeze/cold occurs primarily during the late evening and early morning hours. During these periods, most people are indoors utilizing gas furnaces, fireplaces and blankets to regulate their temperature. Populations at greatest risk during extreme cold/freezes are homeless individuals who cannot find indoor shelter. Public Safety personnel continually monitored calls for service related to vulnerable populations such as the homeless and seniors who might have needed these services. In addition, Fire Prevention staff performs a wellness check on our mobile home residents during their normal smoke alarm check/installs.

Essential Facilities and Infrastructure

A critical facility may be defined as one that is essential to providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses three categories of critical assets: 1) Essential Facilities - those that if damaged would have devastating impacts on disaster response and recovery; 2) High Potential Loss Facilities - those that would have a high loss or impact on the community; and 3) Transportation and Lifeline. Examples are provided in Table 10.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifeline
▪ Hospitals and other medical facilities ▪ Police stations ▪ Fire station ▪ Emergency Operations Centers ▪ City Administration ▪ Federal Facilities ▪ County Facilities	▪ Power plants ▪ Dams/levees ▪ Military installations ▪ Hazardous material sites ▪ Schools ▪ Shelters ▪ Day care centers ▪ Nursing homes ▪ Main government buildings	▪ Highways, bridges, and tunnels ▪ Railroads and facilities ▪ Bus facilities ▪ Airports ▪ Water treatment facilities ▪ Natural gas facilities and pipelines ▪ Oil facilities and pipelines ▪ Communications facilities

Essential Facilities, as identified by FEMA HAZUS-MH, are as follows:

- Clovis Fire/PD Headquarters – 1233 Fifth Street
- Clovis Fire Stations
  - CFD 1 – 633 Pollasky
  - CFD 2 - 2300 Minnewawa
  - CFD 3 – 555 N. Villa
  - CFD 4 – 2427 Armstrong
  - CFD 5 – 790 N. Temperance
  - CFD Logistics Center – 650 Fowler
- Clovis Community Medical Center – 2755 Herndon
- Kaiser Medical Offices – 2071 Herndon
- City Hall – 1033 Fifth Street
- Surface Water Treatment Plant - 5805 Leonard
- Sewage Treatment – Water Re-use Facility - Ashlan and McCall

High Potential Loss facilities as identified by FEMA HAZUS-MH are located throughout Clovis. Clovis works closely with Clovis Unified School District, Fresno Metropolitan Flood Control District and elder care property owners in monitoring and assessing non-city owned facilities that fall into this category.

Transportation and Lifeline facilities are located in the center and northeast portion of Clovis with State Route 168 being the major transportation corridor through Clovis. The Surface Water Treatment Plant converts raw water from the Enterprise Canal (originating from the Kings River) into a potable water source for the residents of Clovis. This additional water production from the Surface Water Treatment Plant enables the City to turn off a portion of its groundwater wells throughout the year, resulting in the replenishment of the water table. The Surface Water Treatment Plant is capable of treating and delivering up to 15 million gallons per day of potable water to the City's customers (expandable to 45 million gallons per day).

In addition to facilities necessary to deliver services and ensure public safety, Clovis is home to assets vital to our community's heritage and economic sustainability. The Natural, Cultural, and Historical Assets and the Economic Assets are key to defining the community, providing employment and maintaining commerce.

Natural, Cultural, and Historical Assets

Natural resource assets may include wetlands, threatened and endangered species, or other environmentally sensitive areas. Historical assets include State and Federally-listed historic sites. While the City of Clovis has no registered State or Federal historic sites, there are several assets within Clovis that define the community and represent our history. There are three locations that are recognized as Fresno County Historical Landmarks. Those locations are:

- First National Bank of Clovis/Clovis Museum – 401 Pollasky
- Carnegie Library Building – 325 Pollasky
- Gibson Home – 940 Third

Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster. The City's economic base consists of retail sales and services and light manufacturing. The breakdown of the Clovis residential employment sector is as follows:

- Agriculture, forestry, fishing and hunting, mining: 2%
- Construction: 7%
- Manufacturing: 8%
- Wholesale: 4%
- Retail: 13%
- Transportation and warehousing, utilities: 5%
- Information: 3%
- Finance, insurance, and real estate: 7%
- Professional, scientific, management, administration, waste management: 8%
- Education, health and social services: 23%
- Arts, entertainment, recreation, accommodation, food service: 7%
- Public administration: 8%
- Other services: 5%

Fire Events Risk Assessment

The response area for each fire station is identified as a station district. These districts are a collection of the multiple-fire demand zones that are mapped and split the district into smaller response zones. When a request for service is received through the 911 system, the EMS Communication Center verifies the call location and uses the computer-aided dispatch (CAD) system to identify the required resources to send. The CAD system takes into consideration the type of occupancy and associated risk. Once the call type has been identified, the correct type of predetermined response is dispatched. For example, a fire in a vehicle (low-risk) will receive one engine, with three firefighters. An apartment building (high-risk occupancy) will receive five engines, one truck and one battalion chief, for a minimum of nineteen firefighters. This utility allows the dispatcher to dispatch a predetermined fire alarm assignment quickly to the emergency.

The Department has identified risk hazards for each type of occupancy within the City of Clovis. All emergency response units are outfitted with mobile data computers (MDC) that contain computer-aided dispatch premise information for identified occupancies. Premise information might also include Pre-Fire Plans for risks that pose a high life hazard, high property loss, conflagration hazard, contain hazardous materials or have frequent fire occurrence. The assessment of each commercial facility was conducted by Fire personnel evaluating seven elements:

1. Premise – Evaluate data related to property use, occupancy type and assessed valuation.
2. Building – Evaluate building data considering exterior building characteristics including height and exposure separation.
3. Life Safety – Evaluate specific elements affecting life safety and the ability of the occupants to leave the building including occupant load, fire sprinklers, alarms and occupant mobility.
4. Risk – Evaluate the frequency/likelihood of an event and the consequence as it relates to regulatory oversight, experience and human activity within the structure.
5. Consequence – Evaluate the range between controlling a fire within the building of origin and a fire that is hazardous to fire fighting activities. Specific considerations included: 1) The ability to control, 2) Hazard index, and 3) Fire Load per NFPA 13.
6. Water Demand – Evaluated available water resources, fire sprinklers and flow availability.
7. Value – Evaluated economic impact or importance to the community.

Once compiled, each element was assigned a value within a range and then applied to a formula that produced a final rank. This calculation used weighting and valuation consistent with the Risk Hazard and Value Evaluation process recommended by the Commission on Fire Accreditation International. Numerical values associated with each rank are as follows:

- Low — (10-17)
- Moderate — (18-30)
- High — (31-42)

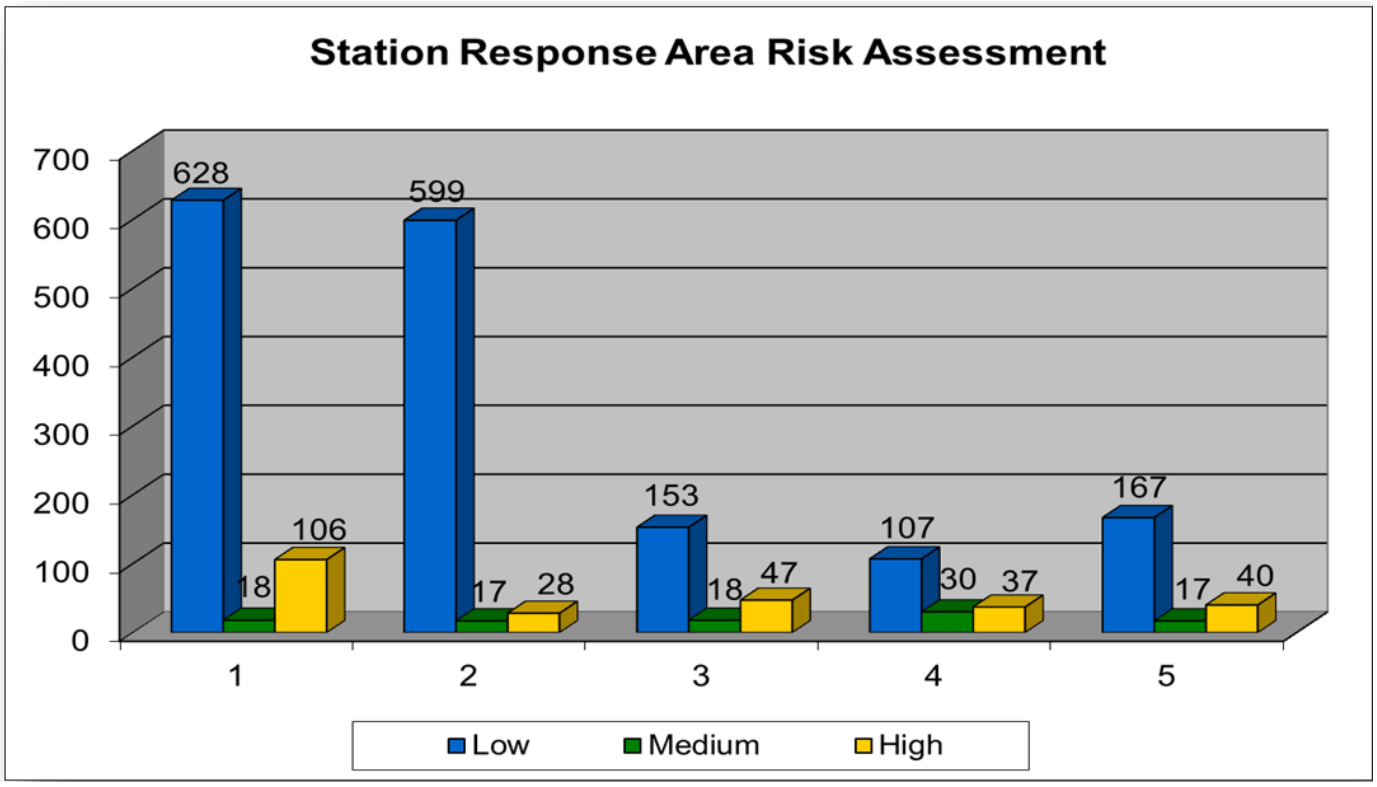
Once facilities were ranked, their information was then geo-coded into our GIS system. With this overview, Clovis has been able to look at concentration/density of our fire risk concurrent with data related to four years (2013-2016) of response data. In addition, we can plot these points and add call history data to see if there is correlation between concentration of occupancies and actual incidents.

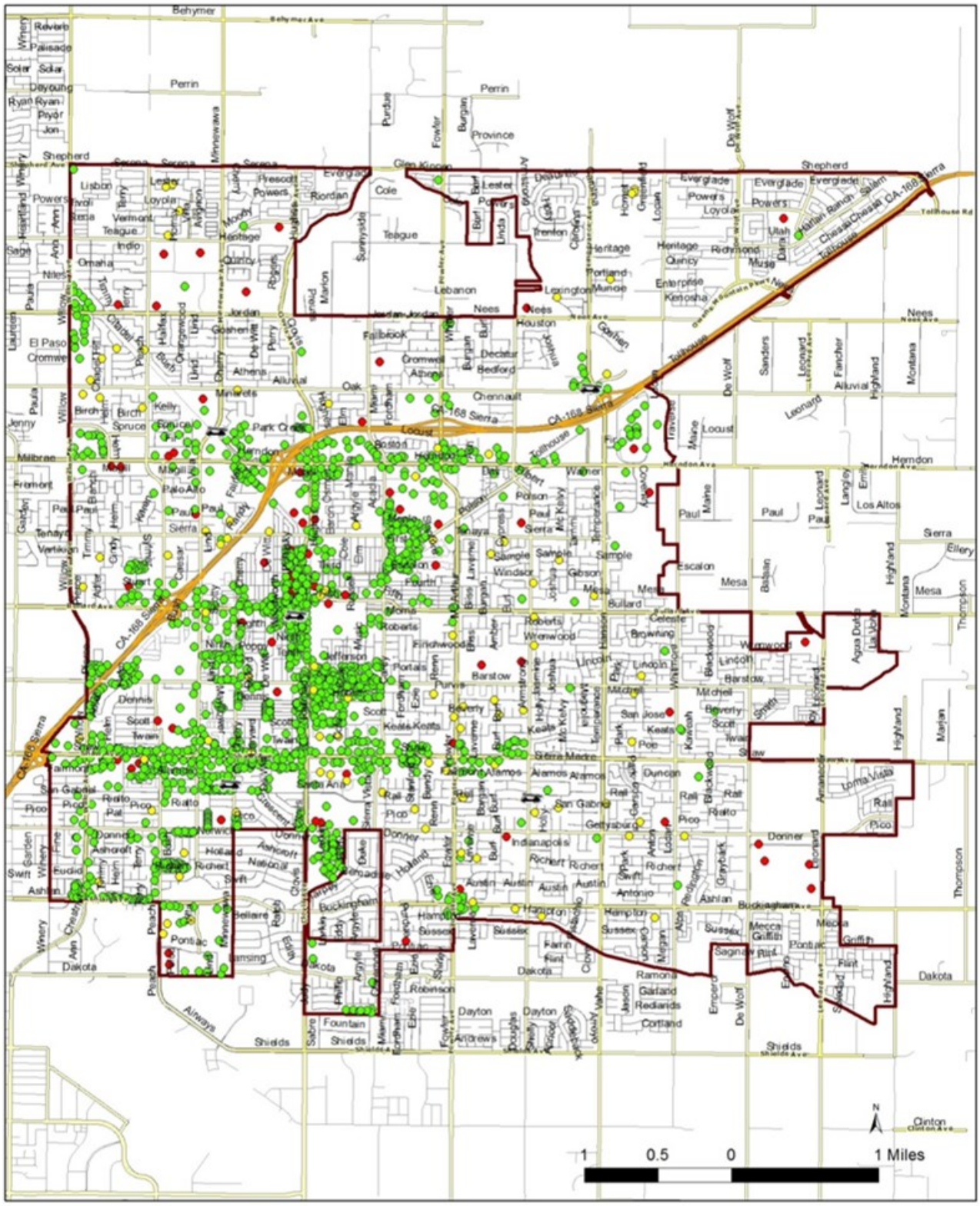
Results from this analysis placed commercial occupancies into three categories:

High Risk Occupancies: Schools, apartments, hospitals, nursing homes, low-rise buildings, commercial structures, dwellings in water deficient areas, and other high-life hazard or large fire potential occupancies.

Medium: One-, two- or three family dwellings. Approximately 70% of the occupancies within the City of Clovis fall into the Moderate-Risk category.

Low Risk Occupancies: Small outbuildings, park restrooms, sheds, very small drive-by/thru service structures. Fires in these structures are usually handled by a single fire company.

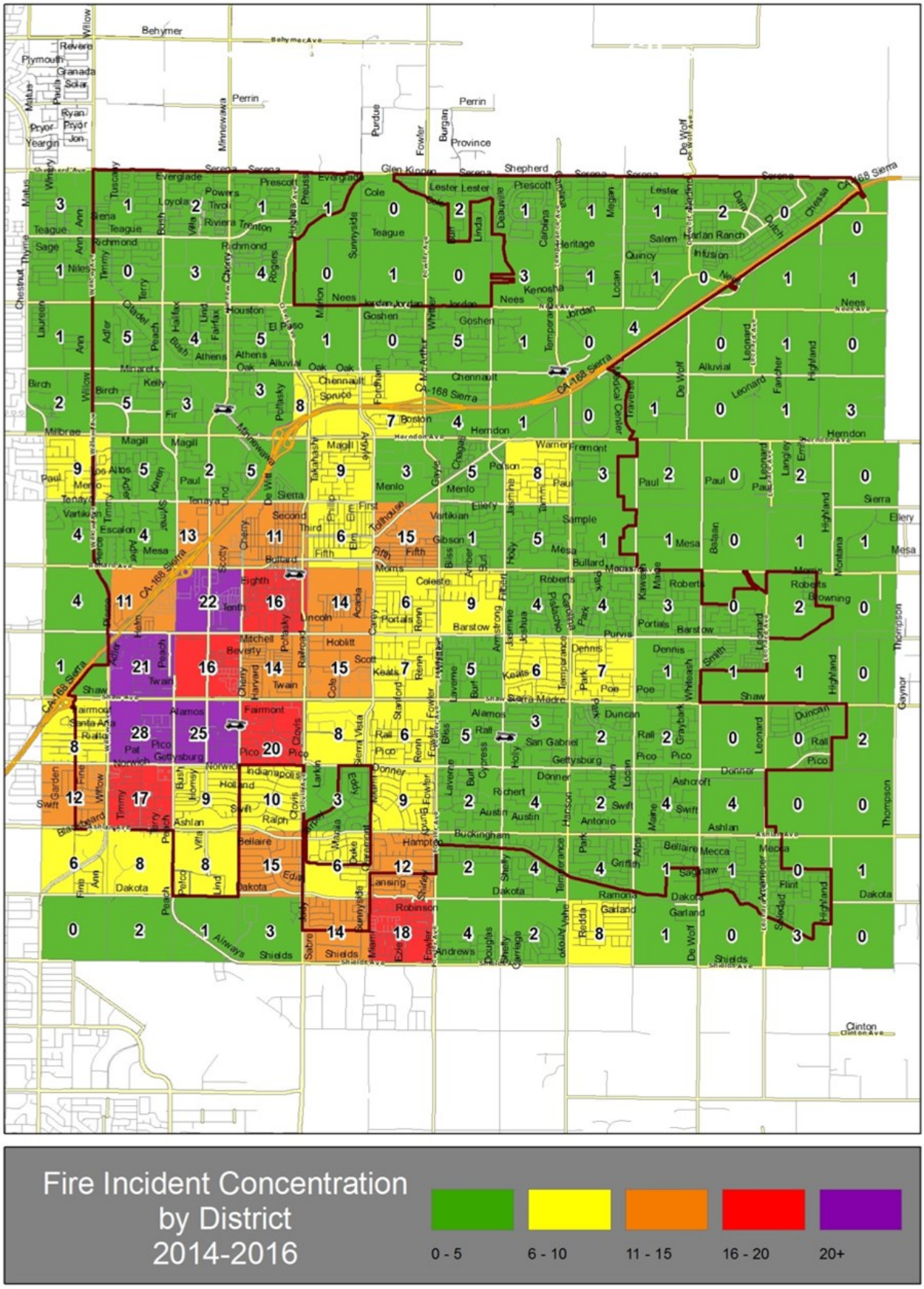




Fire Risk Profile
2014-2016

Occupancy Risk Profile - Fire

High Medium Low


Fire Incident Concentration
by District
2014-2016
0 - 5
6 - 10
11 - 15
16 - 20
20+

Fire Suppression Capabilities

Firefighters encounter a wide variety of conditions at each fire. Some fires will be at an early stage and others may have already spread throughout the building. This variation in conditions complicates attempts to compare fire department capability. A common reference point must be used so that the comparisons are made under equal conditions. In the area of fire suppression, service-level objectives are intended to prevent the flashover point, a particular point of a fire's growth that makes a significant shift in its threat to life and property. Fire suppression tasks required at a typical fire scene can vary a great deal. What fire companies must do, simultaneously and quickly if they are to save lives and limit property damage, is to arrive within a short period of time with adequate resources to do the job. Matching the arrival of resources within a specific time period is the objective of developing a comprehensive Standard of Cover.

The Four Stages of a Fire

Virtually all structure fires progress through a series of identifiable stages:

Stage 1: The Incipient Stage—This first stage begins when heat, oxygen and a fuel source combine and have a chemical reaction resulting in fire. This is also known as “ignition” and is usually represented by a very small fire that often goes out on its own, before the following stages are reached. Recognizing a fire in this stage provides your best chance at suppression or escape.

Stage 2: The Growth Stage—Where the structure’s fire load and oxygen are used as fuel for the fire. There are numerous factors affecting the growth stage including where the fire started, what combustibles are near it, ceiling height and the potential for “thermal layering”. It is during this shortest of the four stages when a deadly “flashover” can occur; potentially trapping, injuring or killing firefighters.

Stage 3: The Fully Developed Stage—When the growth stage has reached its max and all combustible materials have been ignited, a fire is considered fully developed. This is the hottest phase of a fire and the most dangerous for anybody trapped within.

Stage 4: The Decay Stage—Usually the longest of a fire, the decay stage is characterized by a significant decrease in oxygen or fuel, putting an end to the fire. Two common dangers during this stage are first—the existence of non-flaming combustibles that can potentially start a new fire if not fully extinguished. Second, there is the danger of a backdraft when oxygen is reintroduced to a volatile, confined space.

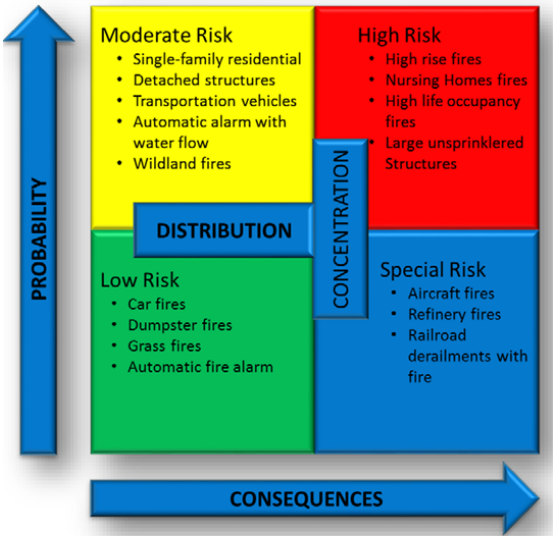
As suggested previously, the number of times that fires are controlled before flashover depends on the entire fire protection system and is not solely dependent on emergency response forces. Built-in fire protection, public education, extinguishment by citizens, and even the type of fuel on fire are all factors that affect flashover. Even when fires are not extinguished by firefighting forces, these personnel often provide other services, ranging from smoke removal to the restoration of built-in fire control systems. The objective is all components of the fire protection system, from public education to built-in fire protection to manual fire suppression, are maintained at a level to provide adequate service and the performance of each is periodically evaluated.

