SANTA CLARA FIRE DEPARTMENT

Community Risk Assessment & Standards of Cover

Center for Public Safety Excellence

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Santa Clara Fire Department

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Executive Summary

The agency exists to provide services in the form of protection and safety to the community. The leadership of the agency believes it to be unconscionable to proclaim a level of service provided, or request more resources from a community, without first performing a comprehensive assessment of the risks of its community and examine how it is meeting those demands. The development of an accurate and consistent risk assessment model is imperative to both the community and the agency. The implementation of that model is what the agency refers to as its Community Risk Assessment and Standards of Cover.

It is the responsibility of the agency to provide the Mayor, City manager, City Council and other community decision makers with an educated assessment of the level of risk within the community and the agencies capabilities to respond to and mitigate that risk, and expected outcomes. It is the goal of the agency to provide empirical data to document the effectiveness of its performance. The agency will measure itself against recognized, accepted, and adopted industry standards

The community expects the best from all of its governmental agencies and a tremendous amount of responsibility lies with the fire department. The agency set out to provide a Community Risk Assessment (CRA) in order to meet those expectations and validate trust. The CRA will also be used a as tool to determine future needs of the community as it develops and ensure the agency is effectively adapting to meet growing community risks.

The agency is confident that the CRA will assure community members their expectations are being met by providing emergency services that will make a positive change in people's lives. It will ensure that quality equipment provided to the agency will arrive in a time to provide the greatest chance of survivability in an Emergency Medical call. For structure fire and other fire related calls the response times and concentration/deployment of resources will allow for enough personnel and equipment to arrive in time to stop most fires in the room of origin ensuring more property and environment will be saved.

A. Description of Community Served

Introduction

Located 45 miles (72 km) southeast of San Francisco, the city of Santa Clara was founded in 1777 and incorporated in 1852. The city currently covers 19.3 square miles and sits in the heart of what is known worldwide as Silicon Valley. The city is the site of the eighth of 21 California missions, Mission Santa Clara, and was named after the mission. The Mission and Mission Gardens are located on the grounds of Santa Clara University, the oldest institution of higher learning in the state of California. Saint Clare is the patron saint of Santa Clara.

The city's population was recorded as 116,468 at the 2010 United States Census, making it the ninth-most populous city in the San Francisco Bay Area. The day time population of Santa Clara is estimated at 175,000 people as it is located in the center of Silicon Valley and is home to several high-tech companies such as Intel, National Semiconductor, Applied Materials, Oracle, and Apple. Santa Clara is also home to Valley Fair Mall and Great America Theme Park which receives approximately 500,000 visitors annually. Additionally, Mission College and Kaiser Hospital are also located within the city limits.

Levi's Stadium, the home of the NFL's San Francisco 49ers, the site of Super Bowl 50, and the site of the 2019 NCAA College Football Playoff title game, is located in the city, as well as the International Swim Center which hosts national and international events annually. Santa Clara is bordered by San Jose on its southern, eastern, and northeastern borders, Sunnyvale on its northwestern border and Cupertino on its western border. Santa Clara features thirty-seven parks, three libraries, ten museums, a senior center, community center, a youth activity center, four community pools, and was rated as an 'All America City' in 2005.

Community and Department Legal Basis

The Santa Clara Fire Department (SCFD, department, or agency) is a fire department formed under California Health and Safety Code Div.12 Section 13862 which empowers the department to provide fire protection services, rescue services, emergency medical services, hazardous materials emergency response services, ambulance services and other services relating to the protection of lives and property.

The department's authority is granted by the California Health and Safety Code Div. 12 part 2, and the 38611, which reads:

> The legislative body of a city organized under general law shall establish a fire department for the city. The fire department shall be under the charge of a chief who shall have had previous training and experience as a fireman. The other members of the fire department shall consist of paid firefighters or

such companies of volunteer firefighters as the legislative body may determine. The city legislative body shall fix and pay the compensation of the chief and other paid firefighters.

Notwithstanding the provisions of this section, and of subdivision (e) of Section 36501, no general law city shall be required to appoint or elect a fire chief or establish a fire department if such city is included within the boundaries of an established fire protection district. (Amended by Stats. 1957, Ch. 674)

The Santa Clara City Council governs the department through the office of the City Manager who hires and supervises the Fire Chief. The Fire Chief is responsible for the proper administration of all affairs of the department.

History of the Community

In 1769, Jose Francisco Ortega, scouting for the Portola-Serra party, became the first European to visit the fertile valley that later became known as the Santa Clara Valley. Spain began colonizing California by establishing a string of 21 churches, called missions that eventually stretched 600 miles along the California Coast from San Diego to Sonoma. The Franciscan priests selected the fertile valley discovered by Ortega to establish the eighth mission, Mission Santa Clara, named for Saint Clare. The mission was founded January 12, 1777.

Mission Santa Clara

In 1821, the Mexicans achieved independence from Spain, and in 1836, control of Mission Santa Clara was taken from the padres and turned over to civil commissioners who were supposed to oversee the return of the land to the native population. This did not happen, and squatters took over the church buildings and land. Disorder and decay set in and by 1839 the Mexican governor began issuing land grants to various favored people. The land was used for vast ranchos (ranches); large numbers of cattle were raised and roamed at will over the land. Hides and tallow from the livestock eventually comprised the first commercial export product and industry in the area.

By the 1840's, the American frontier had expanded to California and new settlers began arriving in the area. The raising of the American flag over Monterey in July of 1846 was a symbol of the fact that the lands of California had passed from the hands of Mexico to the United States. California became a state in 1850. When promises of great wealth failed to materialize during the Gold Rush of 1849, many of the gold seekers turned to the "gold" that was the fertile land of the Santa Clara Valley and began to settle in Santa Clara.

In the 1850's the hamlet of Santa Clara began to take shape as a recognizable small town. The town site was surveyed by William Campbell into lots one hundred yards square, and one lot was given to each citizen with the understanding that he was to build a house on it within three months or lose the property. A schoolhouse and a church were built, several hotels erected, mercantile businesses established, and 23 houses were imported from Boston to be set up in the town.

In 1851, Santa Clara College was established on the old mission site and became a prominent feature of the developing town. Santa Clara incorporated as a town on July 5, 1852, and became a state-chartered city in 1862. By this time the city encompassed an area two miles long and one and a half miles wide. Outside city limits, small family farms and orchards developed and thrived in testimony of the area's fertile soil and mild climate.

As the town grew, it was supported by a variety of manufacturing, seed, and fruit industries. One of the earliest manufacturing businesses in Santa Clara was Wampach Tannery, established in 1849. In 1866, the business was taken over by Jacob Eberhard. Eberhard Tannery provided employment for the area for many years until torn down in 1953. Its fine leather products were sent to the eastern United States as well as Europe.

As the 19th century came to a close, more and more people arrived seeking the mild climate and job opportunities of the Santa Clara area. By 1906, the population of the city had grown to nearly 5,000. The population remained fairly stable and did not increase greatly until after World War II when the city outgrew its 19th century boundaries and expanded to open lands north and west of the original city limits. The farms and orchards began to accommodate the burgeoning population.

The semiconductor chip was developed in the area in the 1950's. The resulting electronics industry, based on the silicon chip, bought up the remaining orchard land and changed the agricultural nature of Santa Clara and Santa Clara Valley forever. By 1990, the city covered 19.3 square miles and had a population of more than 93,000. Few remnants of Santa Clara's agricultural past remain as it today sits in the heart of what is known world-wide as Silicon Valley.

Community Financial Basis

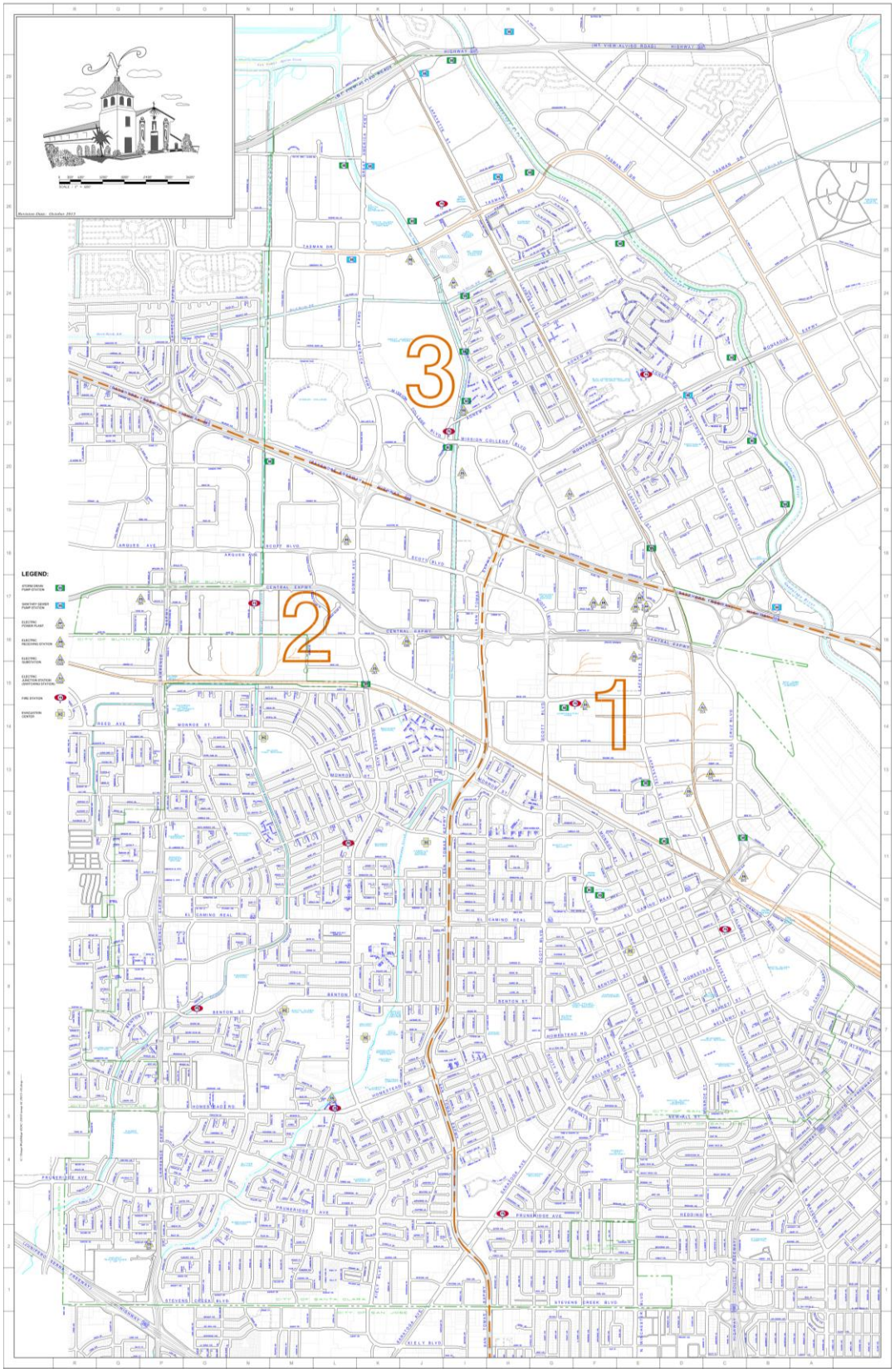
The SCFD Operating Budget of 41-million-dollars makes up approximately 21% of the City of Santa Clara's 201-million-dollar General Fund budget and approximately 6% of the city's entire 667-million-dollar Operating Budget, which includes enterprise funds. The fire department is funded through General Fund resources, which include sales tax, property tax, transient occupancy tax, charges for services and other revenues (rents and leases, interest income, transfers to/from reserves and contribution in-lieu).

Area Description

Community Boundaries

The legal boundaries of Santa Clara City are outlined by the Santa Clara City Charter Section 200. Santa Clara City is comprised of 18.4 square miles in the north-central part of Santa Clara County, heart of Silicon Valley. Santa Clara is surrounded on the north, east, and south sides by the City of San Jose, and by the cities of Sunnyvale and Cupertino on the west. Santa Clara City also borders Hwy 237 in the north, I280 and I880 in the south. The San Jose International Airport borders the city to the east. Hwy 101 splits the city into north and south.

Map 1 City of Santa Clara EOC - Facilities



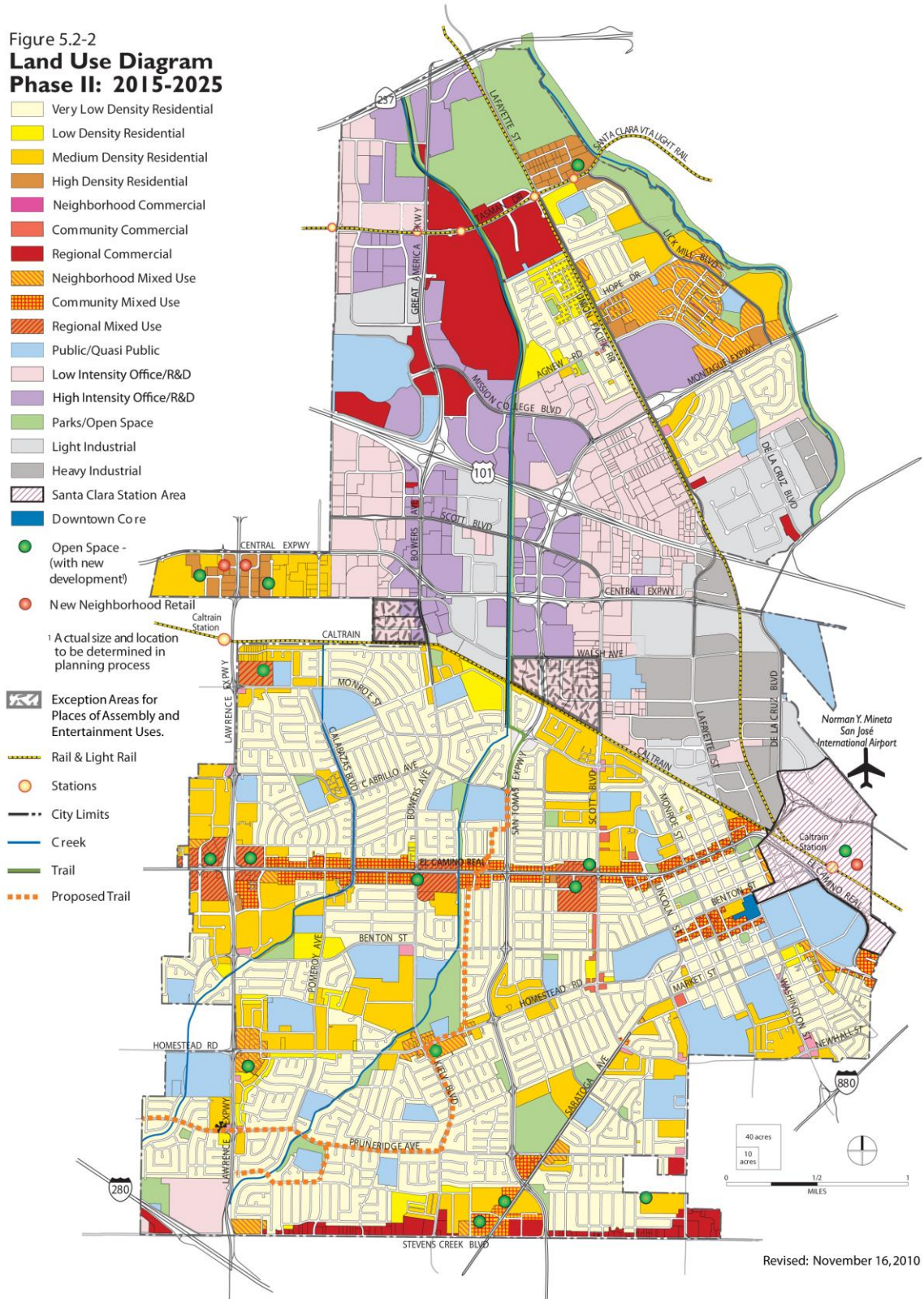
Community Planning Areas/Zones

Because Santa Clara has virtually no vacant land, new development will primarily redevelop existing sites from lower to higher intensity uses. Intensifying existing development will result in a more efficient, sustainable use of limited land and resources, particularly along El Camino Real and Stevens Creek Boulevard, as well as in the city's employment core north of the Caltrain corridor. Focusing increased intensities at these locations will maximize opportunities for mixed uses and future transit, without impacting the city's existing residential and industrial areas.

The 2010-2035 City of Santa Clara General Plan identifies Focus Areas throughout the city to support and foster the city's diverse economic base. The purpose of these Focus Areas is to encourage improvements and new development tailored to the character and quality of these areas. Near-term Focus Areas include the El Camino Real and Stevens Creek Boulevard corridors where a mix of land uses at key locations, in conjunction with improved commercial and streetscape design, are encouraged.

Santa Clara's Downtown is another Focus Area for regeneration as a center of activity to draw patrons City-wide for shopping, eating and entertainment. The fourth near-term Focus Area is centered on the Santa Clara Transit Station. Future Focus Areas are envisioned along transportation corridors, such as San Tomas Expressway and Bowers Avenue, in order to facilitate greater mobility and expand accessibility to jobs in these areas. Comprehensive planning is a prerequisite for all the Future Focus Areas prior to development approvals.

Map 2 Land Use: 2015-2025



Community Transportation Systems

Vehicle Transportation Routes

Four highways transect all or parts of Santa Clara, including U.S. 101 and State Routes 82, 237, and 280. These highways carry an annual average daily traffic volume (all vehicles) of approximately 527,000 vehicles as shown in the following map. The San Tomas and Lawrence Expressways are also primary transportation routes carrying an additional 438,000 vehicles through Santa Clara daily. The city also has approximately 220 miles of surface roadway.

Rail Services and Mass Transportation

Passenger rail service to and within Santa Clara is provided by Amtrak (Sacramento–San-José Capitol Corridor and Seattle–Los-Angeles Coast Starlight), Caltrain, and Altamont Corridor Express (ACE). Long-term plans call for the Bay Area Rapid Transit (BART) to be expanded to Santa Clara through Milpitas and San José from the current terminus in Fremont. Multiple Union Pacific Railroad tracks also carry heavy daily railway cargo traffic into and through Santa Clara from both the north and south.

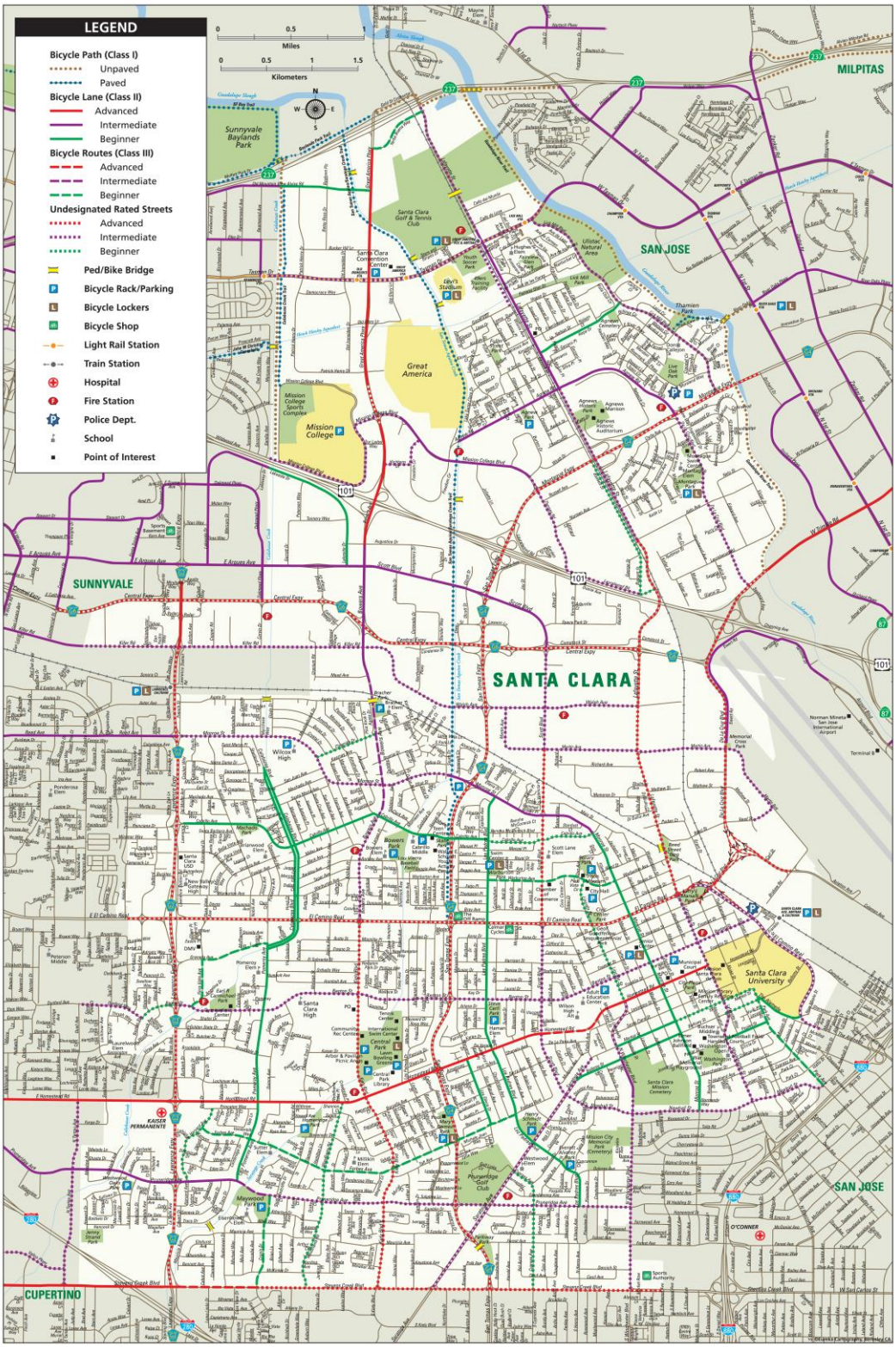
Airports

The Norman Y. Mineta San José International Airport, adjacent to the city's central eastern boundary, supports approximately 127,500 flights transporting 9.5 million passengers and 25,000 tons of cargo annually.

Bike

A convenient and efficient multimodal transportation system is essential. Santa Clara's Mobility and Transportation goals and policies support connected networks that facilitates pedestrian, bicycle and vehicular movement throughout the city. Emphasis is placed on alternative transit modes to support increased densities, a mix of uses, as well as walking and bicycling as a practical solution for everyday transportation. Enabling vehicle alternatives, Santa Clara is serviced by several transit systems composed of public and private agencies.

Map 3 Bike Routes

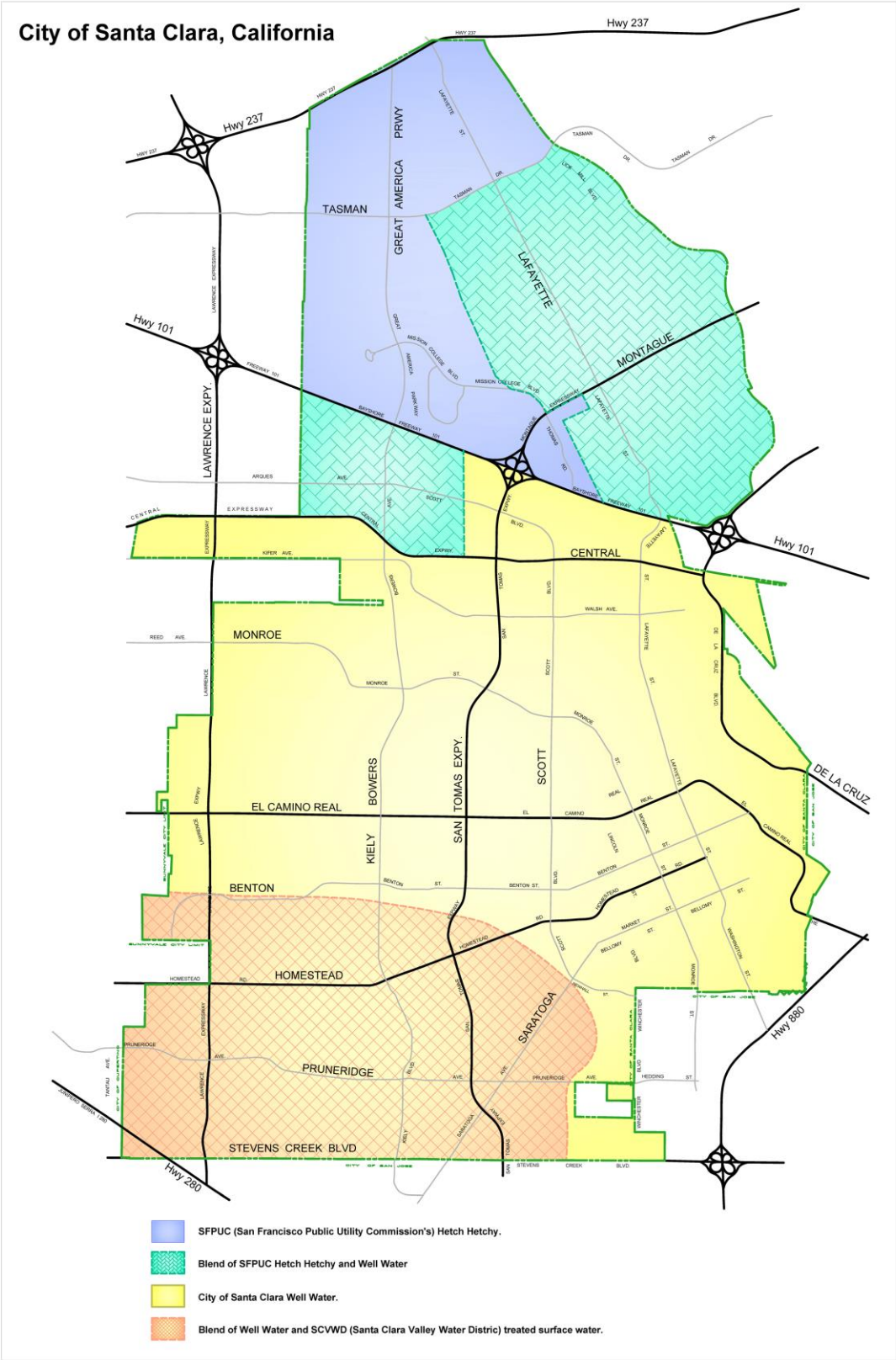


Community Critical Infrastructure

Water services are provided to residents and businesses in the City of Santa Clara by the Water Utility. The Water System consists of more than 315 miles of water mains, 27 wells and 6 storage tanks with approximately 27 million gallons of water capacity.

Sources available to the city include an extensive local underground aquifer and imported water supplies delivered by two wholesale water agencies: the Santa Clara Valley Water District (SCVWD) and the San Francisco Hetch Hetchy system. The city operates 27 wells that tap the underground aquifers and make up about 62% of the city's water supply. A water recharge program administered by the SCVWD from local reservoirs and imported water enhances the dependability of the underground aquifer. An additional 25% is supplied by water imported from the two wholesale water agencies. A third source of water available to the city for irrigation purposes is recycled water from the San Jose/Santa Clara Water Pollution Control Plant's South Bay Recycled Water facility. This is highly treated water delivered through separate pipelines. This source makes up about 13% of the water used in the City of Santa Clara. Recycled water offsets the use of potable sources in drought-prone California and is a reliable source for irrigation for conservation of potable sources.

Map 4 Water Sources



I:\Water\CAD\Wall Map\WM-Sampling Stations\W-2551-4(10)\10-WM-Water-Source-Service-Map.dwg Plot Style: 10-WM-Water-Source-Service-Map.ctb - LTscale: 0.3000 - Water Source Map(D) - Created By: DL Plot Date: 10/31/12

Sanitary sewer flows in the City are collected and transported through more than 270 miles of sewer main by way of six pumping stations to the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The WPCP has the capacity to treat 167 million gallons a day of liquid waste. The plant also treats waste from other cities in Santa Clara County.

The wastewater is treated in three stages: primary treatment, activated sludge secondary treatment, and advanced tertiary treatment, comprised of nitrification, filtration and chlorine disinfection. This highly treated water is then discharged to the south in the San Francisco Bay and a portion delivered to the South Bay Water Recycling (SBWR) Project. That portion delivered to SBWR is then prepared for distribution as recycled water for landscaping and dual plumbing projects.

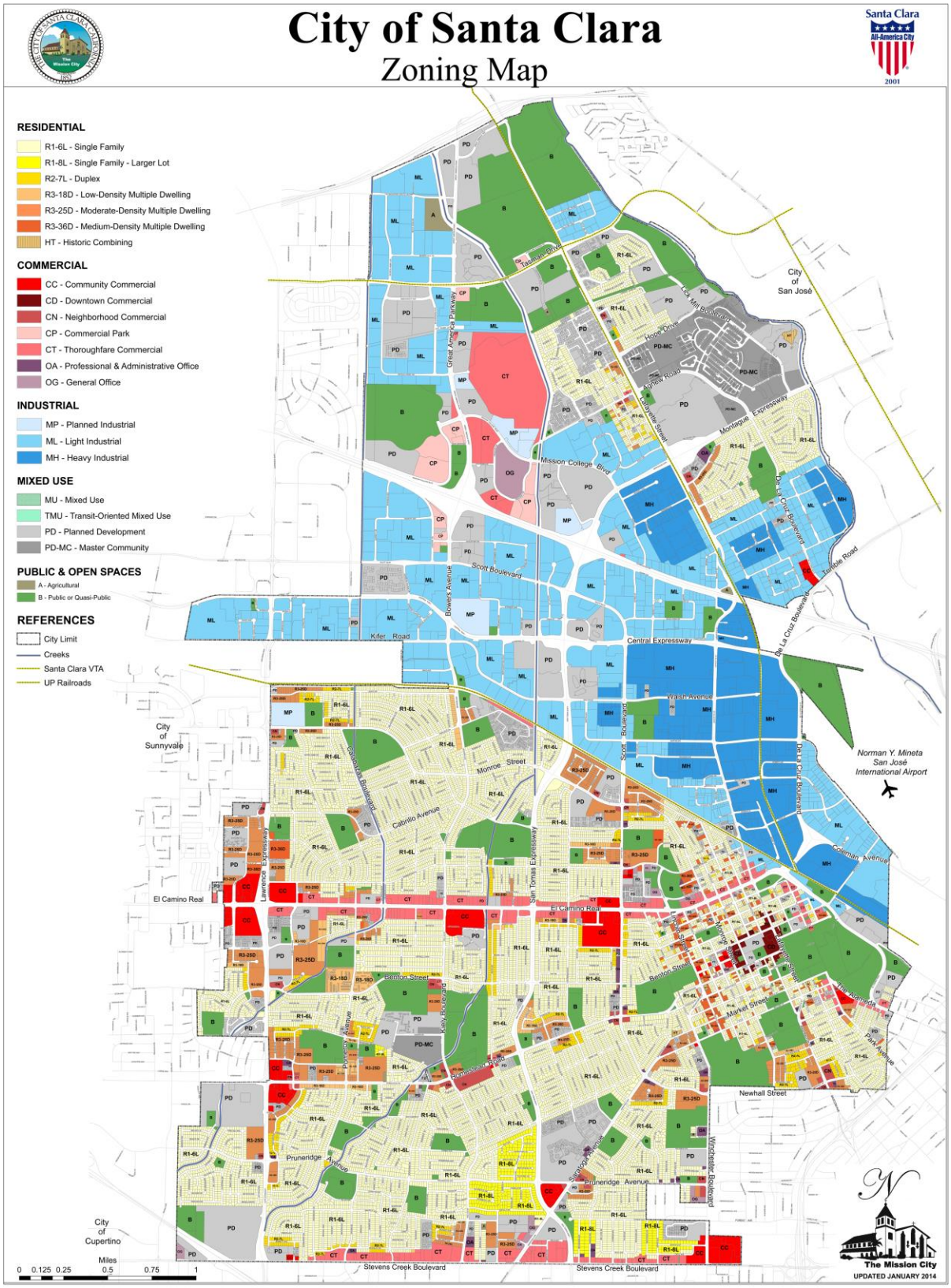
Santa Clara's municipal electric utility (dba Silicon Valley Power) is an enterprise of the City of Santa Clara, and was established in 1896. On a not-for-profit basis, Silicon Valley Power owns power generation facilities, has investments in joint ventures that produce electric power, and trades power on the open market. These efforts are directed toward ensuring its retail customers—the citizens, organizations and business of the City of Santa Clara—a highly reliable source of electric power at low, stable rates.

The Don Von Raesfeld Power Plant is located near the intersection of Central Expressway and Lafayette Street. The power plant is powered by natural gas, which is fed through large high pressure gas lines. The peak capacity of the power plant is 147 megawatts.

Community Land Use and Zoning

There are seven different approved Land Uses within the City of Santa Clara. They are: Residential, Human Services, Recreation, Education, and Public Assembly, Utility, Transportation, and Communication, Retail, Service, and Office, Automobile and Vehicle Industrial, Manufacturing, and Processing. The community is divided into six different zoning districts. They are: Residential, Commercial, Mixed-Use, Office and Industrial, Public (parks) and Open Space, and Special Purpose zoning districts.

Map 5 City of Santa Clara Zoning Map



Community Topography

Santa Clara is located 72 feet above sea level and is primarily flat with very little elevation change. Santa Clara is drained by three seasonal creeks, all of which empty into the southern portion of San Francisco Bay; these creeks are San Tomas Aquino Creek, Saratoga Creek, and Calabazas Creek. Additionally, the City is bordered by the Guadalupe River to the northeast. The community historically was dedicated to farming consisting of orchards that have since been developed into the center of the high-tech industry known as the Silicon Valley.