Flashover is a critical stage of fire growth, as it creates a quantum jump in the rate of combustion and a significantly greater amount of water is needed to reduce the burning material below its ignition temperature. A fire that has reached flashover often indicates it is too late to save anyone in the room of origin, and a greater number of firefighters are required to handle the larger hose streams needed to extinguish the fire. A post-flashover fire burns hotter and moves faster, compounding the search-and-rescue problems in the remainder of the structure and, at the same time, more firefighters are needed for fire combat operations.

PRE-FLASHOVER	POST-FLASHOVER
Limited to one room	May spread beyond one room
Requires smaller attack line	Requires more and larger attack lines
Search and Rescue is easier	Compounds search and rescue
Initial assignment can handle	Requires additional companies

Probability/Consequence of Fire Event Risk

The relatively low frequency of fire related events required the Department to rely more heavily on the consequences of the events than the probability of the event occurring. For example, according to the Department's NFIRS final incident typing, the Department annually responded to 80 structure fires or fires in buildings involving cooking or chimneys. The resulting probability and consequence matrix is presented below.



Impact of Residential Fire Sprinklers

In January 2010, California became one of 46 states that adopted a residential sprinkler requirement for all new homes. This was, in part, a result of years of scientific study and lobbying efforts by the National Fire Service and Building Industry. The impact of the new requirement on the Clovis Fire Department will take many decades to fully realize but there are reasonable assumptions that can be made and used in the deployment analysis. There are also some assumptions made by the general public, media, elected officials, etc., that are incorrect and it will be important for the Department to continue to provide ongoing public information to keep the public informed on the facts.

- Residential fire sprinklers do not cover the entire structure like similar systems installed in commercial occupancies. In residential units there are no fire sprinklers in the attic space.
- Fire sprinkler systems are designed to keep fire contained long enough to allow occupants to exit, not fully extinguish the fire. A fire department response is still needed.
- Installing both smoke alarms and a fire sprinkler system reduces the risk of fire death by 82%.
- Sprinkler systems allow quicker control and extinguishment by the fire department and less time committed for overhaul.
- Fire sprinkler systems do not control fires originating outside the home.
- Over time, sprinkler systems will lower property loss ($) due to fire, which will have a positive effect on residential fire insurance premiums citywide.
- Sprinkler systems do not lessen the need for fire stations (distribution), but will lessen the need for multiple units responding from the same stations (concentration).

Fire Event Service Level Goals

The Department's response and deployment standards are based upon urban population density and historical demand for services within community and region. The targeted service level benchmark statements are based on industry standards, best practices and historical response data. The Department's benchmark service level objectives are as follows:

Fires

For 90 percent of all low, moderate, and high risk fires, the Department's total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the first-due unit, staffed with at least 3 firefighters, shall be: 7 minutes for all areas within the city limits (urban). The first-due unit for all risk levels shall be capable of: rescuing at-risk victims or initiating command, establishing an attack line flowing a minimum of 150 gallons per minute (gpm) and 500 gallons of water carried on the fire apparatus; or establishing an uninterrupted water supply; or performing salvage operations; or requesting additional resources; and containing the fire. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

Structure Fire Calls, Code 3, in Clovis, First Unit at Scene Benchmarks at 90th Percentiles								
Time Interval	Benchmark	Metric	All	2012	2013	2014	2015	2016
Call Processing	01:30	Count	117	24	20	21	24	28
		90th Percentile	01:24	01:03	00:57	01:22	01:33	01:32
Turnout	01:30	Count	117	23	21	21	24	28
		90th Percentile	01:48	01:42	01:40	02:06	01:49	01:36
Travel	04:00	Count	119	24	21	22	24	28
		90th Percentile	04:08	03:56	04:10	04:08	04:19	04:00
Total Response-1st on Scene	07:00	Count	118	24	21	21	24	28
		90th Percentile	06:35	05:55	06:28	06:50	06:42	06:16
Total Response-ERF	10:30	Count	118	24	21	21	24	28
		90th Percentile	10:42	10:14	10:42	09:07	11:13	09:59

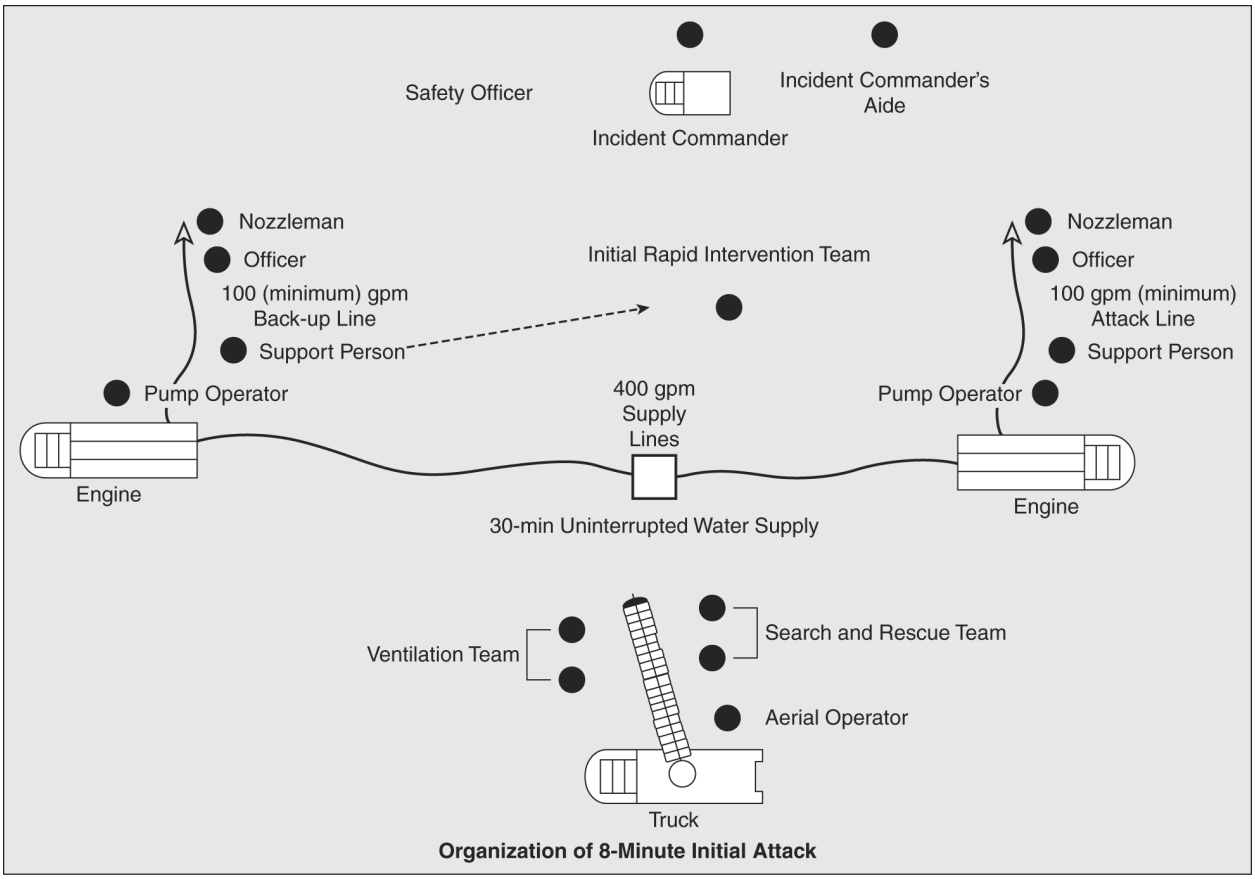
Effective Response Force Capabilities

The capability of an Effective Response Force (ERF) to assemble in a timely manner with the appropriate personnel, apparatus, and equipment is important to the success of a significant structural fire event. Therefore, it is important to measure the capabilities of assembling an ERF. In most fire departments, the distribution model performs satisfactorily, but it is not uncommon to be challenged to assemble an ERF in the recommended timeframes.

Several factors affect the capabilities to assemble an ERF such as the number of fire stations, number of units and number of personnel on each unit. Each of these policy decisions should be made in relation to the community's specific risks and the willingness to assume risk.

For 90 percent of all moderate risk structure fires, the total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the effective response force (ERF), staffed with 16 firefighters and officers, shall be: 10 minutes and 30 seconds for all areas within the city limits (urban). The ERF for moderate risk shall be capable of: establishing command; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two-in-two-out; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; and controlling utilities. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all high-risk structure fires, the total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the effective response force (ERF), staffed with 19 firefighters and officers, shall be: 10 minutes and 30 seconds for all areas within the City limits (Urban). The ERF shall be capable of: establishing command; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two-in-two-out, and expanding to a Rapid Intervention Crew staffed with 4; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; controlling utilities; and filling a safety officer position. The ERF for high risk structure fires shall also be capable of placing an elevated stream into service from an aerial ladder and supporting a sprinkler system. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.



Organization of 8-Minute Initial Attack

Critical Task Analysis

The combination of property and life risk determines the fire ground tasks that must be accomplished in an emergency to minimize loss. These factors, although interrelated, can be separated into two basic types: fire flow and life safety. Fire flow tasks are related to getting water on the fire; life safety tasks are related to finding injured/ill persons and providing definitive emergency medical care, or finding trapped victims and removing them from the building. The required fire flow is based on a building's:

- size
- structural material
- distance from other buildings
- horizontal and vertical openness (lack of partitions)
- contents
- type
- density
- potential energy (BTUs per pound)

Life-safety tasks are based upon the number of patients in an emergency medical incident or occupants in a fire situation: their location (e.g., a low rise versus high rise), their status (awake versus asleep), and their ability to take self-preservation action. For example, ambulatory adults need less assistance than non-ambulatory. The elderly and small children always require more assistance. The key to the fire department's success at an emergency incident is coordinated teamwork, regardless of whether the tasks are all fire-flow related or a combination of fire-flow, rescue and life safety. A fire in an occupied residential single- or multi-family structure requires a minimum of eight tasks to be simultaneously conducted in order to stop the loss of civilian lives, stop further property loss, and minimize the risks to the firefighter. The number and type of tasks needing simultaneous action will dictate the minimum number of firefighters needed at different types of emergencies. The following tables are examples of the tasks that are usually performed simultaneously in fire responses to a single-family residential structure (High Risk Occupancy) versus a fire in a small outbuilding (Low Risk). The tasks identified usually occur within the first 10 minutes of fire ground operations.

The key to any fire department's success at a fire includes a rapid response and efficient fire scene deployment, as well as adequate staffing and coordinated teamwork. Critical tasks are tasks that must be conducted in a timely coordinated manner by firefighters at structure fires, in order to control the fire prior to flashover or to extinguish a larger fire beyond the room of origin. A fire department is responsible for assuring that responding companies are capable of performing all of the critical tasks in a prompt and proficient manner.

When identifying critical tasks, we are assuming interior firefighting operations are necessary and require the use of protective equipment, which includes personal protective clothing, self-contained breathing apparatus (SCBA), and a minimum of a 1¾" hose line. Additional personnel must be staged to perform rescue functions for interior firefighting personnel, and a command structure needs to be established.

Below are definitions of critical tasks that are to be performed at the scene of a structure fire:

Fire Attack: A medium-sized hose that produces 100+ gpm and is handled by a minimum of two firefighters or a larger hose that produces 200+ gpm and is handled by three or more firefighters.

Search and Rescue: A minimum of two firefighters assigned to search for living victims and remove them from danger while the fire attack crew moves between the victims and the fire to stop the fire from advancing towards them. A two-person crew is normally sufficient for most small- to medium-sized structures, but more crews are required in multi-story buildings or high risk structures with people who are not capable of self preservation.

Ventilation: A minimum of three firefighters to open a horizontal or vertical channel. Vertical ventilation, or ventilation of a multi-story building, can require more than three firefighters depending on the size and complexity of the structure involved. Ventilation removes superheated gases and obscuring smoke, preventing flashover and allowing attack crews to see and work closer to the seat of the fire.

Back-up Line/2-Out: A back-up hose line is used to protect the fire attack crew in case the fire overwhelms them or a problem develops with the fire attack hose line. This function requires a minimum of two firefighters.

Rapid Intervention Crew (RIC): When the first four firefighters are on scene, the two outside firefighters are also known as the 2-Out. When the balance of the effective response force arrives and interior fire attack is continuing in hazardous atmospheres and conditions, a full company is assigned to be the rapid intervention team.

Exposure Line: Any sized attack line or master stream appliance staffed by two or more fire fighters and taken above, below, or next to the fire in multi-story buildings or externally to protect nearby structures with the intent to prevent fire involvement from the radiant heat.

Pump Operator: One firefighter assigned to deliver water under the right pressure to the various hose lines in use (attack, backup and exposure lines), and monitor the pressure changes caused by the changing flows on each hose line. This firefighter also completes the hose hookups to the correct discharges and completes the water supply hookup to the correct intake. The pump operator can sometimes make the hydrant hookup alone if the pumper is near a hydrant (50 feet). However, more distant hydrant locations sometimes preclude this action.

Water Supply: A crew of one or more firefighters who must pull the large diameter hose between the fire engine pump and the nearest hydrant.

Command: An officer assigned to remain outside of the structure to coordinate the fire attack, evaluate results, request additional resources, and monitor fire conditions that might jeopardize firefighter safety.

Safety Officer: This is an officer assigned to ensure that fire department personnel on scene are following department policies and procedures to ensure their safety.

Evaluating critical tasks that need to be accomplished depending upon the risk involved determines the appropriate level of resources necessary to simultaneously handle the tasks of fire attack, search and rescue, ventilation, backup lines, pump operation, water supply and command, all within a goal of 10 minutes after arrival of the first-due unit. If fewer firefighters and equipment are available, or if they have longer travel distances, then the department will not be able to accomplish an objective such as confining the fire near or to the room of origin.

The fire department reviewed historical data, existing time standards, and completed several time-measured training exercises to determine which tasks can be accomplished under different circumstances such as a single family residence, multi-family residence and commercial occupancies. This data was then correlated with existing actual fire call tasks and time criteria to validate the Department's capabilities for completing all critical tasks outlined above.

Critical Task Necessary at a Low-Risk Fire (Vehicle, Dumpster, Small Building)

Task	Firefighters	Company
Attack Line	2	1st Fire Engine
Pump Operator	1	1st Fire Engine
Total	**3 FFs**	**1 Fire Apparatus**

Critical Task Necessary at a Moderate-Risk Fire

Task	Firefighters	Company
Attack Line	2	1st Fire Engine
Pump Operator	1	1st Fire Engine
Primary Search/Rescue	3	2nd Fire Engine
Water Supply/Sprinkler	1	2nd Fire Engine
Rapid Intervention/Utilities	2	3rd Fire Engine
Back Up Attack Line	2	4th Fire Engine
Ventilation/Forced Entry	3	1st Truck
Safety	1	4th Fire Engine
Command	1	Battalion Chief
Total	**16 Firefighters**	**4 Engines, 1 Truck & 1 BC**

Critical Task Necessary at a High/Special-Risk Fire

Task	Firefighters	Company
Attack Lines (2)	4	1st & 5th Fire Engine
Pump Operator	1	1st Fire Engine
Primary Search/Rescue	2	2nd Fire Engine
Water Supply/Sprinkler	1	2nd Fire Engine
Rapid Intervention/Utilities	4	3rd Fire Engine
Back Up Attack Line	2	4th Fire Engine
Ventilation/Forced Entry	3	1st Truck
Safety	1	4th Fire Engine
Command	1	Battalion Chief
Total	**19 Firefighters**	**5 Engines, 1 Truck & 1 BC**

First Alarm Structure Fire (16 Firefighters) Large Single Family Residence		
Task Description	**Units**	**Running Clock Time Buccioni Fire**
Dispatch	E42, E43, E44, E6, T41 & B45	00:46
Crew Turnout		01:28
First-Due Engine on Scene	E44	06:51
Secure Utilities	E44	08:18
2-in, 2-out / Fire Attack	E44/45	08:58
Incident Command	B45	09:27
Secure Water Supply	E43	10:28
Primary Search Started	E42	10:40
Horizontal Ventilation	T41	12:26
Safety Officer	C41	14:52
Primary Search Completed	E45	15:57
Fire Under Control	E44/45	**16:33**

First Alarm Structure Fire (16 Firefighters) - Urban Core		
Task Description	**Units**	**Running Clock Time Pollasky Fire**
Dispatch	E42, E43, E44, E6, T41 & B45	00:51
Crew Turnout		01:41
First-Due Engine on Scene	T41	04:39
2-in, 2-out / Fire Attack	T41/E42	06:13
Primary Search Started	E43	06:51
Safety Officer	T01	09:35
Primary Search Completed	E43	10:12
Secure Utilities	E44	10:23
Fire Under Control	T41/E42	**10:53**

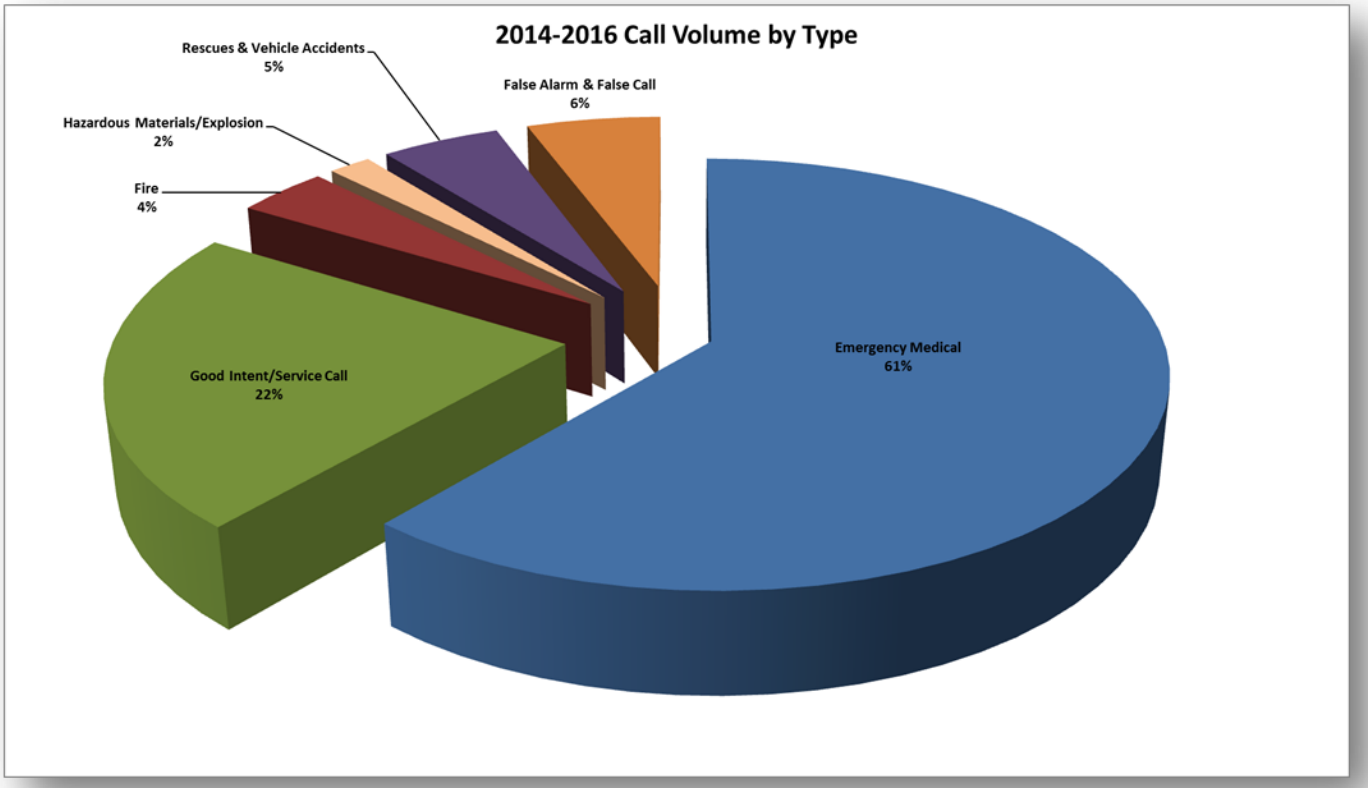
First Alarm Structure Fire (19 Firefighters) Multi-Family / Commercial		
Task Description	**Units**	**Running Clock Time Drill**
Dispatch	E42, E43, E44, E6, T41 & B45	00:59
Crew Turnout		01:51
First-Due Engine on Scene	E45	06:53
Incident Command	B45	08:44
Secure Water Supply	E44	11:23
2-in, 2-out / Fire Attack	E44/45	11:52
Primary Search Started	E43	12:57
Vertical Ventilation	T41	13:31
Safety Officer	C41	14:47
Primary Search Completed	E43	15:51
Fire Under Control	E45	**16:59**

EMS Risk Assessment

The Clovis Fire Department provides Basic Life Support (BLS) emergency medical services (EMS) with automated external defibrillator (AED) certification. All Department personnel are Emergency Medical Technicians (EMTs) providing first responder service from four fire engines, and a ladder truck. Fresno County Emergency Medical Service provides BLS, Advanced Life Support (ALS), and ambulance transportation services through an exclusive contract with American Ambulance. The City's 9-1-1 primary Public Safety Answering Point (PSAP) obtains basic medical information and routes the call to the Fresno County EMS Communications Center for fire unit and ambulance dispatching. Requests for EMS are categorized as either BLS or ALS. All priority EMS requests receive one of the Department's first responder units. Most BLS patients are either treated and released or treated and transported by the American Ambulance. Most ALS patients are treated and transported by American Ambulance. In total, the Department wholly participates in the delivery of EMS and, at full staffing, has five (5) fire suppression units geographically deployed to meet the service demands and the Department's current performance goals.

Community Service Demands

The majority of the community's requests for services are for emergency medical services. In total, approximately 60% of all Department requests for services are for EMS. A summary of all dispatched calls from 2014-2016 is provided below:



The Department has identified medical risk hazards for occupancies within the City of Clovis. All emergency response units are outfitted with mobile data computers (MDC) that contain computer-aided dispatch premise information for identified occupancies. Premise information might also include annotations for medically fragile patients, high population concentrations, or frequent EMS events. The assessment of each facility was conducted by Fire personnel evaluating four elements:

1. Premise – Evaluate data related to property use, occupancy type and assessed valuation.
2. Building – Evaluate building data considering exterior building characteristics including height and exposure separation.
3. Life Safety – Evaluate specific elements affecting life safety and the ability of the occupants to leave the building including occupant load, alarms and occupant mobility.
4. Risk – Evaluate the frequency/likelihood of an event and the consequence as it relates to regulatory oversight, experience and human activity within the structure.

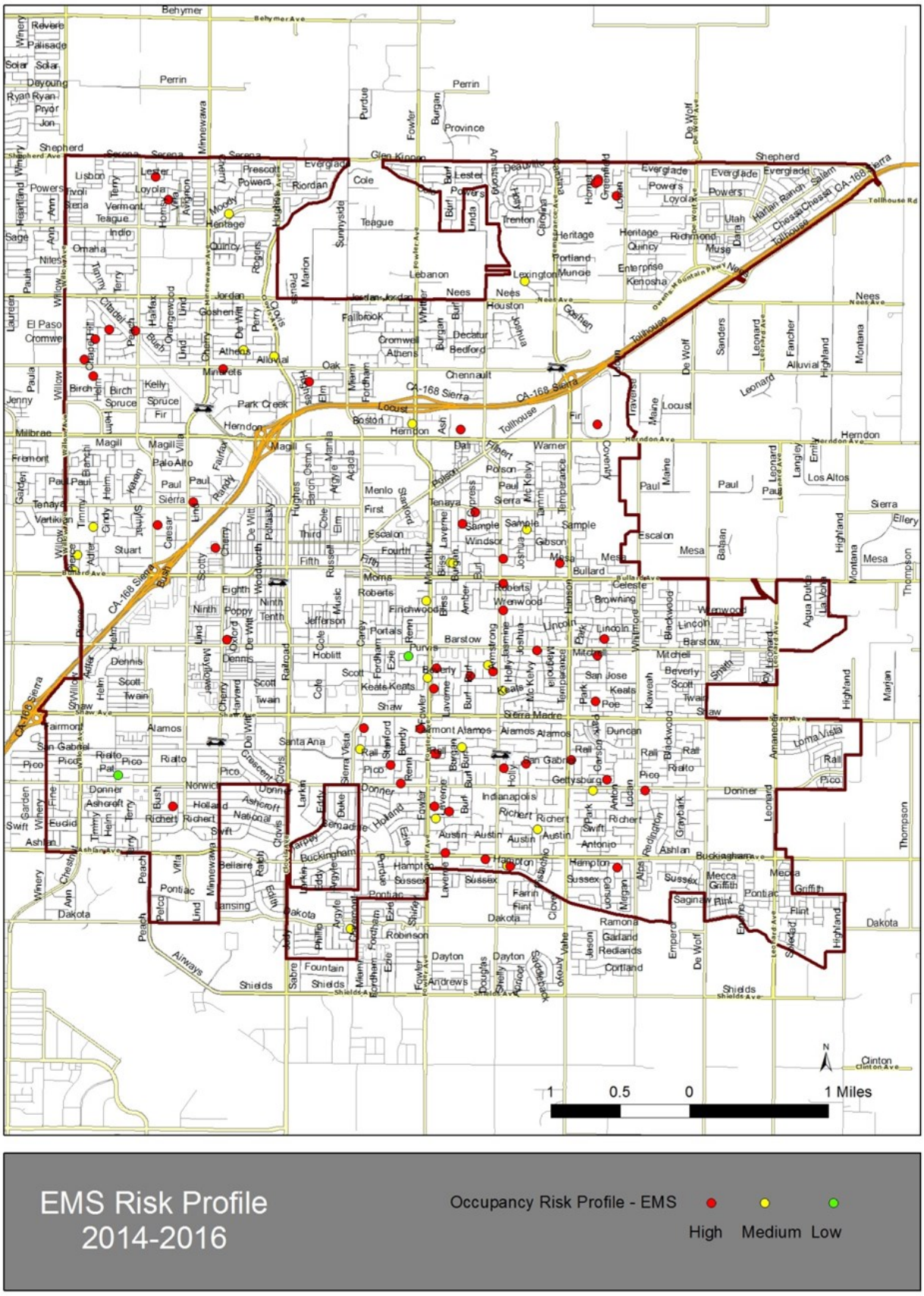
From that evaluation, EMS risk was defined into three categories:

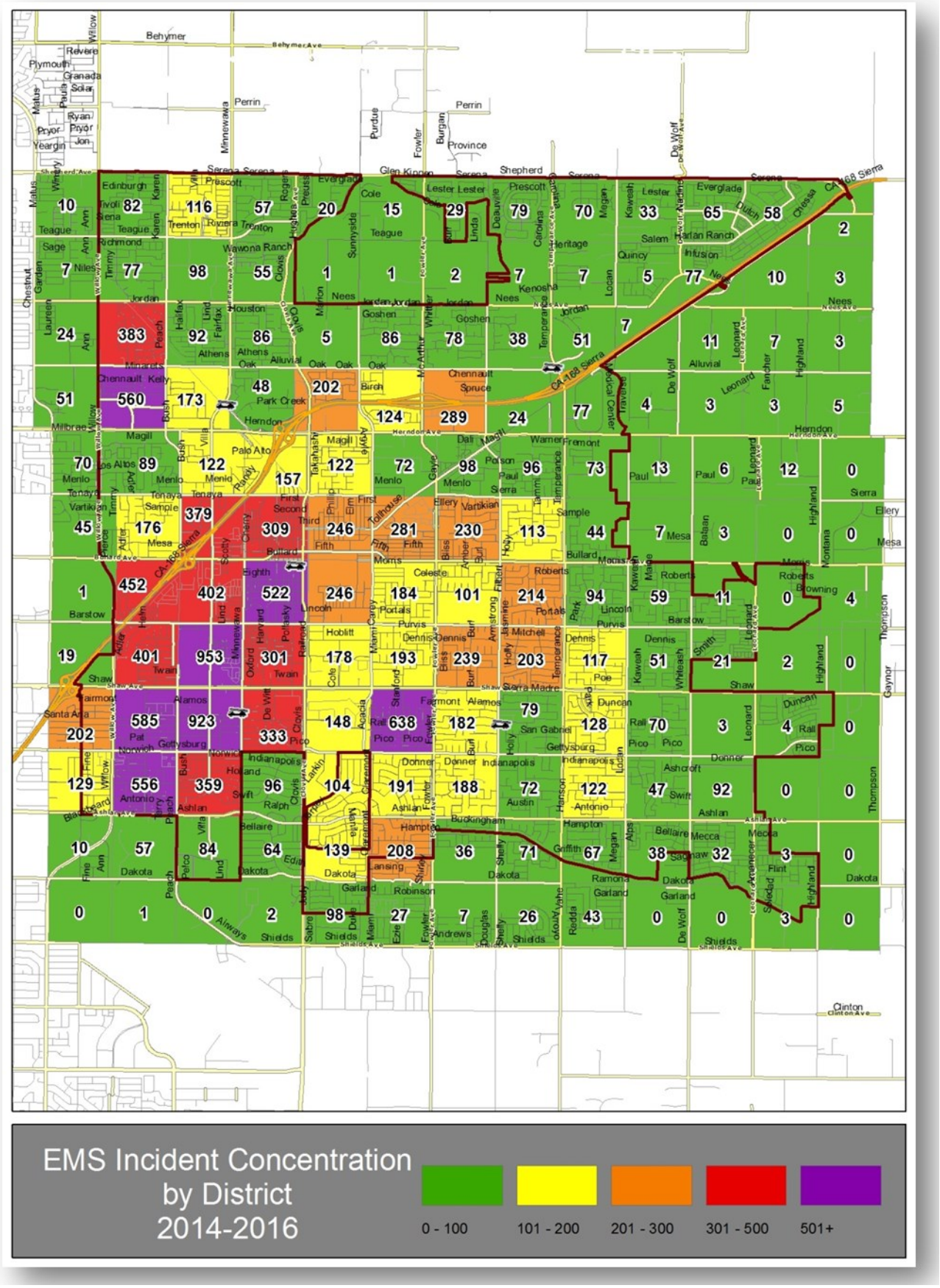
Low Risk: Non-life threatening medical events that can be handled by ambulance alone with time standards longer than required for life threatening emergencies. Clovis Fire Department suspended response to these types of calls for service in 2008. The time performance for ALS provider is 9 minutes or less at 90%.

Medium Risk: Medical responses that require the use of the following procedures: Traumatic injury, CPR with an AED application, rescue breathing with a bag-valve-mask, uncontrolled bleeding, severe allergic reactions, severe respiratory distress, non-cooperative patients, and altered mental status patients.

High Risk: Response to an incident of substantial size that contains a heavy concentration of occupants presenting a high risk of life loss. While these structures contain built-in fire protection features, many occupants are not capable of self-preservation.

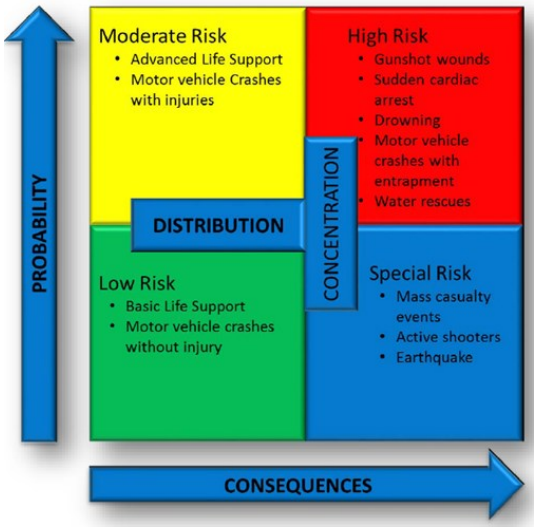
Once facilities were ranked, their information was then geo-coded into our GIS system. With this overview, Clovis has been able to look at concentration/density of our EMS risk throughout Clovis. In addition, we can plot these points and add call history data to see if there is correlation between concentration of occupancies and actual incidents.


1 0.5 0 1 Miles
N
EMS Risk Profile
2014-2016
Occupancy Risk Profile - EMS
High Medium Low


EMS Incident Concentration
by District
2014-2016
0 - 100
101 - 200
201 - 300
301 - 500
501+

Probability/Consequence of EMS Risk

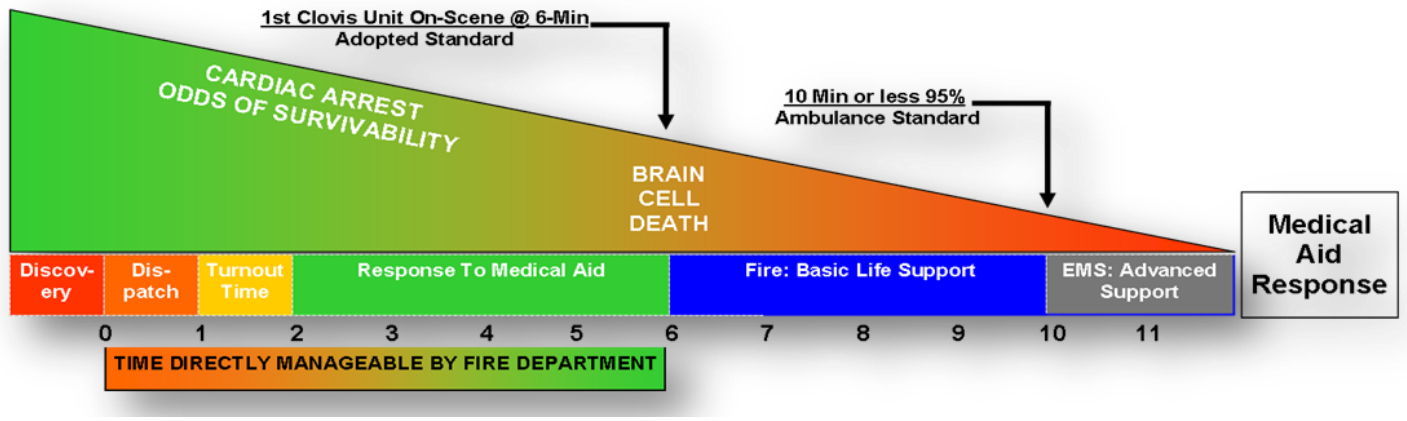
The probability and consequence process used for the EMS risk assessment is derived by the call taking process and call typing at the dispatch center. These call typing determinants are the framework for first responder and Fresno County EMS Ambulance responses. The analysis evaluates the probability and consequence of EMS incidents. The results are presented below.



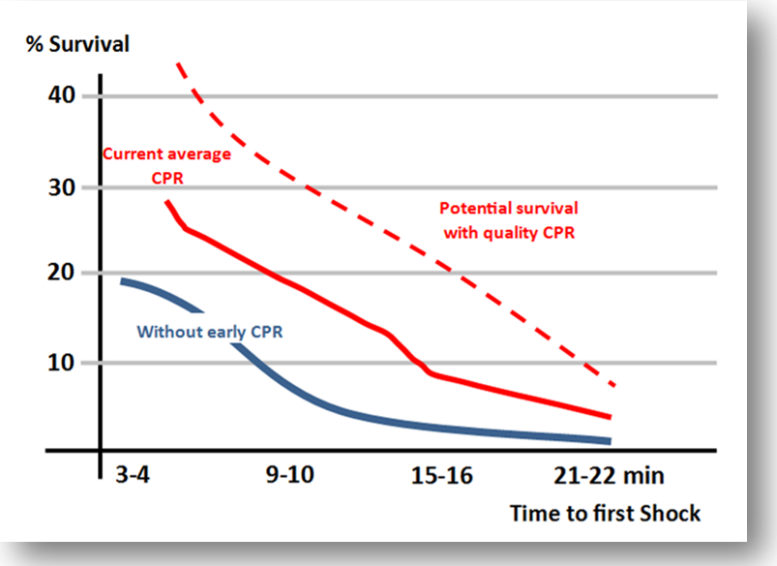
Similar to preventing flashover in a fire, survival from a cardiac emergency is time driven. The brain can only be without oxygen for a short period of time (four to six minutes) before irreparable cell damage begins to occur. Rapid intervention is necessary to prevent brain death from occurring.

From an emergency medical perspective, the service-level objective typically is to provide medical intervention within a six-minute timeframe, as brain damage is very likely at six minutes without oxygen. However, in a cardiac arrest situation, survivability dramatically decreases beyond four minutes without appropriate intervention. Intervention includes early recognition and bystander CPR. The medical industry recommends using the Utstein reporting criteria to capture the following time stamps/points in the cascade of events in an EMS call that fortunately match many of the same time stamps used in tracking the cascade of events for fire calls.

Early defibrillation is often called the critical link in the chain of survival because it is the only way to successfully treat most sudden cardiac arrests. When cardiac arrest occurs, the heart starts to beat chaotically (fibrillation) and cannot pump blood efficiently. Time is critical. If a normal heart rhythm is not restored within minutes, the person will die. In fact, for every minute without defibrillation, the odds of survival drop seven to ten percent.



The shortest possible response times create the highest probabilities of resuscitation. An important evaluation point lost on most agencies is the time crews reach the patient's side. Often the clock stops when the vehicle arrives or stops at the address. The key to a successful outcome is the point the patient is actually contacted. Consideration of actual patient contact must be made when evaluating total response time for EMS calls; this time period can be substantial and can, most certainly, affect the outcome due to delayed intervention. The following graph illustrates the importance of not just rapid response, but rapid response coupled with properly trained employees:



3 Year Review of Return of Spontaneous Circulation (ROSC)			
2014			
Cardiac Arrest	**Resuscitation Attempted**	**ROSC**	**ROSC %**
111	72	22	30.56%
2015			
Cardiac Arrest	**Resuscitation Attempted**	**ROSC**	**ROSC %**
103	64	21	32.81%
2016			
Cardiac Arrest	**Resuscitation Attempted**	**ROSC**	**ROSC %**
114	79	23	29.11%

EMS Service Level Goals

The Department's response and deployment standards are based upon urban population density and historical demand for services within community and region. The targeted service level benchmark statements are based on industry standards, best practices and historical response data. The Department's benchmark service level objectives are as follows:

For 90 percent of all moderate EMS calls for service, the Department's total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the first-due unit, staffed with at least 3 firefighters, trained to the EMT-D level, shall be: 6 minutes and 30 seconds for all areas within the city limits (Urban). The first–due unit for all risk levels shall be capable of: assessing scene safety, establishment of incident command, conducting an initial patient assessment, obtaining vitals, patient's medical history, and initiating mitigation efforts. The Department is also capable of providing first responder automatic external defibrillation (AED).

For 90 percent of all high risk EMS calls for service response incidents, the total response time for the arrival of the effective response force (ERF), staffed with 7 firefighters and officers, shall be: 10 minutes and 30 seconds for all areas within the city limits (urban). The ERF shall be capable of: providing incident command, completing patient assessment on multiple patients, providing appropriate treatment, initiating cardio-pulmonary resuscitation (CPR), performing AED, and assisting transport personnel with packaging the patient.

EMS Calls, Code 3, in Clovis, First Unit at Scene

Benchmarks at 90th Percentiles

Time Interval	Benchmark	Metric	All	2012	2013	2014	2015	2016
Call Processing	01:30	Count	25,555	4,860	5,056	5,108	5,552	4,979
		90th Percentile	01:34	01:03	01:26	01:27	01:31	01:55
Turnout	01:00	Count	25,643	4,851	5,033	5,111	5,590	5,058
		90th Percentile	01:26	01:28	01:26	01:25	01:27	01:25
Travel	04:00	Count	25,926	4,838	5,125	5,200	5,639	4,838
		90th Percentile	04:31	04:26	04:37	04:30	04:30	04:34
Total Response-1st on Scene	06:30	Count	25,921	4,827	5,120	5,189	5,659	4,827
		90th Percentile	06:47	06:33	06:45	06:39	06:47	07:07
Total Response-ERF	10:30	Count	49	9	11	14	9	6
		90th Percentile	9:07	8:31	9:04	9:38	8:03	9:05

Critical Task Analysis

The occupancy risk assessment reviewed commercial and residential occupancies for EMS risk. While this is helpful for assessing concentration of the medically fragile, EMS incidents can occur just as readily in a home, on the street and involve multiple patients. Critical tasks for low-risk EMS incidents that typically involve a single person receive a single ambulance response that could be an ALS or BLS ambulance based on Pro QA from dispatch.

Critical Task Necessary at a Low-Risk EMS Incident		
Task	**Firefighters**	**Company**
ALS or BLS	2	1st Ambulance
Total	**2 Other**	**1 Ambulance**

Medium Risk: Medical responses including: Traumatic injury, CPR with an AED application, rescue breathing with a bag-valve-mask, uncontrolled bleeding, severe allergic reactions, severe respiratory distress, non-cooperative patients, and altered mental status patients.

Critical Tasks Necessary at a Medium-Risk EMS Incident		
Task	**Firefighters**	**Company**
Command	1	1st Engine or truck
BLS	2	1st Engine or truck
ALS	2	1st Ambulance
Total	**3 FFs & 2 Other**	**1 Fire Apparatus & 1 Other**

High Risk: Multi-Casualty Incident (MCI), vehicle into buildings with multiple patients, vehicle accidents with pin-ins, bus accidents, trench.