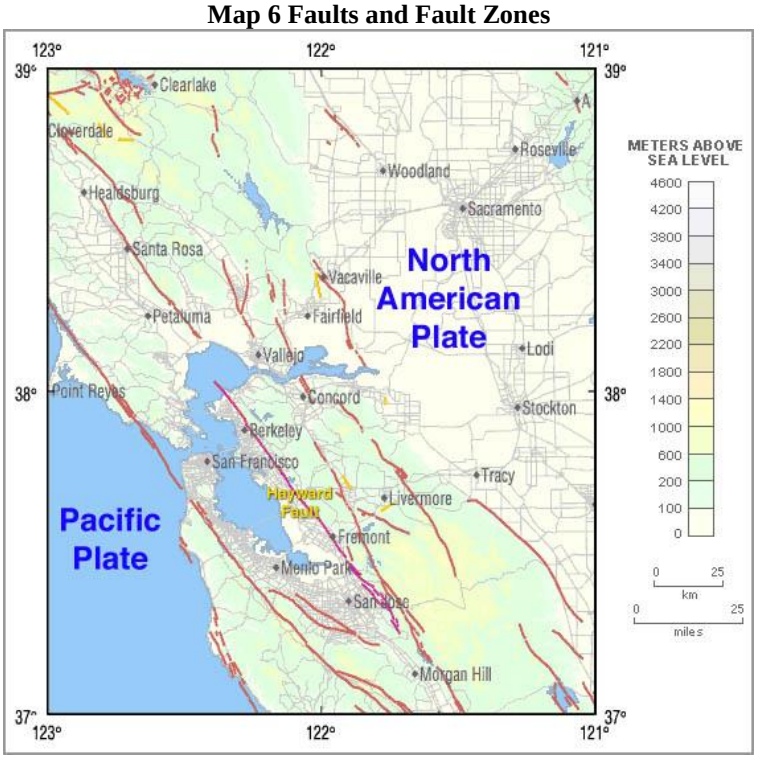
Community Geography

Santa Clara is located in California and is located at the center of the Santa Clara Valley, between the Santa Cruz Mountains to the southwest and the Diablo Mountain Range to the northeast at 37.3541 N, 121.9552 W. Santa Clara is at the southern end of the San Francisco Bay 40 miles south of San Francisco.

Community Geology

Santa Clara County is crisscrossed by a series of major faults that together relieve the motion and grinding between the huge Pacific and North American plates. The San Andreas Fault and other Bay Area fault zones are on both sides of the bay: San José fault, Berrocal fault zone, Hayward fault zone, Chabot fault, San Gregorio fault zone, and others as shown in the following map. Although the lines on the map represent the faults as linear, most fault lines can be very intricate with multiple fractures along curved, complex paths during and after an earthquake.

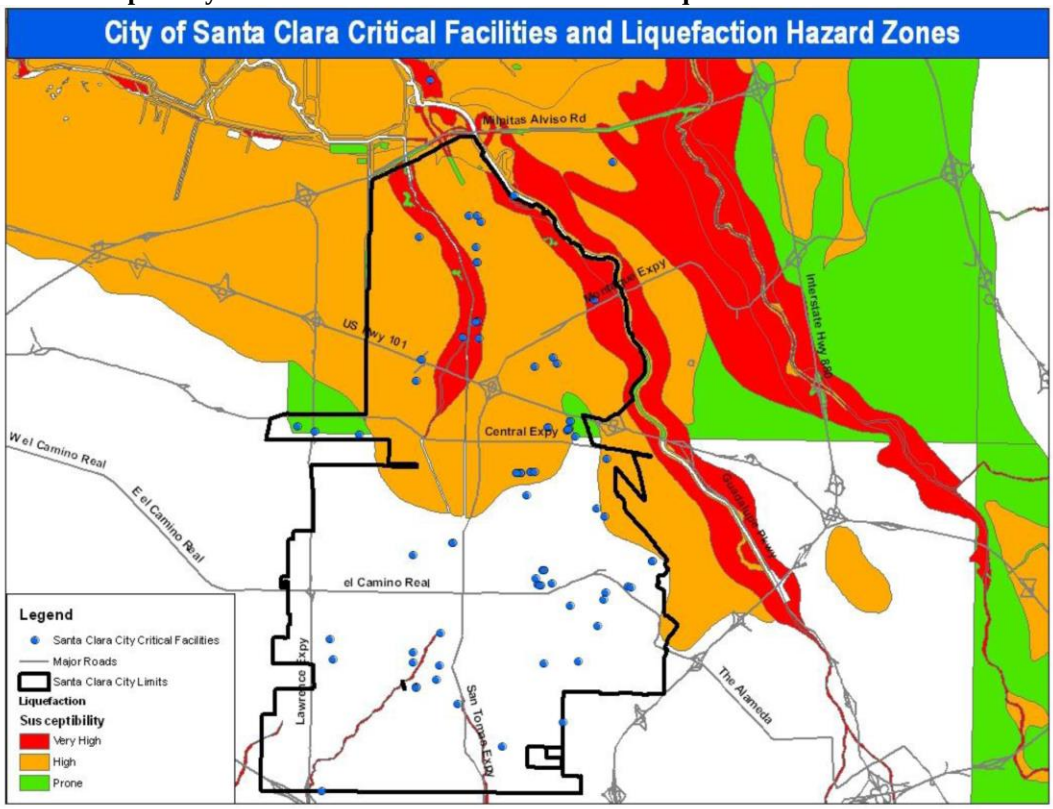
Map 6 Faults and Fault Zones



Multiple significant earthquakes have occurred in the San Francisco Bay Area over the last 50 years, including the 1984 Morgan Hill, 1989 Loma Prieta, and 2004 Napa earthquakes, as well as at least two smaller locally-significant earthquakes in Santa Clara County over the same time period.

Additionally, Santa Clara has large geographic areas that are affected by liquefaction effects. Liquefaction occurs when vibrations or water pressure within a mass of soil cause the soil particles to lose contact with one another. As a result, the soil behaves like a liquid, has an inability to support weight and can flow down very gentle slopes. This condition is usually temporary and is most often caused by an earthquake vibrating water-saturated fill or unconsolidated soil. Liquefaction can cause serious damage to buildings and structures within those zones.

Map 7 City of Santa Clara Critical Facilities and Liquefaction Hazard Zones



Community Physiography

There are some significant biological resources within the city including habitat for the burrowing owl, a species of special concern in California due to reduction in habitat from urban development during the latter 20th century. This owl uses burrows created by ground squirrels and prefers generally level grasslands and even disturbed areas. The most significant area is located in the northern section of Santa

Clara near Mission College. Santa Clara is fully developed and most space is concrete and asphalt, with ground cover being made up of common decorative landscape materials. There is no special threat or fire spread concern from the fauna or flora in Santa Clara.

Community Climate

The climate in the City of Santa Clara is typical for California. The climate has primarily mild temperatures all year with an average high of 82 degrees in the month of July and an average low in the month of January of 42. Santa Clara receives an approximately 23 inches of rainfall per year and no snow. On average, there are 261 sunny days per year. There are occasional storms from the Pacific Northwest that can bring heavy rains and high winds. These storms can result in increased calls for service. Most common is an increase is vehicle accidents, utility emergencies from wind, alarm malfunctions and localized flooding. Occasionally, there are extreme heat waves in the summer months that result in an increase in calls for heat related emergencies and if there is a special event at Levi's Stadium there is a significant spike in heat related medical emergency calls.

Community Population/Population Densities

According to US Census Data collected in 2010, Santa Clara had a population density of 6,327 people per square mile with a total reported population of 116,497 people. Santa Clara population densities are clearly divided by El Camino Real (ECR) with the vast majority of the residential population residing to the south of ECR, with a small cluster of residential units on the northern side of Highway 101 in the Rivermark area. Zoning map 1.5 located in the Community Land Use and Zoning section gives a visual image of the population densities. The majority of the daytime transient worker population is located north of ECR.

The population density surges on special event days at Levi's Stadium. Full-capacity events (sports or concerts) bring an additional 70,000 people to Santa Clara and a corresponding increase in emergency call volume, which is handled by SCFD. On February 6, 2016 Levi's Stadium was host to NFL Super Bowl 50, which brought a sustained surge of population for a period of over three-weeks. On game day, the surge to the area was estimated to be approximately 120,000 – 150,000 people in Santa Clara and over 1 million to the South Bay. It is likely that Santa Clara will host future Super Bowls at Levi's Stadium.

The population density is District 1 is higher than other areas of Santa Clara due to the population of students attending Santa Clara University. Santa Clara University has an estimated 9,000 student and faculty population. The area has several dormitory buildings located on campus. The campus does have a

student EMT program and security that respond to make initial patient contact prior to SCFD arrival on EMS emergencies.

Community Demographic Features

The SCFD services an estimated population of 126,215 residents as of July 1, 2015. This represents an 8.3% increase from the 2010 census figure of 116,497. The City of Santa Clara is composed of a diverse population, representing a wide economic, social and cultural perspective. Of the City's residents approximately 10% are over the age of 65, 21% are under 18, 8% are under the age of five and half are female. These demographics result in both a growing general population and an expanding senior population, requiring a continually evolving approach to fire and life safety throughout the service area.

The City of Santa Clara also represents a variety of cultural perspectives exemplifying the ideals of an increasingly interconnected world. In approximate terms Santa Clara is composed of 36% white (non-Hispanic), 19% Hispanic or Latino descent and 38 percent Asian. Additionally, 41% of the residents are foreign born and 52% households in Santa Clara speak a language other than English in the home. Of residents over the age of 25, 92% are at least high school graduates and 55% of residents over 25 possess a bachelor's degree or higher.

Santa Clara is also home to multiple multi-billion-dollar technology companies. As a result, a large number of Santa Clara residents are employed in technology related job fields. As of 2015 the median household income ($98,914) and median per-capita income ($42,967) was almost double the national figures for the same sample. While many of the largest employers in Santa Clara in terms of number of people employed correlate with the high-tech industry, conversely there are also a few large employers located within the city that are reflective of other referenced population demographics. Those include but are not limited to: Kaiser Hospital, Santa Clara University, Owens Corning, and Mission College.

Table 1 Santa Clara Demographics

Demographic	2000	2014	Percentage / Percent Change
Population	**102,361**	**119,525**	**16.77%**
Under 5 years	6,688	9,327	7.80%
5 – 17 years	16,872	21,873	18.30%
18 – 64 years	67,901	76,400	63.92%
Over 65 years	10,900	11,925	9.98%
Median age	**33.4**	**34.3**	**2.69%**
Housing Units	**39,630**	**45,147**	**13.92%**
Owner-Occupied	17,763	19,747	43.74%
Renter-Occupied	20,763	23,274	51.55%
Median Value	N/A	**$628,800**	N/A
Ethnicity			
White	56,903	59,506	49.79%
Asian	29,966	50,040	41.87%
Black / African American	2,341	5,017	4.20%
Native American / Alaskan	542	1,026	0.86%
Other	12,609	3,936	3.29%
Education (age 25 and over)			
High School Graduate	11,990	13,249	**-0.63%**
Undergraduate Degree	18,076	25,968	**4.07%**
Graduate/Professional Degree	11,612	21,640	**6.76%**
Employment[2]			
Management/Professional	28,498	33,399	43.72%
Service	5,142	8,192	10.72%
Sales/Office	12,862	11,218	14.68%
Construction/Maintenance	3,033	2,623	3.43%
Production/Transportation	5,899	3,983	5.21%
Median Household Income	$69,466	$93,840	**35.09%**
Birthplace			
U.S.	65,039	70,555	59.03%
Foreign-Born	35,694	48,970	40.97%
Language			
Non-English Speaking[1]	18,630	10,280	8.60%

Source: U.S. Census Bureau and ABAG
[1] Population over 5 years of age
[2] Only key employment categories are shown

B. History of the Fire and Emergency Services Agency

Major Historical Milestones of the Department

The Santa Clara Fire Department (SCFD) has a rich history. Since its inception, the services SCFD provided and the manner in which they were delivered evolved, as the town has expanded, and its needs have developed. Santa Clara made its humble beginnings in a variety of manufacturing, seed, and fruit industries and developed into a thriving city at the heart of Silicon Valley. SCFD prides itself in the ability to maintain strong roots of service and community while thoughtfully and professionally serving the community that has blossomed into a booming industry and entertainment destination.

Santa Clara originated as part of the California Mission system in 1777 when the eighth mission, Saint Clare, was established. As the lands of California passed from the hands of Mexico to the United States and the 1849 Gold Rush brought a stream of settlers to the area, the town began to take shape. In 1851 Santa Clara College was established on the old mission site, and the town officially incorporated on July 5th, 1852.

Fire service in Santa Clara began in 1854 with the establishment of the Columbia Hose Volunteer/Reserve (VR) Company to protect the growing manufacturing and agricultural industries. As the town expanded, its buildings became larger and fires more prevalent, resulting in the expansion of VR companies. Between 1854 and 1878 four more companies formed, including a hook and ladder truck company. These individual companies functioned well, fought fire efficiently, and minimized average losses due to fire to less than $500 in 1895 (Clara, 2017). Between 1904 and 1908 the individual companies merged to form one fire department. The City of Santa Clara was proudly served and protected by these VR companies for nearly a century.

Santa Clara's population nearly doubled in the 1940's. The citizens recognized this pattern of continual population growth. As a result, they approved a bond to hire six paid firefighters and to build a new fire station and fire headquarters. In 1949, the SCFD became a paid organization. The five VR companies that remained intact supported the paid organization.

The 1950's were a time of great development for the city and SCFD. Growth saw response times reduced and the fire insurance rating rose to a Class 3, which was the highest rating of any city in the country. Even with the rapid expansion of the fire department, it was merely keeping pace with the overall growth of the city. Fire Chief George ensured the fire department was equipped to provide the new residents with the highest level of fire protection (Kelly, 2000 pg 31). As Santa Clara continued its transition from agriculture to manufacturing of synthetic products, the paid fire department expanded as well. By 1958 three more fire stations were built and several classes of paid firefighters were added to the ranks.

The industrial growth of the 1960's brought many changes to the city and as a result, the fire department. This era brought with it the semiconductor industry and the development of large apartment complexes and business parks. Larger buildings meant larger fires. By 1967 the SCFD added two more fire stations (6 total), a wooden training tower, and numerous paid firefighters. (Kelly, 2000 pg 44).

The 1970's brought with them a rapidly expanding high-technology industry and a common place for large multi-alarm fires. Chief George maintained his commitment to ensuring SCFD was able to provide the highest level of fire protection to address the ever-evolving needs of the city and its residents. In 1971 the seventh fire station was built and new alarm systems were installed in all fire stations. The new system was touted as cutting-edge technology at the time and was meant to reduce response times. This allowed SCFD to continue to achieve some of the fastest response times in the country (Kelly, 2000 pg 57). In a four-year period, starting in 1975, fire damage from hazardous materials grew from $20,000 annually to $1 million. As a result, new fire Chief Visconti wanted to reduce the dangers that hazardous materials posed to the citizens and the firefighters who served them (Kelly, 2000 pg 58). He made Santa Clara the first fire department in the nation to establish a "fire prevention" program to regulate and inventory hazardous materials in the city of Santa Clara. In 1976 Marriott's Great America Theme Park was built and Fire Station 8 was constructed adjacent to the park.

The 1980's ushered in further changes to SCFD. With the tech industry beginning to root itself in Santa Clara, SCFD upgraded its emergency response commitment to its citizens to address these new and relatively unknown dangers. SCFD hired a full-time chemist and established a Chemical Division of the fire department. This division regulated hazardous materials within the city and trained firefighters to respond to these types of emergencies. The focus of the division was the prevention of hazardous material emergencies. In this decade, SCFD opened its final two fire stations: Station 9 in 1982 and Station 10 in 1986. The 1980's also brought with it the infancy of SCFD's emergency medical services (EMS) program. With an effective fire prevention and public education program, fires were on the decline, however medical calls were on the rise. All SCFD members were trained to be Emergency Medical Technicians (EMT's).

The 1990's brought significant change to SCFD in the form of EMS. Fire loss was still rapidly declining, with medical calls continuing to increase. To perpetuate high quality service that reflected the needs of the citizens, SCFD evolved even further. In 1991 automatic external defibrillators (AED) were being carried on all apparatus. In 1994 an EMS Division was added to the department and 27 firefighter/paramedics were introduced to the ranks. This was the birth of SCFD's paramedic program.

The 2000's provided an opportunity for the department to rebuild several fire stations and replace outdated apparatus. In 2003 the department built a new training center as well as rebuilding station 2. Stations 6, 3, and 4 were reconstructed in 2005, 2006, and 2008, respectively. Also in 2008, SCFD replaced two ladder trucks.

The 2010's in Santa Clara proved to be eventful. SCFD expanded its advanced life support (ALS) program by transitioning three stations that were previously basic life support (BLS) to ALS stations. This allowed the department to better serve the citizens by delivering ALS services to areas of the city with an even faster response. Five new fire engines were purchased to replace an aging fleet. In 2014 Levi Stadium was built in Santa Clara. SCFD developed a staffing model to deliver high quality service to the possible 68,000 attendees to dozens of events held annually. This task is currently being accomplished without affecting response capabilities to the remaining citizens. Since its debut, Santa Clara has hosted international events such as WrestleMania in 2015, and was the host for Super Bowl 50 in February of 2016.

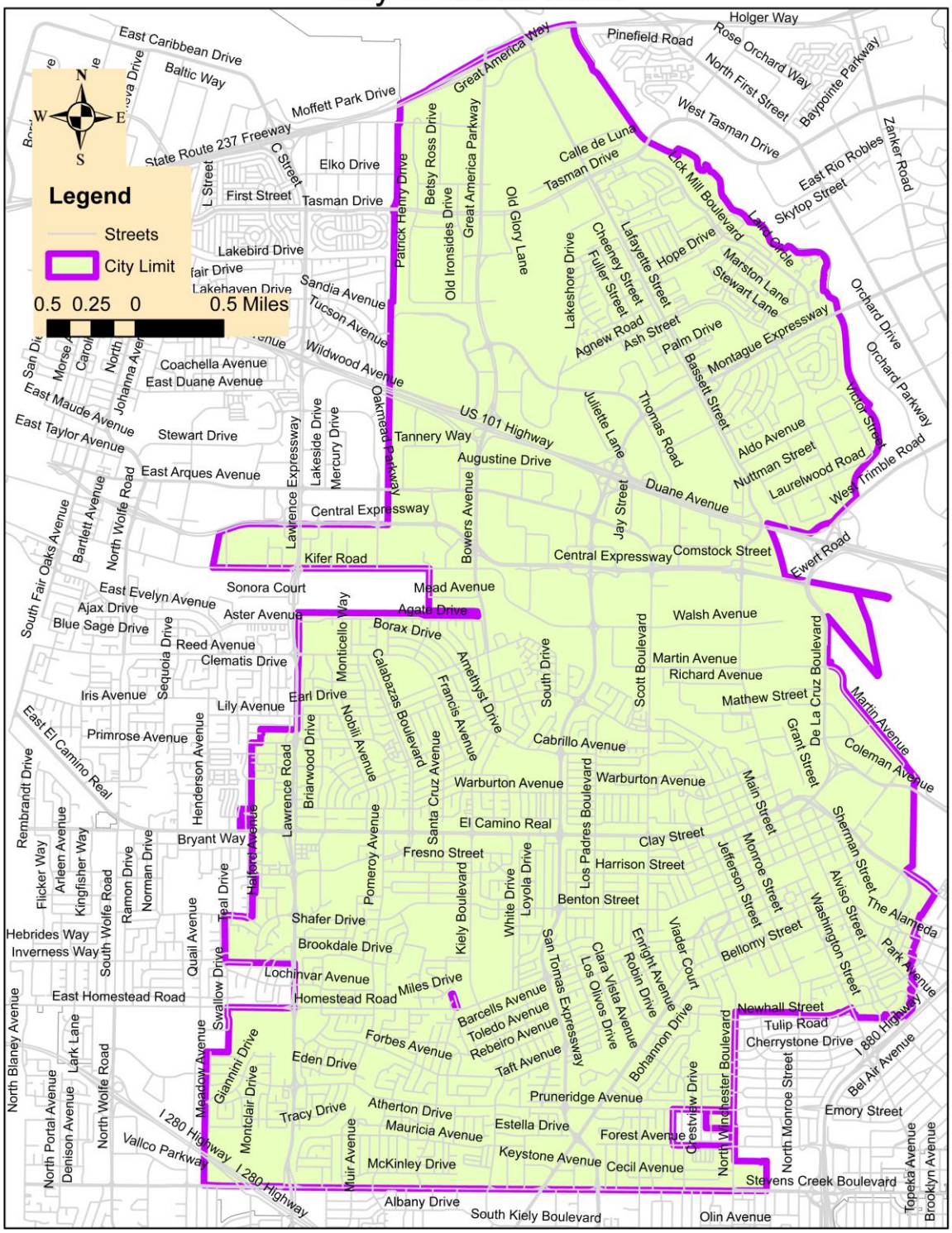
In 2016 SCFD underwent an assessment process by an independent consulting firm to analyze all practices from top to bottom. This was done in the spirit of the continual pursuit of excellence and desire to grow, become more efficient, and better serve the community. Taking an honest look at the fire department is an exciting process, which is embraced by the department with open arms. The accreditation process will reveal many opportunities for growth. SCFD looks forward to its future as much as it cherishes its rich history.

Current Legal Boundary of Service Area

The SCFD provides emergency response within the legal boundaries of Santa Clara City as outlined by the Santa Clara City Charter Section 200. Santa Clara City is comprised of 18.4 square miles in the north-central part of Santa Clara County, the heart of Silicon Valley. Santa Clara is surrounded on the north, east and south sides by the City of San Jose, and by the cities of Sunnyvale and Cupertino on the west. Santa Clara City also borders HWY 237 in the north, I280 and I880 in the South. SCFD responds to calls on HWY 101, which splits the City into North and South. The San Jose International Airport borders the city to the East. The SCFD also provides Automatic and Mutual aid as requested.

Map 8 City of Santa Clara City Limit Boundary

City of Santa Clara

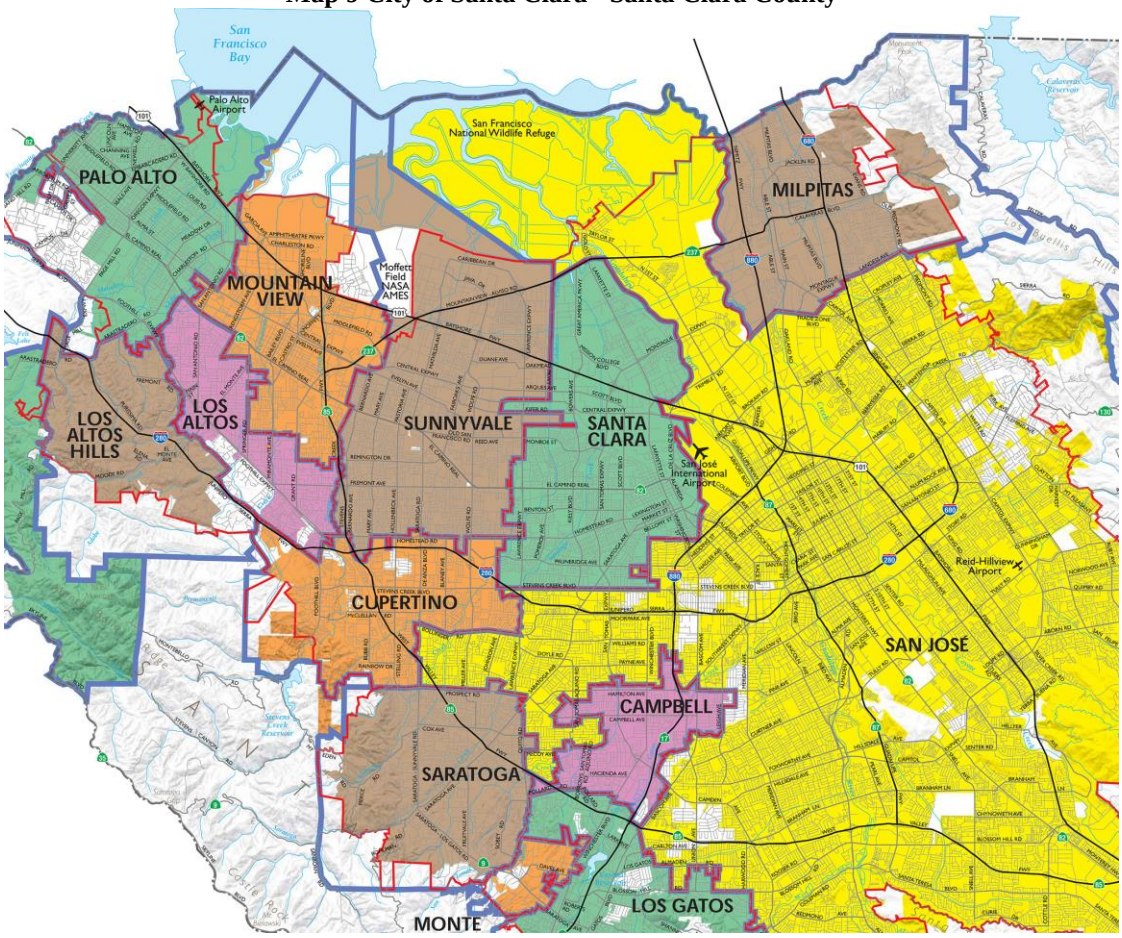


Mutual Aid

The SCFD is a participating agency in the Santa Clara County Local Fire Service and Rescue Mutual Aid Plan. This plan is an extension of, and supportive document to, the California Fire Service and Rescue Emergency Mutual Aid Plan. The California Fire Service and Rescue Emergency Mutual Aid Plan was born from the inherent wildfire risk in California, although any type of incident or disaster is covered in the plan.

The following map illustrates Santa Clara in relation to the rest of Santa Clara County.

Map 9 City of Santa Clara - Santa Clara County

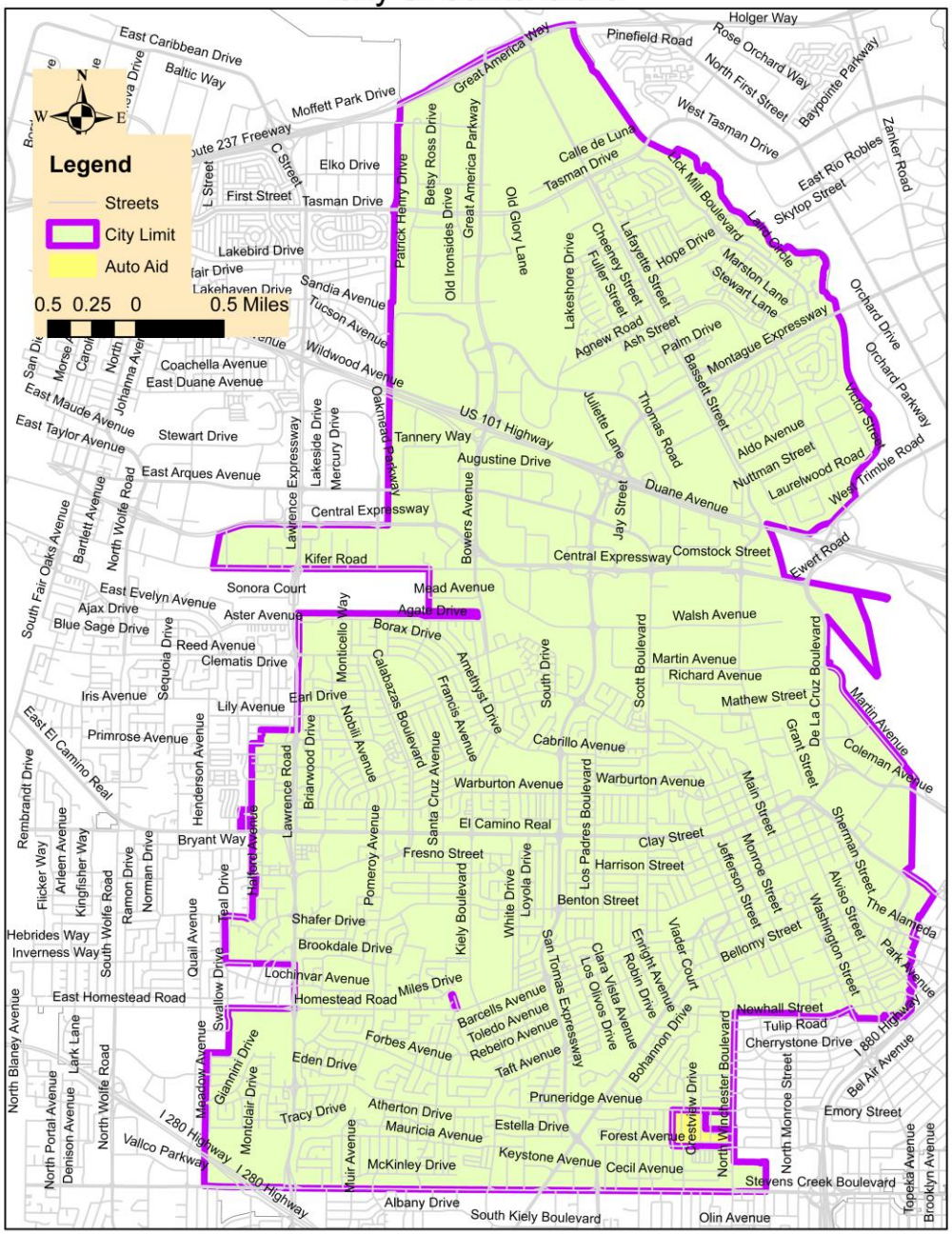


Automatic Aid

The SCFD defines Automatic Aid as a predetermined Mutual Aid request based on location. The only Automatic Aid agreement currently in place is with San Jose Fire Department (SJS). The area is bordered by Winchester, Pruneridge, Forest and Westridge. This response can be handled solely by SCFD or the SCFD response is used to augment a multiple unit response by SJS.

Map 10 City of Santa Clara City Limit Boundary

City of Santa Clara



Current Organization, Divisions, Programs and Services

The Fire Chief is responsible for the proper administration of all affairs of the SCFD and reports to the City Manager. The divisions of the fire department are split between two Deputy Fire Chiefs. The Deputy Fire Chief of Operations oversees the Volunteer/ Reserve Division, Fire Protection Division, Emergency Medical Services Division, and the Training Division. The Deputy Fire Chief of Administrative-Technical Services oversees the Fire Prevention/Hazardous Material Division.

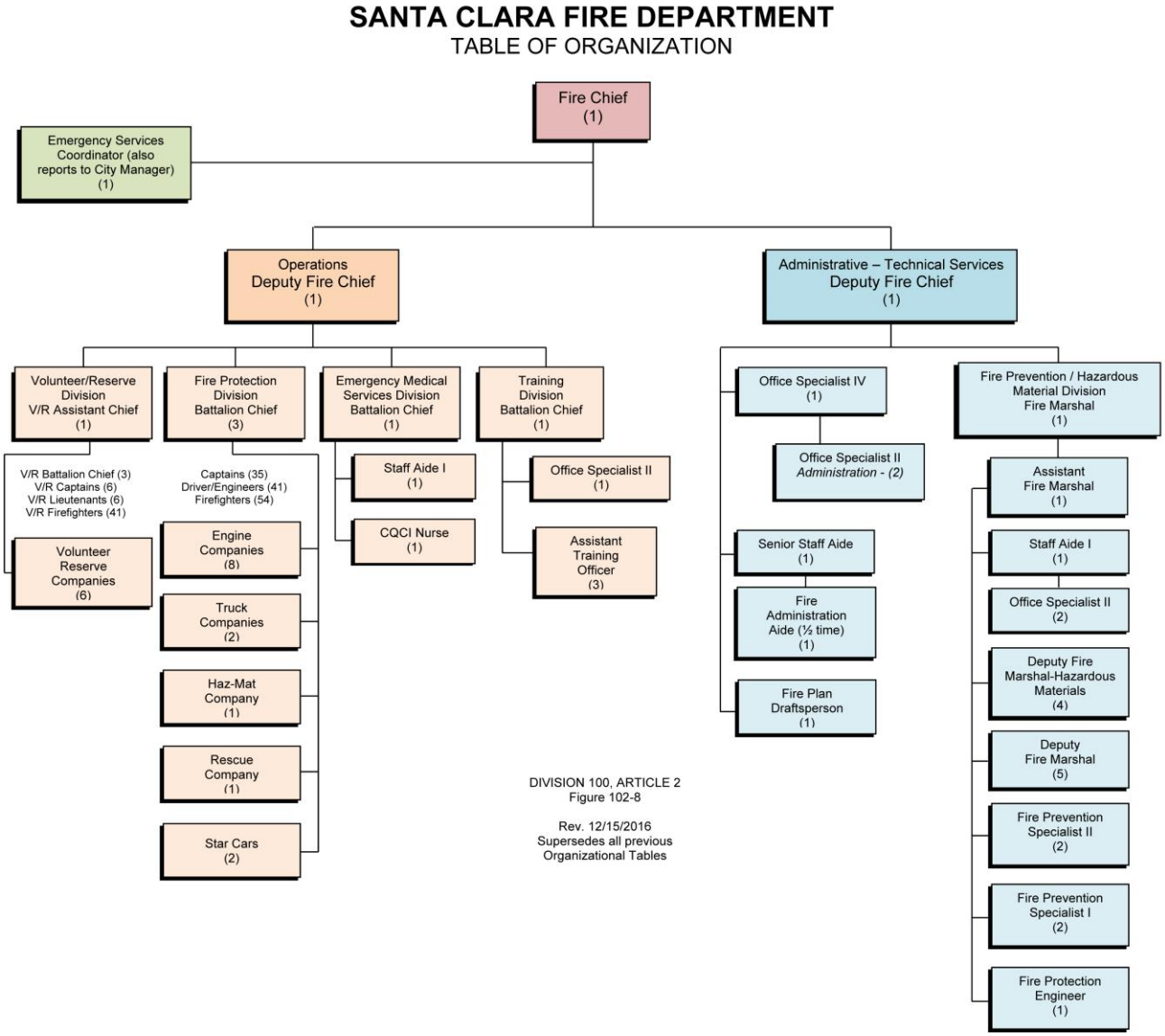


Figure 1 SCFD Organizational Chart

The SCFD provides fire suppression, emergency medical services, technical rescue, hazardous materials response, and community risk reduction. The SCFD also provides wildland fire services to the City of Santa Clara, but based on the topography and the risk-profile, the majority of wildland fire service is provided to the county and to the state through mutual aid agreements.