Critical Tasks Necessary at a High-Risk EMS Incident		
Task	**Firefighters**	**Company**
Command	1	Battalion Chief
Medical Supervisor	1	EMS Supervisor
Safety	1	1st Engine or truck
Triage	2	1st Engine or truck
Treatment	3	2nd Engine
Transport	4	1st and 2nd Ambulance
Total	**7 FFs & 5 Other**	**3 Fire Apparatus & 3 Other**

Special Operations Risk Assessment

The fire department is required to formally define the types of special operations required or expected to be performed in an emergency or other incident. These types of special operations include, but are not limited to, hazardous materials response, confined-space response, technical rescue, high-angle rescue, and water rescue. Regardless of the fire department's defined special operation capability, all firefighters that provide emergency response must be trained to the first responder operations level for both hazardous materials and confined-space responses. Likewise, all fire departments must define their response capability to natural disasters, terrorism incidents, large-scale emergencies, and mass casualty events. When fire departments have established that they will provide response beyond first-responder level for hazardous materials or confined-space emergencies, they are required to ensure all members involved in this level of response be trained to the levels specified in the standard. The fire department must also determine the availability of resources outside the fire department through Federal, State, or Local assistance or private contractors who are deployed to emergencies and other incidents and the procedures for initiating such outside response. The fire department must also limit the level of response to special operation emergencies to the level for which it has staffed, trained, and equipped its personnel. Additionally, it must have the capacity to initiate a rapid intervention crew during any and all special operations responses.

Hazardous Materials Risk Assessment

Clovis is in an area that has hazardous materials risk potential from fixed facilities and transportation of materials. The Department utilizes a three-tiered system to respond to and mitigate hazardous materials incidents. All personnel are trained to the HazMat First Responder Operational level for hazardous materials and decontamination, thus making the fire suppression force the first line of response for low-risk events. Low risk events would receive a response for early size-up and hazard abatement within their level of training and resources. Moderate-risk events that require additional resources for identification of the hazard, entry, decontamination and medical monitoring are primarily handled by the Department's Hazardous Materials Team. However, for high-risk and large events that require considerable duration and relief, the Department participates and utilizes the full Department and Mutual/Auto-Aid compliment of HazMat resources including Specialists and Technicians to assemble the appropriate effective response force.

Hazardous material release emergencies can be broken into three categories (low, medium and high risk) within our dispatching matrix, with each category requiring a different number of resources.

High Risk: All large quantity releases of known or "unknown" hazardous materials, incidents where patient(s) requiring full body decontamination from exposure to hazardous materials, materials producing a vapor cloud or other airborne hazard, or damaged chemical pipelines.

Medium Risk: Confirmed spills or releases of "unknown" materials where there are no patients but contamination requires specialized equipment, personnel, testing and possibly evacuation depending on population density/proximity and type of materials identified.

Low-Risk: Low quantity spills that a person trained to the Haz Mat First Responder Operational level can mitigate with no assistance required of a Specialist. Examples include: Automotive fluids released at a traffic accident, identified abandoned chemicals with their original container, abandoned waste not posing an immediate release hazard, less than one gallon of spilled pool chlorine, etc.

Community Service Demands

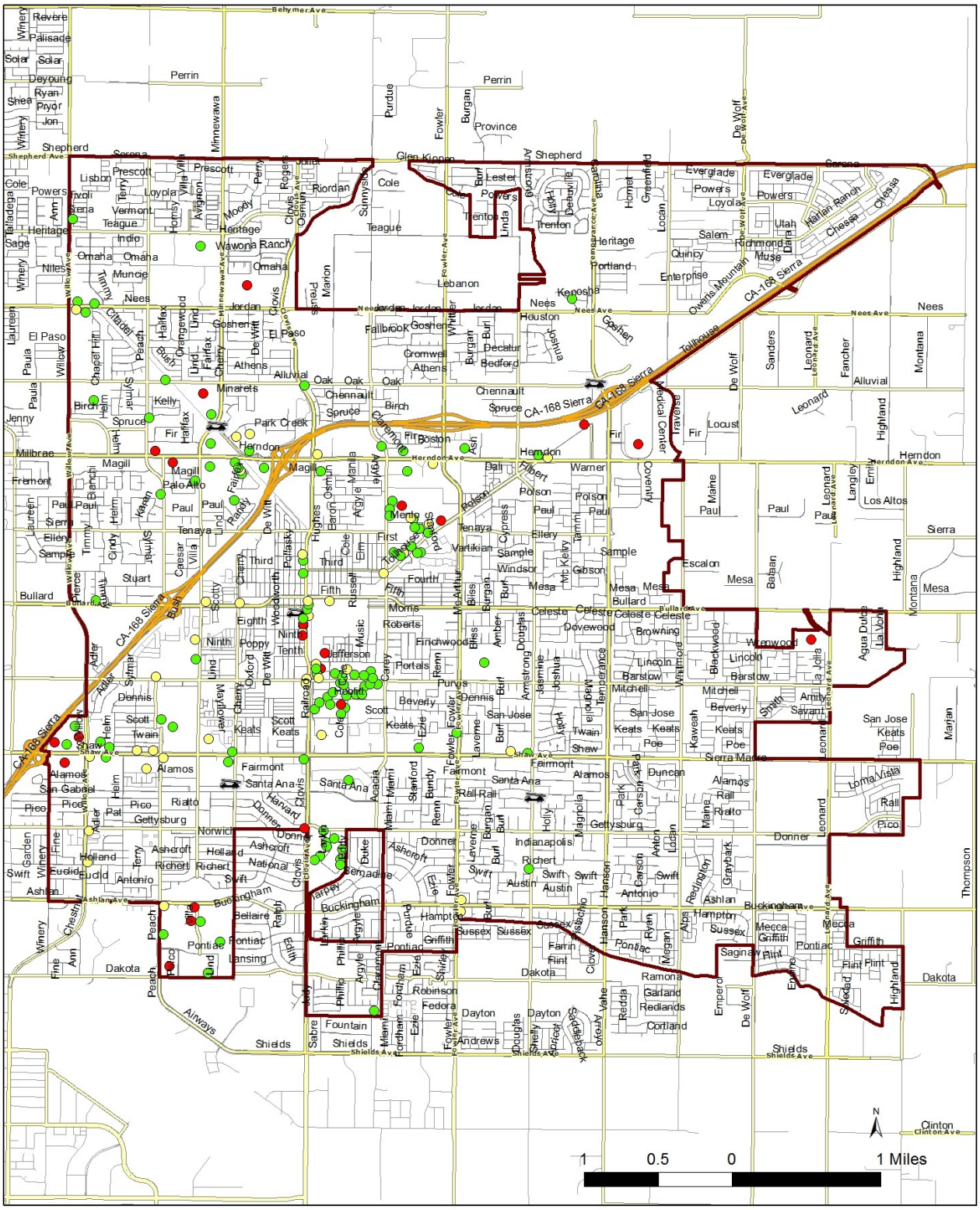
Fortunately, for the Department, the Community's demand for hazardous materials services is limited. While there is a potential exposure to hazardous materials risk, the demand for responses is low. This category accounted for 531 unique dispatches from 2014 – 2016, or 2.14% of the total call volume. Hazardous materials responses are broken down by the following categories and data is reproduced below.

Incident Type	All Incidents	All Incidents Percent	First-In Units	First-In Units Percent	Unit Responses	Unit Responses Percent
400 - Hazardous condition, other	10	1.88%	10	1.89%	19	1.84%
410 - Flammable gas or liquid condition, other	7	1.32%	7	1.32%	7	0.68%
411 - Gasoline or other flammable liquid spill	35	6.59%	35	6.60%	44	4.27%
412 - Gas leak (natural gas or LPG)	175	32.96%	175	33.02%	266	25.80%
413 - Oil or other combustible liquid spill	8	1.51%	8	1.51%	11	1.07%
420 - Toxic condition, other	5	0.94%	5	0.94%	14	1.36%
421 - Chemical hazard (no spill or leak)	5	0.94%	5	0.94%	21	2.04%
422 - Chemical spill or leak	10	1.88%	10	1.89%	30	2.91%
423 - Refrigeration leak	1	0.19%	1	0.19%	1	0.10%
424 - Carbon monoxide incident	39	7.34%	39	7.36%	40	3.88%
440 - Electrical wiring/equipment problem, other	33	6.21%	34	6.42%	70	6.79%
441 - Heat from short circuit (wiring), defective/w	9	1.69%	9	1.70%	24	2.33%
442 - Overheated motor	11	2.07%	11	2.08%	46	4.46%
443 - Light ballast breakdown	5	0.94%	5	0.94%	22	2.13%
444 - Power line down	36	6.78%	35	6.60%	42	4.07%
445 - Arcing, shorted electrical equipment	107	20.15%	107	20.19%	271	26.29%
451 - Biological hazard, confirmed or suspected	2	0.38%	2	0.38%	4	0.39%
460 - Accident, potential accident, other	2	0.38%	2	0.38%	2	0.19%
461 - Building or structure weakened or collapsed	4	0.75%	4	0.75%	12	1.16%
462 - Aircraft standby	8	1.51%	8	1.51%	60	5.82%
463 - Vehicle accident, general cleanup	12	2.26%	11	2.08%	15	1.45%
471 - Explosive, bomb removal (for bomb scare, us	2	0.38%	2	0.38%	2	0.19%
480 - Attempted burning, illegal action, other	2	0.38%	2	0.38%	3	0.29%
481 - Attempt to burn	2	0.38%	2	0.38%	4	0.39%
482 - Threat to burn	1	0.19%	1	0.19%	1	0.10%
Report Totals	**531**	**100.00%**	**530**	**100%**	**1,031**	**100%**

Community Risks

The City and the Department have existing hazardous materials risks between the fixed facilities and the transportation routes to move materials. Fresno County Department of Public Health is the administrator of the local Certified Unified Program Agency (CUPA). The CUPA inspects businesses or facilities that handle or store hazardous materials, generate and/or treat hazardous waste, own or operate underground storage tanks, store petroleum in aboveground tanks over State thresholds, or store Federal regulated hazardous materials over State thresholds. The inspections determine compliance with the California Health and Safety Code, California Code of Regulations, and the Code of Federal Regulations. The CUPA Program achieves compliance through education, community and industry outreach, inspections and enforcement. Once facilities were ranked, their information was then geo-coded into our GIS system. With this overview, Clovis has been able to look at concentration/density of our EMS risk throughout Clovis. In addition, we can plot these points and add call history data to see if there is correlation between concentration of occupancies and actual incidents.

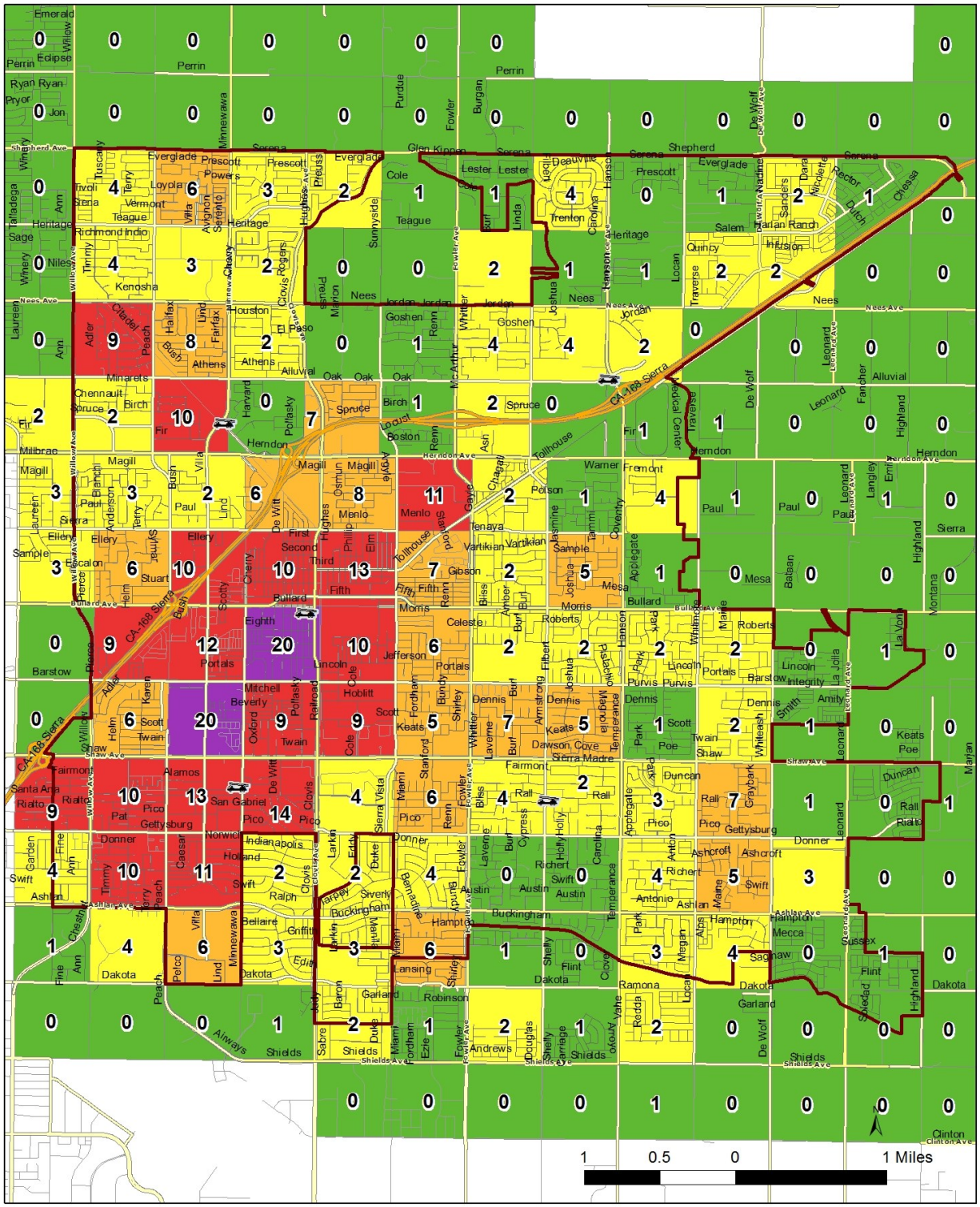
The most prevalent hazardous materials reported in storage were diesel fuel, gasoline, and lube oil. The most prevalent extremely hazardous materials reported in storage are sulfuric acid, ammonia, and chlorine. Wawona Foods uses a variety of hazardous materials for daily produce packaging and storage operations. Wawona Foods maintains an active OSHA compliant storage and safety division that is responsible for ensuring compliance with the regulations applicable to the hazardous materials stored and utilized in production.



HazMat Risk Profile
2014-2016

Occupancy Risk Profile -HazMat

High Medium Low

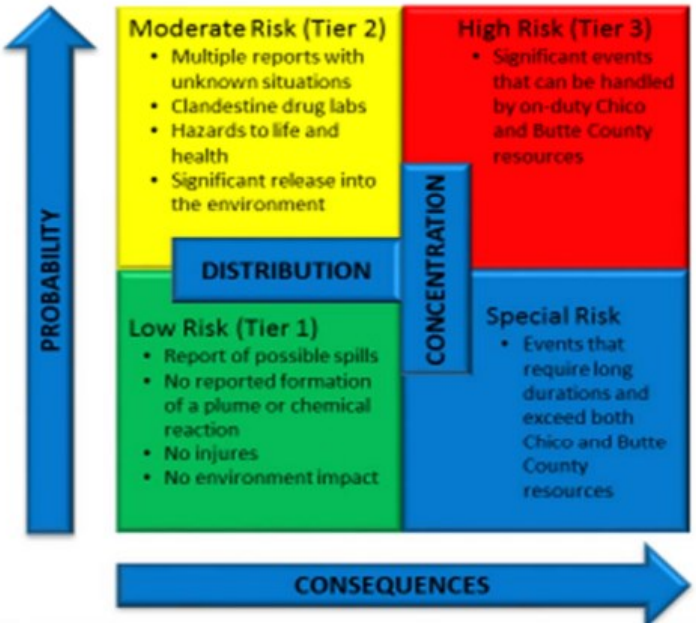


HazMat Incident Concentration by District 2014-2016

0 - 1 2 - 4 5 - 8 9 - 14 15 - 20

Probability/Consequence of Hazardous Materials Risk

The Department staff completed analyses for the probability and consequence of hazardous materials events. In this case, the risks for hazardous materials are greater than the historical experience. Therefore, the consequence portion of the matrix had greater influence on the risk classification than the probability. All hazardous materials events are relatively low frequency as compared to other community service demands but the consequence of events could be significant. A probability and consequences risk matrix was developed and is presented below.



Hazardous Materials Service Level Goals

The Department's benchmark service level objectives are as follows:

For 90 percent of all low- and high-risk Hazardous Material release calls for service, the Department's total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the first-due unit, staffed with at least 3 firefighters, trained to the First Responder Operational level, shall be: 7 minutes for all areas within the city limits (Urban). The first-due unit for all risk levels shall be capable of: isolating the area, provide emergency medical care to any patients, provide initial identification of the type and hazard of materials involved, and establish incident command. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all high risk Hazardous Material release calls for service, the total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the effective response force (ERF), staffed with 10 firefighters and officers, 4 or more of which are trained to the Hazardous Materials Specialist level shall be: 17 minutes and 30 seconds for all areas within the city limits (urban). The ERF for high risk shall be capable of: providing incident command, basic life support, isolate the area and deny entry, provide identification of type and hazard of materials involved, enter the hazard areas and mitigate risk or secure for clean-up employing the use of Level A or B protective ensembles. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

Critical Task Analysis

These tables show the breakdown of critical tasks that need to occur within the first 5 to 15 minutes after arriving at a hazardous materials release based on the hazard category:

Critical Task Necessary at a Low-Risk Hazardous Materials Incident		
Task	**Firefighters**	**Company**
Command	1	1st Engine or Truck
Mitigation	2	1st Engine or Truck
Total	**3 Firefighters**	**1 Fire Apparatus**

Critical Task Necessary at a High-Risk Hazardous Materials Incident		
Task	**Firefighters**	**Company**
Command	1	Battalion Chief
Entry Team Leader	1	1st Engine/HM Spec.
Entry Team	2	2nd Engine/HM Spec.
Back Up Team	2	3rd Engine/HM Spec.
Decon Team	3	1st Engine
Safety Officer/HazMat ASO	1	2nd Engine/HM Spec.
ALS	2	1st ALMBULANCE
Total	**10 FFs & 2 Other**	**3 Fire Apparatus, 1 HazMat, 1BC & 1 ALS Unit**

Hazardous Material Calls, Code 3, in Clovis, First Unit at Scene Benchmarks at 90th Percentiles								
Time Interval	**Benchmark**	**Metric**	**All**	**2012**	**2013**	**2014**	**2015**	**2016**
Call Processing	01:30	Count	573	131	119	110	108	120
		90th Percentile	01:59	01:57	01:40	01:41	02:01	02:22
Turnout	01:30	Count	585	131	119	107	108	120
		90th Percentile	01:49	01:45	01:58	01:49	01:43	01:36
Travel	04:00	Count	519	112	106	102	101	108
		90th Percentile	06:54	05:30	06:33	06:21	05:15	05:41
Total Response	07:00	Count	482	103	90	95	96	98
		90th Percentile	07:52	07:48	07:49	07:57	07:33	08:12

Technical Rescue Services Risk Assessment

The Department has several members trained as technicians for the Technical Rescue Program and both rely on and participate with the Countywide Technical Rescue Team. Technical rescue is a relatively broad term and includes responses to a wide variety of incidents such as surface water rescue, confined space rescue, low- and high-angle rescues, and structural collapse. Due to the critical tasking elements necessary for technical rescue events, the Department utilizes a tiered response process that begins with Department resources, then escalates to a region-wide response. A Department response includes operations level personnel in addition to available technicians. A region-wide response includes additional staffing and resources commensurate with a high-risk fire structure fire response including on-duty Department technicians and team leaders as well as region-wide Rescue Team units.

Search and rescue emergencies can be broken into three general categories (low, medium and high risk) within our dispatching matrix, with each category requiring a different number of resources to effectively and safely manage each. The risk levels are as follows:

High Risk: Structure collapse, vehicle into buildings with patient(s), trench rescue, high– and low- angle rescue, and confined space rescue.

Medium Risk: Vehicle into buildings without patients, vehicle accidents with pin-ins, freeway accidents, person(s) caught in machinery, industrial accidents, water rescue.

Low-Risk: Elevator rescue, victim trapped in a car or room of building due to a lock failure.

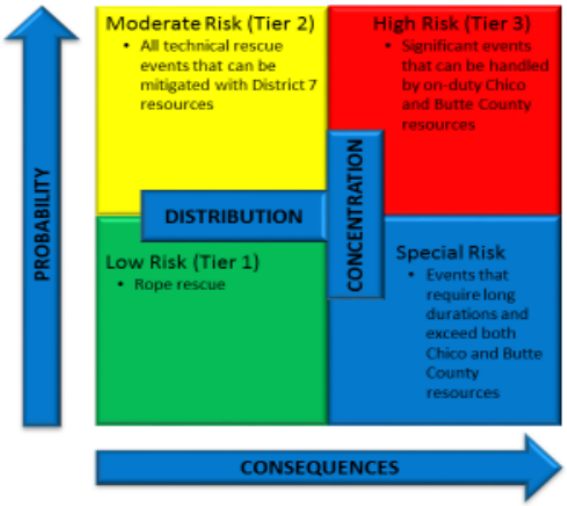
Community Service Demands

Similar to the analyses for hazardous materials, the demand for technical rescue services is low with the exception of motor vehicle accidents in relation to the primary service areas. From 2014 – 2016, there was a total of 1,565 search and rescue incidents. Of those, 98% involved a motor vehicle accident of some type. With the improved economy, the Department is experiencing an upswing in building, therefore a potential risk for high angle rescues, trench emergencies, and structural collapses. Search and Rescue responses are broken down by the following categories and data is reproduced below:

Incident Type	All Incidents	All Incidents Percent	First-In Units	First-In Units Percent	Unit Responses	Unit Responses Percent
322 - Code 2 Vehicle accident with injuries	49	3.13%	49	3.16%	59	2.70%
322 - Priority 1 Vehicle accident with injuries	499	31.88%	493	31.79%	836	38.19%
322 - Priority 2 Vehicle accident with injuries	551	35.21%	546	35.20%	700	31.98%
322 - Vehicle accident with injuries	3	0.19%	3	0.19%	11	0.50%
323 - Motor vehicle/pedestrian accident (MV Pe	21	1.34%	20	1.29%	22	1.01%
323 - Motor vehicle/pedestrian accident Code 2	30	1.92%	30	1.93%	36	1.64%
323 - Motor vehicle/pedestrian accident Priority	52	3.32%	52	3.35%	57	2.60%
323 - Vehicle vs pedestrian, prior 1	53	3.39%	53	3.42%	57	2.60%
324 - Motor vehicle accident with no injuries	246	15.72%	244	15.73%	321	14.66%
331 - Lock-in (if lock out , use 511)	38	2.43%	38	2.45%	41	1.87%
350 - Extrication, rescue, other	3	0.19%	3	0.19%	6	0.27%
352 - Extrication of victim(s) from vehicle	2	0.13%	2	0.13%	4	0.18%
353 - Removal of victim(s) from stalled elevator	8	0.51%	8	0.52%	9	0.41%
357 - Extrication of victim(s) from machinery	1	0.06%	1	0.06%	6	0.27%
360 - Water & ice related rescue, other	3	0.19%	3	0.19%	13	0.59%
371 - Electrocution or potential electrocution	1	0.06%	1	0.06%	1	0.05%
381 - Rescue or EMS standby	5	0.32%	5	0.32%	10	0.46%
Report Totals	**1,565**	**100.00%**	**1,551**	**100%**	**2,189**	**100%**

Probability/Consequence of Technical Rescue Risk

The Department staff completed analyses for the probability and consequence of technical rescue events. In this case, the risks for technical rescue, and the Department's technicians, are greater than the historical experience. Therefore, the consequence portion of the matrix had greater influence on the risk classification that the probability. All technical rescue events are relatively low frequency as compared to other community service demands. A probability risk matrix was developed and is presented below:



Technical Rescue Service Level Goals

The Department's benchmark service level objectives are as follows:

For 90 percent of all low-, moderate-, and high-risk rescue calls, the Department's total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the first-due unit, staffed with at least 3 firefighters, shall be: 7 minutes for all areas within the city limits (Urban). The first-due unit for all risk levels shall be capable of: providing incident command, basic life support and minor rescue services such as minor extrications of a patient from a vehicle, or removing victims trapped in a non-operational elevator. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all moderate-risk rescue calls, the total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the effective response force (ERF), staffed with 5 firefighters and officers, shall be: 10 minutes and 30 seconds for all areas within the city limits (urban). The ERF for moderate risk shall be capable of: providing incident command, provide basic life support, perform most vehicle extrications, or extrication of patients from machinery, filling the position of safety officer. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

For 90 percent of all high risk rescue calls, the total response time, from the receipt of the 911 call in the secondary PSAP to the arrival of the effective response force (ERF), staffed with 7 firefighters and officers, 3 or more of which are trained to the Rescue Systems I level shall be: 17 minutes and 30 seconds for all areas within the city limits (urban). The ERF for high risk shall be capable of: providing incident command, provide basic life support, perform complex vehicle extrication, shore up compromised structures, perform trench rescues, filling the position of safety officer. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

MVA Calls, Code 3, in Clovis, First Unit at Scene

Benchmarks at 90th Percentiles

Time Interval	Benchmark	Metric	All	2012	2013	2014	2015	2016
Call Processing	01:30	Count	1,649	317	299	331	377	325
		90th Percentile	01:13	01:05	01:10	01:02	01:13	01:27
Turnout	01:00	Count	1,598	300	287	325	369	317
		90th Percentile	01:35	01:31	01:37	01:30	01:35	01:37
Travel	04:00	Count	1,627	309	297	333	369	319
		90th Percentile	04:28	04:24	04:34	04:30	04:30	04:22
Total Response-1st On Scene	06:30	Count	1,627	308	296	330	372	321
		90th Percentile	06:29	06:20	06:31	06:19	06:40	06:37
Total Response-EFR	17:30	Count	49	9	11	14	9	6
		90th Percentile	9:07	8:31	9:04	9:38	8:03	9:05

Critical Task Analysis

These tables show the breakdown of critical tasks that need to occur within the first 5 to 15 minutes after arriving at a rescue emergency based on the hazard category:

Critical Task Necessary at a Low-Risk Technical Rescue Incident		
Task	**Firefighters**	**Company**
Command	1	1st Engine or Truck
Rescue	2	1st Engine or Truck
ALS	2	1st Ambulance
Total	**3 FFs & 2 Other**	**1 Fire Apparatus & 1 ALS Unit**

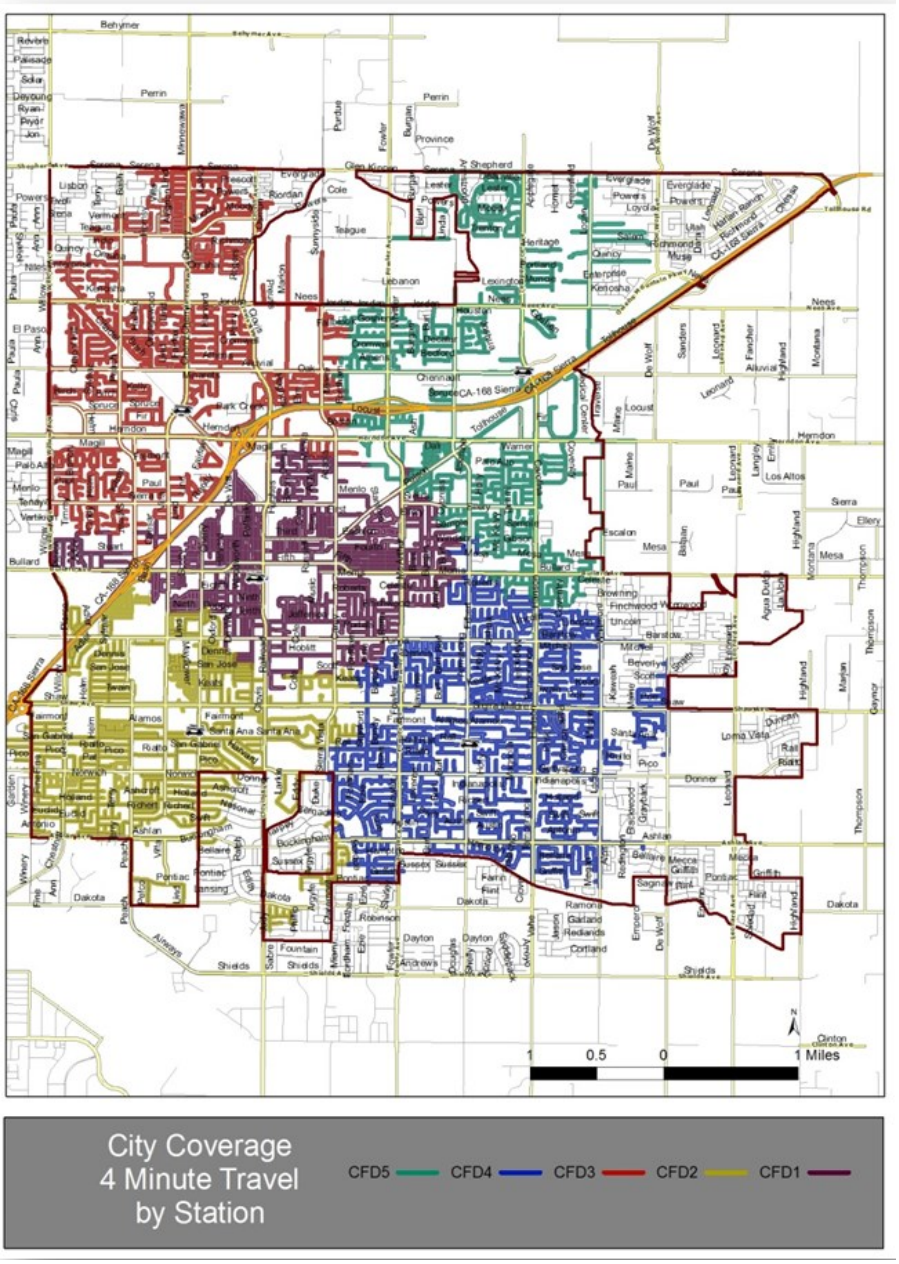
Critical Task Necessary at a Medium-Risk Technical Rescue Incident		
Task	**Firefighters**	**Company**
Command	1	Battalion Chief
Rescue Group Supervisor	1	1st Engine/Rescue Spec.
Rescue Team	2	1st Engine/Rescue Spec.
Safety Officer	1	1st Truck/Rescue Spec.
ALS	2	1st Ambulance
Total	**5 FFs & 2 Other**	**1 Fire Engine, 1 Truck, 1 BC & 1 ALS Unit**

Critical Task Necessary at a High-Risk Technical Rescue Incident		
Task	**Firefighters**	**Company**
Command	1	Battalion Chief
Rescue Group Supervisor	1	1st Engine/Rescue Spec.
Rescue Team	2	1st Engine/Rescue Spec.
Back Up Team	2	1st Truck/Rescue Spec.
Attendant	1	1st Truck/Rescue Spec.
Safety Officer	1	2nd Engine/Rescue Spec.
ALS	2	1st Ambulance
Total	**8 FFs & 2 Other**	**1 Fire Engine, 1 Truck, 1 BC, 1 USAR Unit & 1 ALS Unit**

Distribution Factors

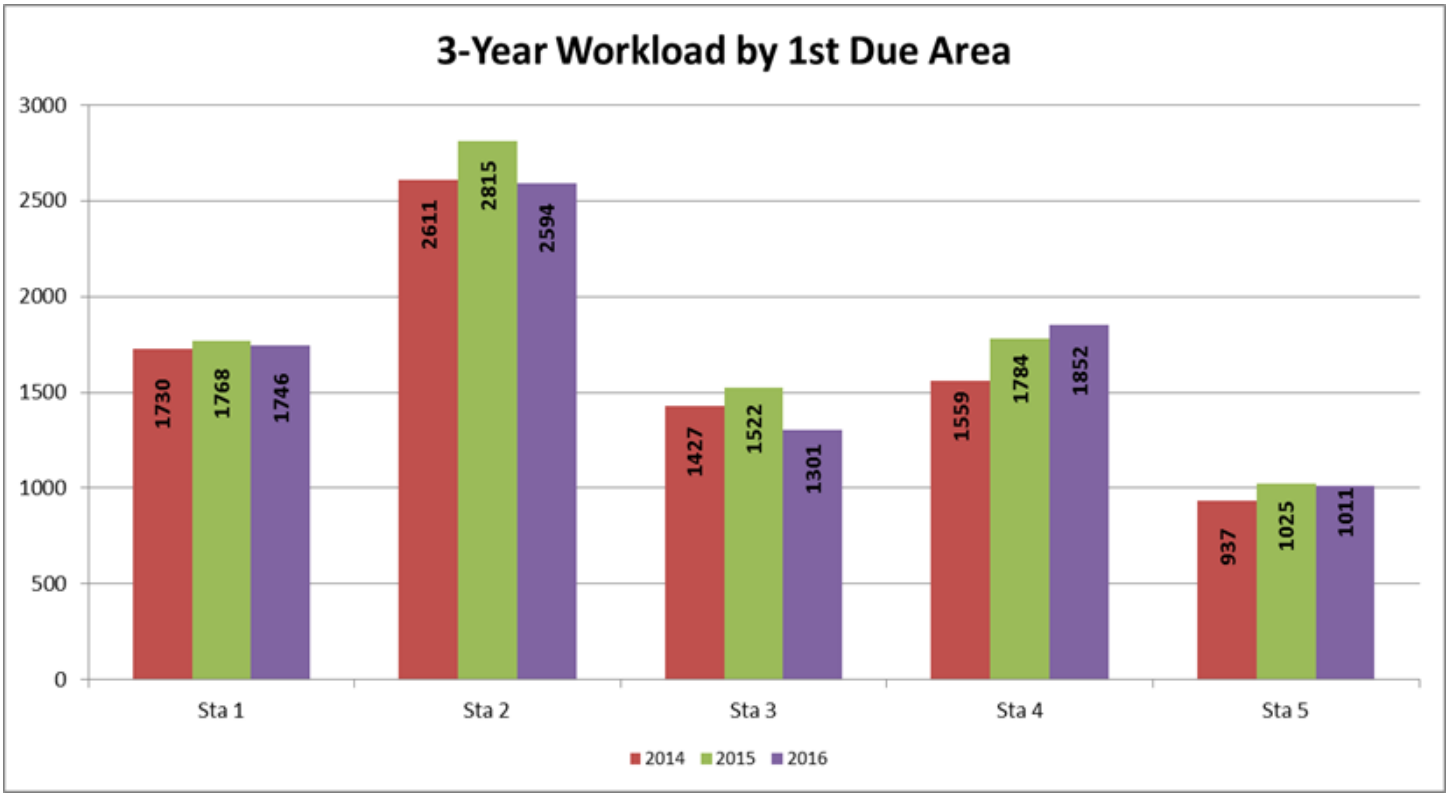
Comparison of Demand Zones

Each of the five fire demand zones were compared for factors that would impact the distribution of resources. A geospatial analysis was completed regarding drive times that incorporated the Department's current performance and nationally recommended best practices. Drive times from each of the current fixed facility fire stations were created utilizing existing road miles and past performance for first unit arrival at 4 minutes. This analysis suggests that the majority of the Department's jurisdiction should be able to be responded to within 4 minutes for where the majority of the risk is located. Each individual stations 4-minute service area is noted from the existing road networks. While the geographic analysis is a quality surrogate measure, there are times that the complexity of the roadway system or time of day may provide additional challenges.



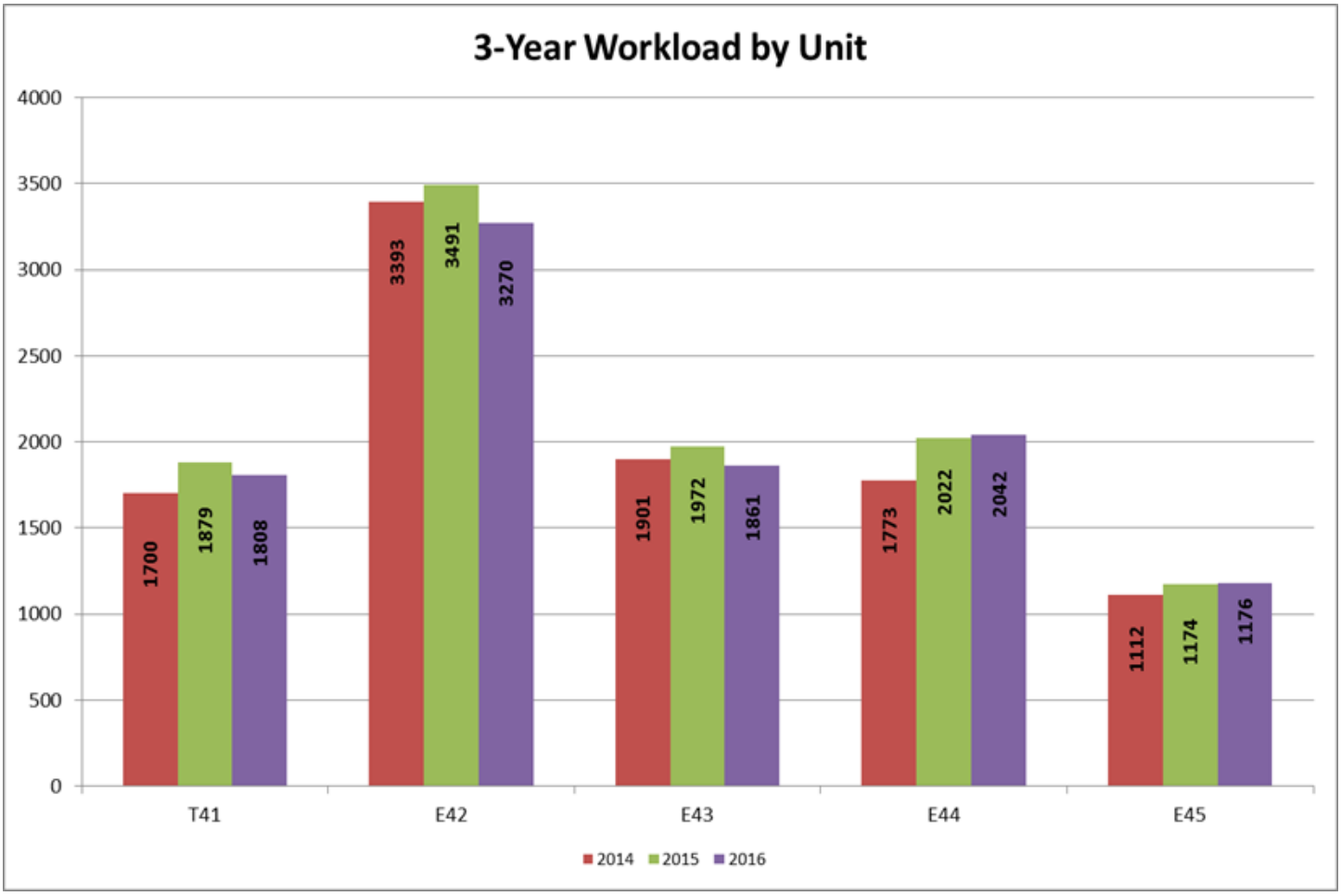
Comparison of Workloads by Demand Zone

Another method of assessing the effectiveness of the distribution model is to analyze the demand for services across the distribution model. Workload is assessed at the station demand zone level and at the individual unit level. Analyses illustrate that Stations 2 and 4 were the top demand zones, and each answered 20.42% and 31.23% of the total responses for services. Collectively these two demand zones accounted for 51.65% of the total workload. Results are presented below:



Station	2014	2015	2016	3-Year Average
1	1730	1768	1746	1748
2	2611	2815	2594	2673
3	1427	1522	1301	1417
4	1559	1784	1852	1732
5	937	1025	1011	991
TOTAL	**8264**	**8914**	**8504**	**8561**

Finally, unit workload analyses were completed for both comparative purposes as well as for introspection into potential system failures. First, this analysis utilized the summation of individual unit workload from dispatch to clear. E42 was dispatched to the most accounting for 33.21% of the runs, followed by E44. Results of the unit workload analysis are presented below:

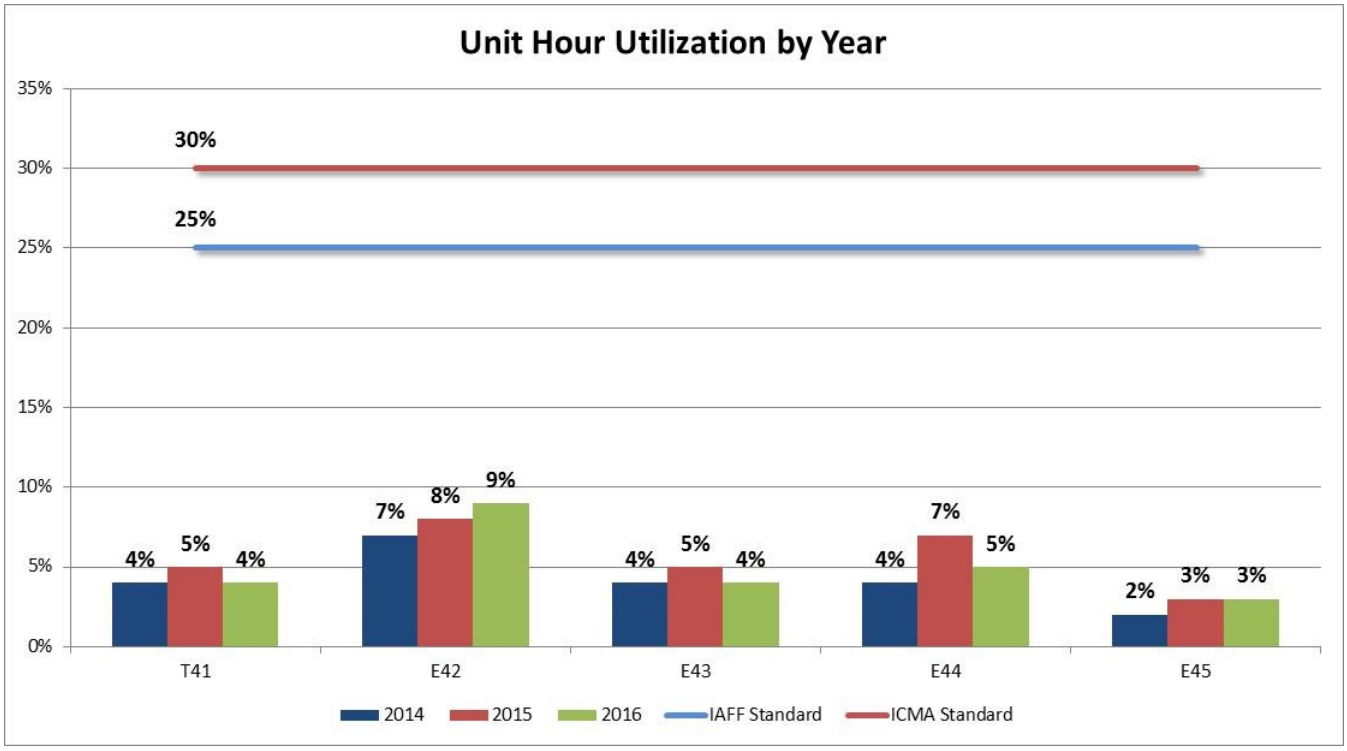


Unit	2014	2015	2016	3-Year Average
T41	1700	1879	1808	1796
E42	3393	3491	3270	3385
E43	1901	1972	1861	1911
E44	1773	2022	2042	1946
E45	1112	1174	1176	1154
TOTAL	**9879**	**10538**	**10157**	**10191**

Comparison of Workloads by Unit Hour Utilization (UHU)

Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) determinants were developed by mathematical model. This model includes both the proportion of calls handled in each major service area (Fire, EMS, Special-Ops, and Service) and total unit time on task for these service categories from 2014-2016. The resulting UHU's represent the percentage of the work period (24 hours) that is utilized responding to requests for service. Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.25, or 25% workload as an upper threshold. In other words, this recommendation would have personnel spend no more than six (6) hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire and community risk reduction inspections. The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *International City Managers Association (ICMA)* recommends that an upper unit utilization threshold of approximately 0.30, or 30%, would be considered best practice. In other words, units and personnel should not exceed 30%, or eight (8) hours, of their workday responding to calls. These recommendations are also validated in the literature.