Fire Stations, Training Facilities, Apparatus, Equipment and Staffing

The SCFD consists of ten stations strategically located throughout the city's 18.4 square miles to meet the needs of any emergency in the city. Service is provided from these ten fire stations under one battalion. As a general rule, the city is broken up into a north side and south side, with Highway 101 being the line of demarcation. Stations 1, 2, 3, 4, 5, 7 and 9 reside within the south side, while Stations 6, 8, and 10 are located in the north side of the city.

Administration, the Volunteer/ Reserve Division, Fire Protection Division, and Emergency Medical Services Division are located at the department headquarters at Fire Station 1, 777 Benton St. The Training Division is located at 1900 Walsh Ave, which serves as Fire Station 2 as well as the department's Training Center. On site at the Training Center are a six-story drill tower, various drill props, pump testing area, classrooms, offices, equipment storage, and the Santa Clara Fire Museum.

The SCFD staffs and operates day-to-day with eight fire engines (TYPE 1), two trucks (quints), one hazardous materials unit, one medium rescue unit, two ambulances (STAR Cars), and two battalion chief vehicles. In reserve, the SCFD maintains three engines, one truck, one rescue, and two ambulances. To assist with emergency response for the purpose of providing additional equipment for major events and emergencies, the SCFD maintains three trailers which are towed by one of two utility vehicles. To provide service at special events and for specialized deployment, two "golf-cart" type vehicles are maintained but not staffed. In addition to emergency response vehicles, the SCFD maintains several staff cars which are used by the Administration, Fire Prevention, Emergency Medical Services, and Training Divisions.

The following table lists the ten fire stations, their location, the resources located at the station, the staffing level, and any services that the station focuses on.

Table 2 SCFD Station Locations, Resources, Staffing Levels, Special Services

	Resources	Staffing	EMS	Rescue	Haz Mat	Wildland
Station 1	Battalion 91	1				
777 Benton St	Engine 91	3	ALS			
Station 2	Battalion 92	1		X		
1900 Walsh Ave	Truck 92	4	BLS			
	Medic 92	2	ALS			
	Rescue 92	1	BLS			
	Truck 192					
	Utility 92					
	USAR Trailer					
Station 3	Engine 93	3	ALS			
2821 Homestead Rd.	*Engine 193*					
	Medic Cart 93					
Station 4	Engine 94	3	ALS			
2323 Pruneridge Ave	*Engine 194*					
Station 5	Engine 95	3	ALS			
1912 Bowers Ave.	*Medic 95*					
Station 6	Truck 96	4	BLS	X	X	
888 Agnew Rd.	Medic 96	2	ALS			
	Medic 196					
Station 7	Engine 97	3	ALS			X
3495 Benton St.	Engine 197					
Station 8	Engine 98	3	ALS		X	
2400 Agnew Rd.	*Medic Cart 98*					
Station 9	Engine 99	3	BLS		X	
3011 Corvin Dr.	Hazmat 99	1				
	Rescue 199					
	Decon Trailer					
	EMS Trailer					
Station 10	*Engine 90*	3	BLS		X	X
5111 Stars and Stripes Dr.	*Stadium Authority Vehicles*					

C. Current Levels of Service with Delivery Programs

Fire Suppression

All 18.4 square miles and 10 fire stations in the City of Santa Clara fall under one battalion, Battalion 91. Each first-in apparatus, whether it is an Engine or a Ladder Truck, is capable of performing fire suppression operations in their first-in district. All Engines in the SCFD are Type I Engines, carrying 500 gallons of water and having pumping capabilities of 1500 gallons per minute. Both first-in Trucks are quints, carrying water and hose in addition to the standard truck equipment.

First-in apparatus is deployed to provide adequate personnel to the scene of a working structure fire within 8 minutes from time of call to first apparatus arriving on scene. Additional resources are capable of responding and fulfilling the 2-in, 2-out requirement set forth by the Occupational Safety and Health Administration (OSHA) guidelines.

For SCFD, a structure fire response consists of four Engines, one Truck, one Light & Air Unit, one Medic unit, one Battalion Chief, and the Volunteer/Reserves. Each subsequent alarm consists of two Engines and one Truck. If, upon arrival, the structure fire is determined to be a "working" structure fire, County Ambulance is dispatched, Overhead Staff is notified, and apparatus are re-positioned throughout the city to maintain effective coverage.

The SCFD has enough resources for a first alarm and a second alarm fire. Any subsequent resources will respond from neighboring cities as part of the Santa Clara County Mutual Aid agreement. These resources will respond directly to the emergency or to Fire Station 2, where they protect the rest of the city. There are 15 additional suppression resources available within 15 minutes of travel time.

Emergency Medical Services

The SCFD deploys both Advanced Life Support and Basic Life Support capable apparatus dispatched under the Medical Priority Dispatch System. All personnel possess an Emergency Medical Technician Basic license at a minimum. There are six ALS Engine companies, each staffed with a minimum of one Paramedic, two BLS Trucks, two BLS Engines, one BLS Rescue, and one BLS Haz Mat. In addition to the six ALS Engines, the SCFD also staffs two Supplemental Transport Ambulance Resources (STAR Cars) with two Paramedic Firefighters. The closer of the two STAR Cars is dispatched to provide ALS care in the areas where the responding resource is BLS. This provides ALS coverage for the entire city in accordance with County Emergency Medical Services contract and policy. Contracted County Ambulances are utilized for patient transport to the hospital. The STAR Cars are part of the Santa Clara County Medical Health Mutual Aid System. They may be activated for transport by the County in cases where no County Ambulances are available or are extremely delayed. There have been 9 transports in the last 4 years, 1 in 2015 and 8 in 2017. The increase in transports is due to a staffing shortage that occurs occasionally with

the county contracted ambulance company. Fire Personnel may activate the STAR Car for patients in need of immediate transport.

Technical Rescue

The SCFD provides a wide range of technical rescue services to the community. These services include vehicle extrication, low and high angle rope rescue, confined space, trench rescue, and shore-based water rescue operations. The potential for a technical rescue exists from active construction projects, structural collapse, confined spaces that are below and above ground vaults/ tanks, vehicle accidents, and natural disasters such as earth quakes and floods. All eight front-line engine companies carry basic rescue equipment such as axes, sledge hammers, and pry bars. The department has a rescue company and two front-line truck companies that carry the same equipment as the engine companies, plus specialized rescue equipment such as extrication equipment, wood cribbing, air bag systems, rope rescue equipment, and power tools/ saws. The SCFD's Urban Search and Rescue (USAR) trailer is housed at Fire Station 2 and is available for response. It carries lumber and cutting tools for shoring incidents such as a structural collapse.

All SCFD firefighters are trained on different technical rescue scenarios and specialized equipment use, on an annual basis. Many personnel are trained to California State Fire Marshal Rescue Systems 1, Rescue Systems 2, Trench Rescue, and Confined Space Rescue Technician level. The SCFD also participates in county-wide technical rescue drills every year, where neighboring fire departments work together and become more familiar with each other's capabilities and resources. A standard "technical rescue" or "rescue" emergency response consists of one engine, one paramedic ambulance, one truck, one rescue apparatus, and one battalion chief. Technical rescue resources exist in the county through the county-wide mutual aid system that are available to assist SCFD if an incident grows to a point at which SCFD cannot mitigate it.

The SCFD also is a participating agency for FEMA Urban Search and Rescue Task Force 3 based out of Menlo Park, CA. This task force is one of eight in California and one of 28 teams nationwide. SCFD currently supports one planning position, two medical specialist positions and one rescue specialist position. For each medical specialist position and rescue specialist position the department must provide 3 people to fill them. As a result, nine people total fill those three positions.

Hazardous Materials

The SCFD has, at a minimum, 22 Hazardous Materials Technicians or Hazardous Materials Specialists on each shift. These personnel train a minimum of 24 hours annually on hazardous materials response equipment and tactics/strategies. The SCFD has designated Fire Station 6 and Fire Station 8 as hazardous materials core stations. Personnel assigned to these stations also participate in the annual hazardous

materials core training, regardless of whether they are hazardous materials technicians or specialists. Additionally, SCFD has four deputy fire marshals assigned to hazardous materials.

The SCFD has several deployment models in the area of hazardous materials (hazmat) response, depending on the nature and severity of the incident. A hazmat 2 incident, defined as a known or unknown substance contained or confined, results in the first-due unit response only. A hazmat 3 incident, defined as an active leak of a known or unknown substance, results in a first-due unit response as well as Engine 99, Hazmat 99, one truck company, battalion chief(s), and one deputy fire marshal. A hazmat-EMS incident is similar to a hazmat 3, only with a suspected or confirmed patient exposure. The response is also similar to a hazmat 3, with the addition of an ALS component and a County Ambulance for patient transport.

The SCFD Hazardous Materials Team is classified as a Type II team, per California Office of Emergency Services. If any incident exceeds the capabilities of the team, the SCFD is able to augment the response with mutual aid from the Santa Clara County Fire Department or the San Jose Fire Department, both of which have Type I teams. Conversely, the SCFD Hazardous Materials Team is available to support neighboring jurisdictions, in or out of the county, upon request.

Wildland Fire Services

The SCFD has the resources and the training to provide Wildland Fire Services to the City of Santa Clara. However, this service has not been utilized due to the topographical features of the city. The SCFD provides this service to the rest of Santa Clara County and the State of California. The SCFD is part of a larger commitment by the County of Santa Clara to provide up to three municipal strike teams to CAL OES for major incidents under the California Fire Service and Rescue Mutual Aid Plan. The department has two designated Type I Strike Team Engine Companies. These companies are highly trained and equipped to respond to mutual aid requests in the wildland urban interface when requested by agencies in the county, neighboring counties and throughout the state. The two designated engine companies are Engine 90 and Engine 97. The SCFD has the capability to assemble a third Type I Strike Team engine company to fulfill mutual aid requests in extreme emergencies.

Due to the non-existing wildland threat in the city, only about 50 members are trained in the wildland program every year. These members respond to “In-County” or “Out-of-County” responses. These personnel are trained to the minimum California Incident Command Certification System (CICCS) qualifications. All members at a minimum are trained to a Firefighter Type II level and Captains are trained to the Engine Boss level. Recruits receive basic wildland training in the academy.

Community Risk Reduction

The Fire Prevention and Hazardous Materials Division of the SCFD organizes the Community Risk Reduction efforts through community education programs, sound engineering practices, and an active code enforcement and inspection program.

The division maintains a vital role as the technical consultant to the fire department, the City, and the business community, advising on site construction, process installation, and the safe use and handling of hazardous materials as outlined in federal, state and local regulations. There is a plan checking service that assures the incorporation of proper life safety standards, as well as code compliance in all new construction in the city. The Fire Prevention and Hazardous Materials Division supervises and coordinates over 9,900 Fire and Life Safety Inspections annually. Under this program, all commercial occupancies are inspected at least once a year and residential occupancies are inspected upon request.

The Fire Prevention and Hazardous Materials Division is the Certified Unified Program Agency (CUPA) for the City of Santa Clara. A CUPA is a local agency that has been certified by the State of California to implement six hazardous materials and hazardous waste programs. These six programs used to be implemented by several agencies. Consolidation of this program has helped with streamlining regulatory requirements and to assist the business communities achieve compliance.

The division's staff is trained to meet the state's minimum education requirements to implement the program. The SCFD CUPA Program is audited triennially to ensure that consistency is maintained and to evaluate performance relative to the standards.

The six CUPA programs that SCFD implements include:

- Hazardous Materials Business Plans (HMBP)
- Aboveground Petroleum Storage Tanks
- California Accidental Release Prevention Program (CalARP)
- Hazardous Waste Generator
- Tiered Permit (Hazardous Waste Treatment)
- Underground Storage Tanks

The Fire Prevention and Hazardous Materials Division implements the fire, industrial accident, and hazardous materials release investigations program. SCFD currently staffs six trained investigators that implement this program.

The investigators conduct fire origin and cause investigations at fires that occur within the city, and also serve on the county-wide task force to assist other fire agencies that need additional support with large incidents. Investigators assist with the development of cases with Santa Clara Police Department.

Investigators conduct investigations at significant industrial accidents. This includes where workers are injured and require hospitalization or when a fatality has occurred. Investigators complete reports and assist with the State Department of Industrial Relations (Cal-OSHA) with root cause analysis.

Investigators conduct follow-up on hazardous materials releases within the City. This is to ensure that proper reporting of a release is conducted, proper mitigation has occurred, and to develop a root cause analysis on why the release occurred.

The Fire Prevention and Hazardous Materials Division is responsible for implementing the public education program. This includes programs at schools, senior centers, community events and festivals, and with the business community. The division participates in about 10 major events annually, making contact with approximately 25,000 people in the community.

The city has one Emergency Services Coordinator (ESC) responsible for maintaining the city's Emergency Services program in conformity with federal and state requirements for participation in the federally and state funded Emergency Services programs. The city ESC reports to the Fire Chief as delegated by the City Manager. The city ESC is a member of the County Emergency Managers Association (EMA), which is a group comprised of emergency managers from local public, private and non-profit organizations. The EMA makes recommendations to the Santa Clara County Operational Area Council (OAC), which is a group of appointed and elected officials who work collaboratively on regional emergency management issues.

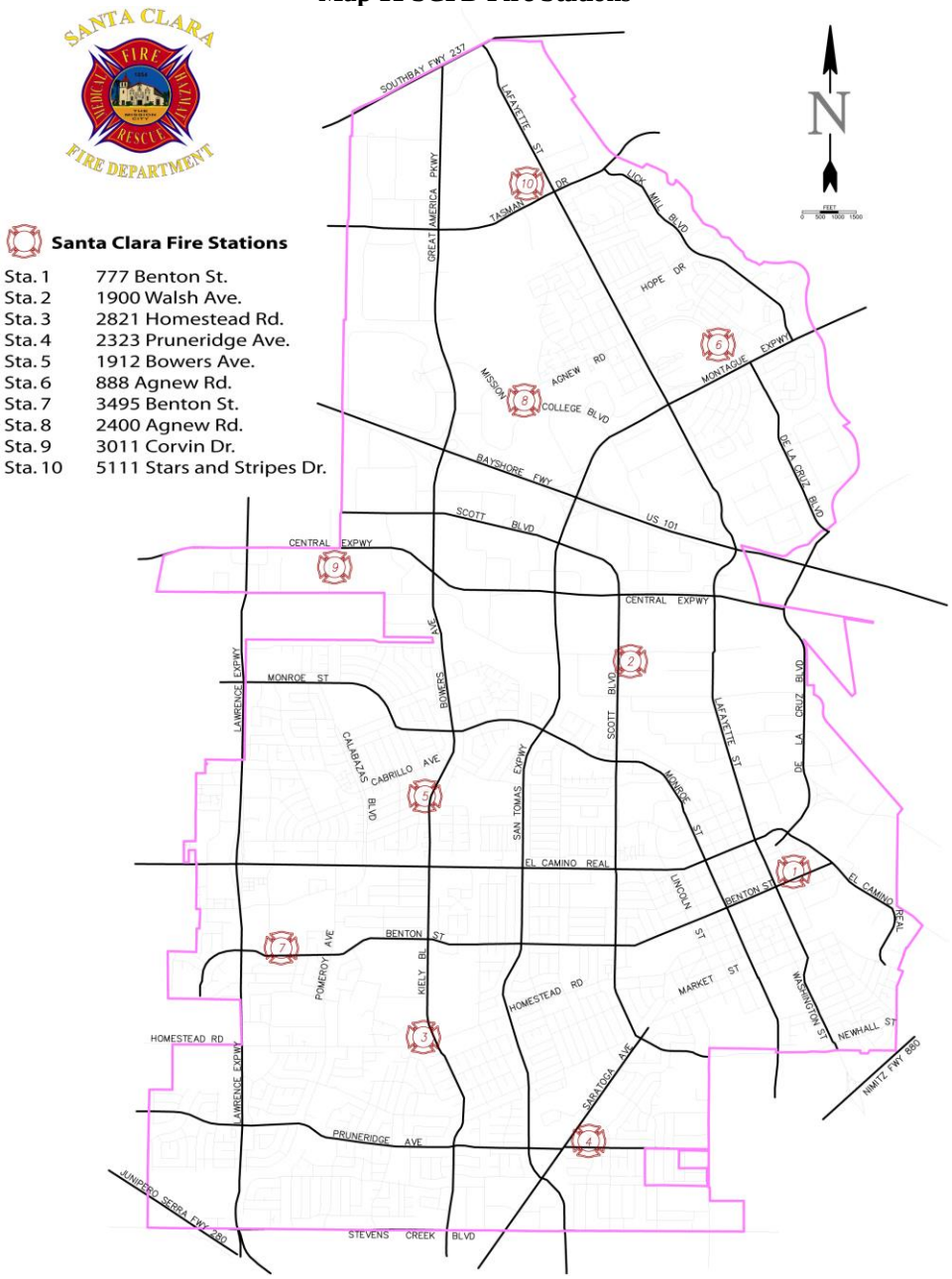
SCFD has a trained civilian component called CERT (Community Emergency Response Team). Over 1500 residents have received CERT training. CERT trains and organizes teams of volunteers that provide assistance to their communities before, during and after disasters. Volunteers also support emergency response agencies by organizing and participating in local preparedness projects and initiatives. The CERT program educates the participants about how to prepare for the hazards that may impact their community and trains them on basic disaster response skills. This program is managed by the city ESC and a SCFD fire captain.

D. Current Deployment and Coverage Areas

Points of Service Delivery

The SCFD has ten stations strategically positioned throughout the city. The "North" side of the city is considered to be anything to north of Highway 101 and is home to Fire Stations 6, 8, and 10. The "South" side is considered to be anything south of Highway 101 and is home to Fire Stations 1, 2, 3, 4, 5, 7, and 9. As resources are depleted due to major incidents or extremely high call volume, Fire Stations 2, 3, and 6 are staffed first and considered to be core stations.

Map 11 SCFD Fire Stations



Minimum Deployment Resources

SCFD Truck companies respond with four personnel. Medic Units are staffed with two personnel. The daily staffing number includes one Battalion Chief but excludes the one Assistant Training Officer (ATO). The following table shows the apparatus in service at each station with the associated staffing in parentheses.

Table 3 SCFD Apparatus and Associated Staffing

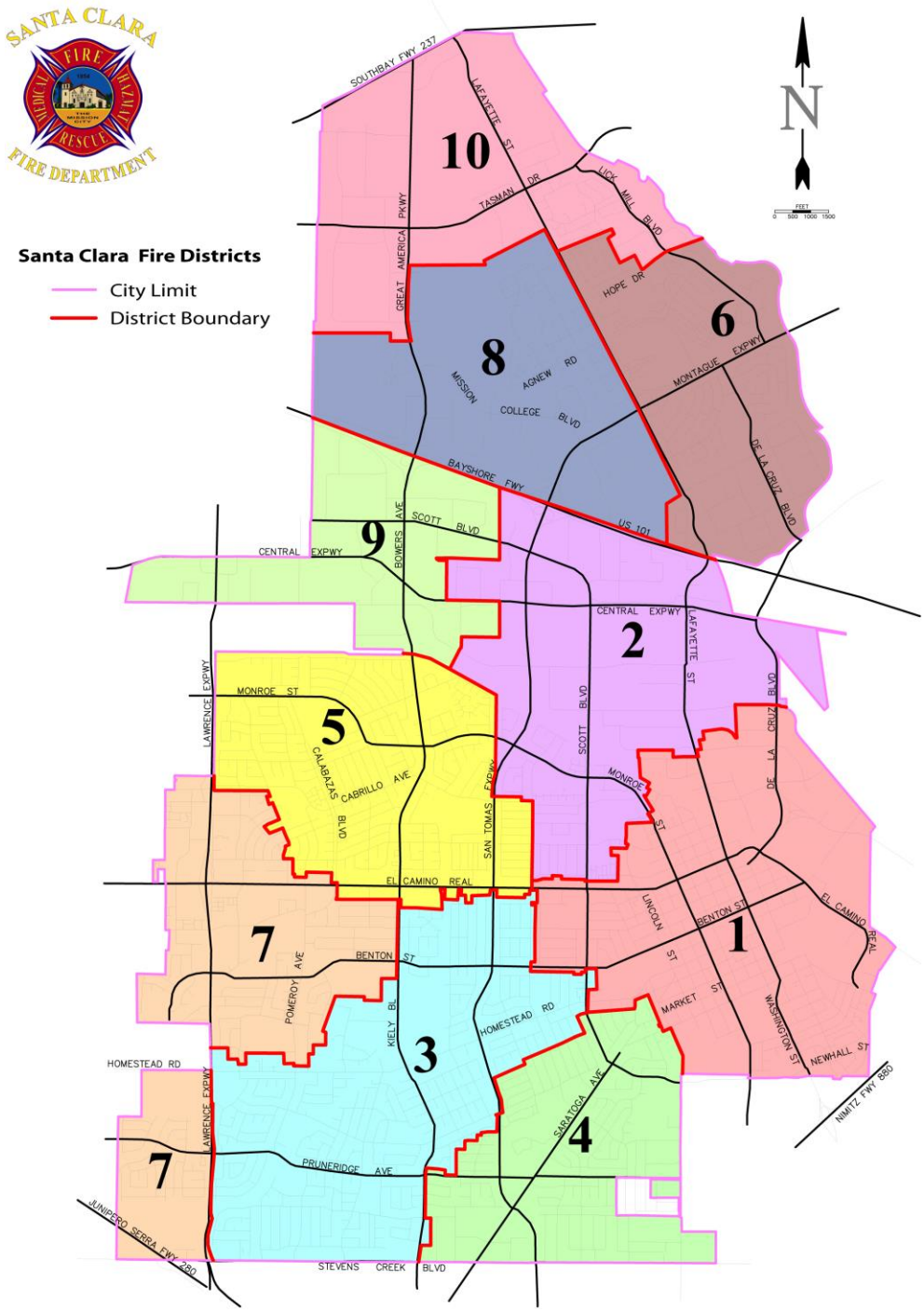
Station 1	**Engine 91 (3) Battalion 91 (1)**
Station 2	**Truck 92 (4) Rescue 92 (1) *Battalion 92 (1) Medic 92 (2)**
Station 3	**Engine 93 (3)**
Station 4	**Engine 94 (3)**
Station 5	**Engine 95 (3)**
Station 6	**Truck 96 (4) Medic 96 (2)**
Station 7	**Engine 97 (3)**
Station 8	**Engine 98 (3)**
Station 9	**Engine 99 (3) Hazmat 99 (1)**
Station 10	**Engine 90 (3)**
Total Daily Target Staffing	**39 Personnel**

*Battalion 92 (ATO) does not count toward staffing number because it is an Assistant/Trainee position

Response Areas

Santa Clara is divided into 10 geographical planning zones, known as fire districts. Each fire district is served by a fire station and defines the first-due response area for each station.

Map 12 SCFD Fire Districts



District 1 ***2.4 square miles***

District 1 is the oldest portion of Santa Clara. The Old Quad area is home to many original Victorian houses and well as the city's downtown area. It contains Santa Clara University as well as Mission Santa Clara. The majority of District 1 is residential, but the northern and western portions of the district are office and industrial. This is a First in ALS district

District 2 ***2.2 square miles***

District 2 is largely office space and industrial zoning. The residential portion of the district is towards the south. The district includes Highway 101 and borders the western edge of San Jose International Airport. This is a First in ALS district

District 3 ***2.3 square miles***

The majority of District 3 is residential. It is bordered by El Camino Real to the north and Stevens Creek Boulevard to the south. These stretches are commercial with many businesses and strip malls. District 3 is home to Central Park and the International Swim Center. This is a First in ALS district

District 4 ***1.4 square miles***

District 4 is very similar to District 3. It is mostly residential with commercial on the outskirts. District 4 includes the western portion of Westfield Shopping Mall and is bordered to the south by Stevens Creek Boulevard. Pruneridge Golf Course, a 9-hole course, is located in the middle of District 4. This is a First in ALS district

District 5 ***1.8 square miles***

District 5 is mostly residential with a small amount of commercial business lining El Camino Real in the southern portion of the district. District 5 is located in the center of the city. This is a First in ALS district

District 6 ***1.5 square miles***

District 6 is a mix of office and industrial, as well as residential. The majority of the residential is located in the Rivermark area. This is a newer (2004) development located in the northern part of the district. District 6 is home to many technology companies and machine shops. This is a First in ALS district

District 7 ***1.8 square miles***

District 7 is home to Kaiser Permanente Hospital and is bordered by Sunnyvale to the west. It is mostly residential with businesses along El Camino Real, along the northern portion of the district. This is a First in ALS district

District 8 ***1.9 square miles***

District 8 includes a small portion of residential, but the majority of the district is office and industrial. It is home to Mission College, Mercado Shopping Complex, and portions of Great America Theme Park. The tallest buildings in the city are located in District 8, located in the southern portion of the district along Highway 101. This is a First in ALS district

District 9 ***1.2 square miles***

Currently, District 9 is all office and industrial and is home to many technology companies and manufacturers. Development is under way to add residential to District 9 towards the eastern portion of the district. This is a First in BLS district

District 10 ***1.9 square miles***

District 10 is the area of town that is currently seeing the most change. There is a small portion of residential along the eastern portion of the district. Aside from that, District 10 is mostly office and industrial. Levi's Stadium, home to the National Football League's San Francisco 49ers, is located in District 10. It holds events year-round and can host upwards of 80,000 spectators. Santa Clara Golf and Tennis Club is located in the northern portion of District 10. This is a First in BLS district

E. Summary of Community Response History

Table 4 Annual Responses by Type and Station (2014-2017)

1/1/2014 8:00:00 To 1/1/2015 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	29	1.8%	21	2.6%	17	1.4%	17	1.9%	26	2.6%	21	2.8%	11	1.0%	9	1.9%	9	3.3%	18	3.2%	178
Rupture/ Explosion	1	0.1%	1	0.1%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	1	0.2%	0	0.0%	0	0.0%	4
EMS/ Rescue	1,127	70.1%	516	65.0%	815	68.1%	675	75.0%	775	76.4%	570	75.6%	806	70.0%	321	68.7%	154	56.2%	371	66.3%	6,130
Hazardous Condition	31	1.9%	12	1.5%	30	2.5%	7	0.8%	11	1.1%	8	1.1%	18	1.6%	10	2.1%	6	2.2%	6	1.1%	139
Service Call	164	10.2%	99	12.5%	192	16.0%	108	12.0%	104	10.2%	49	6.5%	155	13.5%	27	5.8%	15	5.5%	31	5.5%	944
Good Intent	53	3.3%	32	4.0%	52	4.3%	38	4.2%	30	3.0%	29	3.8%	55	4.8%	22	4.7%	14	5.1%	37	6.6%	362
False Call	197	12.3%	110	13.9%	90	7.5%	52	5.8%	69	6.8%	73	9.7%	101	8.8%	77	16.5%	73	26.6%	96	17.1%	938
Special	6	0.4%	3	0.4%	1	0.1%	3	0.3%	0	0.0%	3	0.4%	5	0.4%	0	0.0%	3	1.1%	1	0.2%	25
Total Calls Per Station	1,608		794		1,197		900		1,015		754		1,151		467		274		560		8,720

1/1/2015 8:00:00 To 1/1/2016 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	39	2.2%	12	1.4%	19	1.5%	10	1.0%	20	1.7%	18	2.4%	40	3.4%	8	1.4%	6	2.1%	21	4.5%	193
Rupture/ Explosion	0	0.0%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.2%	0	0.0%	1	0.2%	4
EMS/ Rescue	1,254	71.3%	556	65.4%	925	74.4%	714	72.2%	936	78.3%	551	73.8%	804	69.1%	390	69.4%	153	53.1%	266	57.1%	6,549
Hazardous Condition	31	1.8%	14	1.6%	25	2.0%	16	1.6%	15	1.3%	15	2.0%	15	1.3%	7	1.2%	11	3.8%	5	1.1%	154
Service Call	170	9.7%	90	10.6%	150	12.1%	150	15.2%	138	11.5%	46	6.2%	149	12.8%	40	7.1%	23	8.0%	36	7.7%	992
Good Intent	61	3.5%	36	4.2%	50	4.0%	35	3.5%	16	1.3%	22	2.9%	55	4.7%	27	4.8%	19	6.6%	18	3.9%	339
False Call	197	11.2%	139	16.4%	70	5.6%	62	6.3%	69	5.8%	94	12.6%	98	8.4%	89	15.8%	72	25.0%	118	25.3%	1,008
Special	6	0.3%	3	0.4%	2	0.2%	2	0.2%	1	0.1%	1	0.1%	3	0.3%	0	0.0%	4	1.4%	1	0.2%	23
Total Calls Per Station	1,758		850		1,243		989		1,195		747		1,164		562		288		466		9,262

1/1/2016 8:00:00 To 1/1/2017 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	22	1.3%	21	2.4%	32	2.3%	12	1.1%	20	1.7%	11	1.3%	20	1.8%	18	3.4%	11	3.4%	11	2.1%	178
Rupture/ Explosion	1	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	1	0.2%	1	0.3%	0	0.0%	4
EMS/ Rescue	1,121	68.0%	586	67.7%	1,004	73.6%	726	68.2%	901	78.6%	598	72.1%	793	71.8%	362	67.7%	163	50.9%	304	58.7%	6,558
Hazardous Condition	32	1.9%	14	1.6%	26	1.9%	6	0.6%	13	1.1%	19	2.3%	17	1.5%	9	1.7%	21	6.6%	7	1.4%	164
Service Call	209	12.7%	114	13.2%	154	11.3%	195	18.3%	100	8.7%	58	7.0%	123	11.1%	39	7.3%	14	4.4%	41	7.9%	1,047
Good Intent	74	4.5%	23	2.7%	40	2.9%	39	3.7%	32	2.8%	27	3.3%	39	3.5%	22	4.1%	15	4.7%	19	3.7%	330
False Call	187	11.3%	106	12.3%	102	7.5%	86	8.1%	79	6.9%	116	14.0%	110	10.0%	84	15.7%	91	28.4%	135	26.1%	1,096
Special	3	0.2%	1	0.1%	6	0.4%	1	0.1%	1	0.1%	0	0.0%	2	0.2%	0	0.0%	4	1.3%	1	0.2%	19
Total Calls Per Station	1,649		865		1,364		1,065		1,146		829		1,105		535		320		518		9,396

1/1/2017 8:00:00 To 1/1/2018 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	29	1.8%	21	2.4%	20	1.6%	18	1.8%	14	1.3%	21	2.5%	15	1.3%	10	2.1%	6	2.0%	16	3.6%	170
Rupture/ Explosion	0	0.0%	0	0.0%	1	0.1%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	1	0.3%	2	0.4%	6
EMS/ Rescue	1,167	70.8%	583	65.5%	907	72.4%	728	72.4%	824	77.4%	590	70.1%	817	71.7%	297	61.1%	173	56.9%	283	63.3%	6,369
Hazardous Condition	41	2.5%	19	2.1%	25	2.0%	19	1.9%	20	1.9%	17	2.0%	19	1.7%	7	1.4%	9	3.0%	10	2.2%	186
Service Call	169	10.2%	102	11.5%	157	12.5%	135	13.4%	97	9.1%	69	8.2%	129	11.3%	48	9.9%	13	4.3%	20	4.5%	939
Good Intent	57	3.5%	29	3.3%	43	3.4%	28	2.8%	30	2.8%	21	2.5%	53	4.7%	32	6.6%	21	6.9%	20	4.5%	334
False Call	182	11.0%	133	14.9%	99	7.9%	74	7.4%	79	7.4%	122	14.5%	103	9.0%	91	18.7%	75	24.7%	94	21.0%	1,052
Special	4	0.2%	3	0.3%	1	0.1%	2	0.2%	1	0.1%	2	0.2%	2	0.2%	1	0.2%	6	2.0%	2	0.4%	24
Total Calls Per Station	1,649		890		1,253		1,005		1,065		842		1,139		486		304		447		9,080

F. Community Priorities, Expectations, and Performance Goals

Mission Statement

In December of 2016, 36 members of the Santa Clara Fire Department (SCFD) reviewed the current mission statement and values as part of the strategic planning process. The mission statement was revised from the previous (2015) version and reads as follows:

> "As compassionate members of the community, the Santa Clara Fire Department protects and enhances the quality of life for the people we serve. We provide caring, customer-oriented service to protect life, property, and the environment."

Community Service Priorities

In December of 2016, as part of the strategic planning process community members gathered at the SCFD Training Center to provide feedback on the services provided by the SCFD. As part of that process, community members prioritized these services by comparing these programs to one another. The results were as follows:

1. Fire Suppression
2. Emergency Medical services
3. Rescue- Basic and Technical
4. Hazardous Materials Mitigation
5. Community Risk Reduction
6. Domestic Preparedness Planning and Response
7. Fire Investigation
8. Public Fire and Life Safety Education

Community Service Expectations

In December of 2016, as part of the strategic planning process, community members gathered at the SCFD Training Center to provide feedback on their expectations of the SCFD. The top ten expectations (in priority order) are listed below.

1. Response
2. Personnel Training
3. EMS Response
4. Fire Suppression
5. Code Enforcement
6. Innovate and Adapt to Changes
7. Public Education and Outreach
8. Dispatch
9. Hazardous Materials Response
10. Professionalism

Performance Goals

The following table shows the various performance measures of the SCFD. These measures are established annually during the budget process and the results are reported to the Santa Clara City Council on a monthly basis.

Table 5 SCFD Monthly Activity Report

Santa Clara Fire Department Monthly Activity Report

		2016-2017 Benchmark
Protection/Administration		
1	Number of EOC activations (includes drill/exercises)	10
2	Number of EOC training sessions/planning meetings	10
3	Number of community volunteer hours	100
4	Number of special event planning hours	1,000
Protection/Emergency Response		
1	Response time in 90% of all high level emergency calls	5:30
2	Number of calls for service	9,000
3	Number of special event deployment hours	5,000
4	Number of hours contributed by the Volunteer/Reserve Division	10000
Prevention-Hazardous Materials		
1	Number of inspections performed by Prevention staff	2,500
2	Number of inspections performed by the Fire Protection Division	2,500
3	Number of permit inspections	2,000
4	Number of plans reviewed	2,000
5	Number of hazardous materials incidents investigated	2
6	Number of hazardous materials inspections	400
Training		
1	Number of fire prevention training hours	500
2	Number of hazardous materials training hours	500
3	Number of rescue training hours	1000
4	All other training hours	8000
Emergency Medical Services		
1	Response time in 90% of all high level emergency medical calls	5:30
2	Number of City employees trained in CPR/AED or BLS provider	210
3	Number of Emergency Medical Services training hours	1500

G. Community Risk Assessment and Risk Levels

Community Risk Assessment Overview

The only way to truly provide a precise and satisfactory level of service to a community is to identify and analyze its risks. Using general guidelines based on past practice, common expectations or assumptions on a community, especially as it develops, may get one close but is inefficient. Unfortunately, this leads to committing dollars, resources, and time on under informed decisions about public safety services. In the case of fire services, the agency must assess the risks it protects so that it may make precise and accurate recommendations to elected officials and the community on what resources are needed to keep citizens safe.