In the Clovis Fire Department, the most utilized units are E42 and E44. The least utilized unit was E45. All unit utilizations were below 20%. This is partly contributed by the relative short average time on task of 22 minutes. Emergency related workload is a factor of community demands for service and is not a reflection of internal policies or non-emergency duties. Any changes to the current system would require workload to be redistributed across the deployed units. This analysis demonstrates that considerable capacity exists to absorb additional work.



Description of First Arriving Unit Performance

Analyses of the response characteristics of the first arriving units were conducted. This analysis focused on lights and sirens responses (Priority 1 calls). Overall call processing time (dispatch) at the 90th percentile was 1:34. Turnout time performance at the 90th percentile was 1:28. The travel time for all first arriving unit responses was calculated irrespective of their assigned first-due area. In other words, this analysis describes the first arriving unit to the scene. Travel time at the 90th percentile was 4:33. Total Reflex Time performance (call pick-up to unit arrival) at the 90th percentile was 6:35. Aggregate results and annual results from 2014 – 2106 are provided below:

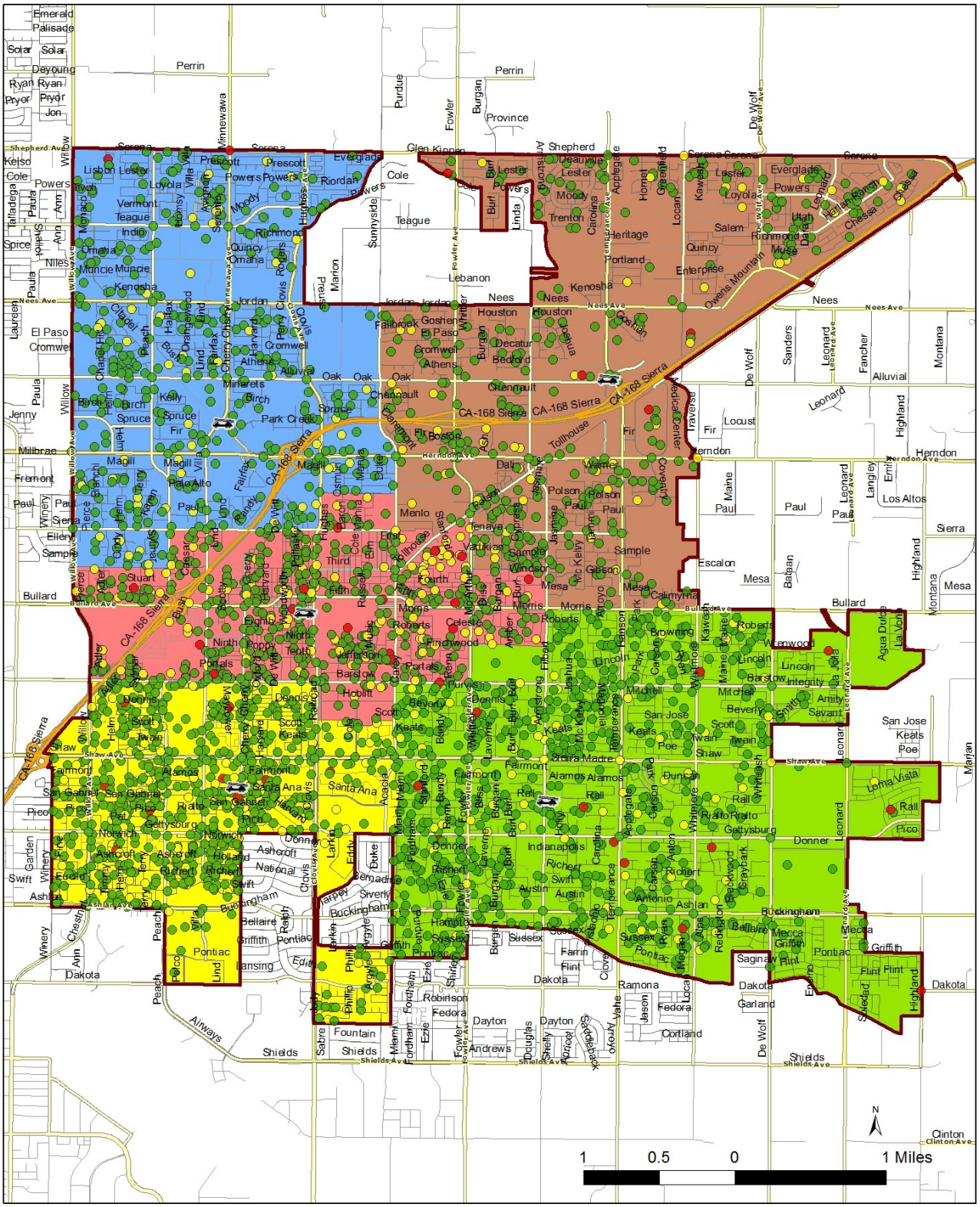
Year	Process Time	Turnout Time	Travel Time	Response Time	Total Reflex Time	Total Resource Time	First-In Units	All Unit Responses
2014	01:42	01:27	04:30	05:26	06:36	21:44	6,381	6,649
2015	00:53	01:30	04:33	05:33	06:09	22:07	6,838	7,148
2016	02:01	01:26	04:37	05:31	06:58	21:54	6,155	6,412
Total	**01:34**	**01:28**	**04:33**	**05:30**	**06:35**	**21:55**	**19,374**	**20,209**

First Arriving Unit Response Time by Station Demand Zone

Further analyses were conducted to measure the performance of the first arriving unit. Response times are reported at the 90th percentile. Examination of the overall performance at the 90th percentile reveals that Engine 42 had the quickest response times. The unit with the longest total response times is Engine 45 due to the street network and continued build-out in the Harlan Ranch area. An illustrative comparison of unit performance at the 90th percentile is provided below.

Unit	Process Time	Turnout Time	Travel Time	Response Time	Total Reflex Time	Total Resource Time	First-In Units	All Unit Responses
E42	01:34	01:26	04:07	05:02	06:04	20:36	6,906	7,063
E43	01:34	01:31	04:31	05:30	06:35	21:31	3,119	3,303
E44	01:32	01:30	04:26	05:24	06:31	22:54	3,897	4,045
E45	01:38	01:23	05:29	06:24	07:22	23:01	2,117	2,228
T41	01:33	01:28	04:49	05:46	06:49	22:51	3,330	3,564
Total	**01:34**	**01:28**	**04:33**	**05:30**	**06:35**	**21:55**	**19,369**	**20,203**

The data was further analyzed to compare actual vs. expected response times for incidents in 2016. In the analysis, factors that determine the expected performance include the street network, posted speeds and actual performance history for incidents within the same area. When examining the travel time performance, only calls within the City limits that received a Clovis Fire unit were included. As seen in the exhibit above, calls are concentrated in the core and southwest part of the City. It should be noted that as growth continues along the City limits, and resources are pulled out form the core, we're beginning to see a trend where travel times are increasing to the outer limits.



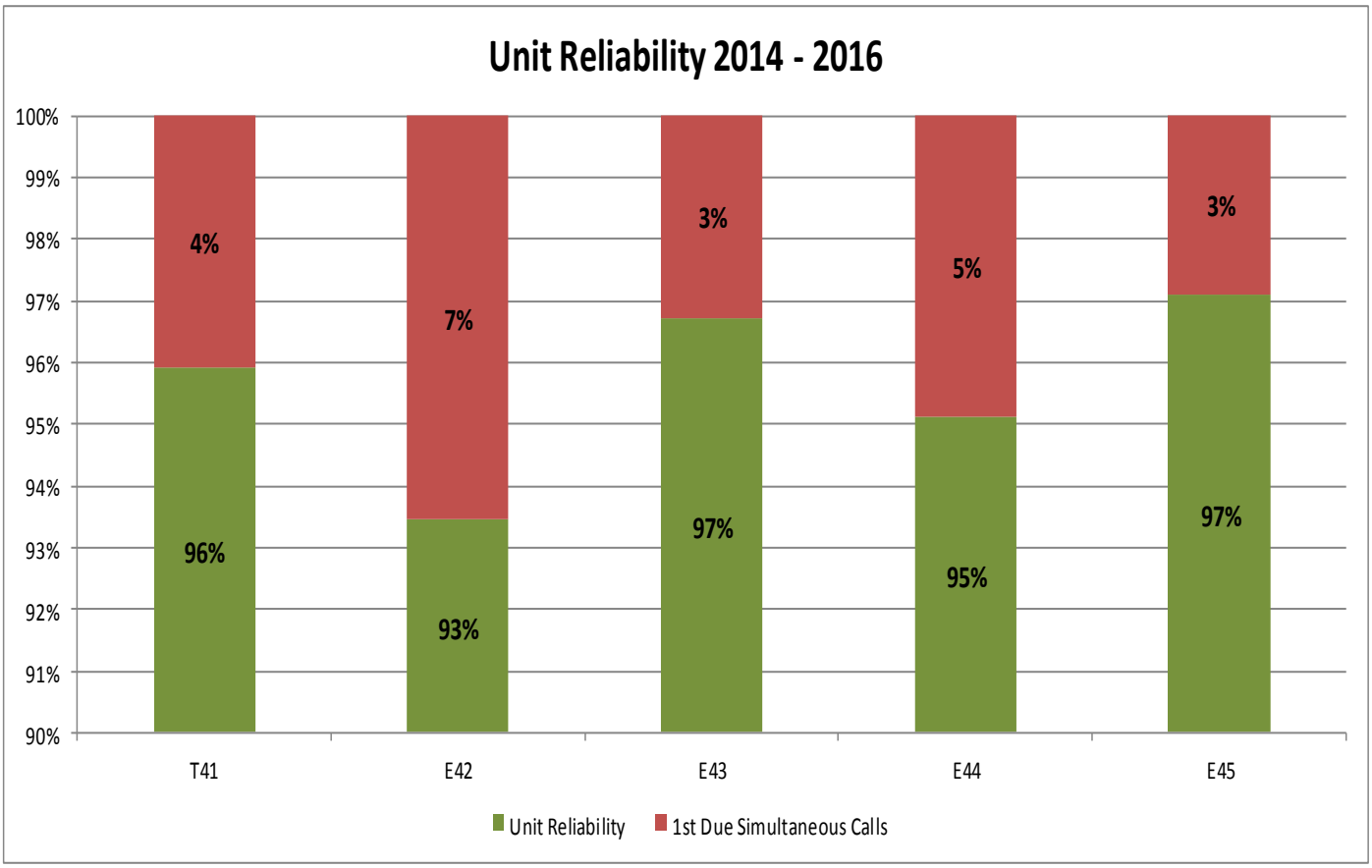
1st Arriving CFD Unit
Actual vs. Expected
Travel Times
2016

- Over 3 minutes slower
- 1-3 minutes slower
- Within 1 minute

Description of First Arriving Unit Reliability

Response reliability is defined as the probability that the required amount of staffing and apparatus will be available when a fire or emergency call is received. The response reliability of the fire department would be 100 percent if every piece of its apparatus were available every time an emergency call was received, there was no traffic, no bad weather, access was not obstructed, etc. In reality, there are times when a call is received for a particular Company but the Company is already on another call. This requires a substitute (second-due) Company to be assigned from another station. As the number of emergency calls per day increases, so does the probability that a needed piece of apparatus will already be busy when a call is received. Consequently, the response reliability of the fire department for that Company decreases, which will have an impact on department travel times to emergencies.

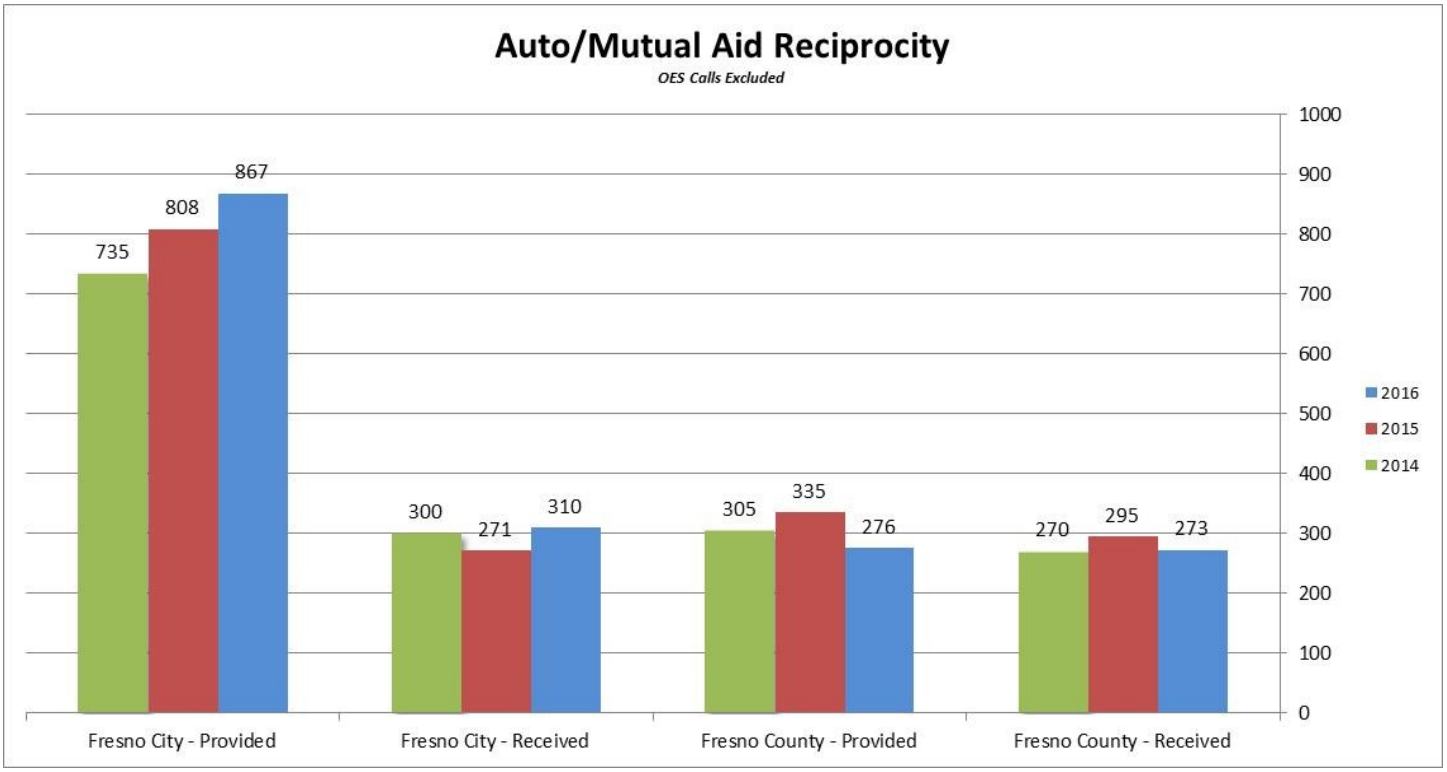
The size of the area that a station covers, the number of calls, the types of calls, and the population density all affect response reliability. The more densely populated, the more likely a second-due call will occur. An analysis of current response data can reveal variations in the response reliability among stations. The chart below tracks response reliability by analyzing the total call volume for a particular fire first-due area and then tracks the number of additional calls occurring within that area while that first-due unit is still on a call.



As seen, Clovis Fire Department units are reliable for calls within the their first due response areas over 90% of the time.

Additional Unit Demands

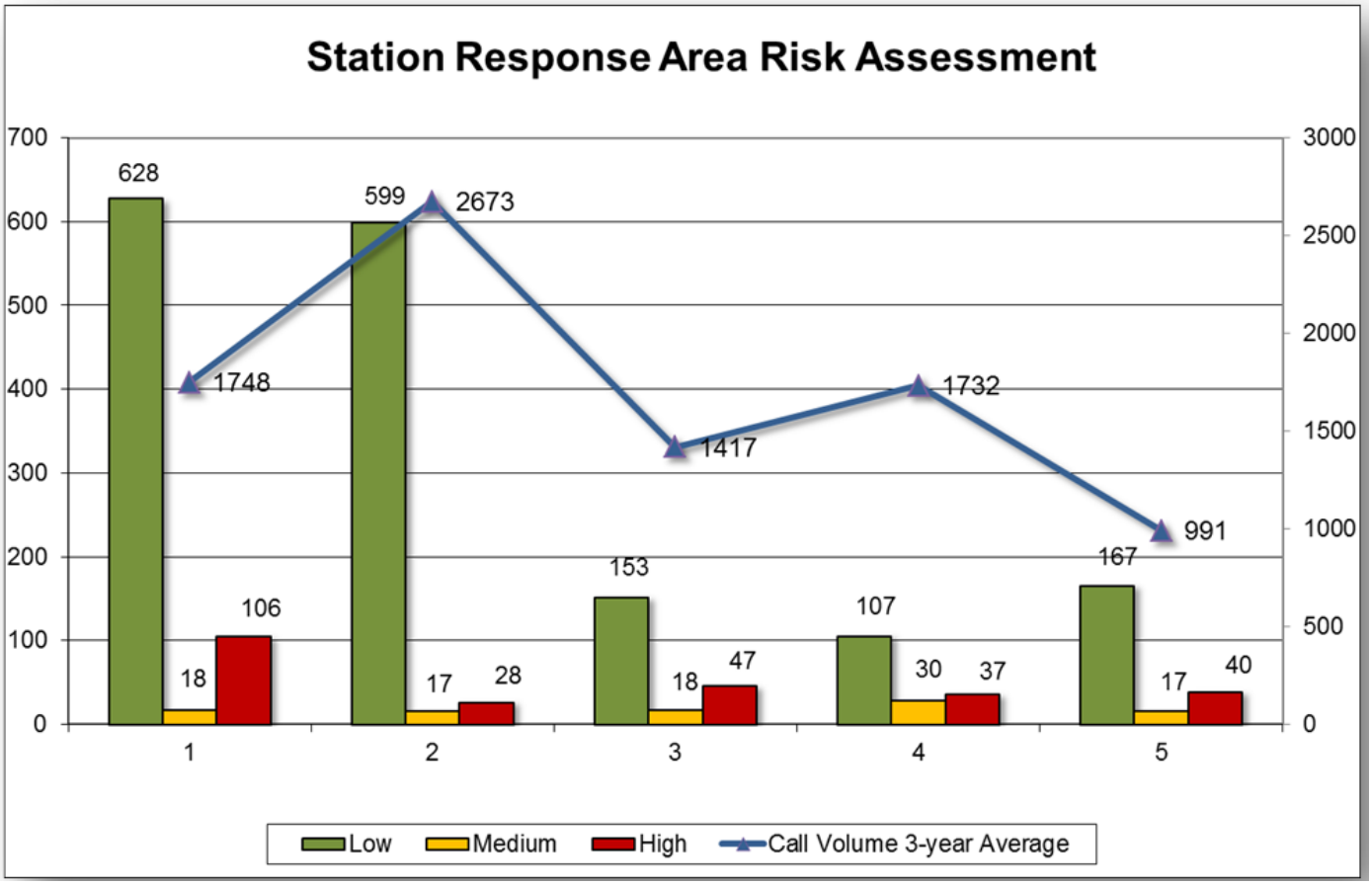
Within California, the Master Mutual Aid System operates to provide firefighting and support capabilities for a variety of events including wildfires, landslides, earthquakes, and other major events. In addition, the System supports regional, county, and inter-agency agreements to ensure lives and property are protected. As a fire agency within Fresno County, Clovis provides automatic aid within a one-mile service area outside of the City borders. Most often, those calls support Fresno City Fire Department or Fresno County Fire Protection District. Our partner agencies also provide coverage within the City of Clovis boundaries when our resources may be deployed on other calls. Requests outside of the automatic aid area are handled through mutual aid agreements that define the scope of services and process by which those calls will be handled. To ensure mutual and automatic aid calls don't create service gaps in either jurisdiction, regular monitoring of aid received or given is conducted. The chart below demonstrates the current ratio and distribution of auto/mutual aid support with our partner agencies:



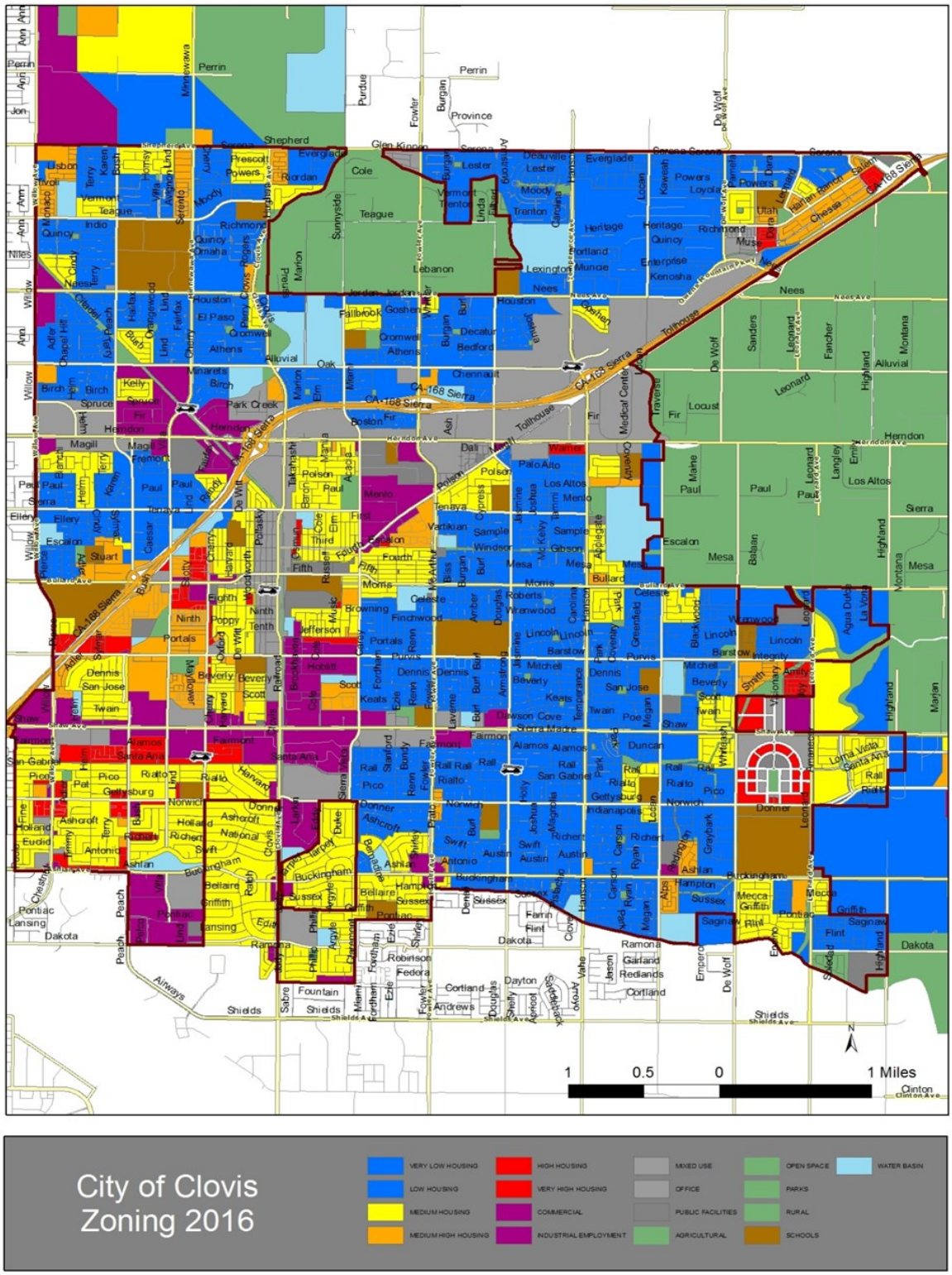
Concentration Factors

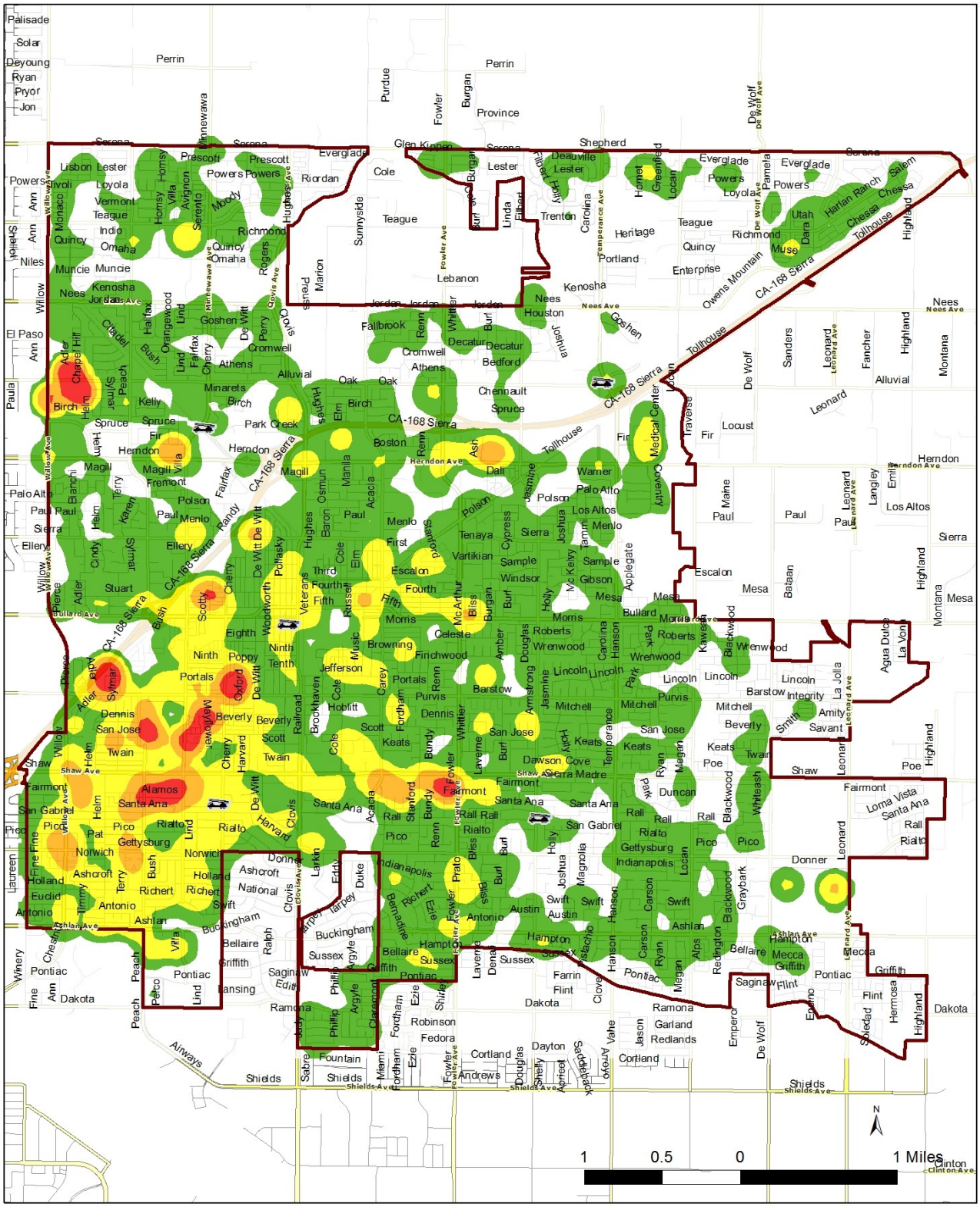
Concentration of Risks by Demand Zone

Analyses were conducted to describe and measure the relative concentration of risks in each of the fire station demand zones. Therefore, a station demand zone risk matrix was developed to quantitatively evaluate the relative risk by including measures for the frequency of moderate and high risk occupancies in each fire demand zone that are directly correlated to the necessity of higher concentrations of resources. In addition, several measures that both serves the distribution aspect of the risk evaluation, but also contributes to the need for higher concentrations of resources. For example, a higher call volume may serve to drive the need for additional resources to cover the community's demand. The variables included in the risk matrix were assessment of occupancy type, patient ambulatory status, fire protection system, occupancy load and economic impact. All measures were weighted equally. The scoring and count by first due are provided below:



When combining the risk assessment with average call volume 2014 – 2016, there is little in the way of direct correlation between high-risk occupancies and actual call volume. It can be inferred that the more likely contributing factors are socioeconomics, population density and housing stock within the various first-due areas. The following maps demonstrate the correlation based on call volume and zoning designation:





2014 - 2016
Clovis Fire Department
Service Demand Concentration

Very High | High | Moderate | Low | None

Industry Standards on Measuring Performance

Insurance Services Office (ISO) Grading Schedule

For a broad spectrum of commercial and personal lines of insurance, ISO provides statistical, actuarial, underwriting, claims information and analyses; consulting and technical services; policy language; information about specific locations and communities; fraud-identification tools; and data processing. In the United States and around the world, ISO serves insurers, reinsurers, agents, brokers, self-insurers, risk managers, insurance regulators, and other government agencies.

Fire remains one of the leading causes of property loss. A community's efforts to mitigate those losses before, during, or after a fire are of great importance to insurers. For more than 30 years, ISO has used the Fire Suppression Rating Schedule (FSRS) to review the firefighting capabilities of individual communities helping to provide the insurance industry with information on a community's ability to suppress and limit fire losses. The FSRS develops a numerical grading, ISO's Public Protection Classification (PPC), to help insurers differentiate the varying levels of fire protection. Class 1 represents the best public protection and Class 10 indicates no recognized protection.

The Fire Suppression Rating Schedule

In December 2012, ISO developed a Revised Fire Suppression Rating Schedule with changes that focus on areas that have a proven effect on fire suppression and prevention, as well as revisions that align the schedule's requirements with those of nationally accepted standards. The schedule now recognizes proactive efforts to reduce fire risk and frequency.

The FSRS assigns credit points to recognize a community's performance on measures related to fire suppression. The schedule objectively evaluates each item and uses the evaluations in a mathematical calculation to determine the accurate amount of credit for each category. Using the FSRS, ISO develops a PPC number for each community. The number represents the average class of fire protection for small to moderate-size buildings, the vast majority of all buildings in nearly all cities. The system compares the average available protection with the average protection needed for such buildings.

The revised FSRS makes increased reference to the national consensus standards of the National Fire Protection Association (NFPA), American Water Works Association (AWWA), and Association of Public-Safety Communications Officials International (APCO). Using feedback from these organizations and many other industry associations, ISO revised the PPC evaluation to make it more accurately reflect modern fire prevention and suppression capabilities. By incorporating more direct references to national consensus standards, ISO shows that it doesn't just write standards independently, but uses recognized fire suppression and prevention practices as the basis for their PPC evaluations.

The new schedule continues to evaluate three major categories of fire suppression: fire department, emergency communications, and water supply. In addition, it includes a new Community Risk Reduction section that recognizes community efforts to reduce losses through fire prevention, public fire safety education, and fire investigation.

The addition of the new risk reduction section represents a major shift in emphasis in the FSRS, giving incentives to communities that strive to reduce fire severity proactively through a structured program of fire prevention activities. Examples of fire prevention programs include fire prevention public education, certificate of occupancy inspections, and inspections of fire prevention equipment.

The total credit points for the existing three major categories remain unchanged at a total of 100 points, but ISO has increased or decreased the point weights for some sections. The total credit points are:

Fire Department: 50+ points
Emergency Communications (formerly "Fire Alarm"): 10 points
Water Supply: 40 points

The Community Risk Reduction section has a weight of 5.5 points, resulting in a revised 105.5+ available points out of 100. The inclusion of the new section with its extra points allows recognition of communities that include effective fire prevention practices without applying undue penalty for those that haven't yet adopted such measures.

"The revised FSRS continues to provide incentives to communities to strengthen their public fire protection, as fires are one of our major property insurance perils," said Bill Raichle, President of Verisk Insurance Solutions for Commercial Property. "The revision reflects current trends in fire protection, credits a community's fire prevention and fire protection capabilities in a measured, analytical way, and improves the predictive nature of the evaluation process."

There's been growing involvement in community efforts to limit losses before they happen, led largely by fire departments and their personnel. It's not easy to quantify the efforts made toward fire prevention and fire safety education, but there is enough anecdotal evidence to indicate that the more done to prevent a fire, the less likely a fire will happen or that it will be a major event.

Summary of ISO Schedule

All of these categories are processed through a formula that summarizes a city's fire protection capabilities into a numerical Class:

Class	Percentage Credited
1	90.00 or more
2	80.00 to 89.99
3	70.00 to 79.99
4	60.00 to 69.99
5	50.00 to 59.99
6	40.00 to 49.99
7	30.00 to 39.99
8	20.00 to 29.99
9	10.00 to 19.99
10	0 to 9.99

The City of Clovis was last evaluated in 2015 and received an increased rating performance to a Class 2. The City has experienced a steady improvement in its fire protection rating over the past 25 years.

Recommendations

Since being accredited in 2003, Clovis Fire has regularly undergone independent evaluation for continuous process improvement and assessment in meeting adopted standards. As a result of our last reaccreditation in 2013, a number of opportunities and challenges were identified. Over the past five-year period, a majority of those identified improvements have been accomplished. As we look into the future for improvements in the delivery system model, we have identified the following issues and the following recommendations are intended to be accomplished by 2021:

1. Improve the capacity to collect and analyze all elements of an emergency call from phone pick-up to arrival at patient or "Hello to Hello".
2. Improve reporting and documentation of patient care and outcomes.
3. Improve service delivery in the Southeast portion of the City and prepare for future development in the Northwest.

Recommendation 1

It is recommended that the Department stringently monitor the recently implemented improvements to alarm handling practices from the EMS Communication Center to identify positive outcomes and additional opportunities for further enhancements. It is also recommended that the Department look into the possibility of getting call processing data for its other three PSAP agencies.

In 2016/2017, Clovis Fire noted that there was a significant increase in call processing times over several months. To solve the problem, the Clovis Fire Department actively engaged the Communications Center management for improvements in the Pro Q/A process to improve efficient unit assignments and faster dispatch.

Due to different 911 systems and cellular call routing that feed into the EMS Dispatch Center, total call processing time can be difficult to analyze without the ability to track each individual call for service through the system. Call processing once the call is received at the EMS Communication Center is highly accurate and reported at the 90th percentile. In addition, Clovis regularly meets with EMS Communications Center personnel to review call processing procedures and performance.

Recommendation 2

It is recommended the Department continue to improve on the reporting and documentation of patient care, medical treatment, and procedures, with an emphasis on patient outcomes. Additionally, the Department wants to monitor and improve the outcomes for cardiac arrest/ROSC. This is currently completed with a blend of appraisal from within the Department and the Central California EMS Agency's (CCEMSA).

Recommendation 3

It is recommend the Department monitor performance, development, and calls for service in the Southeast area (Loma Vista). Service demands in this area are increasing and response times are currently exceed 1 minute greater than the Department's benchmark total response time. The Department reviewed criteria when it opened its previous three stations and compared this to similar cities. It was determined that the process for developing and staffing a new station should occur when the benchmarks outlined in the following section have been achieved.

New Fire Station Needs Analysis

As development within the City continues to expand, demand for service in the new areas will eventually grow to the level that a new fire station will be needed. It is important to develop a set of objective criteria in advance of the need for the station so that expectations of the fire department, City Council, the Community, and other stakeholders, are all aligned and pre-established. In the absence of consensus on a plan, one high profile fire or medical emergency could create political strife that may cause the stakeholders to make decisions based on emotions and not an objective risk management model.

The following matrix outlines the measurable benchmarks that will drive the decision making process for future fire stations:

Step 1: New Fire Station Location Identification
The location (or possible locations) for the proposed station will be made after each update to the General Plan. Note: This step was completed in Fall 2014 with the adoption of the updated General Plan.

Step 2: Acquisition of Land for New Fire Station
When the area that will be serviced by the proposed fire station reaches 100 calls for service, the City will begin the land acquisition process.

Step 3: Design New Fire Station
When two or more of the following benchmarks are reached, the design phase for the new fire station will begin:

- Area served by the proposed fire station receives 300 or more calls for service per year (rolling 365).
- The First-In performance of adjacent existing fire stations drops below 80%.
- Development with the proposed service area exceeds 45%. (percentage of development is based on a total build out of 9,000 residences, plus commercial occupancies).

Step 4: Build and Staff New Fire Station
When two or more of the following benchmarks are reached, the build and staff phase for the new fire station will begin:

- Area served by the proposed fire station receives 500 or more calls for service per year (rolling 365).
- The First-In total response time performance of adjacent existing fire stations drops below 75%.
- Development with the proposed service area exceeds 55%.

	2014	2015	2016
Single Family Homes	2840	3127	3770
Calls for Service	187	278	326
Total Reflex Time	7:59	7:49	8:04

Fire Station Coverage

A critical factor in developing a Standard of Cover is to look at the overall system to see if it is meeting the established service level objectives. It is common for fire and EMS response that distinctive geographic areas are built upon the first-response areas of the fire stations located throughout the city. This approach allows the fire department to analyze the workload and measure the performance of those stations based upon the identified service level objectives. By doing so it will assist the department to identify any areas of weakness, where additional stations may be warranted, or additional companies should be placed in service based upon the workload.

The following is a breakdown of each station and provides an analysis for the Companies' first-in response area:

Fire Headquarters

1233 Fifth Street

Clovis, CA 93612

Apparatus

Duty Chief

Station 1

633 Pollasky Avenue

Clovis, CA 93612

Apparatus

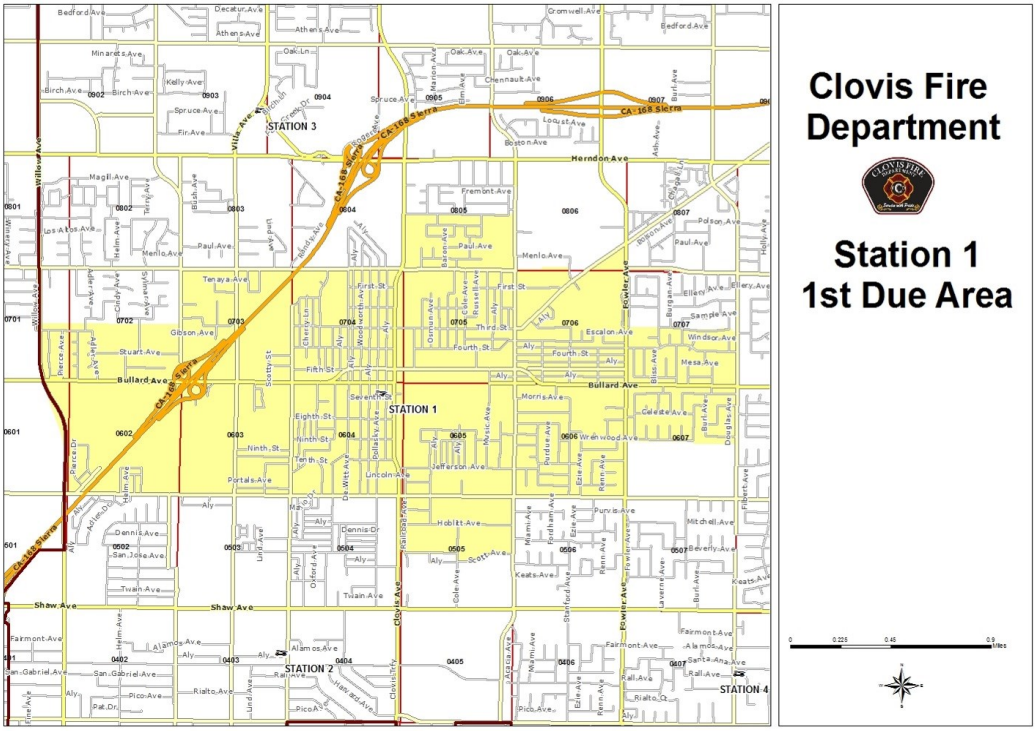
Truck 41

Truck 241

G.E.M. Car (special events only)