The Santa Clara Fire Department (SCFD) provides All-Hazard Risk Mitigation to the community and citizens of Santa Clara. This is accomplished through intense planning, preparation and concludes with methodical training. However, the process of All-Hazard Risk Mitigation must first begin with a comprehensive and thorough analysis of the various risks among a community as a whole, as well as the hazards, threats (probability), consequences, and impact to the agency and community. Risk assessment is essential and is defined as the analysis of the probability of an event occurring, the resulting consequence that could occur due to the event, the impact on the agency mitigating the risk (SCFD), and the agency's resiliency for addressing congruent emergencies. This is referred to as Community Risk Assessment.

Risk management is the practice of committing sufficient resources to mitigate the hazards in the most effective and efficient manner available. Determining the most effective and efficient process includes identifying risks then developing response strategies based on the critical tasks, based on its classification and level of consequence, that are required to safely mitigate an incident. The objective of risk management and assessment is twofold. First, is to ensure truly serious losses remain a very rare event and secondly, to keep routine emergencies from developing into large loss events.

Overall, there is likely to be an extensive range in the severity and types of potential risks within the agency's jurisdiction. With that said, it would be inefficient to staff and deploy resources based solely upon the absolute greatest risk within the jurisdiction if the probability of the event occurring is very low (once every 100 years). Likewise, it would also be inefficient and hazardous to the community if the agency built a deployment model based solely around being able to mitigate its most frequent or highly probable events. In reality, the most frequent events are usually routine and result in minimal loss. Conversely, maximum risk events that result in significant loss are less frequent. If the risk assessment/management system has been successfully built and maintained, a catastrophic loss to the community would be extraordinary. To clearly determine the hazards of a jurisdiction, the agency must adopt a concise and inclusive methodology that can adapt to its developing community.

For the purposes of the risk-assessment, the agency defines all risk in accordance with a tier-based decision-making model that communicates commitment to the community as the primary purpose for existence. Therefore, when risk is assessed, the agency is assessing the risk to the community. This does not mean that the agency places responder safety as a secondary consideration. However, the agency has an extensive system of risk/benefit decision-making tools and policies in place to ensure that responder safety is a top organizational priority.

In the United States, there are no federal or state government requirements for a minimum level of fire services. It is a local choice issue for each community to consider and fund as it deems necessary. The Accreditation Standards of Cover (SOC) systems approach to deployment, rather than a one-size-fits-all prescriptive formula, allows for local determination. In this comprehensive approach, each agency can match local needs (risks and expectations) with the costs of various levels of service. In an informed public policy debate, a governing board "invests" in the fire and emergency medical service levels the community needs and deems sufficient.

Risk Assessment Methodology

Community Risk Assessment examines Santa Clara's jurisdiction using a systematic process to determine both fire and non-fire emergency hazards for this SOC. The process used was a combination of those created by the agency and those offered by the Commission on Fire Accreditation International. To create our initial standard of coverage, community-wide risks and all potential hazards within the agency's jurisdiction were examined. To more accurately determine community needs, the jurisdiction was subdivided into response zones. All communities go through development and redevelopment. For example, the south west portion of the jurisdiction is mostly single family residential, the central is commercial, and the north is industrial. Dividing the agency into response zones aids the agency in recognizing and addressing its communities natural forming pockets of land use, allowing for a deeper and more manageable understanding of a specific area.

Human, material, mechanical and natural causes were considered when identifying potential risks within the community. Human hazards include danger or peril caused by intentional, accidental, physiological or psychological action. Material hazards include all matter and products which, if not effectively contained, are a threat to human life and property. Mechanical hazards include danger or peril caused by failure of equipment or material, lack of required safety equipment or failure of safety equipment. Natural hazards include extreme weather, floods, earthquakes and high wind events. These hazards are characteristic of the entire jurisdiction and are outlined in this chapter. Once hazard identification within the jurisdiction and its response zones was completed and all potential risks were identified, each risk is then assessed so it can be categorized.

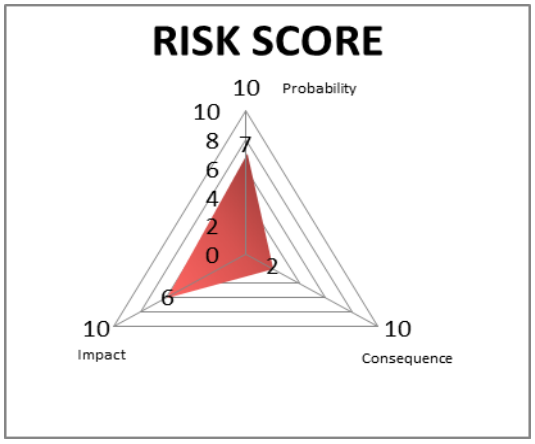
Categorizing Risk

Categorizing risk involves assessing the identified risks by examining three factors: probability, consequence and impact. Probability is the likelihood that a particular event will occur in a given time period that would result in injury or loss to and individual, community or the city. Consequence is the reasonably expected loss that an individual, company, community, and/or city would experience should an incident occur. Four primary areas of loss considered in respect to consequence were: life safety, economic (property loss, income, historic, irreplaceable assets), environmental (irreparable or long-term damage to the environment), and psychological (decreased moral/social function, increased fear, or alterations in lifestyle). Impact is the affect an incident would have on the agency in terms of number of resources the event would consume, the time those resources would be committed to the incident, and the residual draw-down on the community's coverage.

Each of the three factors (probability, consequence, and impact) is then assigned a number value ranging from one to ten. Therefore, the lowest attainable "linear" risk score would be a 3 and the highest a 30. However, these numbers were placed into a sophisticated mathematical equation (Heron's Formula) that results in a more accurate mathematical representation of the level of risk. It also delivers a visual depiction of the risk in the form of a tetrahedron. The greater the volume of the tetrahedron, the higher level of risk is assigned. Likewise, a greater numerical number results in a greater risk assessment. The agency's lowest assessed risk was 3.46 (small vegetation fire) and its highest assessed risk was 74.15 (School Fire). The following is an example of the three-axis risk methodology.

Figure 2 Example of Three-Axis Risk Methodology

RISK	
Probability of occurrence	**7**
Consequence to community	**2**
Impact on Fire Department	**6**
SCORE	**32.43455**



It is important to examine each of the three elements (probability, consequence, and impact) that contribute to the category level of a risk and its overall risk assessment score. This includes examining all the mitigating factors and modifying factors that would either reduce or increase the probability of an incident. Furthermore, it is important to understand the relationship between the factors of the risk assessment.

The first factor to consider is probability. Again, probability is the likelihood an incident will occur or, in some cases, the frequency an event occurs (historical probability) over a given period. Historical call patterns such as distribution of calls throughout the jurisdiction as well as distribution of calls across occupancy types were analyzed to help predict future probability. To more clearly delineate terminology used in relation to probability and because risk assessment requires consistent (annual) review of an agency's risks, the following terms have been defined:

Table 6 Probability of Occurrence

Probability of Occurrence	Description
Very Low	Less than 5% probability of occurrence within the next 12 months
Low	5% - 9% probability of occurrence within the next 12 months
Moderate	10% - 49% probability of occurrence within the next 12 months
High	50% - 95% probability of occurrence within the next 12 months
Very High	Greater than 95% probability of occurrence within the next 12 months

Factors that contribute to the increased probability of an event occurring include poor maintenance of equipment, lack of worker training, higher occupancy population and high-risk demographics of an occupancy. The agency mitigated over 25,400 (70 % of overall call volume) medical emergencies from 2014 - 2017. The number of emergency medical services (EMS) calls has increased by 3.3% in four years, from 6,130 in 2014 to 6,329 in 2017, as the agency has seen an increase in its overall population during the same period. One note is that the 6,329 medical calls in 2017 decreased from the 6,508 medical calls in 2016, a 2.8% decrease.

The probability of a medical event occurring at a skilled nursing facility is much greater than an event occurring at an apartment complex with the same number of people. Statistically, this can be seen when looking at the increased call volume. There were 676 more calls in 2016 than in 2014. However, only 412 (60.9%) of those calls were classified as EMS. Similarly, the agency has seen a steady decrease in the percentage of EMS calls, from 73.2% in 2012 to 69.7% in 2017 (3.5% decrease). Due to the economy and the agency's location within Silicon Valley, the percentage of the population in the 20-45 age range has increased while the percentage of the 65+ population has decreased further illustrating how the demographics of a population can affect probability.

Factors that that reduce the probability of an event include public education, fire and life safety inspections, and technological integrations. For example, every year the agency has a goal of inspecting

100% of the businesses within its jurisdiction. The fire prevention and suppression division combine to accomplish this task. During these fire and life safety inspections businesses are inspected for presence of and maintenance of required fire suppression systems such as fire extinguishers, hood and duct systems, and fire sprinklers. There are a number of additional factors, all pertaining to compliance with California Fire Code and local building ordinances, such as proper ingress and egress (emergency exits), examination of electrical hazards, utility hazards, storage, and ensuring that the business being conducted is appropriate for the building construction and zone location of the building. Additionally, home/residential inspections are conducted if requested. Approximately 10-20% of business inspections are found to have a correctable violation, thus reducing the probability of an incident.

Familiarity of a structure, the businesses type and its contents (material and human) are a secondary benefit to fire and life safety inspections. While conducting these inspections, fire suppression crews have the ability to preplan even the smallest business in the city. In terms of business inspections, each of the ten fire districts is divided into three smaller zones (1, 2 and 3). Each zone is assigned to one of the three shifts within a given district and the zone assignments are rotated each year. Therefore, if an officer or crew member works in the same district for three years they will have effectively inspected and become familiar with 90% (approximately 10% of businesses require inspections from a fire prevention specialist due to contents or business type) of the businesses within their first due response zone. While the inspection alone reduces the probability of an incident, having an officer with preplan knowledge of businesses in their first due response zone will reduce the consequences of an incident.

The second factor contributing to risk assessment categorization is consequence. In regard to risk assessment, it is important to remember that the term consequence refers to the effect an incident has on the community as a whole. For example, medical emergencies that occur with very high frequency will have consequences to one person. Even if the consequence is grave (cardiac arrest), it is not as significant, in terms of consequence, as an emergency that impacts the community. A moderate earthquake, which generally occurs with very low frequency, will have significant impact on the community even if no lives are lost, as it will cause loss in personal, public, and private arenas. Therefore, outcome severity refers to the potential negative impacts a hazard occurrence may have on a community relative to people, property, the environment, economic stability, and overall community resilience. Furthermore, in the three-axis risk assessment, consequence does not pertain to the effect an incident has on the agency, as this is quantified when analyzing impact.

As a reminder, when determining consequence, four primary considerations were made:

1. Life Safety- potential for loss of life or serious injury
2. Economic Impact- property loss, income loss, loss of historic or irreplaceable assets

3. Environmental Impact- irreparable or long-term damage to the environment
4. Psychological Impact- decreased moral/social function, increased fear, or alterations in lifestyle.

To specifically address consequence in regard to structures or occupancies, a secondary set of seven considerations were made. Therefore, each property has been assessed for risk factors including:

1. Building Occupants- number and demographics of occupants
2. Community Impact- community reliance on the occupancy
3. Construction Features- building age, building construction and fire suppression systems
4. Building Usage
5. Building Contents- materials such as hazmat and fire loading
6. Number of Stories
7. Square Footage.

The agency is not currently plotting buildings into a geographic information system (GIS) system and does not yet have an integrated data system that would allow for risk assessment to specific buildings. This is an identified goal, as the agency is upgrading its computer aiding dispatch system (CAD), California fire and incident reporting system (CFIRS) program and inspection software. The goal is to build a more flexible platform with ease of data input and extraction. Rather, the agency currently applied these considerations to buildings across all occupancy types.

When assessing consequence, it is important to give consideration the presence of any and all modifying/mitigating factors that have a positive or negative affect on the significance of a risk. In other words, a factor will either increase or reduce an incident's outcome impacts (consequences). Factors such as properly maintained sprinkler systems, available automatic external defibrillators (AED) or a trained emergency response team (ERT) will all reduce the consequence of an incident. Furthermore, the agency's use of pre-plans will decrease the consequence and risk. Pre-plans are reports conducted on target hazards within the jurisdiction. They give detailed information on fire and non-fire related risk of a structure, as well as, outline initial and long-term tactics and strategies should an incident occur. Conversely, presence of hazardous materials, physically impaired occupants, or high fire load would increase the consequence of an incident.

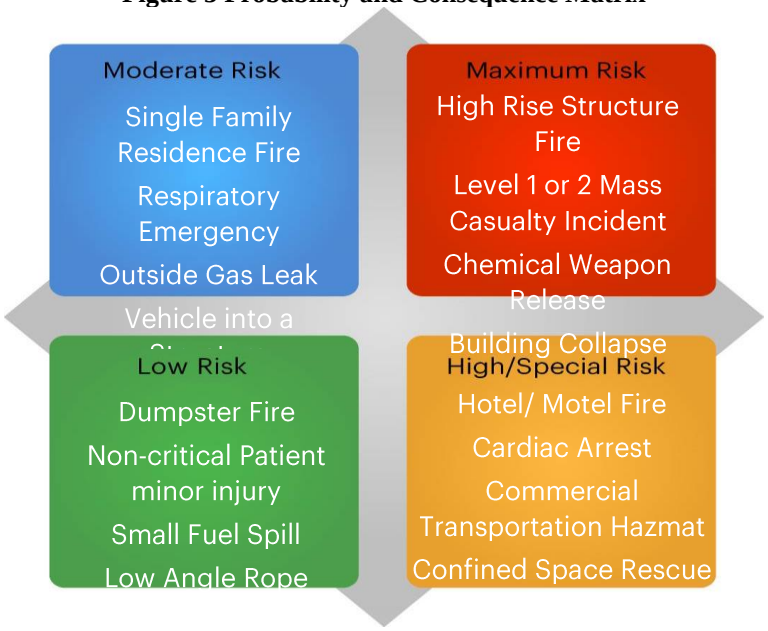
The third and final factor when assessing risk is impact, which is a measure of the demand an incident has on agency resources. For example, fire risks include response to incidents involving vehicles, dumpsters, single family residences, motels or high-rises. Though each of these incidents requires some form of fire suppression actions, the tactics and strategies for mitigating these events vary greatly; therefore, the number of resources required range greatly. The more resources required to terminate an incident, the greater the impact the incident has on the agency.

Furthermore, agency impact examines the draw down effect on the community's remaining coverage resources and the agencies abilities to mitigate congruent incidents. For instance, a working structure fire at a strip mall (high risk) would be a two-alarm structure response, utilizing six engines, two trucks, one medic unit, one light and air unit, and one battalion chief (BC). These resources, relatively speaking, would be committed to that event for an extended period of time. During that time frame, the agency would have two engines, one light and air unit, and one medic unit available to cover the city. This is approximately 50% of the Effective Response Force (ERF), based on critical tasks, needed to control and terminate a single family (moderate risk) structure fire.

An important dynamic of risk assessment that deserves acknowledgement is the inverse relationship between probability and consequence. High probability/routine incidents such as medical calls, alarm activations and gas/odor investigations generally result in smaller consequences, as losses are minimal if any and the frequency of these calls allows for greater agency preparation. Conversely, low probability events have the potential for significant loss or consequence. For example, structure fires are relatively infrequent in comparison to medical complaints; however, the financial burden, loss of irreplaceable items, loss of potential jobs, revenue or income, and loss of jobs make the consequence high. Likewise, activation or automatic fire alarms are a frequent (very high probability) event with low consequence. Earthquakes or a large hazardous materials incident, on the other hand, may be an infrequent event but would represent a large potential for loss of life and property. With an understanding of the different levels of probability, consequence and impact, proper strategic planning with respect to risk management and resource deployment can take place.

After the various factors of a risk were analyzed, it was placed into one of four categories: Low, Moderate, High/Special, or Maximum.

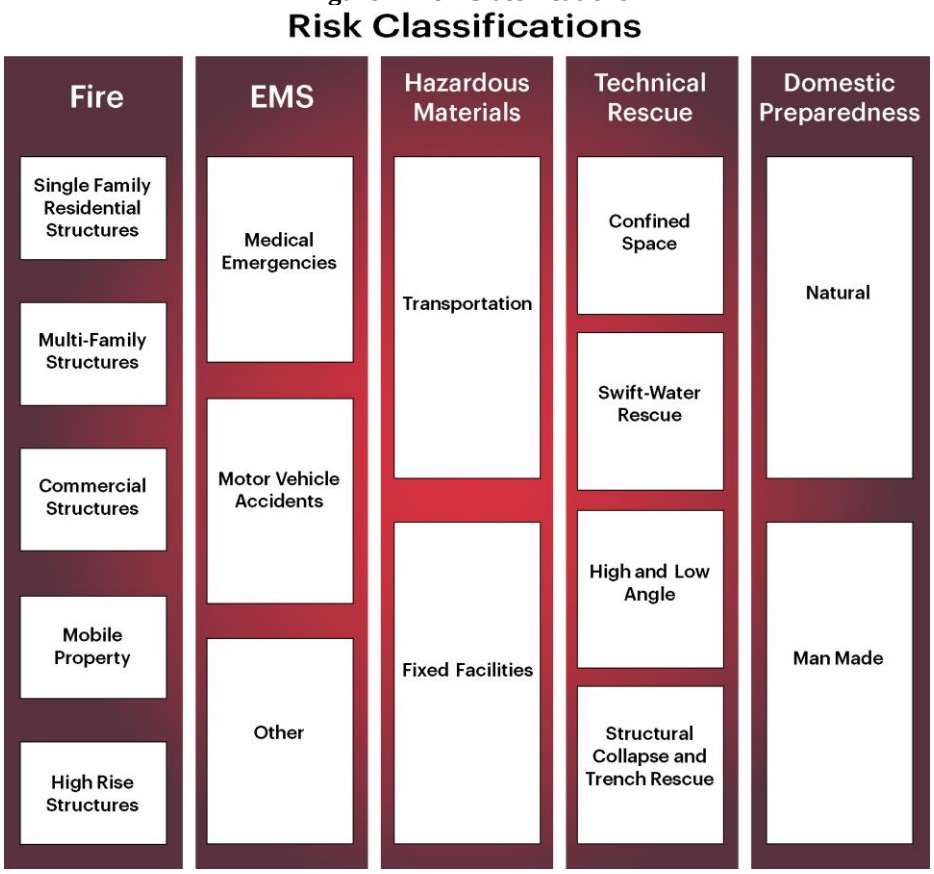
Figure 3 Probability and Consequence Matrix



Classifying Risk

The next step is to conduct an examination of risk, specific to various response classifications. These are risks prevalent in the community to a degree that the agency has pre-defined response/training programs or divisions in place to mitigate and respond to such risk. The prevalence of these risks allows them to be grouped into one of five classifications; these classifications include fire suppression, emergency medical services (EMS), hazardous materials, technical rescue, and domestic preparedness. For the purpose of this document, non-fire related calls will include EMS, hazardous materials, technical rescue, domestic preparedness, and all other service calls. See below for illustration of the five classifications of risk within the agency's jurisdiction.

Figure 4 Risk Classifications



Source: adapted from the Commission on Fire Accreditation International (5th Edition)

The following is a brief summary of the overall risk mitigated by the agency in recent years. The SCFD was dispatched to 8,720 calls for service in calendar year 2014, 9,296 calls in calendar year 2015, 9,396 calls in calendar year 2016, and 9,080 in calendar year 2017. The combined four-year total was 36,458 calls for dispatch. During that same 4-year time period there were approximately 25,457 (69.8%) EMS calls, 1,917 of those calls involved injuries from a vehicle accident, 737 (2%) fire calls, 643 (1.8%) hazardous materials calls, 149 (0.4%) rescue calls, and 9,450 (25.9%) of calls classified as other. It is important to note that the rescue call data is almost solely comprised of elevator emergencies. A very low number of vehicle accidents require the use of hydraulic extrication equipment. Furthermore, calls classified as other include lift assists, false alarms, and smoke detector activations in both residential and commercial properties. A greater statistical detail of the agency's four-year summary of risk can be seen in the following table. Likewise, further detail in regards historical frequency of response is offered in the description of each risk classification and in the description of the response zones.

Table 7 Four-Year Summary of Risk (2014-2017)

1/1/2014 8:00:00 To 1/1/2015 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	29	1.8%	21	2.6%	17	1.4%	17	1.9%	26	2.6%	21	2.8%	11	1.0%	9	1.9%	9	3.3%	18	3.2%	178
Rupture/ Explosion	1	0.1%	1	0.1%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	1	0.2%	0	0.0%	0	0.0%	4
EMS/ Rescue	1,127	70.1%	516	65.0%	815	68.1%	675	75.0%	775	76.4%	570	75.6%	806	70.0%	321	68.7%	154	56.2%	371	66.3%	6,130
Hazardous Condition	31	1.9%	12	1.5%	30	2.5%	7	0.8%	11	1.1%	8	1.1%	18	1.6%	10	2.1%	6	2.2%	6	1.1%	139
Service Call	164	10.2%	99	12.5%	192	16.0%	108	12.0%	104	10.2%	49	6.5%	155	13.5%	27	5.8%	15	5.5%	31	5.5%	944
Good Intent	53	3.3%	32	4.0%	52	4.3%	38	4.2%	30	3.0%	29	3.8%	55	4.8%	22	4.7%	14	5.1%	37	6.6%	362
False Call	197	12.3%	110	13.9%	90	7.5%	52	5.8%	69	6.8%	73	9.7%	101	8.8%	77	16.5%	73	26.6%	96	17.1%	938
Special	6	0.4%	3	0.4%	1	0.1%	3	0.3%	0	0.0%	3	0.4%	5	0.4%	0	0.0%	3	1.1%	1	0.2%	25
Total Calls Per Station	1,608		794		1,197		900		1,015		754		1,151		467		274		560		8,720

1/1/2015 8:00:00 To 1/1/2016 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	39	2.2%	12	1.4%	19	1.5%	10	1.0%	20	1.7%	18	2.4%	40	3.4%	8	1.4%	6	2.1%	21	4.5%	193
Rupture/ Explosion	0	0.0%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.2%	0	0.0%	1	0.2%	4
EMS/ Rescue	1,254	71.3%	556	65.4%	925	74.4%	714	72.2%	936	78.3%	551	73.8%	804	69.1%	390	69.4%	153	53.1%	266	57.1%	6,549
Hazardous Condition	31	1.8%	14	1.6%	25	2.0%	16	1.6%	15	1.3%	15	2.0%	15	1.3%	7	1.2%	11	3.8%	5	1.1%	154
Service Call	170	9.7%	90	10.6%	150	12.1%	150	15.2%	138	11.5%	46	6.2%	149	12.8%	40	7.1%	23	8.0%	36	7.7%	992
Good Intent	61	3.5%	36	4.2%	50	4.0%	35	3.5%	16	1.3%	22	2.9%	55	4.7%	27	4.8%	19	6.6%	18	3.9%	339
False Call	197	11.2%	139	16.4%	70	5.6%	62	6.3%	69	5.8%	94	12.6%	98	8.4%	89	15.8%	72	25.0%	118	25.3%	1,008
Special	6	0.3%	3	0.4%	2	0.2%	2	0.2%	1	0.1%	1	0.1%	3	0.3%	0	0.0%	4	1.4%	1	0.2%	23
Total Calls Per Station	1,758		850		1,243		989		1,195		747		1,164		562		288		466		9,262

1/1/2016 8:00:00 To 1/1/2017 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	22	1.3%	21	2.4%	32	2.3%	12	1.1%	20	1.7%	11	1.3%	20	1.8%	18	3.4%	11	3.4%	11	2.1%	178
Rupture/ Explosion	1	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.1%	1	0.2%	1	0.3%	0	0.0%	4
EMS/ Rescue	1,121	68.0%	586	67.7%	1,004	73.6%	726	68.2%	901	78.6%	598	72.1%	793	71.8%	362	67.7%	163	50.9%	304	58.7%	6,558
Hazardous Condition	32	1.9%	14	1.6%	26	1.9%	6	0.6%	13	1.1%	19	2.3%	17	1.5%	9	1.7%	21	6.6%	7	1.4%	164
Service Call	209	12.7%	114	13.2%	154	11.3%	195	18.3%	100	8.7%	58	7.0%	123	11.1%	39	7.3%	14	4.4%	41	7.9%	1,047
Good Intent	74	4.5%	23	2.7%	40	2.9%	39	3.7%	32	2.8%	27	3.3%	39	3.5%	22	4.1%	15	4.7%	19	3.7%	330
False Call	187	11.3%	106	12.3%	102	7.5%	86	8.1%	79	6.9%	116	14.0%	110	10.0%	84	15.7%	91	28.4%	135	26.1%	1,096
Special	3	0.2%	1	0.1%	6	0.4%	1	0.1%	1	0.1%	0	0.0%	2	0.2%	0	0.0%	4	1.3%	1	0.2%	19
Total Calls Per Station	1,649		865		1,364		1,065		1,146		829		1,105		535		320		518		9,396

1/1/2017 8:00:00 To 1/1/2018 8:00:00

	Station 1		Station 2		Station 3		Station 4		Station 5		Station 6		Station 7		Station 8		Station 9		Station 10		Total Incidents per Category
Fire	29	1.8%	21	2.4%	20	1.6%	18	1.8%	14	1.3%	21	2.5%	15	1.3%	10	2.1%	6	2.0%	16	3.6%	170
Rupture/ Explosion	0	0.0%	0	0.0%	1	0.1%	1	0.1%	0	0.0%	0	0.0%	1	0.1%	0	0.0%	1	0.3%	2	0.4%	6
EMS/ Rescue	1,167	70.8%	583	65.5%	907	72.4%	728	72.4%	824	77.4%	590	70.1%	817	71.7%	297	61.1%	173	56.9%	283	63.3%	6,369
Hazardous Condition	41	2.5%	19	2.1%	25	2.0%	19	1.9%	20	1.9%	17	2.0%	19	1.7%	7	1.4%	9	3.0%	10	2.2%	186
Service Call	169	10.2%	102	11.5%	157	12.5%	135	13.4%	97	9.1%	69	8.2%	129	11.3%	48	9.9%	13	4.3%	20	4.5%	939
Good Intent	57	3.5%	29	3.3%	43	3.4%	28	2.8%	30	2.8%	21	2.5%	53	4.7%	32	6.6%	21	6.9%	20	4.5%	334
False Call	182	11.0%	133	14.9%	99	7.9%	74	7.4%	79	7.4%	122	14.5%	103	9.0%	91	18.7%	75	24.7%	94	21.0%	1,052
Special	4	0.2%	3	0.3%	1	0.1%	2	0.2%	1	0.1%	2	0.2%	2	0.2%	1	0.2%	6	2.0%	2	0.4%	24
Total Calls Per Station	1,649		890		1,253		1,005		1,065		842		1,139		486		304		447		9,080

Modifying Factors

When assessing risk, it is important to recognize and calculate any modifying/mitigating factors that would influence the probability and/or consequence of risk. A modifying factor can either increase or decrease the probability of an event occurring or can increase or decrease the consequences of an event. For example, fire sprinkler systems can prevent a fire from growing beyond its point of origin, reducing fire damage to a structure. Therefore, building that contain fire sprinklers may be seen has having a lower risk because fire sprinkler systems reduce the consequences of a fire. Conversely, the agency has freight trains that carry hazardous material through its jurisdiction. Rail cars containing large volumes of hazardous materials moving through a city present an increased probability of risk for a release of a chemical into the atmosphere. The agency's known modifying factors influencing the risk assessment process are listed below and include Fire Prevention programs, Fire Flow and Water Supply Factors, Building Classification, Supplemental Resources, and Transportation Risk.

Fire Prevention Programs

The agency's commercial and residential fire prevention programs are aimed at reducing the instances of fire, as well as minimizing consequences or loss. While it may be obvious to most, the best way to survive a structure fire is to prevent it in the first place, followed by early detection and warning of occupants, and installation of fire sprinklers. These three factors combined reduce the loss of life and keep small fires from becoming big fires. Smoke detectors or other alarm activating devices gives occupants valuable time to exit the structure. Additionally, early activation of 911 gives firefighters a greater chance of beginning fire suppression tactics earlier during an incident. Lastly, properly operating fire sprinkler systems generally keep fires confined to the materials of origin.

First and foremost is prevention, and the agency has set the goal of providing fire and life safety inspection to 100% of businesses within its jurisdiction. The Fire Prevention and Hazardous Materials Division of the SCFD organizes the Community Risk Reduction efforts through community education programs, sound engineering practices, active code enforcement, and comprehensive inspection programs.

The division maintains a vital role as the technical consultant to the fire department, the City, and the business community, advising on site construction, process installation, and the safe use and handling of hazardous materials as outlined in federal, state and local regulations. There is a plan checking service that assures the incorporation of proper life safety standards, as well as code compliance in all new construction in the city. The Fire Prevention and Hazardous Materials Division supervise and coordinate over 9,900 Fire and Life Safety Inspections annually. Under this program, all commercial occupancies are

inspected at least once a year and residential occupancies are inspected upon request. In each of the last three years the agency has inspected at least a 95% of the businesses within its jurisdiction.

The Fire Prevention and Hazardous Materials Division is responsible for implementing the public education program. This includes programs at schools, senior centers, community events and festivals, and with the business community. The division participates in about 10 major events annually, making contact with approximately 25,000 people in the community. All preschools, elementary, and middle schools are visited on an annual basis to promote fire safety and reduce the incidence of intentional or accidental juvenile fire starting. Fire and life safety hazards that are corrected through this process have an impact on probability by potentially reducing the number of incidents.

The agency also has a residential smoke detector program in place to ensure residential structures have functioning smoke detectors. Regardless of the nature of an incident, which is most often medical in nature, the presence and operability of a smoke detector is checked when there is a call for service to a residential structure. Crews will either install or replace a smoke detector that is not present or broken or will install batteries in detectors that are found to have low or missing batteries. These smoke detectors and batteries are supplied by the agency at no cost to the public.

The residential smoke detector program decreases consequences of a fire in two ways. First, it ensures the occupants will be warned of the presence of smoke, which increases an occupant's chance of safely exiting a structure by providing early warning thus reducing life loss. Secondly, a fire will have less time to grow as the earlier notification will give fire suppression crews a valuable early start on an event. This will reduce the extent of damage to a structure, as there is a greater chance fire crews will arrive on scene early in a fire's growth phase. On December 15, 2016, the agency added a drop-down list to its incident reporting system to capture data for its residential smoke detector program.

Although the agency has had a residential smoke detector program for over 20 years, data entry for this was entered into the narrative portion of CFIRS reports and was unsearchable. Therefore, there is only one year worth of data. From December 15, 2016 to December 31, 2017, there were 4,824 calls for service to residential structures. On 1,766 of those calls the smoke detector was found to be fully operational. However, either a smoke detector or battery was installed on 271 (6%) of those calls, ensuring the occupants had a functioning alarm device to alert them of an emergency.

The National Fire Protection Association (NFPA) continues to state that fire sprinkler systems could easily have controlled most of the catastrophic fires in the incipient phase. An important factor to consider as the agency enforces the 2010 California Fire Code (CFC) and the 2010 California Building Standards Codes. A key component in the 2010 code adoption is the addition of residential fire sprinklers in all new one-and two-family dwellings and townhouse construction statewide. For many years,

installation of fire sprinkler systems has only been required in office buildings and multi-family dwellings (i.e. apartments). In addition to previously required structures, the code requires fire sprinklers in all newly constructed buildings or for alterations or repairs to existing buildings involving demolition of more than 50% of the existing floor area or removal of 50% or more of the existing ceiling material, the building shall meet the sprinkler requirements for a newly constructed building (CFC 903.2.3). The city's adopted amendments to the CFC that requires automatic fire sprinkler systems in all new and existing buildings greater than 1,000 square feet in area for habitable buildings, and greater than 5,000 square feet in area for non-habitable buildings.

An evaluation of Santa Clara's building inventory revealed 549 high-risk building as they relate to the building fire risk categories as shown in the following table. The number of high-risk buildings is typical of other medium-sized San Francisco Bay Area technology-based cities. Of the 549 high-risk building occupancies in the agency's jurisdiction, all except 56 facilities are protected by automatic fire sprinkler systems, which are proven to effectively reduce consequence severity in most building fire events where those systems have been properly designed, installed, and maintained. Therefore 90% of potential high risk buildings have a modifying factor that would reduce the consequence of a fire in that structure. No specific data on the number of lower risk buildings with automatic fire sprinkler systems was available. Locations of these buildings can be seen on map 13.

Table 8 Building Use Classification and Risk Category

Building Occupancy Classification	Number	Risk Category
Assembly (A-1, 2, 2.1, 3)	400	***High/Special***
Educational (E-1, 2, 3)	56	***Maximum***
Factory Group (F-1, F-2)	33	***High/Special***
Hazardous (H-1, 2, 3, 4)	25	***High/Special***
Institutional (I-1.1, 1.2, 3)	5	***High/Special***
Residential (R-1) Multi-family transient	30	***High/Special***
Total	**549**	

Source: City of Santa Clara Fire Department

Lastly, the agency has a preplan program targeted at increasing the efficiency of mitigating efforts and reducing risk at known target hazards. An occupancy known to contain a large number of occupants or hazardous materials is considered a target hazard. An emergency at such a facility would then have the potential for a large loss of life or property. Therefore, a preplan is conducted and a "complex card" of the facility is created. The card will include items such as locations of Fire Department Connections (FDC), horizontal and vertical standpipes, wharf hydrants, utility shutoffs, stairwells, and detailed floor plans.

These complex cards afford responders the ability to make quicker and more accurate decisions on the tactics required to mitigate an emergency, which can contribute to the reduction of consequences in one of these structures. The agency is in the process of developing a clearly defined policy on triggers for the development of a complex card. Currently, the agency has 222 cards and is in the process of developing more. (zone 1=54, zone 2=27, zone 3=24, zone 4=16, zone 5=8, zone 6=16, zone 7=40, zone 8=17, zone 9=11, and zone 10=9).

Fire Flow and Water Supply

A reliable public water system providing adequate volume, pressure, and flow duration in close proximity to all buildings is a critical factor in mitigating a community's building fire risk. The City of Santa Clara has its own water utility that purchases water from the San Francisco regional Hetch Hetchy water system as a member of the Bay Area Water Supply and Conservation Agency (BAWSCA). The city has also adopted NFPA-recommended water supply standards for firefighting.[1]

The evaluation of water supplies needed once a structure has become fully involved is known as fire flow and is a vital component of assessing fire risk. The fire flow evaluation does not address other equally important issues such as occupant risk and content vulnerability to fire. Fire flow requirements are factored into the risk assessment. Santa Clara follows California Fire Code minimum fire flow requirements and total water supply needed for existing structures and other anticipated fire locations. The absolute minimum fire flow established by SCFD and enforced by the city's Water & Sewer Utility is 1500 gallons per minute (GPM) at 20 pounds per square inch (PSI) residual for 2 hours in residential zones — although those numbers are subject to change based on variables including type of construction, purpose of building, sprinklers, etc. See page 588 of the 2010 CFC for specific details.

The city's water system is capable of providing 87 million gallons per day with a storage capacity of 27.3 million gallons. A daily average of 18.9 million gallons of water is distributed to over 25,000 users through 315 miles of pipeline. The water distribution system includes approximately 3,470 fire hydrants. Flow rates were not available for this study; however, there are no areas of the city with substandard fire flow.[2] This excellent water storage and distribution system is a significant factor influencing a reduction in consequence severity in the event of most building fires.

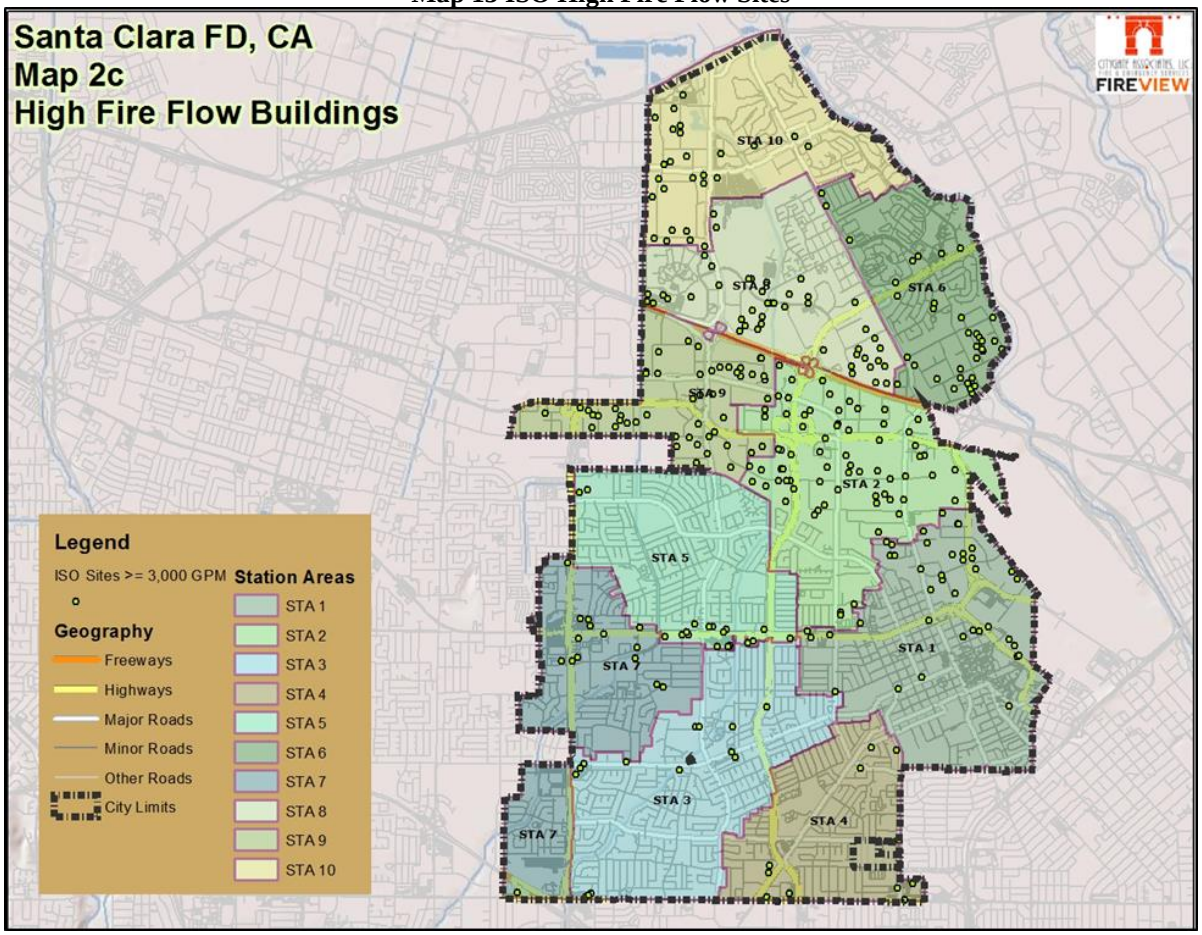
However, there are a number of structures that are known to have a high needed fire flow. One of the factors evaluated by the Insurance Services Office (ISO) is "Needed Fire Flow" (NFF), which is the amount

[1] NFPA 1142 – *Standard on Water Supplies for Suburban and Rural Fire Fighting* (2012 Edition)
[2] Source: City of Santa Clara Water and Sewer Utilities Department

of water that would be required in gallons per minute (GPM), if the building were seriously involved in fire. For Santa Clara, the ISO database identifies 2,339 buildings evaluated, of which 892 have a needed fire flow of 1,500-3,000 GPM, 277 have a needed fire flow of 3,000-5,000 GPM, and 70 buildings have a needed fire flow of 5,000 GPM or more.

This is a significant amount of water to deploy for firefighting purposes, and a major fire at any one of these buildings would require a substantial commitment of the department's on-duty force. There are two opposing factors to consider. First is hydrant spacing and flow. The agency's water distribution system is designed, with few exceptions, so that hydrants are spaced no more than 300 feet apart. With all apparatus carrying 600 feet of large diameter hose (5-inch supply line), 3 hydrants should be available to an incident. Therefore, the water supply system should be able to provide a minimum of 4,500 GPM to an incident. However, the second factor to consider in relation to fire flow is the expected flow a firefighter can deliver on an emergency scene. Using a generally accepted figure of 50 GPM per firefighter on large building fires, a fire in a building requiring 2,000 GPM (6,000 square foot structure 100% involved) would require 40 firefighters, which is nearly double the Department's current initial ERF of 21 firefighters for a building fire, and one more than the department-wide minimum daily staffing level. A significant fire in any of these buildings would likely have high consequence severity. The agency does not currently have these building locations inputted into its CAD. Consequently, this factor is not influencing a structure fire response to these locations.

Map 13 ISO High Fire Flow Sites



Building Classification

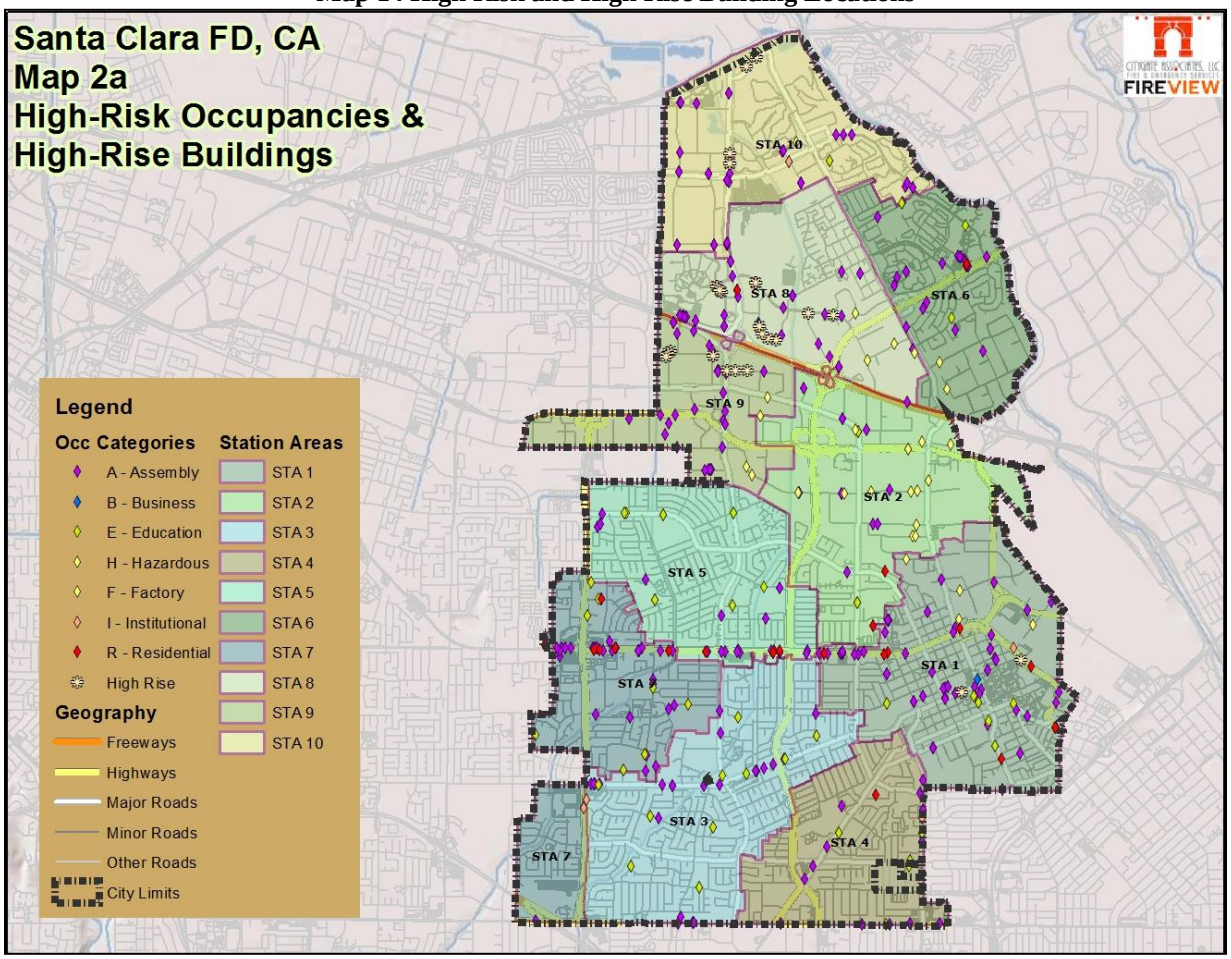
<u>High-Rise Buildings</u>

High-rise buildings present unique fire risks, particularly as they relate to the number of potential building occupants, the time required to evacuate those occupants in the event of an emergency, and the time required to get firefighters and fire suppression equipment to the floor(s) involved in fire. Furthermore, according to the agency and NFPA 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Department*, 41 personnel are required for the critical tasking of a high-rise structure. There are 39 personnel on duty but generally 31 (two alarm assignments) is the most personnel assigned to a single event. Once a request is received, there is a 15-minute response time for Mutual Aid. Calls for mutual aid can be prolonged, as these calls are not made until the initial unit has arrived on scene. Therefore, it can be assumed that the effective response force will not arrive on scene for at least 20 minutes, which is eight minutes more than the standard recommends. A high-rise building is defined by the California Building Code as any building having floors used for human occupancy more than 55 feet

above the lowest floor having building access, except hospitals,[3] and by the California Health and Safety Code and California Fire Code as any building having floors used for human occupancy located more than 75 feet above the lowest level having building access, except hospitals.[4]

Santa Clara has 22 high-rise buildings, as depicted on the following map. All high-rise buildings in Santa Clara exceed eight stories in height, which exceeds the reach of the department's aerial devices. There are two high-rise buildings located in district one and the remainder are on the north side of the jurisdiction in districts eight, nine, and ten. All high-rise structures within the agency's jurisdiction are protected by fire sprinkler systems and contain standpipe systems.

Map 14 High Risk and High Rise Building Locations



Critical Facilities

Critical facilities are those that are vital to the agency and are deemed structures, if damaged, would hinder the agency's ability to deliver expected services to the community or would impact the community on a large scale. The City of Santa Clara's 2011 Annex to the 2010 Santa Clara County Local Hazard

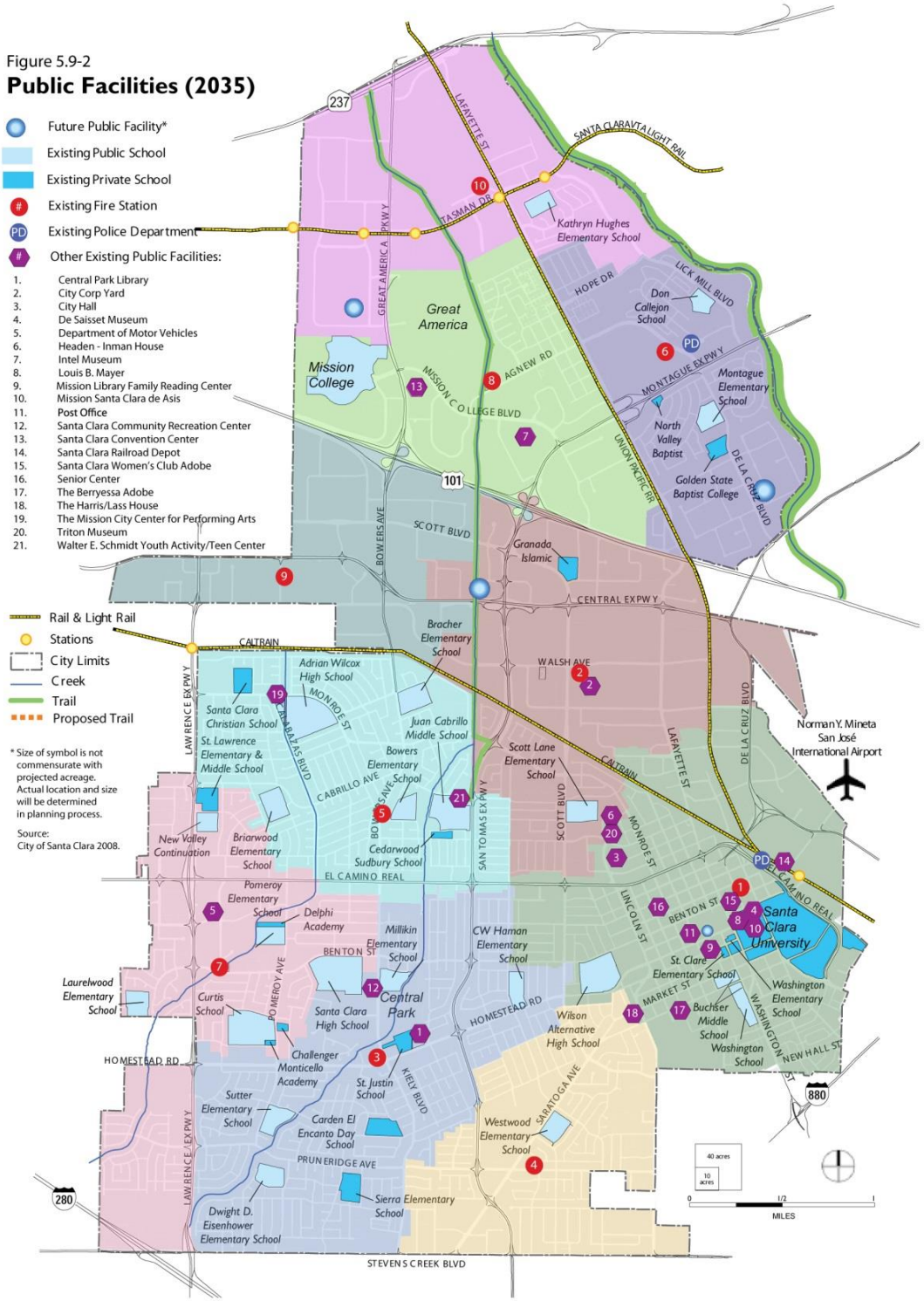
[3] California Building Code Section 10-28.030 (2013 Edition)
[4] California Health and Safety Code Section 13210; California Fire Code Section 202 (2013 Edition)

Mitigation Plan (LHMP) identifies 80 critical facilities. These facilities provide essential public or community services, or are high-value cultural or historical sites. A fire occurrence with significant consequence severity in one or more of these facilities would adversely impact essential public or community services. These facilities include: Silicon Valley Power Plant (SVP) and its substations, the city owned power station that supplies power to all residents and commercial occupancies in its jurisdiction; City Corp Yard, which includes central garage and radio shop, the Emergency Operations Center (EOC), and other public utility services.

Schools were also identified as a critical facility due to the large impact a school closure would have on the community. Santa Clara is home to over 24 schools, grades kindergarten or higher, responsible for the education of over 32,000 students. This includes three colleges: Santa Clara University (SCU), Mission College, and North Baptist College. There are also 14 elementary schools, 4 middle schools, 2 High Schools and 3 continuation schools. In addition to the preceding list, there are over a dozen preschools and day cares.

Lastly, Historical Buildings were considered structures that raised the overall consequence of loss. The agency is rich in tradition and values its historically significant buildings. These structures are irreplaceable and a loss of one of them would result in a great loss to the community. There are over 324 historical buildings recognized by the city of Santa Clara. These buildings also represent a significant increase of difficulty in structural firefighting. Many of these buildings are Victorian-style architecture, which allows for vertical fire travel due to the balloon frame construction. Furthermore, they present greater challenges in getting to deep seated fires located behind lath and plaster.

Map 15 Critical Public Facilities



Supplemental Resources

Another factor that can contribute to reducing the amount of loss during an incident is the use of supplemental resources. If mitigating an incident is based on completely critical tasks, then it is safe to assume that having more trained personnel available will expedite the completion of those tasks. There are two primary supplemental resources that the agency can use in mitigating an incident: The Volunteer Division and the Community Emergency Response Team (CERT). Although there is no accurate way to predict the quantity of people who will respond to an incident, historically, an average of four volunteer division personnel will respond. The agency has not experienced an event where CERT members were called upon. The following are more details regarding these programs.

The Volunteer Division currently consists of 55 volunteers and is overseen by an assistant chief, who reports to the Deputy Chief of Operation. There are three battalion chiefs and total of six captains and six lieutenants. There is one captain and one lieutenant assigned to each of the six reserve companies. Volunteer reserves go through a training program directed by the SCFD training division. Once they have become California State Firefighter I certified, they are fit tested for self-contained breathing apparatus (SCBA) and are cleared to engage in firefighting activities under the supervision of a suppression captain. They respond to an emergency in one of two ways. Either they are voluntarily assigned to an apparatus in the form of a "station ride-along" or they are paged to respond to the scene on all structure and hazardous materials responses. While their response times are not tracked and there is no accurate method to determine how many volunteers will respond to an incident, they are a valuable supplementation to an incident response force. Volunteer reserves have managed critical tasks on incidents including rehab, filling SCBA bottles, deploying exposure lines, and salvage/overhaul. Their skills and presence reduce the consequences of an incident by reducing property loss.

The second supplemental resource comes from the agency's CERT members. These are registered emergency support volunteers who have received the Federal Emergency Management Agency's (FEMA) CERT training. As a community service, firefighters from the agency train participants in neighborhoods and workplaces to be part of the CERT team. The agency has trained over 1500 residents and there are over 942 members in the CERT database. The CERT program is designed to help the citizens of Santa Clara to be self-sufficient after a major disaster, as well as help others in their community. A major earthquake in the City of Santa Clara will cause damage to homes, roads, and other structures. Electricity, gas, water and phone service may be interrupted. Local resources will be overwhelmed and the need for a well-trained civilian work force can be invaluable. Through CERT, organizations and trained volunteers can serve as first responders until professional forces arrive. This program is managed by the agency's Emergency Service Coordinator (ESC) and fire suppression personnel.

Transportation Risk

The various types of transportation routes found within the agency's jurisdiction have a strong influence on all five of the risk classifications. The high number of major (freeway and expressway) roadways that allow for high rates of speed and the dense volume of vehicles combines to increase both the probability and consequence of an incident. Furthermore, the passenger and freight trains that pass through the jurisdiction have a similar effect on risk.

Vehicle Risk

By sheer quantity of vehicles, on the more than 350 miles of road within the city limits, the probability of a vehicle accident occurring is increased. A vehicle accident would most likely result in one or more patients requiring treatment and transport to the hospital. The same factors would also contribute to an increased probability of vehicle fires. Additionally, the increased rates of speed on the freeways and expressways would most likely escalate the severity of those injuries and create a greater probability of a technical rescue situation, such as a trapped victim, requiring forcible entry tools for extrication. Likewise, Hazardous Materials are allowed to be transported on all Freeways, Expressways, and Arterial roads, creating the potential for the mitigation of a spill or leak. Transportation risk factors include motor vehicle, railway, bus and aircraft traffic in, through and over the agency's jurisdiction.

Four highways transect all or parts of Santa Clara, including U.S. 101 and State Routes 82, 237, and 280. These highways carry an annual average daily traffic volume (all vehicles) of approximately 527,000 vehicles, as shown in the following table. The San Tomas and Lawrence Expressways are also primary transportation routes carrying an additional 438,000 vehicles through Santa Clara daily. The city also has approximately 320 miles of surface roadway.

Table 9 Average Annual Daily Traffic Volume

Travel Route	Crossing	AADT[1]	Peak Hour Traffic
Highway 82	Lawrence / San Tomas	38,000	3,700
Highway 101	Great America Pkwy	197,000	14,500
Highway 237	Great America Pkwy	130,000	11,700
Highway 280	Stevens Creek Blvd	162,000	12,500
San Tomas Expressway	Homestead Road	185,000	N/A
Lawrence Expressway	Central Expressway	253,000	N/A
Total		**965,000**	**42,400**

[1] Average Annual Daily Trips

Source: California Department of Transportation / County of Santa Clara

The following is a map and description of the types of streets and standards found throughout the agency's jurisdiction.

Map 16 Roadway Network

Freeways

Freeways are high-speed travel ways included in the state and federal highway systems and under the jurisdiction of the California Department of Transportation (Caltrans). Their purpose is to carry regional through traffic. Typical freeway speeds are 55 to 65 miles per hour, and rights-of-way are 200 to 250 feet wide, with additional width at interchanges. Access is provided by interchanges with typical spacing of one mile or greater. No direct access is provided to adjacent land uses. The existing freeways in the city are:

- U.S. Highway 101
- State Route 237
- Interstate 280

Expressways

Expressways are typically designed to serve regional traffic with speeds of 45 miles per hour and limited access. Crosswalks are provided at all signalized intersections on the expressway system. Wide shoulders or parallel routes are generally provided. The expressways serving the city are:

- Lawrence Expressway
- San Tomas/Montague Expressway
- Central Expressway

Major and Minor Arterial Streets

Major and minor arterial streets primarily serve through traffic not served by expressways or freeways, and typically include transit vehicles. These streets have travel speeds between 35 and 45 miles per hour and are generally 2 to 4 travel lanes. Both types typically have dedicated left-turn lanes, traffic signals at major intersections, and parallel street parking. Through traffic and transit on these streets is given signal priority. Pedestrians are accommodated with sidewalks and crosswalks. Arterial streets can provide bicycle facilities (such as striped lanes or separate paths) and should include sidewalks and street trees. Transit service is also emphasized, particularly on major arterials. Examples of major arterials are:

- De La Cruz Boulevard
- El Camino Real
- Kiely Boulevard/Bowers Avenue/Great America Parkway
- Scott Boulevard
- Tasman Drive

Minor arterials include:

- Lick Mill Boulevard
- Monroe Street
- Walsh Avenue
- Pruneridge Avenue
- Winchester Boulevard

Collector Streets

These streets provide traffic circulation for residential and commercial uses at travel speeds of 25 to 35 miles per hour. Typically, collector streets have two to four lanes and penetrate residential neighborhoods, distributing trips from the arterials into neighborhoods. They usually channel traffic from local streets to arterials. They also provide pedestrian and bicycle links between destinations and should include sidewalks and street trees. Example collector streets in the City of Santa Clara include:

- Calabazas Boulevard
- Forbes Avenue
- Los Padres Boulevard
- Market Street/Bellomy Street
- Pomeroy Avenue

All other streets not designated on the Mobility and Transportation Diagram are local streets. They equally accommodate automobiles, bicycles and pedestrians within the public right-of-way. Transit use and truck traffic, if any, is incidental. These streets are designed for lower traffic volumes and provide primary access for abutting residential and neighborhood commercial properties. Typically, these streets are 2 lanes and have a 40- to 60-foot right-of-way, with travel speeds of 25 miles per hour.

Rail Services and Mass Transportation

Passenger rail service to and within Santa Clara is provided by Amtrak (Sacramento–San-José Capitol Corridor and Seattle–Los-Angeles Coast Starlight), Caltrain, and Altamont Corridor Express (ACE). Long-term plans call for the Bay Area Rapid Transit (BART) to be expanded to Santa Clara through Milpitas and San José from the current terminus in Fremont. Two Union Pacific Railroad rail lines run through the city. The San Francisco line bisects the city in a generally east-west direction and generally forms a boundary between residential uses to the south and industrial uses to the north. The other rail line parallels Lafayette Street from State Route 237 in the north to El Camino Real where it turns to the east toward the airport. Operations on these lines include both passenger and freight service, with spur tracks in industrial areas. Spur tracks are a secondary track used by railroads to allow customers at a location to load and unload railcars without interfering with other railroad operations. Public transit buses, such as

Santa Clara Valley Transportation Authority (VTA), Caltrain, Ace shuttle and other bus routes are typically run on Minor artery streets or higher

Airports

Although the agency does not have jurisdiction over an airport, the Norman Y. Mineta San José International Airport is adjacent to the city's central eastern boundary. It supports approximately 127,500 flights transporting 9.5 million passengers and 25,000 tons of cargo annually. Many of its flight paths are directly over the agency's jurisdiction. This creates a potential for a catastrophic event, should a fixed wing aircraft be forced to land prior to the airport or crash. Furthermore, many of the hospitals in the area have helicopter landing pads. An incident involving an aircraft or helicopter has a very low probability of occurrence.

Hazardous Materials Risk

As stated earlier, both vehicle and cargo train incidents could lead to a release of a hazardous materials putting the public and environment at risk. In addition to fixed hazardous materials facilities, the agency also has significant transportation-related hazardous materials risk as a result of its extensive road transportation network including the previously mentioned roadways. The most serious hazardous materials incident that could occur might involve a release from a transportation accident. Commercial vehicles and vessels transport hazardous materials such as petroleum products, industrial wastes and toxic gases. Transportation-related hazmat incidents can range from a chlorine spill resulting from an overturned pool maintenance vehicle, a derailed train or a tank car. The following table summarizes the average annual daily truck traffic for Santa Clara's four highways.

Table 10 Average Annual Daily Truck Traffic

			Truck AADT by Axles				% Truck AADT by Axles			
Hwy.	Crossing	AADT[1]	2	3	4	5+	2	3	4	5+
82	Mathilda	819	674	66	7	72	82.30%	8.00%	0.85%	8.85%
101	Lawrence Expressway	7,783	4403	848	424	2,108	56.57%	10.90%	5.45%	27.08%
237	Hwy. 101	2,626	983	692	61	890	37.44%	26.35%	2.33%	33.89%
280	Hwy. 880	5,735	2747	998	275	1,715	47.90%	17.40%	4.80%	29.90%
Total		**44,731**	**16,963**	**8,807**	**2,604**	**767**	**4,785**	**51.92%**	**15.35%**	**4.52%**

[1] Average Annual Daily Trips

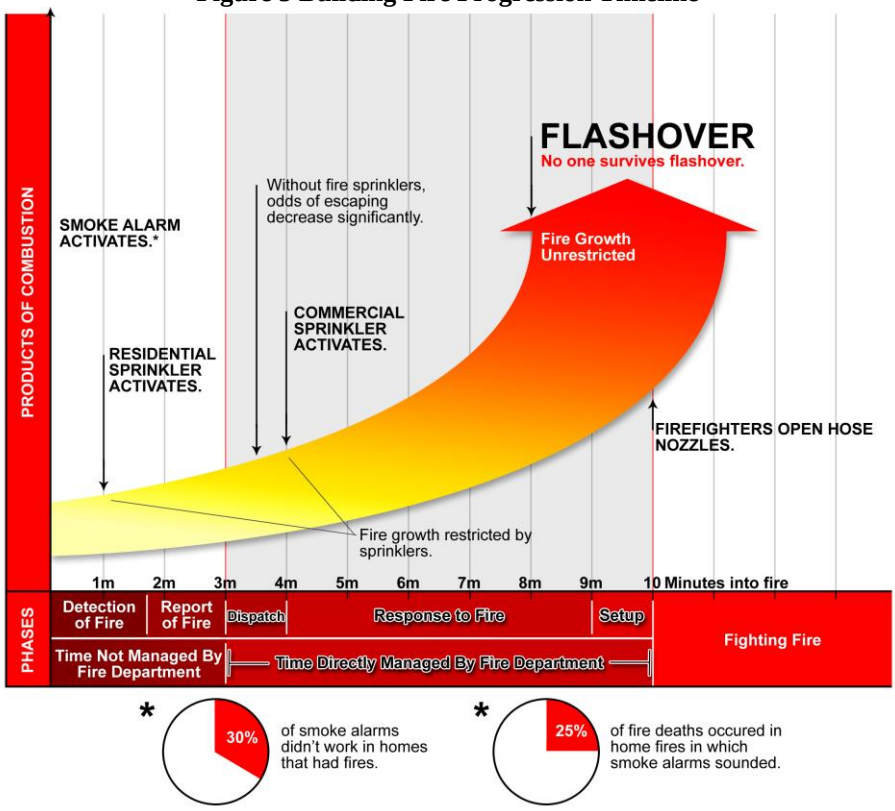
Source: California Department of Transportation / County of Santa Clara

Fire Suppression Services

According to a 2016 report issued by the National Fire Protection Association (NFPA), the leading cause of fires in homes and garages is cooking equipment at 46% and the leading behavior contributor to these fires was unattended cooking equipment. The second leading cause was heating equipment at 16%, most involved portable or space heaters. Smoking materials is the leading cause of civilian fire deaths at 22%, which was followed closely by cooking (19%) and heating equipment (19%). Child fire play, most commonly with lighters, accounted for one of every 10 fire deaths and was the leading cause of preschool fire deaths. U.S. fire departments responded to an estimated average of 358,300 home structure fires per year during 2010-2014, which represents three-quarters of all structure fires. A more alarming figure showed that 93% of all civilian fire deaths and 87% of all civilian injuries occurred in house fires. (NFPA, *Home Structure Fires*, M. Ahrens September 2016)

The following image illustrates the building fire progression timeline, and shows that a response time[5] of 8:00 minutes or less is necessary to stop a building fire before it reaches flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature. Survivability of a human in a room after flashover is extremely unlikely.

Figure 5 Building Fire Progression Timeline



Source: http://www.firesprinklerassoc.org

It is important to understand the development of a fire as it relates to risk management and the significant role it plays in critical tasking and performance standards. The NFPA states the four stages of fire growth within a structure are: incipient, growth, fully developed, and decay. Incipient phase is where ignition takes place and open flame is visible. During the ignition phase, fire has not spread beyond its initial source and is usually represented by a small amount of fire that can be controlled by a fire extinguisher.

The next stage is growth. There are a number of factors that can affect the growth of a fire, including fuel loading and air or oxygen supply. During this stage additional fuels ignite, as convection and radiation ignite more surfaces. The size of the fire increases and the plume reaches the ceiling. Hot gases collecting at the ceiling transfer heat, allowing all fuels in a room to come closer to their ignition temperature at the same time. At this point the fire transitions into the fully developed stage. This is where growth stage reaches its maximum and all combustible materials have been ignited. It is the hottest stage of the fire and most dangerous for any trapped victims.

Flashover is not a stage of fire but is a catastrophic event that often occurs as a fire transitions from the growth to the fully developed stage. It occurs as temperatures in a structure reach 1,000 to 1,200 degrees Fahrenheit. This is well above the ignition temperature of common combustibles in residences, thus immediately igniting all contents. At the point of flashover, the amount of heat produced makes human survivability highly improbable. Furthermore, the amount of lethal gases (carbon monoxide, hydrogen sulfide, cyanide) increases exponentially. People, even if not directly exposed to the fire, have a significant reduction in survivability.

The final stage of fire is decay. This is where a fire has consumed all available fuel or oxygen and begins to smolder or burnout. It is important to note that, without proper cooling, if the fire is in the decay stage due to a lack of oxygen but still has adequate heat to sustain combustion, an explosive event called a backdraft can occur when oxygen is reintroduced into the superheated environment (opening a window or door).

Fires that reach the end of growth and fully developed stage represent the most significant threat to life and property. Significant damage to a structure and its contents occur when the fire reaches this stage. The volume of water that would be required to extinguish a fire in this stage compounds the amount of damage caused by a fire. As a result, the service level is aimed at mitigating an event before this can occur. Applying water to a fire before it can reach this point is essential and drives response standards.

Therefore, the two conditions that the agency has the ability to control, which play a critical role in reducing and eliminating loss, are fire prevention and total response time. Fire prevention takes place in the form of public education, fire code development, fire code enforcement, and ensuring the public has early warning/detection devices. Total response time can be controlled through proper fire

station/apparatus/personnel placement, ensuring adequate density of those resources, incorporating technologies that aid in call handling and turnout times, and training. For that reason, the fire prevention programs and volume of sprinkler systems, preplans, and other hazard reducing factors were mentioned earlier as modifying factors pertaining to fire classification risk.