Investigations

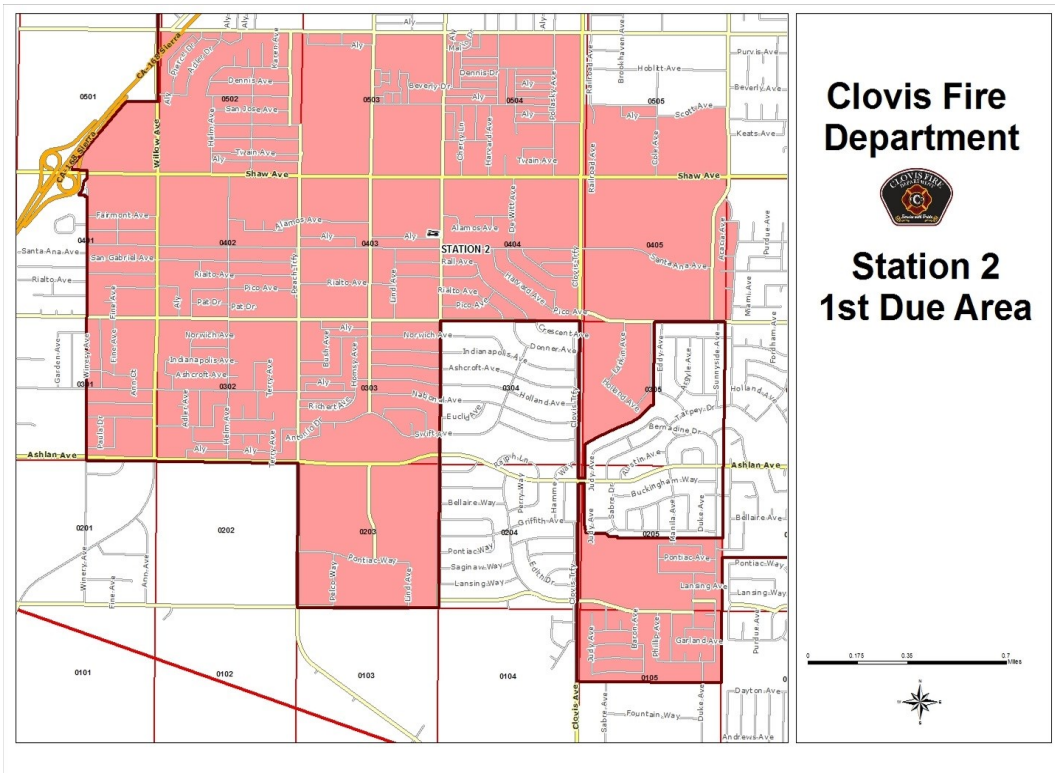
1936 Ford (public education events only)



Station 2
2300 Minnewawa Avenue
Clovis, CA 93612

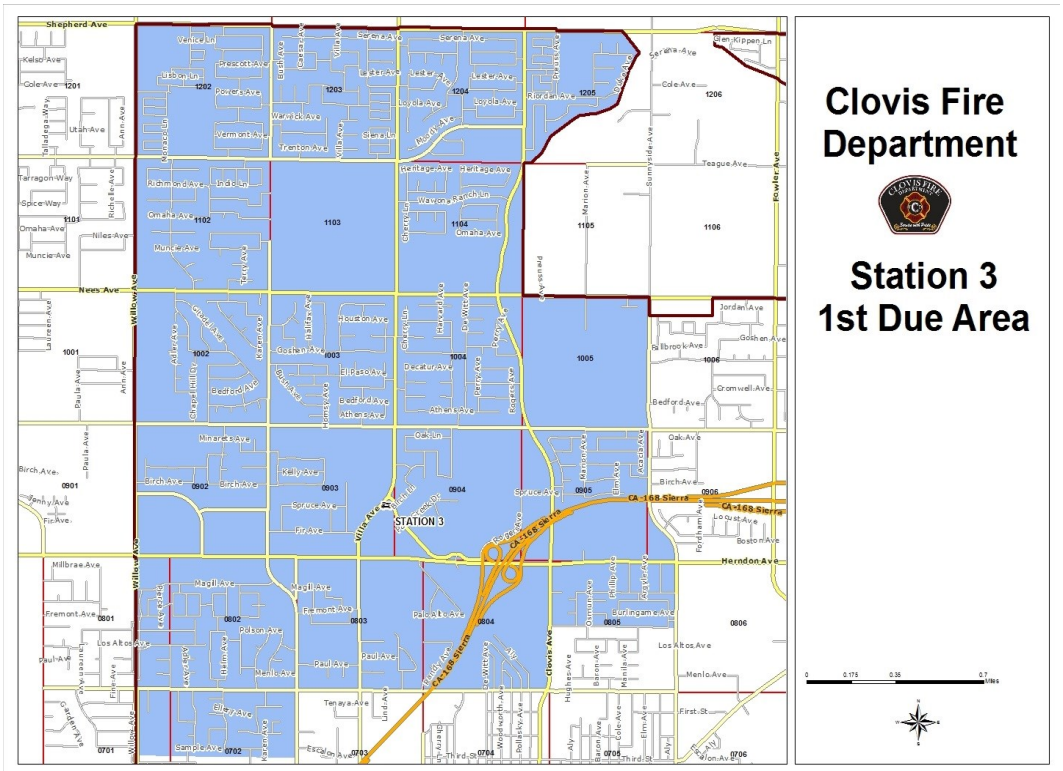
Apparatus

Engine 42
HazMat 40
Engine 242



Station 3
555 N. Villa Avenue
Clovis, CA 93612

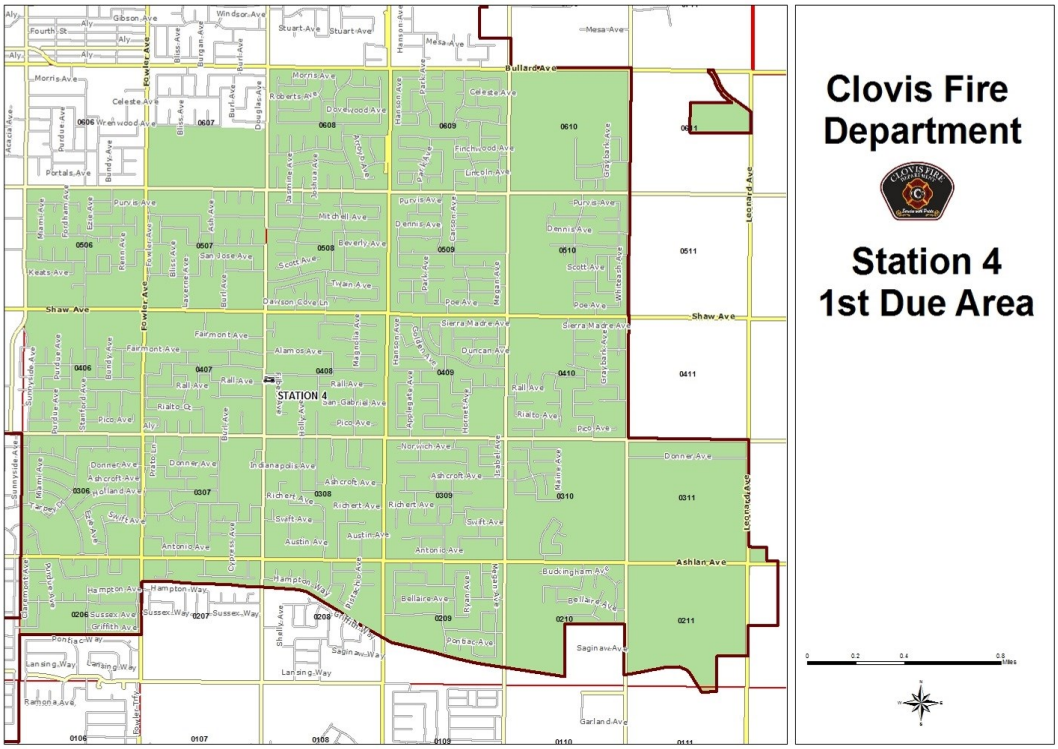
Apparatus
Engine 43
Engine 243



Station 4
2427 Armstrong Avenue
Clovis, CA 93611

Apparatus

Engine 44
Brush Engine 40
Water Tender 40
Decon Trailer
USAR Trailer



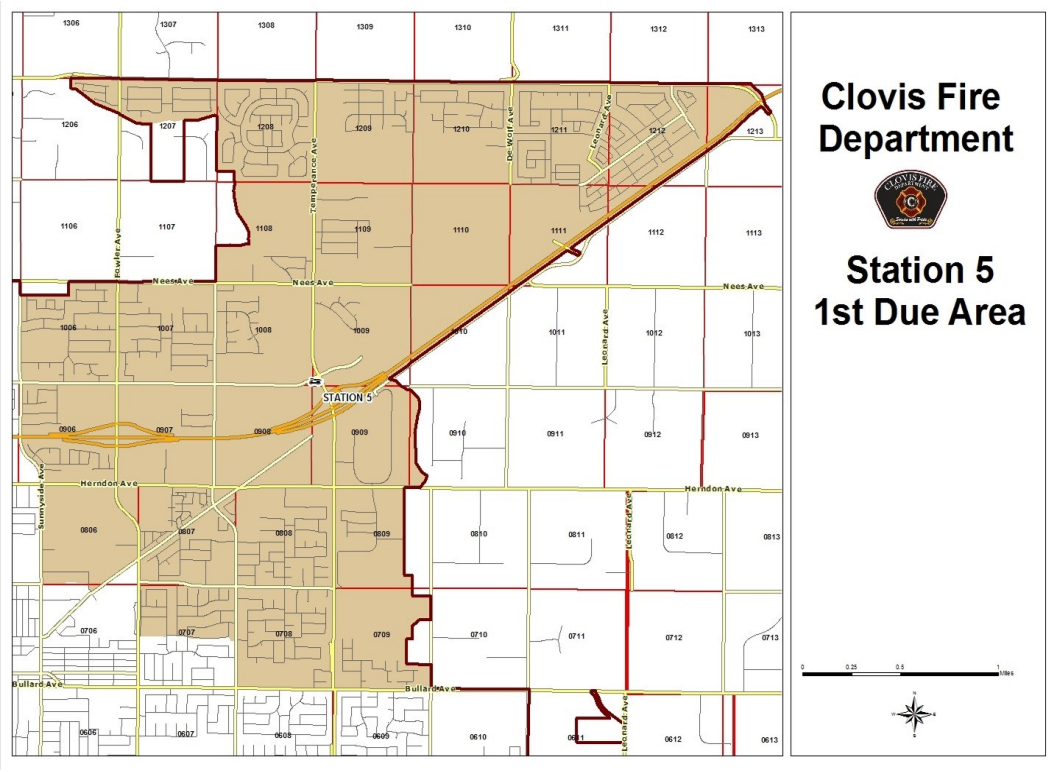
Station 5
790 N. Temperance Avenue
Clovis, CA 93611

Apparatus

Engine 45

OES-276

Rescue 40



APPENDIX

	Clovis, California
Population	
Population estimates, July 1, 2016, (V2016)	NA
Population estimates, July 1, 2015, (V2015)	104180
Population estimates base, April 1, 2010, (V2016)	NA
Population estimates base, April 1, 2010, (V2015)	95699
Population, percent change - April 1, 2010 (estimates base) to July 1, 2016, (V2016)	NA
Population, percent change - April 1, 2010 (estimates base) to July 1, 2015, (V2015)	8.9
Population, Census, April 1, 2010	95631
Age and Sex	
Persons under 5 years, percent, July 1, 2015, (V2015)	X
Persons under 5 years, percent, April 1, 2010	7.2
Persons under 18 years, percent, July 1, 2015, (V2015)	X
Persons under 18 years, percent, April 1, 2010	28.1
Persons 65 years and over, percent, July 1, 2015, (V2015)	X
Persons 65 years and over, percent, April 1, 2010	10.6
Female persons, percent, July 1, 2015, (V2015)	X
Female persons, percent, April 1, 2010	51.8
Race and Hispanic Origin	
White alone, percent, July 1, 2015, (V2015) (a)	X
White alone, percent, April 1, 2010 (a)	70.9
Black or African American alone, percent, July 1, 2015, (V2015) (a)	X
Black or African American alone, percent, April 1, 2010 (a)	2.7
American Indian and Alaska Native alone, percent, July 1, 2015, (V2015) (a)	X
American Indian and Alaska Native alone, percent, April 1, 2010 (a)	1.4
Asian alone, percent, July 1, 2015, (V2015) (a)	X
Asian alone, percent, April 1, 2010 (a)	10.7
Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2015, (V2015) (a)	X
Native Hawaiian and Other Pacific Islander alone, percent, April 1, 2010 (a)	0.2
Two or More Races, percent, July 1, 2015, (V2015)	X
Two or More Races, percent, April 1, 2010	4.8
Hispanic or Latino, percent, July 1, 2015, (V2015) (b)	X
Hispanic or Latino, percent, April 1, 2010 (b)	25.6
White alone, not Hispanic or Latino, percent, July 1, 2015, (V2015)	X
White alone, not Hispanic or Latino, percent, April 1, 2010	57.5
Population Characteristics	
Veterans, 2011-2015	5983
Foreign born persons, percent, 2011-2015	11.4
Housing	
Housing units, July 1, 2015, (V2015)	X
Housing units, April 1, 2010	35306
Owner-occupied housing unit rate, 2011-2015	60.2
Median value of owner-occupied housing units, 2011-2015	247700
Median selected monthly owner costs -with a mortgage, 2011-2015	1856

Median selected monthly owner costs -without a mortgage, 2011-2015	495
Median gross rent, 2011-2015	1068
Building permits, 2015	X
Families and Living Arrangements	
Households, 2011-2015	34512
Persons per household, 2011-2015	2.90
Living in same house 1 year ago, percent of persons age 1 year+, 2011-2015	85.3
Language other than English spoken at home, percent of persons age 5 years+, 2011-2015	23.6
Education	
High school graduate or higher, percent of persons age 25 years+, 2011-2015	88.9
Bachelor's degree or higher, percent of persons age 25 years+, 2011-2015	29.5
Health	
With a disability, under age 65 years, percent, 2011-2015	8.5
Persons without health insurance, under age 65 years, percent	11.6
Economy	
In civilian labor force, total, percent of population age 16 years+, 2011-2015	64.1
In civilian labor force, female, percent of population age 16 years+, 2011-2015	58.2
Total accommodation and food services sales, 2012 ($1,000) (c)	167154
Total health care and social assistance receipts/revenue, 2012 ($1,000) (c)	376455
Total manufacturers shipments, 2012 ($1,000) (c)	D
Total merchant wholesaler sales, 2012 ($1,000) (c)	189912
Total retail sales, 2012 ($1,000) (c)	1496311
Total retail sales per capita, 2012 (c)	15171
Transportation	
Mean travel time to work (minutes), workers age 16 years+, 2011-2015	20.8
Income and Poverty	
Median household income (in 2015 dollars), 2011-2015	62666
Per capita income in past 12 months (in 2015 dollars), 2011-2015	28686
Persons in poverty, percent	13.8
Businesses	
Total employer establishments, 2014	X
Total employment, 2014	X
Total annual payroll, 2014 ($1,000)	X
Total employment, percent change, 2013-2014	X
Total nonemployer establishments, 2014	X
All firms, 2012	7100
Men-owned firms, 2012	3515
Women-owned firms, 2012	2835
Minority-owned firms, 2012	2616
Nonminority-owned firms, 2012	4151
Veteran-owned firms, 2012	524
Nonveteran-owned firms, 2012	6268
Geography	
Population per square mile, 2010	4108.2
Land area in square miles, 2010	23.28

Category	Problem Nature Description	Response Priority	CAD Code	Incident Type	CFD
Aid	Aid-Automatic Aid	Auto Aid	65A4	100	1E or 1T
	Aid-Mutual Aid	Mutual Aid	65A3	BC Approval	BC Approval
Aircraft	Aircraft-Alert I	Aircraft Emergency	51C2	124	N/A
	Aircraft-Alert II	Aircraft Emergency	51C1	125	N/A
	Aircraft-Alert III	Aircraft Emergency	51D1	128	N/A
	Aircraft-Crash (On FYI)	Aircraft Emergency	51D1	128	N/A
	Aircraft-Crash (Off FYI)	Fire	80	135	4E, 1T, 1BC
	Aircraft-Emergency Landing	Fire	81	135	N/A
Alarms	Alarm-CO Alarm (No Pts)	Special Duty	086	Alarm-CO Alarm (No Pts)	1E or 1T
	Alarm-Commercial	Still Alarm	52C3	145	1E or 1T
	Alarm-Commercial with Reset	Special Duty	52C3R	Alarm-Commercial with Reset	No CFD Response
	Alarm-Residential	Still Alarm	52B1	101	1E or 1T
	Alarm-Residential with Reset	Special Duty	52B2R	Alarm-Residential with Reset	No CFD Response
	Alarm-Tamper Alarm	Special Duty	52B5T	Alarm-Tamper Alarm	1E or 1T
	Alarm-Testing	No Fire Response	25	No Fire Response	N/A
	Alarm-Trouble Alarm	No Fire Response	087	Alarm-Trouble Alarm	No CFD Response
Citizen Assist	Citizen Assist-Animal Problem	In Service Detail	53A3	126	1E or 1T
	Citizen Assist-Bees	Special Duty	53A3B	137	1E or 1T
	Citizen Assist-Other	Special Duty	53A2	100	1E or 1T
	Citizen Assist-Pt Locked in Vehicle	Emergency Call (Summer)	53B1	126	1E or 1T
		Special Duty (Winter)	53B1	126	1E or 1T
Electrical	Electrical-Arcing in Structure	Still Alarm	55B1	100	1E or 1T
	Electrical-Arcing Power Lines	Special Duty	55A1	102	1E or 1T
	Electrical-Arcing Power Lines with Hazards	Special Duty	55C2	100	1E or 1T
	Electrical-Power Lines Down	Emergency Call	55B2	100	1E or 1T
EMS	Medical Aid	Emergency Call			1E or 1T
	Vehicle Accident	Emergency Call			1E or 1T
	Vehicle Accident-Pin In / Rollover	Emergency Call			1E, 1T, 1 BC
	Vehicle Accident - Freeway	Emergency Call			1E, 1E or 1T, 1BC
	Vehicle into a Building – with injury	Emergency Call			2E, 1T, Rescue*, 1BC
	Industrial Accident	Emergency Call			1E, 1T, 1BC

Category	Problem Nature De-	Response Priority	CAD Code	Incident Type	CFD
Fire	Fire-Apartment	Fire	69D4	Fire-Apartment	4E, 1T, 1E or 1T 1BC
	Fire-Commercial	Fire	69D3	Fire-Commercial	4E, 1T, 1E or 1T 1BC
	Fire-Residential	Fire	69D5	Fire-Residential	3E, 1T, 1E or 1T 1BC
	Fire-Out Building	Fire	69D09	Fire-Out Bldg Fire	3E, 1T, 1E or 1T 1BC
	Fire-Outside	Still Alarm	67D3	115	1E or 1T
	Fire-Oven Fire (Contained)	Still Alarm	69C1	Fire-Oven Fire (Contained)	1E or 1T
	Fire-Vegetation (Small)	Still Alarm	67D2	129	2E, 1BC
	Fire-Vegetation (Large)	Still Alarm	67D1	106	3E, 1BC
	Fire-Vehicle	Still Alarm	71C1	100	1E or 1T
	Fire-Warming	Special Duty	67B3	100	1E or 1T
Gas Leak	Gas Leak-Fuel Spill/Leak (Small)	Special Duty	59B1	100	1E or 1T
	Gas Leak-Fuel Spill/Leak (Large)	Emergency Call	59C1	160	1E,1T, 1BC
	Gas Leak-Natural Gas Leak (Inside)	Emergency Call	60C1	105	1E or 1T
	Gas Leak-Natural Gas Leak (Outside)	Special Duty	60B1	100	1E or 1T
	Gas Leak-Natural Gas (Rupture)	Emergency Call	60D4	139	1E, 1E or 1T, 1BC
HazMat	Abandoned Waste	Special Duty	61A1	112	1E or 1T
	HazMat	HazMat	61D1	161	2E, 1E or 1T, HMRT*, 1BC
Investigation	Investigation-Fire Report-ed Out	Special Duty	69C2	100	1E or 1T
	Investigation-Odor Smoke (Inside/Outside)	Still Alarm	68A2	100	1E or 1T
	Investigation-Odor Gas (Outside)	Special Duty	60B2	100	1E or 1T
	Investigation-Smoke (Outside)	Still Alarm	68C1	100	1E or 1T
	Investigation-Smoke (Unk Location)	Special Duty	68A1	100	1E or 1T
	Investigation-Strange Odor w/o Pts	Special Duty	66A1	116	1E or 1T
	Investigation-Strange Odor with Pts	HazMat	66C1	136	1E or 1T

Category	Problem Nature De-	Response Priority	CAD Code	Incident Type	CFD
Rescue	Rescue-Building Collapse	Rescue	54B1	132	2E, 1T, Rescue*, 1BC
	Rescue-Confined Space	Rescue	54D1	108	2E, 1T, Rescue*, 1BC
	Rescue-Entrapment	Rescue	58D1	108	2E, 1T, Rescue*, 1BC
	Rescue-High Angle	Rescue	62D1	150	2E, 1T, Rescue*, 1BC
	Rescue-Jumper	Emergency Call	089	Rescue-Jumper	1E, 1T, 1BC
	Rescue-Stuck in Elevator	Special Duty	56A1	126	1E or 1T
	Rescue-Water	Rescue		140	1E, 1T, Rescue, 1BC
Train	Train-Accident	Medical Aid	70D10	148	NA
	Train-Derailment	Hazmat	70D4	138	NA
Vehicle	Vehicle-Vehicle into a Building - Non-Injury	Emergency	53B4	117	1E, 1T, Rescue, 1BC
Water Problem	Water Problem-Knocked Off Hydrant	Special Duty	53O3	127	1E or 1T
	Water Problem-Hydrant Leak	In Service Detail	53O6	In Service Detail	1E
	Water Problem-Broken Sprinkler Head	Emergency Call	53A6	130	1E or 1T
	Water Problem-Domestic Water Leak with Electri-cal Hazard	Emergency Call	53C1	131	1E or 1T
	Water Problem-Domestic Water Leak w/o Electrical Hazard	Special Duty	53A4	113	1E or 1T
	Water Problem-Structure Flooding, non- fire relat-ed	Emergency Call	53O5	134	1E or 1T