Fire Suppression Service Demand

In 2014, the agency responded to 8,720 requests for service or dispatches and the number of fire related calls was 182 (2.04%). In 2015, the agency responded to 9,262 requests for service and the number of fire related calls was 197 (2.12%). In 2016, the agency responded to 9,396 requests for service and the number of fire related calls was 182 (1.93%). In 2017, the agency responded to 9,080 requests for service and the number of fire related calls was 176 (1.93%). Therefore, during this period, the agency responded to 36,458 requests for service and the total number of fire related calls was 737 (2.02%). It is important to note that these numbers do not include alarm activations or other false alarms.

Table 11 Fire Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	30	39	23	29	**121**	16.42%
2	22	12	21	21	**76**	10.31%
3	17	21	32	21	**91**	12.35%
4	17	10	12	19	**58**	7.87%
5	26	20	20	14	**80**	10.85%
6	22	18	11	21	**72**	9.77%
7	11	40	21	16	**88**	11.94%
8	10	9	19	10	**48**	6.51%
9	9	6	12	7	**34**	4.61%
10	18	22	11	18	**69**	9.36%
Total	**182**	**197**	**182**	**176**	**737**	100.00%
Percentage of All Service Demand	2.09%	2.13%	1.94%	1.94%	2.02%	

Source: City of Santa Clara Fire Department incident records

Stations 1, 3, 5, and 7 have the highest number of fire responses. These are the districts that contain the greatest percentage of residential structures and an estimated population of 74,263 (62.13%). Between calendar year 2014 - 2017 the 4 stations combined responded to 380 (53.6%) of the 737fire responses. This suggests a relationship between residential population and increased incidents of fire related events.

Overall, the City of Santa Clara's building fire service demand is typical of other cities in California of similar size and demographics.

Fire Suppression Loss Data

Within the entire agency's jurisdiction in 2014 there were 182 total fires and 68 of those were documented to have a loss. Of the 182 fires, 71 were structure fires and 37 (52%) resulted in a total documented loss of $1,755,745. The remaining 111 fires were classified as other (garbage, shed, and vehicle fires) and 31 (28%) of these fires resulted in a loss of $400,805. The result was a combined total of 68 damaging fires for a loss, totaling $2,156,550 in damages.

In 2015, there were 197 total fires and 82 of those were documented to have a loss. 88 of those were structure fires and 44 (50%) resulted in a total documented loss of $2,266,885. The remaining 109 were classified as other (garbage, shed, and vehicle fires) and 38 (35%) of the "other" fires resulted in a loss of $311,575. The result was a combined total of 82 damaging fires for a loss, totaling $2,578,460 in damages.

In 2016, there were 182 total fires and 64 of those were documented to have a loss. 81 of those were structure fires and 37 (46%) of those structure fires resulted in a total documented loss of $2,640,245. The remaining 101 were classified as other (garbage, shed, and vehicle fires) and 27 (27%) of the "other" fires resulted in a loss of $248,000. The result was a combined total of 64 damaging fires for a loss, totaling $2,888,245 in damages.

In 2017, there were 176 total fires and 48 of those were documented to have a loss. 56 of those 176 fires were structure fires and 16 (29%) of those structure fires resulted in a total documented loss of $294,555. The remaining 120 were classified as other (garbage, shed, and vehicle fires) and 32 (28%) of the "other" fires resulted in a loss of $581,680. The result was a combined total of 48 damaging fires for a loss, totaling $876,235 in damages.

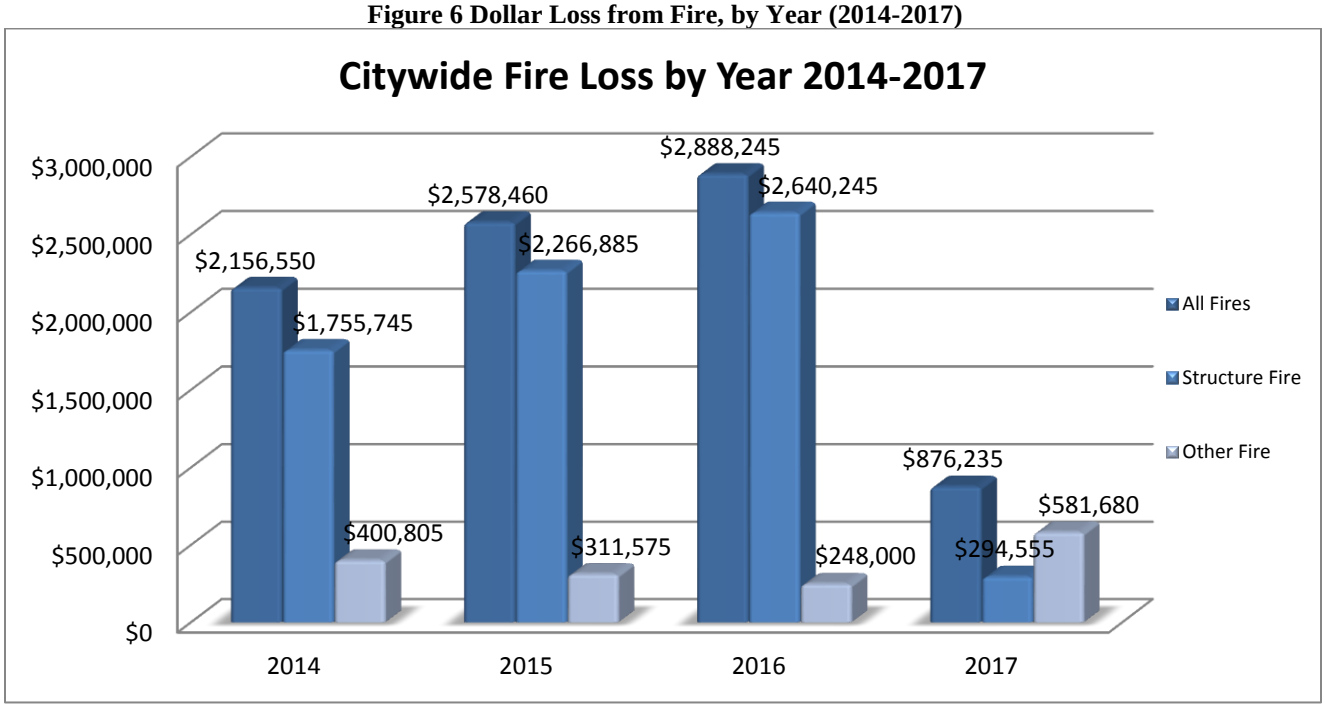
Therefore, in the four years studied (2014-2017), the agency mitigated 451 "other" fires and 128 (28.8%) resulted in a documented loss totaling $1,542,060. Furthermore, from 2014- 2017 the agency responded to 296 structure fires comprising 0.81% of total service demand over that same time period. 134 (45.3%) of those structure fires, 0.37% of the overall service demand, resulted in a documented loss of $6,957,430. The combined total of 737 total fires and 262 (134 structure and 128 other) damaging fires that resulted in a loss totaled $8,499,490 in damages. This is a relatively low number considering the current real estate market values. The total dollar amounts can be seen in the following graph.

Table 12 Citywide Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	182	68	$2,156,550	71	37	$1,755,745	111	31	$400,805
2015	197	82	$2,578,460	88	44	$2,266,885	109	38	$311,575
2016	182	64	$2,888,245	81	37	$2,640,245	101	27	$248,000
2017	176	48	$876,235	56	16	$294,555	120	32	$581,680
Total Loss	**737**	**262**	**$8,499,490**	**296**	**134**	**$6,957,430**	**441**	**128**	**$1,542,060**

The entire jurisdiction had a documented loss of $6,957,430 from structure firse and $1,542,060 in other types of fires for a total of $8,499,490 in fire loss over the four-year period. The majority of this structure fire loss took place in 2016 during two strip mall fires.

Figure 6 Dollar Loss from Fire, by Year (2014-2017)

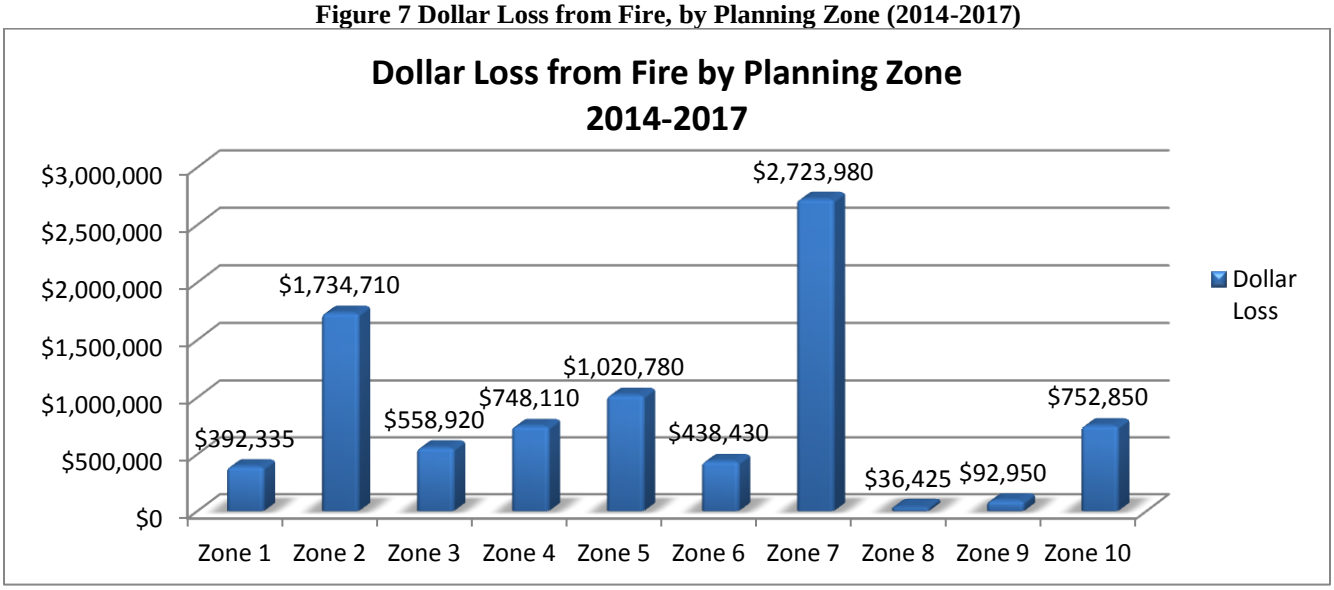


Another important factor to consider is during a similar period of time (2013-2015), the National Fire Protection Association (NFPA) identified the national average for dollar loss from a structure fire in 2015 to be $20,736.00 per event. The agency's average loss per structure fire from 2014 to 2017 was 23,505. This

is more than the national average. However, as previously stated, the property values within the agency's jurisdiction ($655 square foot) are four times higher than the national average of $167 a square foot.

According to the Santa Clara City General Plan 2010-2035, the agency protects an urban jurisdiction with over 44,166 (18,617 detached and 25,549 attached) residential units and 58,846,000 square feet of commercial / R&D / industrial &/Office property. The average cost of residential property in Santa Clara is estimated to be $655 a square foot and a median home value of $800,000 (Zillow) for an estimated $29 billion in home values. Additionally, with an average cost of commercial property at $180 per square foot (Zillow), there is an estimated $10.6 billion worth of commercial real estate property within the jurisdiction. Thus, the agency protects over an estimated $40 billion in property. A loss of under $2.9 million (2016) is a loss of 0.007% or less than seven thousandth of one percent. Furthermore, the NFPA documented that, nationally, fire related calls made up 4% of fire service call volume. However, the agency experienced nearly fifty percent less (2.08%) of its call volume related to fire, or half the national average, thus showing that the public and private fire prevention programs within the agencies jurisdiction are having a positive effect in preventing fires and reducing the community's loss. The following graph is a breakdown of Fire loss per response zone over the four year period (2014-2017). A more detailed summary of loss per response zone can be found in the response zone summaries.

Figure 7 Dollar Loss from Fire, by Planning Zone (2014-2017)



In summary the, the agency has seen a relatively stable amount of structure and non-structure fires. Although 2016 saw the highest amount of dollar loss, the majority of those losses took place during two incidents. Therefore, it is not necessarily accurate to conclude that the dollar loss per structure fire is increasing. Furthermore, in any one year, typically one to two of the structure fires in the city are

responsible for more than 75% of the annual fire loss. The majority (61.8%) of structure fires in the city occur in residential structures, which is over 10% higher than the agency's land use for this occupancy type. Consequently, further increasing public education efforts in fire prevention should be a focus of the agency.

Table 13 Structure Fires, Residential and Other (2014-2017)

Year	Number of Fires	Residential Fires	Percent	Other Structure Fires	Percent
2014	71	44	61.97%	27	38.03%
2015	88	49	55.68%	39	44.32%
2016	81	53	65.43%	28	34.57%
2017	56	37	66.07%	19	33.93%
Total	**296**	**183**	**61.82%**	**113**	**38.18%**

While property loss and damage to the environment remain a major factor determining impact and loss, the most critical factor remains impact to loss of life. Loss of life from fire remains a staggering statistic. Nationwide, the NFPA documented that 3,280 civilian fire deaths occurred in 2015. One civilian fire injury was reported every 34 minutes and one civilian fire death occurred every 2 hours and 40 minutes. There were similar statistics for 2014, 2016, and 2017. During those same four years (2014-2017), the agency has seen zero deaths related to structure fires within the jurisdiction. The summary of the agency's life and property loss compared to national standards is evidence that its commercial and residential fire prevention programs have achieved some success in its goal of reducing loss in fires.

A final note toward classification of risk in the suppression class is that the agency's standard response to residential structure fires is the same as the standard response to commercial structure fires. This is due to the fact that most commercial structures in the agency's jurisdiction have been built since fire sprinkler ordinances were adopted, and all new construction that may otherwise pose a significant risk is required to have a sprinkler system installed. Additionally, some residential structures protected by the Agency are larger than some commercial structures.

The following are the results of the risk categories for Fire Suppression Services:

Low Risk – includes detached garages, storage sheds, outbuildings, and similar buildings that pose a relatively low risk of harm to humans or the community if damaged or destroyed by fire. Vehicle fires, dumpster fires and small vegetation fires.

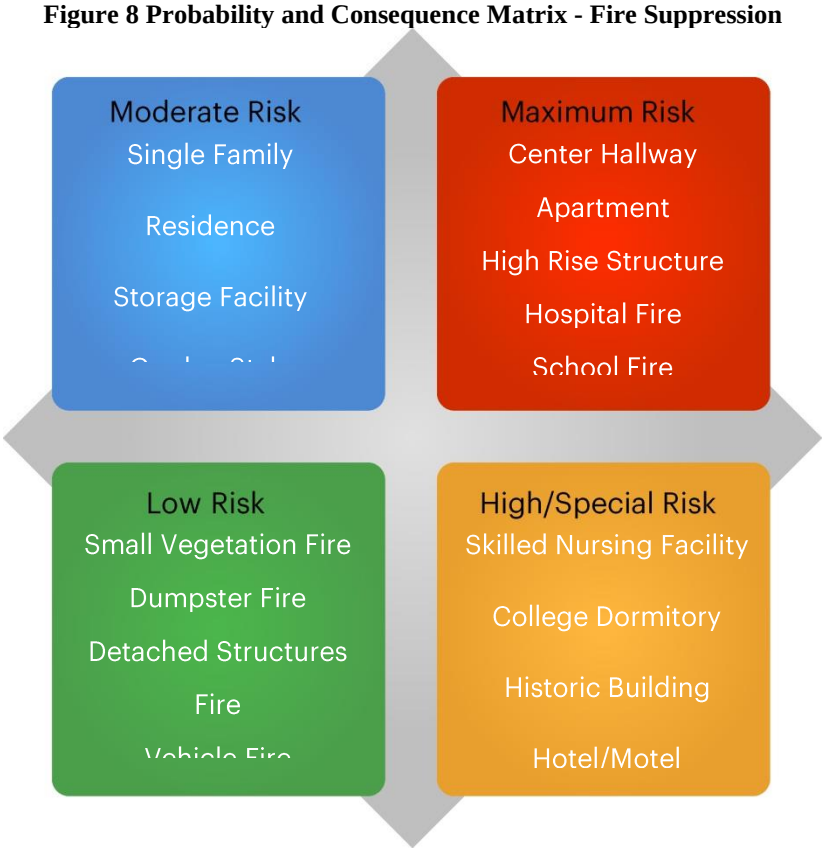
Moderate Risk – includes detached single-family or two-family dwellings, mobile homes, sprinklered commercial and industrial buildings less than 10,000 square feet without a high hazard fire load,

sprinklered storage facilities, garden apartments, off campus college housing, residential board and care, or similar buildings where loss of life or property damage is limited to the single building, and vacant/abandoned buildings,

High Risk – includes apartment/condominium buildings, hotel, motel, college dormitory, churches, skilled nursing facilities, and historic buildings. Nonresidential facilities include Critical Infrastructure/Key Resource (CIKR) facilities, commercial or industrial non-sprinklered buildings, non-sprinklered strip malls, commercial and industrial buildings more than 10,000 square feet with high hazard fire load and/or high-occupant load buildings with high fuel loading or hazardous materials, server farms, gas station, and electrical plant. Lastly, any commercial or multi family dwelling under construction, and similar occupancies with potential for substantial loss of life, unusual property damage, or financial impact.

Maximum Risk – includes buildings or facilities with unusually high risk requiring an ERF involving a significant augmentation of resources and personnel, and where a fire would pose the potential for a catastrophic event involving large loss of life and/or significant economic impact to the community. These include hospitals, schools, center-hallway apartments, and high-rise buildings.

Figure 8 Probability and Consequence Matrix - Fire Suppression



Fire Suppression Critical Tasking - Effective Response Force (ERF)

To clearly describe the fire suppression risk classification, a brief recap of the agency's demographics is provided. The apparatus and personnel within its 10 fire stations protect the agency's jurisdiction, which includes 18.4 square miles, 349.32 road miles and 119,525 people.

Critical tasking must be accomplished in a timely manner. The agency is responsible for ensuring responders are capable of performing all of the identified critical tasks. The agency utilizes aggressive offensive attack whenever possible. As previously stated the objective is to expeditiously place a hose line inside the building for extinguishment. If there is a possibility of a victim in need of rescue, then that hose line will be placed in a manner that best allows for effective rescue. The secondary goal is to confine the fire to the room of origin, thus minimizing loss of property. Utilizing aggressive offensive attack for fire suppression does not mean that the agency will risk the lives of personnel to save property that has already been lost or destroyed.

Each first-in apparatus, whether it is an engine or a ladder truck, is capable of performing fire suppression operations in their first-in district. The agency's service capacity fire risk consists of a minimum daily on-duty response force of 39 personnel staffing eight engines (three personnel), two trucks (four personnel), one rescue unit (one person), one hazardous materials unit (one person), two paramedic units (two personnel), and one battalion chief from ten fire stations. At an average service area of 1.8 square miles per fire station the agency has the highest ratio in the county of fire stations to square miles served. The closest agency is 2.4 square miles per station and the average in the county is 4.7 square miles per station. Furthermore, the SCFD compares favorably at with the Commission on Fire Accreditation recognition that nine square miles or more per station is detrimental to response times. The agency's average square mileage per station is 20% of that recommendation

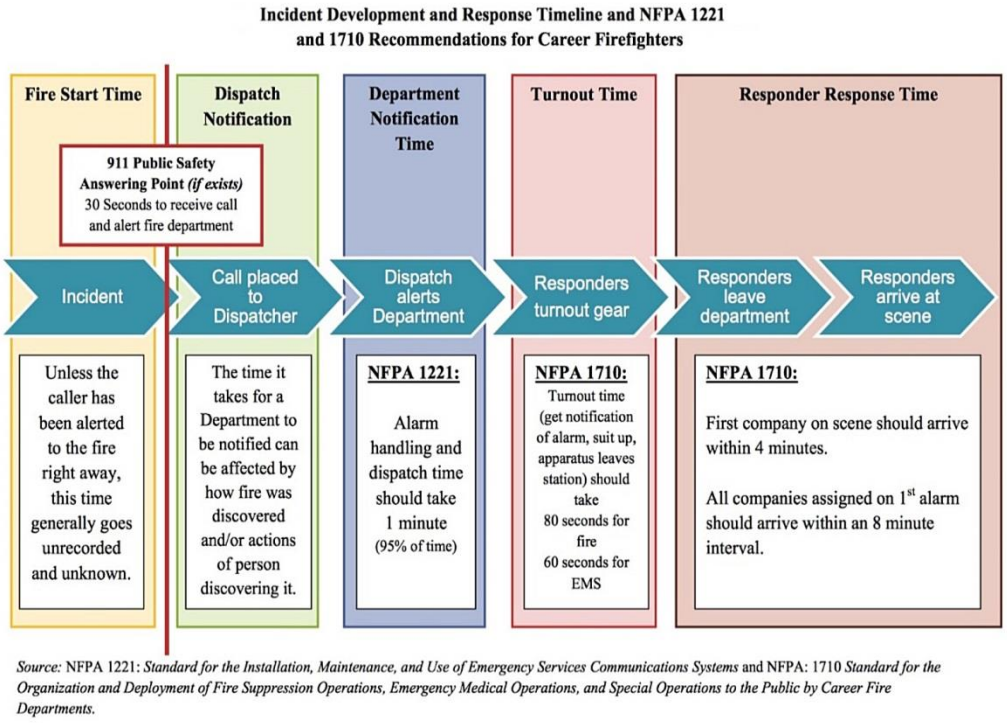
The size of a station's first due service area is an important factor when attempting to minimize response times. Total response time is divided into four stages:

1. Discovery- the time it takes for an emergency to be discovered and can be variable based on many factors
2. Alarm Handling- the times begins when the 911 operator answers the phone and ends when the fire station is notified
3. Turnout Time- is the period of time from when the fire station is alerted to the time the apparatus begins to leave the station
4. Travel Time- the time from when the apparatus leaves the station until it arrives on scene of the emergency

Fire department deployment, simply stated, is about the speed and weight of attack. Speed calls for first-due units (engines, trucks, and/or rescue ambulances) to be strategically located across a community, responding in an effective travel time. The goal of the initial attack crew is to reach the scene of a fire before significant damage to the structure or injury/death to an occupant can occur. Furthermore, these units are tasked with controlling emergencies without the incident escalating to second alarm or greater size, which unnecessarily depletes department resources. Weight is about multiple-unit response for serious emergencies, such as a room-and-contents structure fires. When the risk is large enough, it is essential that enough firefighters are assembled, within a reasonable time, to safely control the emergency, thereby keeping it from escalating to greater alarms.

The alarm handling and turnout times are the most controllable factors in the response. The greatest variable of the response matrix is travel time because it is one of the most difficult factors to predict or control. There is no way to predict when or where an emergency incident is going to take place. However, reducing the spacing of apparatus/ personnel/fire stations is an identifiable way to ensure travel times of less than 4 minutes are maintained.

Figure 9 Incident Development and Response Timeline, NFPA 1221 and 1710 Recommendations



Source: NFPA

For the SCFD, a structure fire response consists of four engines, a truck, a Light & Air Unit, a medic unit, one battalion chief, and the Volunteer/Reserves, for a total response force of 21 responders. When available, an Assistant Training Officer responds as well. Each subsequent alarm will consist of two

engines and one truck for a total of ten additional responders, which would be utilized on high risk structure fires. If, upon arrival, the structure fire is determined to be a "working" structure fire, County Ambulance is dispatched, Overhead staff is notified, and residual apparatus are re-positioned throughout the city to maintain effective coverage.

The SCFD has enough resources for a first and a second alarm fire. Any subsequent resources will respond from neighboring cities as part of the Santa Clara County Mutual Aid agreement. These resources will respond directly to the emergency or to Fire Station 2, where they protect the rest of the city. There are 15 additional suppression resources available within 15 minutes of travel time.

All Engines in the SCFD are Type I, carrying 500 gallons of water and having pumping capabilities of 1500 gallons per minute. Both first-in Trucks are quints, carrying water and hose in addition to the standard truck equipment.

First-in apparatus is deployed to provide adequate personnel to the scene of a working structure fire within 8 minutes from time of call to first apparatus arriving on scene. Additional resources are capable of responding and fulfilling the 2-in, 2-out requirement set forth by the Occupational Safety and Health Administration (OSHA) guidelines. Operations at the emergency scenes are accomplished systematically and in an overlapping manner. The success of an incident is gauged on the minimization of life, property, and environmental loss and the safe return of each firefighter to quarters.

Tasks may be assigned to both individuals and crews and are based upon knowledge, skills, abilities and resources of a particular crew or unit. However, crews are rarely split and asked to complete separate tasks. Examples of these tasks may include:

Critical Task assignments on Low or Moderate Risk Fire Suppression Responses:

- Confirmation of correct response assignments (working structure fire)
- Establishment of Incident Command
- Determination of fire attack type and location
- Establishment of attack lines / water supply / back-up and exposure lines
- Performing a primary and secondary search of the structure
- Providing for Two in Two out crew for interior attack (when required)
- Providing for Rapid Intervention Crew (RIC)
- Providing for Proper Ventilation
- Securing Utilities
- Establishment of a Safety Officer
- Establishment of Medical group / Rehab

Additional Critical Tasks for High or Maximum Risk Fire Suppression Responses:

- Establishment of Large Flow Fire Lines
- Establishment of additional Large Water Supply Lines
- Establishment of Lobby Control
- Placement of Arial Ladders
- Establishment of additional search and rescue / evacuation groups
- Provided an Incident Command Aid
- Provide for a Public Information Officer (PIO)
- Provide for management of elevator operations (when required)

A low risk fire may require a single engine company. For example, an isolated dumpster fire not endangering a structure is naturally contained and would likely cause minimal damage. But a vehicle fire on a roadway may require a second unit. A working single-family residence (moderate risk), currently receives a response of 21 personnel. The additional personnel are used as a secondary support for assignments, such as Salvage/Overhaul (three personnel) and refilling of SCBAs (one person). Furthermore, a second alarm would be initiated to meet the needs of a high risk (Motel) fire. The agency currently dispatches an additional 10 personnel when a second alarm is called to bring the total response force to 31. A third alarm is achieved through mutual aid and will bring 11-12 additional personnel, including one battalion chief, for a total of 43 responders. These numbers do not include a Deputy Fire Marshal that is called to the scene to conduct an investigation of working structure fires.

Table 14 Critical Tasks - Structure Fire ERF

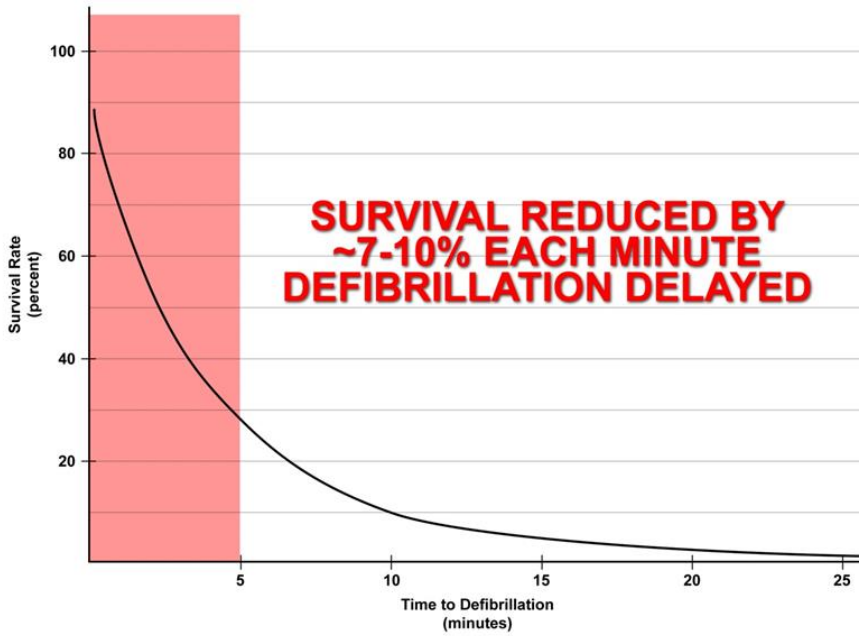
Critical Task	Low Risk	Moderate Risk	High Risk	Maximum Risk
Incident Commander	1	1	1	1
Operations			1	1
Water Supply/ Pump Operator	1	1	2	2
Fire Attack Hose Line	1	2	6	6
Search and Rescue/ Evacuation		2	2	8
2 in 2 out/ RIC Team		2	3	4
Back-Up Hose Line		2	3	4
Ventilation/ Truck Operations		2	3	4
Utilities		1	1	2
Ladder Operations		1	2	2
Safety		1	1	1
Firefighter Rehab/ Medical		2	2	4
Lobby Control/ Elevator (High Rise)				2
Total ERF	**3**	**17**	**27**	**41**

Emergency Medical Services

EMS risk can also be categorized as either a medical emergency resulting from a health-related condition or event, or traumatic injury. Emergency medical incidents have situations with the most severe time constraints, as spontaneous circulation can cease in almost every type of medical emergency. Incidents such as, cardiac arrest, respiratory emergencies, or a trauma that causes severe blood loss or damage to vital organs, interfere with oxygen supply to the brain. The brain can only live seven to eight minutes without oxygen. Therefore, it is critical that these conditions are treated as quickly as possible. Heart attacks make up a small percentage; drowning, choking, traumatic incidents, or other similar events have the same effect. Thus, from the time of 9-1-1 receiving the call, an effective deployment system should begin treatment of a patient prior to the 7- to 8-minute window where irreversible brain death occurs.

From an emergency medical service response perspective, the time objective typically is to begin medical intervention within the first six minutes. However, in the event of cardiac arrest, survivability dramatically decreases after four minutes without early intervention. The following graph illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. American Heart Association (AHA) states that survivability of acute cardiac arrest decreases by 7-10% each minute defibrillation is delayed. While early defibrillation is one factor in cardiac arrest survivability, other factors can influence survivability as well, such as early cardiopulmonary resuscitation (CPR) and pre-hospital advanced life support interventions. Thus, a direct correlation can be made between the survival rates of a patient in cardiac arrest (ventricular fibrillation) and early CPR, defibrillation, and advanced cardiac life support (ACLS) care.

Figure 10 Survival Rate vs Time of Defibrillation



The agency has focused its approach on improving survival rates from cardiac arrest and other emergencies in three ways:

- Aggressive CPR / EMS training: the agency provides mandatory CPR training for all fire and police personnel, as well as, offers CPR training to all city departments and members of the community. This includes approximately 700 people trained in hands only CPR and 200 city employees in Heartsaver AED. Furthermore, all members of the fire department participate in a minimum of 24 additional hours of EMT training provided in quarterly refreshers.
- Increased Staffing of Apparatus with ALS personnel: in the last three years the agency increased it numbers of ALS apparatus from four to seven available resources in early 2017 and added an eighth in October of 2017. The agency generally has a response time approximately five minutes faster than the county contracted ambulance provider, equating to a 50% increase survivability. More ALS resources within the agency's jurisdiction improves the ability to initiate ALS interventions.
- Automatic External Defibrillator (AED) technology has been strategically located with the agency's jurisdiction. All 14 front line fire apparatus responding from the ten fire stations contain a defibrillator. Additionally, AEDs are in 32 city facilities throughout the jurisdiction, plus 5 in Silicon Valley Power buildings, 5 police units, 7 fire department command vehicles, 5 reserve apparatus, 8 stadium bags, and 3 stadium vehicles

The agency has also begun training in a more coordinated and aggressive approach to treating cardiac patients with the "Pit Crew" concept of CPR. This is the practice of preplanning a cardiac arrest call where each member of a crew has designated tasks to perform during patient care. These tasks are decided upon prior to the call for service. This training is in its beginning phases, so the agency does not have data available to show comparative outcomes.

Emergency Medical Service Demand

Human factors continue to have the greatest influence over EMS risk. These factors include life decisions on diet, exercise, and other lifestyle choices that create health conditions requiring care for either acute/catastrophic conditions like a heart attack or chronic conditions leading to routine and frequent calls for service. Likewise, single decisions to drive an automobile intoxicated or under the influence of alcohol can literally and figuratively create a traumatic event requiring a call for service. In many of these events time to initial (EMS) care and time to definitive (hospital) care is a critical factor.

In 2014 the agency responded to 6,104 requests for emergency medical services, which accounted for 70% of total calls for service. In 2015 the agency responded to 6,508 requests for emergency medical services, which accounted for 70.3% of total calls for service. In 2016 the agency responded to 6,516 requests for emergency medical services, which accounted for 69.3% of total calls for service. In 2017 the agency responded to 6,329 requests for emergency medical services, which accounted for 69.7% of total calls for service. Therefore, during the period studied (2014-2017), the agency responded to 25,457 requests for emergency medical services, which accounted for 69.8% of total calls for service. The following table shows a breakdown of emergency medical service for each response zone. EMS service demand varies widely with the highest service demand in the southern half of the city.

Table 15 EMS Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	1,123	1,245	1,117	1,165	**4,650**	18.27%
2	515	553	584	578	**2,230**	8.76%
3	810	918	999	903	**3,630**	14.26%
4	673	713	725	727	**2,838**	11.15%
5	775	934	900	809	**3,418**	13.43%
6	569	547	592	589	**2,297**	9.02%
7	801	800	784	816	**3,201**	12.57%
8	320	387	356	293	**1,356**	5.33%
9	152	149	158	172	**631**	2.48%
10	366	262	301	277	**1,206**	4.74%
Total	**6,104**	**6,508**	**6,516**	**6,329**	**25,457**	100.00%
Percentage of All Service Demand	70%	70.3%	69.3%	69.7%	**69.8%**	

Source: City of Santa Clara Fire Department incident records

In addition to collecting EMS call volume, the agency has also begun tracking cardiac arrest data. The SCFD initiated a "Cardiac Data Collection" program in September of 2015. Prior to that time, data was collected on a case by case basis through identification of Cardiac incidents based on the disposition of individual incidents. This was a manual system and allowed no real evaluation of collective data points.

In total, the department has approximately 80-100 "cardiac incidents" per year. In the vast majority (approximately 70%) of these incidents the patient is found to be deceased on scene (pronounced via Basic Life Support criteria) or pronounced after being treated on scene (Advanced Life Support protocols).

With the implementation of a countywide "Patient Care Reporting" system (PCR), it has been reported that patient outcomes will be accessible to all providers. However, up to this point in time, it is important to note that the County EMS office has provided no support in the development of a program that tracks patient outcomes.

In 2016, the department had 82 documented cardiac incidents. A total of 25 (30%) were transported to a receiving hospital. Of this number, a confirmed survival rate of 6 can be verified. In 2017, the department had 52 documented cardiac arrest incidents. A total of 24 (46%) were transported to a receiving hospital. Of this number a confirmed 24 had Return of Spontaneous Circulation (ROSC) and a survival rate of 9 (17.3%) survive rate. However, as discussed earlier, Health Insurance Portability and Accountability Act HIPAA guidelines restrict the ability to get a true number of positive outcomes. In addition, it is important to note that a number of transported patients may not survive to discharge due complications related to their long-term health.

Factors influencing the probabilities of EMS within the agency's jurisdiction, as well as most communities, are predominantly a function of population density and demographics, violence, and vehicle traffic. Relative to population demographics, EMS risk tends to be higher among poorer and older populations. According to the 2014 U.S. Census, 10% of Santa Clara's population is 65 and older and 9% is at or below poverty level.[6] As would be expected, EMS risk is also higher in communities or segments of communities with higher rates of violence; however, the city has a very low incidence of violence. EMS risk is also higher in areas of a community with high volume vehicle traffic, particularly the areas with high traffic volume and high speeds, which is why transportation was discussed earlier as a factor contributing to increased probability and consequence toward emergency medical response. Santa Clara has four highways that transect all or parts of the city including U.S. 101, California State Highway 280, and State Routes 82 and 237. In addition, County Route G4 (Montague Expressway) transects the city from northeast to south. These freeways and expressways carry an annual average daily traffic volume of approximately 712,000 vehicles.[7] Of all contributing factors all but population has remained relatively stable. The gradual increase in population should provide a slight increase in EMS related calls for service.

Areas where there is evidence of increased EMS incidents include the following:

- Locations with frequent large events: Santa Clara Convention Center, Levi's Stadium, Buckshaw Stadium (Santa Clara University), and Great America Theme Park
- Locations with highest EMS incident frequency: Nursing homes, Santa Clara University, and Assisted an Unassisted living facilities

[6] Source: U.S. Census Bureau (2014)
[7] Source: California Department of Transportation

- Locations with high population density: Santa Clara University and Mission College Campus, High Density housing developments, and Primary and secondary schools
- Transportation network with increased EMS calls: Highway 101, San Tomas Expressway, Lawrence Expressway, El Camino Real, Central Expressway, Tasman Drive, Lafayette Street and Caltrain Railway

The following are the results of the risk categories for Emergency Medical Services:

Low Risk – includes single patient Basic Life Support (BLS) incidents, such as minor traumas such as slip and falls and isolated minor injuries to limbs, chronic conditions, lift assists and other non-critical patients defined by CAD as Alpha and Bravo type Calls.

Moderate Risk – includes single patient Advanced Life Support (ALS) incidents, such as a suspected stroke, cardiac emergency, respiratory emergency, diabetic and other altered level of consciousness incidents, and other critical patients defined by CAD as Charlie or Delta level call types.

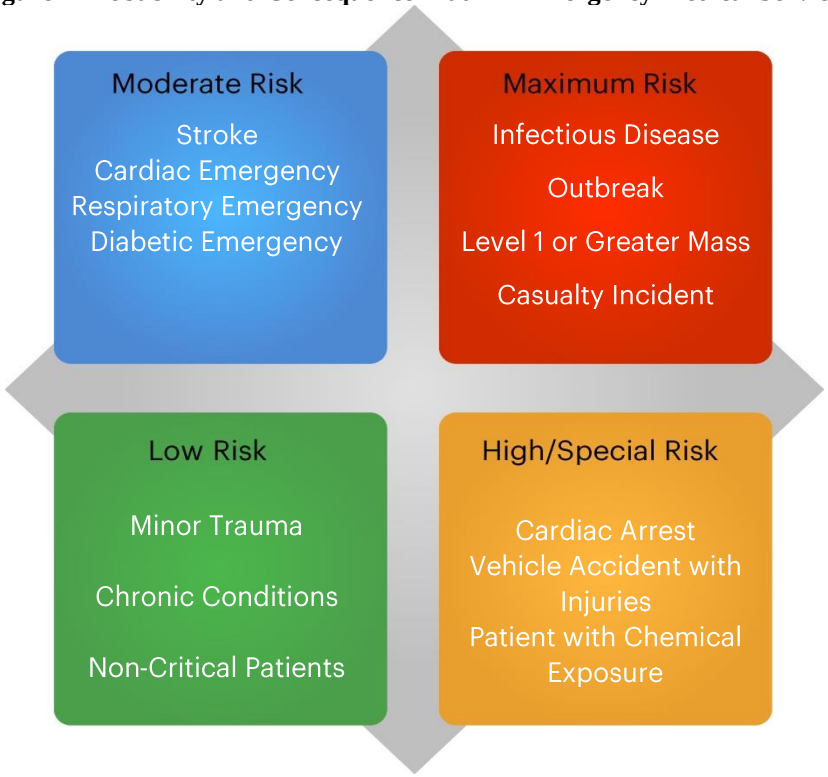
High Risk – includes single patient ALS / Special Circumstances, such as cardiac arrest, vehicle accident with injuries, chemical exposure and other critical patients defined by CAD as Echo level call types.

Maximum Risk – includes multiple patients, such as a Level 1 or greater Mass Casualty Incident or infectious disease outbreak, such as pandemic flu.

Mass Casualty Incidents can result from a variety of causes, some of which may fall into other classifications of risks covered in this report. For the purpose of EMS risk, the two major catalysts for a mass casualty incident (MCI) are intentional and accidental. For the purpose of this document, Mass casualty incident will be defined in accordance with a Level 1 activation of the Santa Clara County Multi Patient Management Plan (MPMP), defined as more than 5 patients requiring transportation. These calls would have a great impact on both the agencies resources, as well as county ambulances and potential overwhelm hospitals.

Infectious Disease events, such as H1N1 and Respiratory syncytial virus (RSV) or any similar infectious/communicable disease outbreaks would have an immense impact the EMS system and would have an effect on the agency in multiple ways. These incidents may occur where large volumes of patients are spread throughout the county and the agency's jurisdiction and can take place over the period of weeks or months. Conversely, the incident could take place in a relatively small space like a nursing home or college dormitory. These incidents would most likely not impact the agency in an acute or intense manner by depleting a large number of resources for a relatively short duration of time. Rather, they would have a lingering effect on the agency's resiliency or resistance to mitigate routine call volumes. The agency also has ambulances that have been pulled into the 911 transporting system, which, in normal operating times, is a service provided by a county contracted private company. During peak call volumes in the county, the agency's ambulances have been drawn into the 911 system and are then subject to the prolonged wait times at the hospital. This would also have a negative impact on the agency's absorption as there is only one reserve ambulance. Likewise, restoration would be negatively impacted if personnel and apparatus had to remain at the hospital for prolonged periods due to being unable to transfer care to hospital staff caused by lack of bed availability.

Figure 7 Probability and Consequence Matrix - Emergency Medical Services



Emergency Medical Services Critical Tasking - Effective Response Force (ERF)

Santa Clara's EMS service capacity consists of a minimum daily on-duty response force of 39 personnel staffing eight engines (six of which are ALS), two trucks, one rescue unit, one hazardous materials unit, two ambulances, and one Battalion Chief from ten fire stations. Eight of the ten response zones (1, 2, 3, 4, 5, 6, 7 and 8) have first due ALS resources. If an ALS resource is required in one of the first due BLS districts (9, and 10), the closer of the two ambulances is dispatched to provide ALS. If an agency ambulance is not available, then an ALS engine will be dispatched in its place. This provides ALS coverage for the entire city in accordance with County Emergency Medical Services contract and policy. All calls for medical assistance receive the closest fire department unit response, in addition to a private-sector contract paramedic transportation ambulance. This level of response provides a minimum of three firefighters to every EMS-related call for service. When deemed necessary by CAD, at least one of these three firefighters will be a paramedic.

All department response personnel are trained to either the Emergency Medical Technician (EMT) level capable of providing Basic Life Support (BLS) pre-hospital emergency medical care. Approximately 45 personnel are trained to the Paramedic level capable of providing Advanced Life Support (ALS) pre-hospital emergency medical services. Furthermore, there is a minimum staffing of 10 paramedics per shift. The ambulances are also part of the Santa Clara County Medical Health Mutual Aid System. They may be activated for transport by the county in cases where no county ambulances are available or are extremely

delayed. Fire personnel may activate, at paramedic discretion, the fire department ambulances for patients in need of immediate transport. This serves as a "security blanket" for citizens. Although only two are staffed, the agency has a total of four fire department ambulances for deployment

Santa Clara County Ambulance, operated by American Medical Response under an exclusive operating area contract with Santa Clara County, provides all BLS and ALS ambulance transportation with a minimum staffing of two personnel per ambulance, at least one of which is a licensed Paramedic and the other an Emergency Medical Technician (EMT). This is a performance-based contract with a 7:59 or less (minutes/seconds) response time requirement for the first responder agency (department), and an 11:59 or less (minutes/seconds) response time requirement for the ambulance, to all immediate priority calls within an urban response zone with 90% or better monthly reliability. Air ambulance transportation is available from Cal STAR (Gilroy) and Stanford Life Flight (Palo Alto).

As was mentioned earlier, initiation of EMS care for the resumption of circulation within six to ten minutes is critical. Likewise, time to definitive care is as important. In the event of Critical Trauma, time from injury to the operating room table needs to be under an hour (golden hour). Similarly, following Return of Spontaneous Circulation (ROSC), delivery to a hospital for clinical intervention is vital. The agency strongly supports its responder's decisions to continue care to the hospital on critical patients for continuity of care and greater level of care, leading to improved patient outcomes. There are four hospitals with emergency room facilities within ten miles of central Santa Clara, including Kaiser Permanente Santa Clara Medical Center, Santa Clara Valley Medical Center, O'Connor Hospital, and El Camino Hospital Mountain View. These hospitals are county approved acute cardiac and stoke centers and Santa Clara Valley Medical Center is also a Level 1 Trauma Center.

The agency is the primary responder for all emergency medical incidents. The Santa Clara Communications Center, under the direction of the Santa Clara Police Department, serves as dispatch center for all agency emergencies. All dispatchers are trained to provide medical and other emergent pre-arrival instructions prior to first responder arrival. They use licensed Priority Medical Dispatching system that prioritizes medical emergencies based on the answers to organized questions asked by the dispatcher. The Computer Aided Dispatching (CAD) system, utilizing medical typing, will recommend a response force for predetermined call types based on the information entered by the dispatcher. One additional factor worth mentioning is calls typed as a Bravo response will send agency responders code three (lights and sirens), while county ambulance will respond code 2 (lights only). In terms of response time, this creates a greater level of service and an increased disparity between the agency's and county ambulance response times. Likewise, it can be anticipated that the agency will have longer on scene times for these calls.

Tasks may be assigned to both individuals and crews and are based upon knowledge, skills, abilities and resources of a particular crew or unit. Examples of these tasks may include:

Critical Task assignments on Low or Moderate Risk Emergency Medical Responses:

- Confirmation of correct response assignments
- Establishment of Incident Command (when needed)
- Confirmation of patient acuity (critical, unstable, or stable)
- Request for additional resources
- Ensure county ambulance is responding properly (code 2 or 3)
- Perform primary and secondary assessment
- Initiate treatment modality according to county protocols
- Provide for responder, patient, and public safety
- Ensure proper use of personal protective equipment according to agency and county requirements to reduce risk of exposure

Additional Critical Tasks for High or Maximum Risk Emergency Medical Responses:

- Coordinate transport efforts with county supervisor (when needed)
- Ensure a minimum of 5 personnel for all critical and unstable patients
- Determine the need for any specialty services such as Hazardous Materials or Rescue

A three-person engine company or four-person truck company is an effective response force for many of the agency's single-stable patient events. However, a critical or unstable patient on a "working" medical call will require additional personnel due to the necessity to perform simultaneous patient treatment procedures vital to patient care. In these instances, a second unit is provided. More resources will be sent or requested for scene safety or mitigation of the emergency in the event of a vehicle accident, multiple patients, or MCI.

Table 16 Critical Tasks - Emergency Medical Services

Critical Task EMS	Low/Moderate Risk Stable Patient	High Risk Unstable Patient	Maximum Risk Multi-Casualty
Incident Commander			1
Scene Control	1	1	
Primary Care/ Patient Assessment	1	1	3
Supportive Care		3	2
Medical Group Supervisor			1
Triage Personnel			3
Treatment Personnel			3
Safety Officer			1
Pt. Movement/Litter Bearer			3
Transport	1 Ambulance	1 Ambulance	1 + Ambulance(s)
Total ERF	**2**	**5**	**17**

Hazardous Materials Services

The agency has a two-tiered approach to hazardous materials mitigation. Similar to fire suppression services, the Fire Prevention and Hazardous Materials Division inspects, educates, and enforces codes and regulations to reduce the probability of an event. The Fire Suppression division is the second tier, put into place to mitigate an emergency event.

The City of Santa Clara has been certified by the California Environmental Protection Agency (CalEPA) as a Certified Unified Program Agency (CUPA). The Fire Prevention and Hazardous Materials Division manage the CUPA program for the agency. The CUPA program takes a progressive approach on combining six different environmental regulatory programs into a singular comprehensive inspection program.

These six programs used to be implemented by several agencies. Consolidation of this program has helped with streamlining regulatory requirements and to assist the business community in achieving compliance.

The division's staff is trained to meet the state's minimum education requirements to implement the program. The SCFD CUPA Program is audited triennially to ensure that consistency is maintained and to evaluate performance relative to the standards.

The six CUPA programs that SCFD implements include:

- Hazardous Materials Business Plans (HMBP)
- Aboveground Petroleum Storage Tanks
- California Accidental Release Prevention Program (CalARP)
- Hazardous Waste Generator
- Tiered Permit (Hazardous Waste Treatment)
- Underground Storage Tanks

One of the CUPA programs is the California Accidental Release Prevention (CalARP) Program. This program focuses on facilities, due to their nature and volume, which may pose a significant threat to public health and safety if these chemicals are accidentally released. This program focuses on preventing a release from occurring through best management practices, maintenance programs, and training in the event of an emergency. Currently there are 5 CalARP facilities within the City of Santa Clara. One of these facilities has an Emergency Response Team (ERT) for their facility on site 24/7. The agency has a goal of performing annual training with that team and facility. A second facility has a modified ERT that is available 24/7, but not on site.

The Fire Prevention and Hazardous Materials Division implement the fire, industrial accident, and hazardous materials release investigations program. The agency currently staffs six trained investigators that implement this program. Furthermore, they are responsible for development of codes that minimized the public's risk from hazardous materials leaks, such as restricting the use and storage of hazardous Materials for industrial uses within 500 feet of existing residential use.

The Fire Suppression Division responds to a variety of incidents where a hazardous material(s) may be present. Each type of hazmat incident will require a different level of skill, detection/ monitoring/ mitigating equipment and personal protective equipment. A minor hazardous materials event may require a single engine company, while significant or maximum risk events would produce a much greater workload and demand a greater response. Not only would a large event trigger the response of additional personnel and equipment it would also dictate the need for specially trained personnel and specialized equipment.

Currently, every member of the agency is trained to the Hazardous Materials First Responder Operational (Hazmat FRO) level and is able to provide initial hazardous material incident assessment, hazard isolation, and support for the Hazardous Material Response Team. However, 36 personnel are trained to the Hazardous Materials Technician (HazMat Tech) level and 35 are trained to the Hazardous Materials Specialist (Hazmat Spec) level. Hazmat Techs are required to go through an initial 160 hours of state mandated training and a Hazmat Spec must complete a total of 240 hours of initial training and both will receive an additional 24 hours annually. The agency has set a target goal of having a minimum combination of 22 Hazmat Techs or Hazmat Specs on each shift. However, it has not made this a requirement for station and shift bid process. Additionally, other regional fire agencies also have Hazardous Material Response Teams available through the mutual aid system.

Hazardous Materials Risk Factors

The agency's hazardous material risk factors include fixed facilities that store, use, or produce hazardous chemicals or hazardous waste; underground pipeline(s) that transport hazardous materials; and aircraft, railroad, and vehicle transportation of hazardous materials into or through the city.

One of the programs is the Hazardous Materials Business Plan (HMBP) Program. The city currently has approximately 1,000 businesses that are currently subject to this requirement. Santa Clara's leadership in Silicon Valley manufacturing results in the city having an elevated hazardous materials risk compared to most other California cities, with more than 1,000 businesses with hazardous materials permits, especially in the Agency's industrially zoned areas (See Map on page 68 under city land usage), which is mostly located north of the Caltrain corridor. Any business that utilizes hazardous materials in quantities of more than 55 gallons, 500 pounds, and/or 200 cubic feet is required to have an emergency plan to mitigate any

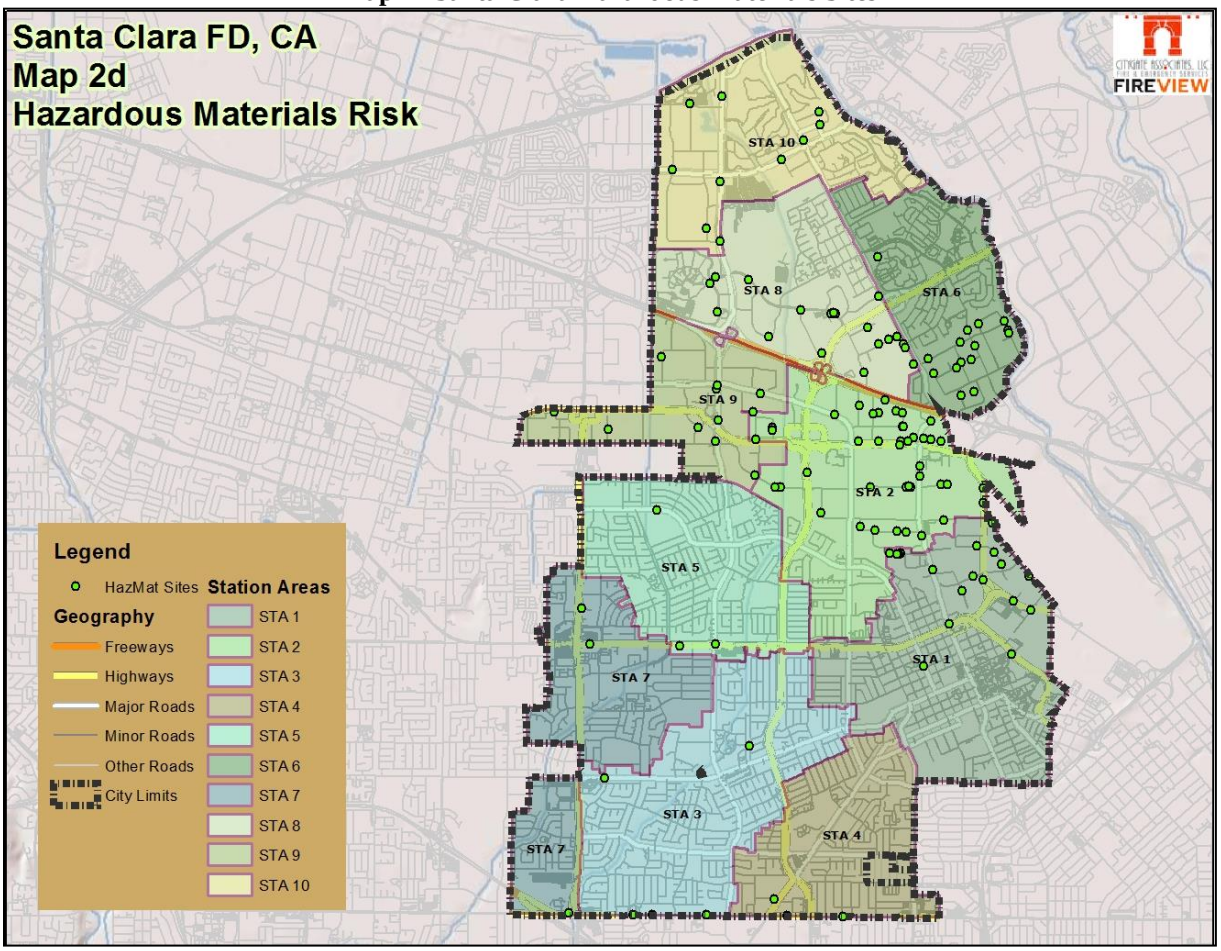
releases at their business. These facilities range from dentist offices and dry cleaners to semiconductor manufacturers such as Intel. Rather than being inspected by fire suppression personnel, each one of these facilities is required to be inspected by a Fire Prevention and Hazardous Materials Specialist at a minimum of once every three years.

Approximately three years ago, the agency transferred its HazMat Business HMBP catalog to an online version provided by the state, called the California Environmental Reporting System (CERS). The program requires the business to enter a number of informational fields. Some of the fields used by the agency's Hazmat Team include Safety Data Sheets (SDS) and the Site Plan. The SDS allows the team to see a list of onsite chemicals and all information pertaining to those chemicals. The Site Plan details building layout, location of hazardous materials, and other vital information. This information is currently accessible on the scene of an incident via the Engine 99 and Hazmat 99 tablets

If improperly handled, hazardous material generation, use, storage, disposal or transport is potentially hazardous to the environment and public health. Although there are many common businesses, such as auto body and machine shops, that generate hazardous materials, such as solvents and petroleum fluids, the facilities of highest concern are those used in semiconductor manufacturing, metal plating, printed circuit board production and a growing photovoltaic sector. Some of these factories use highly toxic gasses, such as arsine, phosphine, diborane, and hydrogen selenide in the manufacturing process. Most of the facilities that house, use, or produce hazardous materials are located in areas north of the Caltrain corridor.

Santa Clara has 60 buildings/facilities classified as hazardous occupancies or requiring a state or city hazardous material operating permit as shown in the following map.

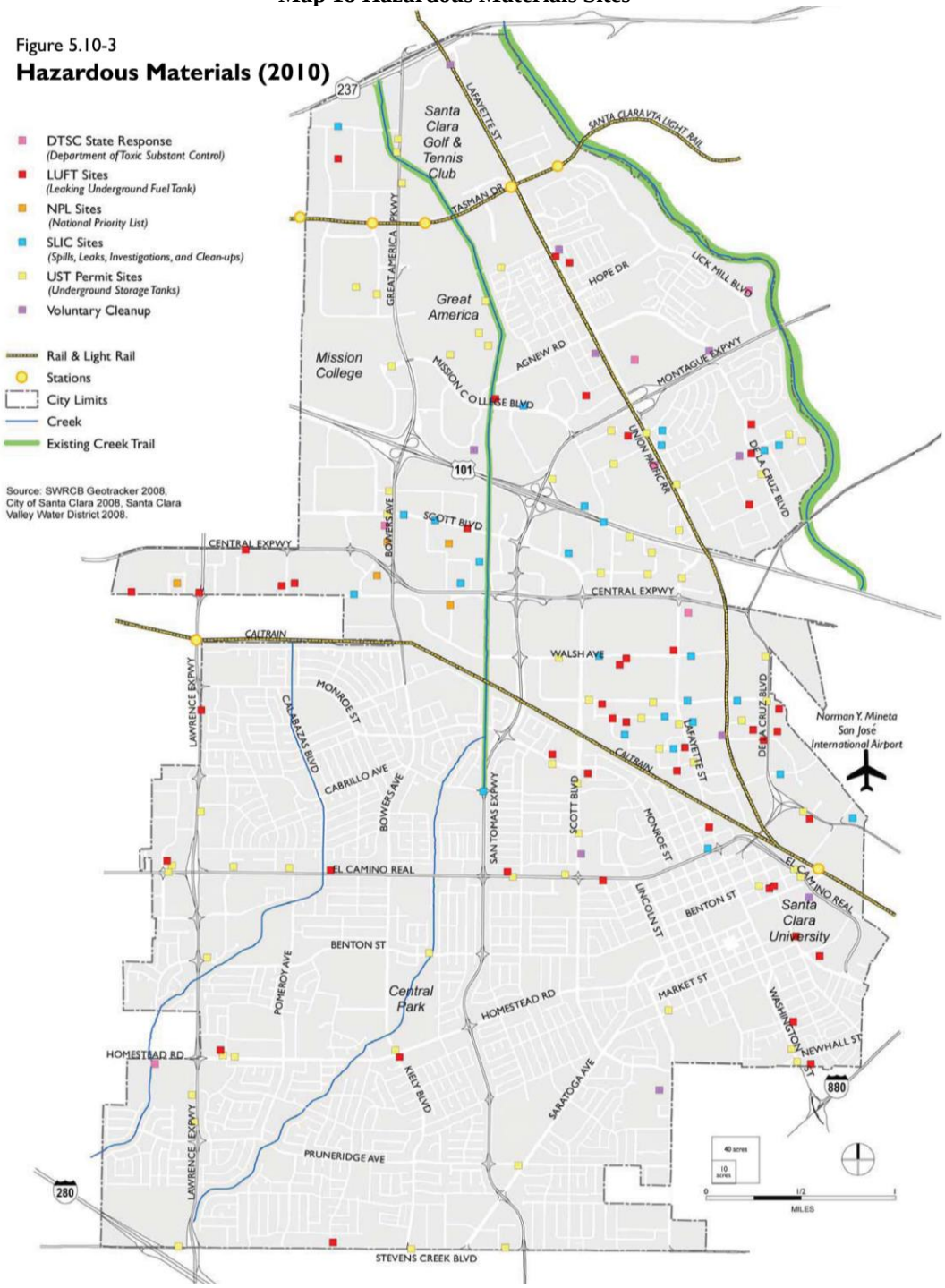
Map 17 Santa Clara Hazardous Materials Sites



Hazardous material sites are located throughout the City but are most prevalent in in the northern half.

By performing fire and life safety inspections, the Fire Prevention and Hazardous Materials Division identified a number of sites subject to investigation, remediation, and operation or monitoring for potential soil or groundwater contamination.

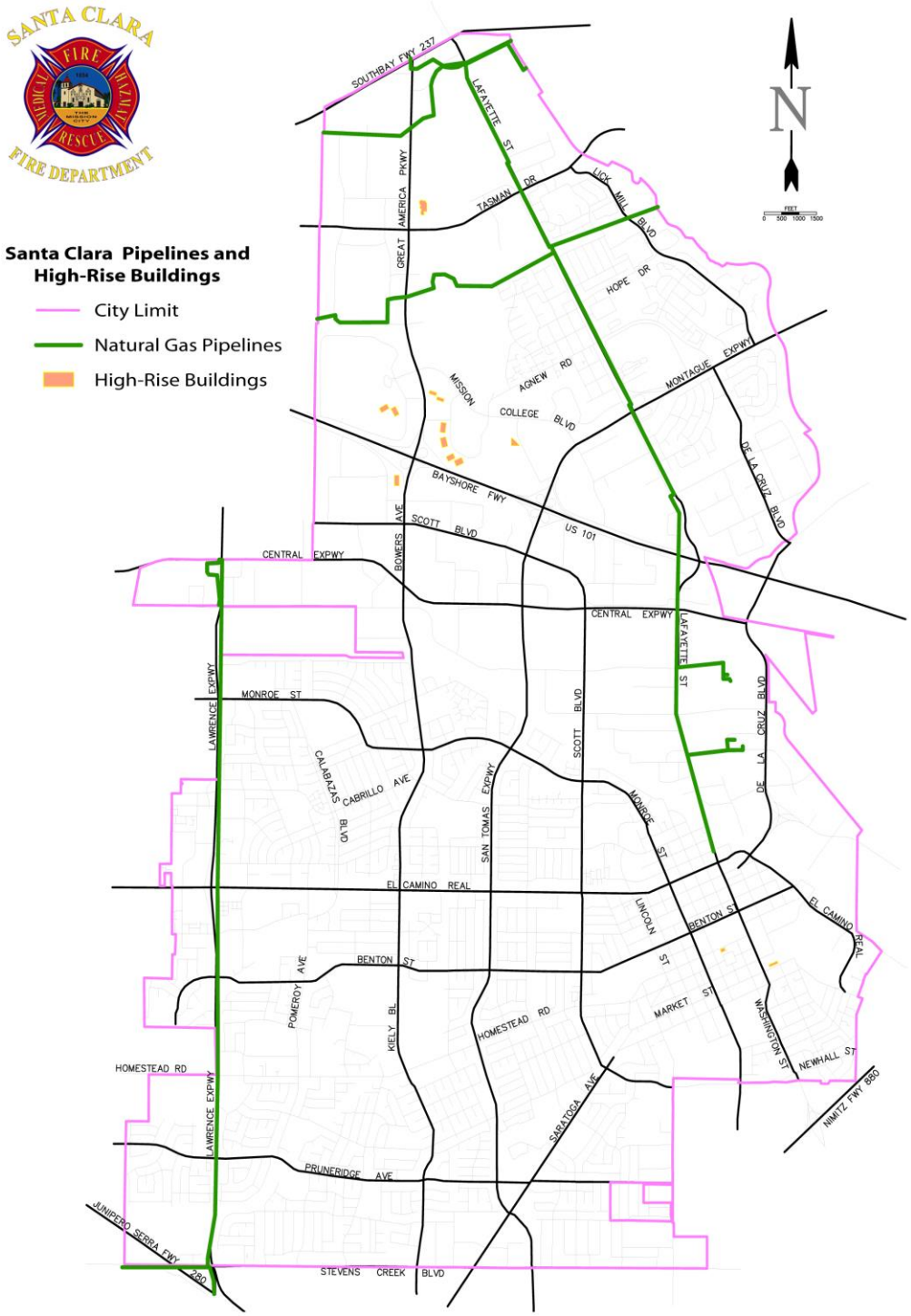
Map 18 Hazardous Materials Sites



Another hazardous material present in the agency's jurisdiction is natural gas. Natural gas is a hazardous material that can lead to fire and explosion. Domestic and residential service lines are present throughout the jurisdiction and present a potential for hazard. Of specific note are transmission lines. While there are fewer transmission lines, they are large and high pressure gas lines that create a potential catastrophic risk to the community. Due to an incident involving one of these transmission lines, the area has a heightened

level of awareness of their potential threat. In September of 2010, a 30-inch gas transmission line, similar to those running under the agency's jurisdiction, ruptured. The explosion left a 70-foot crater, killed eight people, and injured 58; while destroying 38 homes and damaging 70 others. The agency has 3 transmission lines that can be seen in the following map.

Map 19 Santa Clara Pipelines and High-Rise Buildings



Hazardous Materials Service Demand

Human error is always going to be one of the greatest contributing factors toward increased risk. However, mechanical and material hazards play an enormous influence over hazmat risk. The volume and relative toxicity/ stability of a material play a large part in the overall threat to the community. Furthermore, the community's threat from hazardous materials is mostly limited by those materials being isolated from the general environment. Properly functioning primary and secondary containers play an essential role in that process. Hazardous materials events occur when a malfunction or damage to the container occurs. Therefore, well maintained containment is critical to prevention of a hazardous material event.

In 2014 the agency responded to 139 requests for hazardous material services, which accounted for 1.59% of total calls for service. In 2015 the agency responded to 154 requests for hazardous material services, which accounted for 1.66% of total calls for service. In 2016 the agency responded to 164 requests for hazardous material services, which accounted for 1.74% of total calls for service. In 2017 the agency responded to 186 requests for hazardous material services, which accounted for 2.0% of total calls for service. Therefore, in the four years studied, the agency responded to 643 requests for hazardous material services, which accounted for 1.76% of total calls for service. The following table shows a breakdown of hazardous material services for each response zone. The response zones with the highest volume of hazmat responses are 1, 3, 7, and 5 which are all located to the south of the Caltrain corridor. On the surface, this does not correlate with the fact that most of the agency's hazardous materials facilities are located north of the Caltrain corridor. However, further inspection revealed that the most common hazmat response was for fuel leaks and gas odor investigations, which most often occurred in residential structures/areas. The above districts contain the most and highest percentage of residential structures, explaining the distribution of calls.

Table 14 Hazardous Materials Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	31	31	32	41	**135**	21.00%
2	12	14	14	19	**59**	9.18%
3	30	25	26	25	**106**	16.49%
4	7	16	6	19	**48**	7.47%
5	11	15	13	20	**59**	9.18%
6	8	15	19	17	**59**	9.18%
7	18	15	17	19	**69**	10.73%
8	10	7	9	7	**33**	5.13%
9	6	11	21	9	**47**	7.31%
10	6	5	7	10	**28**	4.35%
Total	**139**	**154**	**164**	**186**	**643**	100.00%
Percentage of All Service Demand	1.59%	1.66%	1.75%	2.05%	1.76%	

Source: City of Santa Clara Fire Department incident records

The following are the results of the risk categories for Hazardous Materials Services:

Low Risk – this would include events involving unknown substance small quantity, odor investigations, residential carbon monoxide detector alarms, small fuel/ fluid spills, and small transportation spills.

Moderate Risk – this would include events such as natural gas leak located outside or gas leak inside, and a known small chemical release inside a structure.

High Risk – this would include events such as release of a vapor cloud, large transportation incidents, biological agents, and large scale radiological incidents.

Maximum Risk –this would include a weapon of mass destruction (WMD) event or other large scale hazardous materials release from large manufacturing facilities.

Figure 8 Probability and Consequence Matrix - Hazardous Materials Services

Hazardous Materials Critical Tasking - Effective Response Force (ERF)

The Hazardous Material Response Team operates from Station 9 located in the West-Central region of the agency's jurisdiction. There is one engine staffed with three personnel and one hazmat unit staffed with one person. Both of these units carry specialized equipment used for mitigation and cleanup of an incident. Personnel assigned to station 9 should be trained to the Hazmat Spec level. Additionally, the agency has designated Fire Station 6 and Fire Station 8 as hazardous materials core stations. These stations were chosen due to their proximity to the industrial region of the city (north of the Caltrain corridor). Personnel assigned to these stations should be trained to the Hazmat Tech level or higher and participate in the annual hazardous materials core training,

The agency's Hazardous Materials Team is classified as a Type II team, per the California Office of Emergency Services. If any incident exceeds the capabilities of the team, the agency is able to augment the response with mutual aid from the Santa Clara County Fire Department or the San Jose Fire Department, both of which have Type I teams. Likewise, the agency's Hazardous Materials Team is available to support neighboring jurisdictions, in or out of the county, upon request. In 2015 the agency's hazmat team ranked second out of 17 agencies, including many other Type I teams, at Urban Shield. This is an annual event hosted by the Bay Area Urban Areas Security Initiative (UASI). It is a full-scale regional preparedness exercise assessing the overall response capabilities related to hazardous materials incident planning, policies, procedures, equipment and training.

The SCFD has several deployment models in the area of hazardous materials response, depending on the nature and severity of the incident. A hazmat 2 incident, defined as a known or unknown substance contained or confined, results in the first-due unit response only. A hazmat 3 incident, defined as an active leak of a known or unknown substance, results in a first-due unit response as well as Engine 99, Hazmat 99, one truck company, one battalion chief, and, once the event has been confirmed to be a "working hazmat," one deputy fire marshal (DFM). A hazmat-EMS incident is similar to a hazmat 3, only with a suspected or confirmed patient exposure. The response is also similar to a hazmat 3, with the addition of an ALS component and a county ambulance for patient transport.

Tasks may be assigned to both individuals and crews and are based upon knowledge, skills, abilities and resources of a particular crew or unit. Examples of these tasks may include -

Critical Task assignments on Low/ Moderate/ High/ Maximum Hazardous Materials Responses:

- Confirmation of correct response assignments
- Establishment of Incident Command
- Determination of Hazardous Situation
- Determination of Hazard Control Zone: Exclusion, Reduction, and Support
- Provide a Risk/ Benefit Analysis for Life Safety and Environment Concerns
- Identification of Hazardous Materials
- Establishment of a Safety Officer
- Determination of a Mitigation Plan (containment, control, and protective actions)
- Establishment of Field Decontamination
- Establishment of Debriefing/ Demobilization
- Provide Documentation and Notification to proper organizations
- Ensure proper Disposal

A low risk response is one the agency has determined to be incidents that can be controlled by the first responding unit regardless of their level of hazardous materials training. In other words, a Hazmat First Responder Operational (FRO) would be able to mitigate an event and the incident would not require Hazmat Spec or Tech level training or equipment. If deemed necessary, first responding units may special request a Hazmat unit to the scene. Moderate risk incidents have been determined to have a greater potential for threat to life or property. These may require evacuation of a structure and/or adjacent structures. The scene will be managed with the development of safety zones and may require the use of personnel with Hazmat Tech and Spec certification, as well as specialized equipment. High and maximum risk incidents involve severe hazards that pose extreme threat to life and or property and may require large scale evacuation.

The agency is capable of proving a hazardous materials response team as defined by FIRESCOPE (2010). This team will have the ability to respond to an unknown chemical incident as well as Weapons of Mass Destruction (WMD). They will have the capability to respond in fully encapsulated suits (Level A) and necessary equipment for chemical identification, evidence collecting, sampling and monitoring (combustible gas, oxygen concentration, radiological, pH/ oxidation) plugging, patching, diking, absorption, containment, confinement and neutralization.

Table 15 Critical Tasks - Hazardous Materials

Critical Task	Low Risk	Moderate Risk	High Risk	Maximum Risk
Incident Commander	1	1	1	1
HazMat Group Supervisor			1	1
Entry Team Leader		1	1	1
Entry Team		2	3	3
Back-up Team		2	3	3
Decon Team Leader		1	1	1
Decon Team		2	2	6
Medical Monitoring			2	2
Site Access Control Leader	1	1	2	2
Assistant Safety Officer			1	1
Technical Specialist/Reference			1	2
Safe Refuge Area Manager				1
Staging Area Manager				1
Fire/ Vapor Suppression				2
Defensive Actions	1			
Total ERF	**3**	**10**	**18**	**27**

Technical Rescue Services

The SCFD provides a wide range of technical rescue services to the community. These services include vehicle extrication, low and high angle rope rescue, confined space, trench rescue, and shore-based water rescue operations. The potential for a technical rescue exists from active construction projects, structural collapse, confined spaces that are below and above ground vaults/ tanks, vehicle accidents, and natural disasters such as earthquakes and floods. All eight front-line engine companies carry basic rescue equipment such as axes, sledge hammers, and pry bars. The department has a rescue company and two front-line truck companies that carry the same equipment as the engine companies, plus specialized rescue equipment such as extrication tools, wood cribbing, air bag systems, rope rescue equipment, and power tools/ saws. The SCFD's Urban Search and Rescue (USAR) trailer is housed at Fire Station 2 and is available for response. It carries lumber and cutting tools for shoring incidents such as a structural collapse.

The SCFD is also a participating agency for FEMA Urban Search and Rescue Task Force 3 based out of Menlo Park, CA. This task force is one of eight in California and one of 28 teams nationwide. SCFD currently supports one planning position, two medical specialist positions and one rescue specialist position. For each medical specialist position and rescue specialist position the department must provide three people to fill them. As a result, a total of nine people fill those three positions.

Technical Rescue Risk Factors

Based on the number of natural, human, and mechanical hazard in the agency's jurisdiction, there is a great potential for a technical rescue event. Some of these risk factors include the number of construction projects currently and foreseeably taking place within the agency's jurisdiction. Construction projects house great potential for emergencies involving confined space, trench rescue (underground utility trenches), crush injuries, low and high angle rescue, and machinery entanglement. Furthermore, buildings under construction have received all of their seismic bracing and sheer wall making them more susceptible to a business collapse during an earthquake.

Other sources, such as underground vaults, tanks and machinery pose a threat requiring technical rescue services. As previously discussed, the number and types of vehicles and the speeds of the roadways create potential for an incident requiring vehicle extrication. Some of the large structures or specialty facilities in the jurisdiction, such as Great America Theme Park and Levi Stadium, serve as potential locations for a high angle rescue. Lastly, the agency lives in an area that is extremely susceptible to an earthquake. A seismic event has the potential to create widespread damage to buildings throughout the jurisdiction.

While the historical service demand has been low, many technical rescue emergencies, which could be created from a building collapse, vehicle accident, earthquake or other natural and man-made events,

would be considered high consequence events. Technical rescue is not immune to the importance of efficient operations, as time to treatment is critical for positive outcomes. Studies show the catastrophic consequences of traumatic injuries, such as "crush syndrome," can be seen as quickly as 15 minutes after a lower extremity is pinned. Furthermore, the necessity for a ten minute on scene time in a traumatic event was discussed in the EMS portion of this document.

Technical Rescue Service Demand

For the most part, human and mechanical hazards compose the greatest threat for technical rescue services. The two most common types of technical rescue calls that the agency encounters are elevator extrication, 91 (61%), followed by vehicle accidents creating entrapped victims. Both are caused in some part by human factor and machinery.

In 2014 the agency responded to 26 requests for rescue services, which accounted for 0.3% of total calls for service. In 2015 the agency responded to 41 requests for rescue services, which accounted for 0.44% of total calls for service. In 2016 the agency responded to 42 requests for rescue services, which accounted for 0.44% of total calls for service. In 2017 the agency responded to 40 requests for rescue services, which accounted for 0.44% of total calls for service. Therefore, in the four years studied, the agency responded to 149 requests for rescue services, which accounted 0.41% of total calls for service. The following table shows a breakdown of rescue responses for each response zone. The agency did respond to 1,917 vehicle accidents during 2014-2017, in that time there were only three calls documented to have extrication equipment used.

While zones 1, 2, 3, and 7 had the most responses, with the exception of zone 10, there was an equal distribution of rescue responses throughout the jurisdiction. In the four years studied 15 (83.3%) out of 18 technical rescue calls in zone 10 were due to elevator emergencies, most for people stuck in an elevator in a parking garage. In 2017 zone 5 had 15 technical rescue calls. Nine of these calls were elevator emergencies involving new and large apartment complex. As stated earlier, transportation related incidents were the number one cause for rescue response and all response zones contain at least one major roadway, which would explain the even disbursement. See the following table for further details.

Table 169 Technical Rescue Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	4	9	4	2	**19**	12.75%
2	1	3	2	5	**11**	7.38%
3	5	7	5	4	**21**	14.09%
4	2	1	1	1	**5**	3.36%
5	0	2	1	15	**18**	12.08%
6	1	4	6	1	**12**	8.05%
7	5	4	9	1	**19**	12.75%
8	1	3	6	4	**14**	9.40%
9	2	4	5	1	**12**	8.05%
10	5	4	3	6	**18**	12.08%
Total	**26**	**41**	**42**	**40**	**149**	100.00%
Percentage of All Service Demand	0.30%	0.44%	0.45%	0.44%	0.41%	

Source: City of Santa Clara Fire Department incident records

The following are the results of the risk categories for Technical Rescue Services:

Low Risk – this would include events involving persons trapped in an elevator, vehicle or other above ground confined spaces, small animal rescue or persons tangled in equipment without injury, low angle recue, and swift water rescue.

Moderate Risk – this would include high angle rescue and single vehicle into a structure.

High Risk – this would include events such as confined space, trench, and vehicle extrication.

Maximum Risk –this would include building collapse or wide spread rubble debris due to natural or man-made disasters such as an earthquake, flood, or explosive device.

Figure 13 Probability and Consequence Matrix - Technical Rescue Services

Technical Rescue Critical Tasking - Effective Response Force (ERF)

Santa Clara has a Type-2 Urban Search and Rescue (USAR) company capable of conducting low-angle and high-angle rope rescue, structural collapse, confined space, and trench rescue operations. The majority of the agency's technical rescue specialists are located on Truck 92, Truck 98 and Rescue 92. Both trucks are staffed with four personnel and the rescue is staffed with one person. In addition, many other agency personnel, including paramedics, are trained to Rescue Systems 1 and Rescue Systems 2 level to provide additional service capacity depth and USAR company support. All certified rescue personnel participate in quarterly training, even if not assigned to one of the three technical rescue units. The agency also participates in county-wide technical rescue drills every year. There are other USAR / technical rescue resources available regionally through the mutual aid system. This service capacity is appropriate to mitigate Santa Clara's current and anticipated near-future technical rescue risk.

A standard "technical rescue" or "rescue" emergency response consists of one engine, one paramedic ambulance, one truck, one rescue apparatus, and one battalion chief. The incident commander always has the flexibility to request specific resources as needed. Furthermore, technical rescue resources exist in the county through the county-wide mutual aid system that is available to assist if an incident grows to a point agency's resource capabilities.

Tasks may be assigned to both individuals and crews and are based upon knowledge, skills, abilities and resources of a particular crew or unit. Examples of these tasks may include -

Critical Task assignments on Low/ Moderate/ High/ Maximum Technical Rescue Responses:

- Confirmation of correct response assignments
- Establishment of Incident Command
- Ensure all required ICS rolls are filled
- Establishment of a Safety Officer
- Determination of a Mitigation Plan
- Provide for safety of responders and victims
- Provide Documentation and Notification to proper organizations.

The following table shows the effective response force critical tasking for Basic Rescue that all agency responders are capable of performing.

Table 20 Critical Tasks - Technical Rescue

Critical Task	Vehicle Extrication	Low Angle Rescue
Incident Commander	1	1
Rescue Group Supervisor	1	1
Rescue Team		2
Medical Group Supervisor	1	
Primary Care Medic	2	2
Extrication Team	3	
Nozzle Person	1	
Pump Operator	1	
Rigging Team		3
Safety Officer	1	1
Total ERF	**11**	**10**

The agency defines specialized rescue responses as events that require a higher level of proficiency, certification, and training per California statute. California Code of Regulations (CCR) Title 8 regulates the level of certification required to work in hazardous areas such as confined spaces and trenches.

Table 21 Critical Tasks - Specialized Rescue

Critical Task	Confined Space	Trench Rescue	Building Collapse	Water Rescue	High Angle Rescue
Incident Commander	1	1	1	1	1
Rescue Group Supervisor	1	1	1	1	1
Rescue Team			3	4	7
Medical Group Supervisor			1		1
Primary Care Medic	2	2	2	2	1
Rigging Team	3	2		2	3
Entry Team Leader	1				
Entrant	2	2		1	
Attendant	1	1			
Back Up Entrant	2	2		1	
Supplied Air Resp. Operator	1				
Medical Monitoring/Rehab	1		2		
Atmospheric Monitoring	3	3	3		
Shoring Group Sup.		1	1		
Shoring Team		6	7		
Cutting Station Operator		1	2		
Search Group Supervisor			1	1	
Search Team			3		
Site Access Control Leader	1	1	1		
Safety Officer	1	1	1	1	1
Total	**20**	**24**	**29**	**14**	**15**

Other Services

The goal of the Standards of Cover is to show "all" risk throughout the agency's jurisdiction. Therefore, it is important to note that there are calls that the agency responds to that do not fit into one of the four classifications previously mentioned. Nonetheless, they are a portion of the workload and affect the reliability of first in apparatus being available for calls in their district. Over the four year period these calls accounted for 26% of the agency's overall call volume. Thus, the agency felt it was important to include a summary of these calls in order to show its internal and external stakeholders a complete look at total call volume as well as other factors that can potentially effect the total response time of and ERF. For example, if five people (two apparatus) are needed to fill the ERF of a High Risk EMS call and one of the two closest apparatus are on the scene of a service call, then the third closest apparatus will be dispatched. This will inevitably have a negative impact on the total response time (TRT). In order to create a deeper understanding of factors that can influence TRT, the agency felt it was essential to examine all calls.

There are nine categories within Records Management System (RMS). They are as follows: 100's Fire, 200's Rupture/Explosion, 300's EMS/Rescue, 400's Hazardous Condition, 500's Service Call, 600's Good Intent Call, 700's False Call, 800's Severe Weather, and 900's Special. The previously discussed classifications (Fire, EMS, Hazmat, and Technical Rescue) are all contained within RMS codes 100-400. In the four years examined, there were no calls in the 800's series. Therefore the agency's remaining call volume is comprised of service, good intent, false, and special calls. Due to the similarities in the nature of the calls, the 600's, 700's and 900's were combined to create the false alarm chart. The following charts were created to illustrate the service demand in these areas.

Table 22 Service Call Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	164	170	209	169	**712**	18.15%
2	99	90	114	102	**405**	10.33%
3	192	150	154	157	**653**	16.65%
4	108	150	195	135	**588**	14.99%
5	104	138	100	97	**439**	11.19%
6	49	46	58	69	**222**	5.66%
7	155	149	123	129	**556**	14.18%
8	27	40	39	48	**154**	3.93%
9	15	23	14	13	**65**	1.66%
10	31	36	41	20	**128**	3.26%
Total	**944**	**992**	**1047**	**939**	**3922**	100.00%
Percentage of All Service Demand	10.8%	10.7%	11.1%	10.3%	10.8%	

Source: City of Santa Clara Fire Department incident records (All RMS 500 codes, service)

During the four year period the two most common call types from this classification were Service calls (RMS code 500) equating to 2,069 (52.8%) and Assist invalid calls (RMS code 554) equating to 1151 (29.3%) of all calls from this class.

Table 17 False Alarm Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	256	264	264	243	**1027**	18.50%
2	145	178	130	165	**618**	11.14%
3	143	122	148	143	**556**	10.02%
4	93	99	126	104	**422**	7.60%
5	99	86	112	110	**407**	7.33%
6	105	117	143	145	**510**	9.19%
7	161	156	151	158	**626**	11.28%
8	99	116	106	124	**445**	8.02%
9	90	95	110	102	**397**	7.15%
10	134	137	155	116	**542**	9.77%
Total	**1325**	**1370**	**1445**	**1410**	**5550**	100.00%
Percentage of All Service Demand	15.2%	14.8%	15.4%	15.5%	15.2%	

Source: City of Santa Clara Fire Department incident records (All RMS 600, 700, & 900 codes)

During the four year period the three most common call types from this classification were Smoke detector activation , no fire-unintentional (RMS code 743) equating to 739 (13.3%), Smoke detector activation due to malfunction (RMS code 733) equating to 715 (12.9%), and System malfunction other (RMS code 730) equating to 687 (12.4%) of all calls from this class.

The following chart was created to show the combined total of all calls outside the classification of Fire, EMS, Hazmat, and Technical Rescue. All RMS codes between 500's and 900's were used to produce this chart. In the four years examined, 26% of the agency's total call volume came from these calls.

Table 24 All Other Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	420	434	473	412	**1739**	18.36%
2	244	268	244	267	**1023**	10.80%
3	335	272	302	300	**1209**	12.76%
4	201	249	321	239	**1010**	10.66%
5	203	224	212	207	**846**	8.93%
6	154	163	201	214	**732**	7.73%
7	316	305	274	287	**1182**	12.48%
8	126	156	145	172	**599**	6.32%
9	105	118	124	115	**462**	4.88%
10	165	173	196	136	**670**	7.07%
Total	**2269**	**2362**	**2492**	**2349**	**9472**	100.00%
Percentage of All Service Demand	26.0%	25.5%	26.5%	25.9%	26.0%	

Source: City of Santa Clara Fire Department incident records (All RMS 500, 600, 700, & 900 codes)

The agency also felt it was important to further examine vehicle accidents because they comprise a statistically significant amount of the overall call volume and due to the unique challenges and elevated risk to responders and the patient that occurs on the scene of a vehicle accident. It is important to note that the quantities of vehicle accidents listed below are not in addition to the overall call volume. They are actually already represented in the EMS classification. Vehicle Accidents with injuries equated to 1,917 (5.3%) of the agency's over-all call volume in the four years examined.

Table 25 Vehicle Accident Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	% of Calls in Classification
1	51	66	66	80	**263**	13.72%
2	39	71	84	66	**260**	13.56%
3	48	68	46	57	**219**	11.42%
4	45	48	33	32	**158**	8.24%
5	40	47	57	38	**182**	9.49%
6	35	42	42	28	**147**	7.67%
7	53	72	62	53	**240**	12.52%
8	40	56	53	46	**195**	10.17%
9	41	42	39	41	**163**	8.50%
10	21	28	21	20	**90**	4.69%
Total	**413**	**540**	**503**	**461**	**1917**	100.00%
Percentage of All Service Demand	4.74%	5.83%	5.35%	5.08%	5.26%	

Source: City of Santa Clara Fire Department incident records

The following chart is an overall summary of all calls in all classifications across all response zones over the four year period examined.

Table 26 All Calls Service Demand by Response Zone

Response Zone	Calendar Year 2014	Calendar Year 2015	Calendar Year 2016	Calendar Year 2017	Total	Percentage of Service Demand
1	1,608	1,758	1,649	1,649	**6,664**	**18.28%**
2	794	850	865	890	**3,399**	**9.32%**
3	1,197	1,243	1,364	1,253	**5,057**	**13.87%**
4	900	989	1,065	1,005	**3,959**	**10.86%**
5	1,015	1,195	1,146	1,065	**4,421**	**12.13%**
6	754	747	829	842	**3,172**	**8.70%**
7	1,151	1,164	1,105	1,139	**4,559**	**12.50%**
8	467	562	535	486	**2,050**	**5.62%**
9	274	288	320	304	**1,186**	**3.25%**
10	560	466	518	447	**1,991**	**5.46%**
Total	**8,720**	**9,262**	**9,396**	**9,080**	**36,458**	**100.00%**

Source: City of Santa Clara Fire Department incident records

Domestic Preparedness Services

Domestic Preparedness incidents include natural or man-made disasters, such as earthquakes, floods, terrorism attacks, and other large-scale emergencies. Based on historical data, the probability, of such event is very low. However, the agency recognizes that the consequence and impact of a large-scale disaster would be immense. Not only would any large-scale emergency result in massive loss, it would also be a tremendous drain on the agency's resources. Furthermore, in the case of an earthquake, neighboring jurisdictions would most likely be impacted, which would reduce or eliminate the availability of mutual aid. The risk associated with a natural or main made disaster most likely fall into one of the previous four risk classifications. For example, an earthquake could lead to building collapses, fires, gas line breaks, confined spaces, or a MCI. Likewise, a terrorist event could lead to a building collapse, disbursement of a hazardous material, or a MCI. In either case, the categorization and critical tasks of these events have already been examined. Therefore, domestic preparedness services were not critically tasked or categorized. Nonetheless, these incidents were examined in detail to determine the probability of an event occurring.

Emergency preparedness is an effective method of reducing risk to life and property from natural disasters, such as earthquakes or fires through planning. In Santa Clara, planning for emergency response has resulted in the adoption of the Local Hazard Mitigation Plan (LHMP), in conformance with the Federal Disaster Mitigation Act (DMA). In 2003, the DMA established a national hazard mitigation program to reduce the loss of life and property, human suffering, economic disruption and disaster assistance costs resulting from natural disasters. The DMA also provided a source of pre-disaster hazard mitigation funding to assist local governments in implementing effective hazard mitigation measures to ensure the continued functionality of critical services and facilities after a natural disaster.

In accordance with the DMA, local agencies are required to adopt a Local Hazard Mitigation Plan (LHMP) to be eligible for Federal Emergency Management Agency (FEMA) funding for pre-disaster hazard mitigation and projects that prevent disaster. The agency just completed the 2017 LHMP in the Multi-Jurisdictional Regional Hazard Mitigation Plan entitled, Taming Natural Disasters, developed in cooperation with other local agencies and the Association of Bay Area Governments (ABAG). The plan provides jurisdiction-specific information that has been reviewed and approved by FEMA.

The agency is also in the process of updating its Emergency Operations Center (EOC), which was used during Super Bowl 50 operations as well as many county wide drills. Furthermore, the agency has an Emergency Services Coordinator (ESC) responsible for maintaining the Emergency Services programs in conformity with federal and state requirements for participation in the federally and state funded Emergency Services programs. The city ESC reports to the fire chief as delegated by the city manager. The

agency ESC is a member of the County Emergency Managers Association (EMA), which is a group comprised of emergency managers from local public, private and non-profit organizations. The EMA makes recommendations to the Santa Clara County Operational Area Council (OAC), which is a group of appointed and elected officials who work collaboratively on regional emergency management issues.

Domestic Preparedness Risk Factors

The LHMP identified a number of threats and hazards that could occur within the jurisdiction. Those events have been categorized as natural, technological or human-caused.

Natural hazards include earthquakes, epidemics/pandemics, flood, and severe weather. Technological events include dam or levee failure and human-caused events include biological, chemical, explosive radiological or cyber-attacks, and school or workplace violence. Similar to accreditation, the LHMP utilizes a "risk rating" based upon probability and impact (to the community). Of all the natural events, earthquake ranked as the highest risk. There was a 40% reduction in risk for severe weather, a 66% reduction in risk for flood, damn and levee failure, and an 83% reduction in risk for drought (see following table). The risk ratings for human-caused events were not calculated in the LHMP; however, the agency's jurisdiction has multiple locations that would serve as potential targets for this type of incident.

Table 18 LHMP Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Earthquake	54	High
2	Severe Weather	33	Medium
3	Flood	18	Medium
3	Dam and Levee Failure	18	Medium
4	Drought	9	Low
5	Landslide	0	Low
6	Wildfire	0	Low

Natural hazards

Natural hazards are a concern, as the agency has a wide-ranging risk level with low frequency for natural disasters that are deemed to be inherent to the jurisdiction. These hazards may include earthquakes, floods and severe weather.

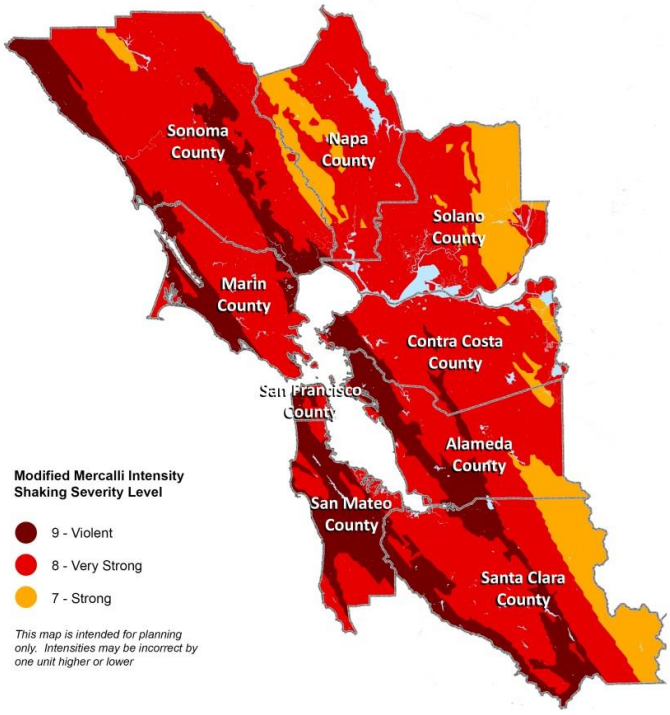
Earthquakes

Seismic hazards or earthquakes have the highest probability of risk to the agency. This is due to its proximity to multiple faults, liquidation factor of its land, and age/types of some of its structures. The San Francisco Bay Area is a seismically active region with numerous active faults. No active faults run through the city, although several are present in the surrounding region. The city is seven miles from both the San

Andreas and Calaveras faults, and five miles from the Hayward Fault. Other principal faults are also located in the Bay Area. Although the risk of surface fault rupture is considered low, the city could experience ground shaking in the event of an earthquake. Geologists with the U.S. Geological Survey and other agencies foresee a 62% probability of a magnitude 6.7 or greater earthquake in the San Francisco Bay region before 2032. Further, the state continues to revise and update its Earthquake Fault Zoning Maps to identify any new faults in the region.

Modeling from the Association of Bay Area Government a show that about 80% of the jurisdiction is within an area prone to high-intensity shaking and possible soil liquefaction during a major earthquake (see following map). Development in a liquefaction hazard zone requires adherence to the guidelines for evaluating and addressing seismic hazards as required by Public Resources Code Section 2695(a). Before a development permit can be granted within this zone, a geotechnical investigation of the site must be conducted and appropriate measures, such as edge containment structures, driving piles or treatment of soils, incorporated into the project design. In addition, the city has adopted the California Building Code with local amendments, which is implemented and enforced by the city's Building Inspection Division. The Building Code includes provisions to address appropriate design and construction, including provisions to ensure that foundation and building design is appropriate to site soil conditions, including standards to address expansive soils conditions.

Map 20 Shaking Hazard



Source: USGS 2013

Although the agency has been proactive in building code development, the agency has some old buildings very susceptible to damage from an earthquake. Many of these structures are multi-family housing units with "soft story" construction that is very susceptible to collapse in an earthquake. A soft story building is a multi-story building in which one or more floors have windows, wide doors, large unobstructed commercial spaces, or other openings in places where a shear wall would normally be required for stability as a matter of earthquake engineering design. A typical soft story building is an apartment building of three or more stories located over a ground level with large openings, such as a parking garage or series of retail businesses with large windows. In 2003, the Collaborative for Disaster Mitigation at San Jose State University completed an "*Inventory of Soft-First Story Multi-Family Dwellings in Santa Clara County*" that identified 320 soft-first story multi-family buildings in the City of Santa Clara, including 3,297 residential living units.

A strong earthquake could also have a significant impact on other property, including damage to structures and infrastructure like roads and bridges. Moreover, secondary effects from shaking, such as hazardous materials spills and fires, would also be of concern.

According to the USGS, the Bay Area recorded over 300 earthquakes from May 1 of 2016 to May 1 of 2017; most of these events were small (under 2.0 in magnitude). The last major earthquake with an epicenter within Santa Clara County was the 1984 Morgan Hill Earthquake (M 6.2) and the 1989 Loma Prieta Earthquake's (M 7.1), where the epicenter was located just a few miles from Santa Clara County, in Santa Cruz County. The Loma Prieta earthquake was responsible for over six billion dollars in damage across the Bay Area. Of all the faults in the Bay Area, the Hayward fault has the greatest likelihood of rupturing in the next 30 years. Liquefaction may occur in the northern portion of the County along the Bay margins, while landslides are more likely in the eastern hills.

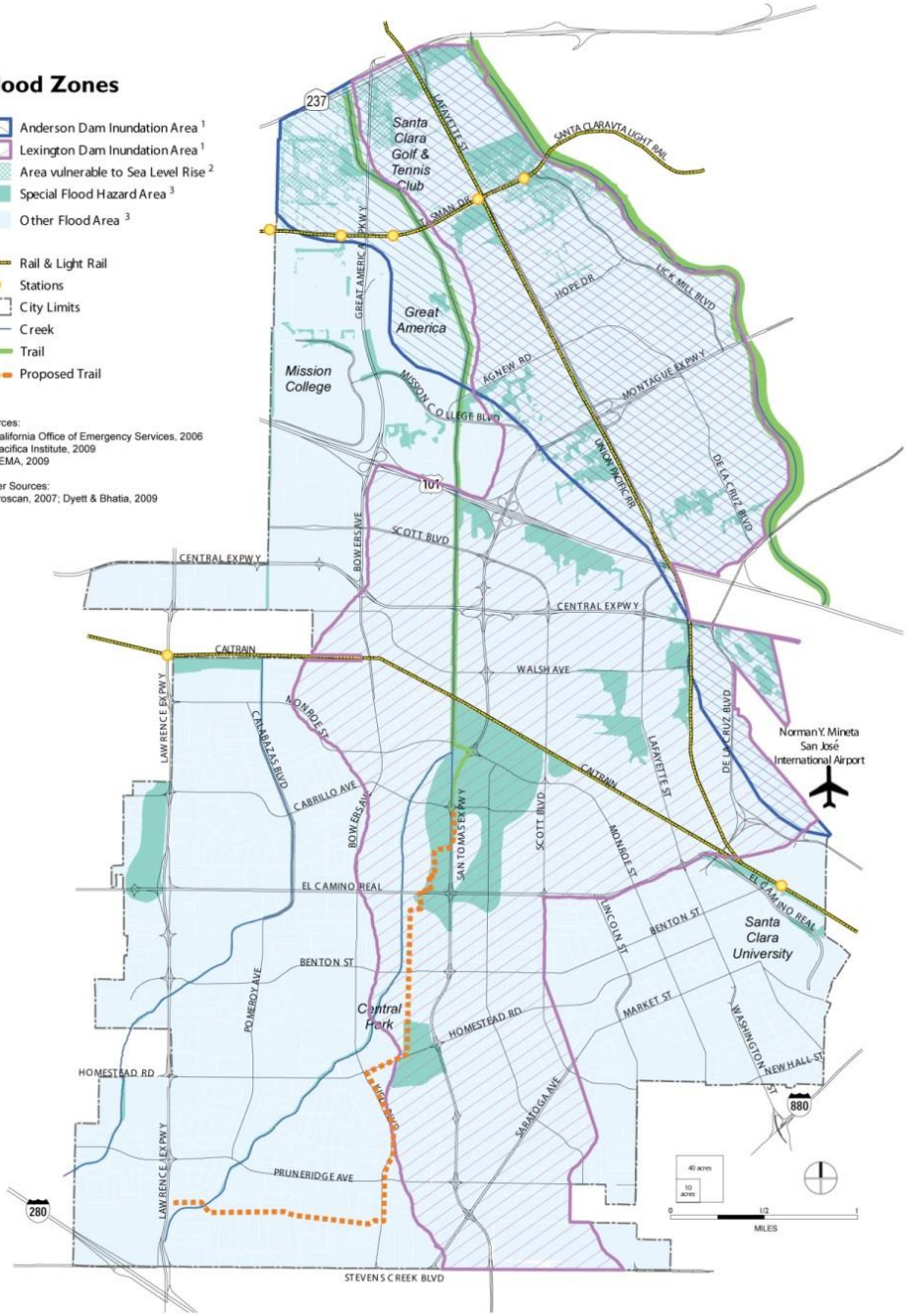
Flooding

No area is immune to flash floods and most areas of Santa Clara lie within a flood zone as designated by the FEMA. On small streams, especially near large bodies of water such as San Francisco Bay, water levels may rise quickly in heavy rainstorms. Flash floods also occur in or near mountainous areas where torrential rains can quickly change a dry watercourse into a raging torrent of water. The jurisdiction is also susceptible to flood damage due to the potential for a levee or damn failure. With that said the only loss created by severe weather in the entire jurisdiction over the last five years resulted on January 8, 2017 and had a preliminary damage assessment of $65,000. While the probability of a flood is very low, the risk remains at a moderate level.

There are three major creeks and waterways in the city; the San Tomas Aquino Creek, Saratoga Creek and Calabazas Creek. In the event of extraordinarily heavy rain, these creeks may become inundated and carry fast-moving water through the city limits from upstream. Drainage is the major contributing factor. Surface water drainage in the city is primarily into the Guadalupe River, San Tomas Aquino Creek, Saratoga Creek and Calabazas Creek, all of which originate in the largely undeveloped Santa Cruz Mountains and drain northward across the urbanized Santa Clara Valley floor to discharge into San Francisco Bay. Within the city, all three of these regionally important streams have been substantially channelized and modified to reduce flood hazards. Furthermore, alongside San Thomas Aquino and Saratoga creeks, the city maintains a 7.85-mile-long recreational trail. As some areas of the trail are far from roads, the agency has a special response vehicle, pre-positioned at Station 8 that can carry firefighters to emergencies along the trail. Furthermore, all members of the agency participate in annual swift water training drills.

The city's storm drain system consists of curb inlets that collect and channel surface water, from rainfall and other sources, into a series of pipelines beneath city roadways. Storm water is conveyed through these underground pipelines to the channelized creeks within the city, which then direct flow into the San Francisco Bay. The agency is prepared to respond to all types of flood situations including flooded structures, street and intersection flooding and waterway flooding. Individual engine and truck companies routinely carry the equipment needed in the majority of storm-related calls.

Map 21 Flood Zones



Terrorism/Weapons of Mass Destruction

The agency has certain areas that are potential terrorist targets, including, server farms, elementary, middle, and high schools, Mission College, Santa Clara University, Levi and Buckshaw stadiums, the Convention Center or other public location such as Great America Theme Park. In addition, the high-tech industry in Silicon Valley has significant symbolic value. Santa Clara is also a transportation hub for much of northern Santa Clara County with its far-reaching passenger and cargo rail lines, adjacent

commercial airport and three major freeway arteries that support statewide commerce and travel. The mitigation of the aftermath of a human caused event could bring risks identified in almost all of the other risk classifications and categories.

Increased terrorism awareness and training has gained footing in the fire service, law enforcement and emergency management communities. Various terrorism intelligence groups, such as the Terrorism Early Warning Group and Joint Regional Intelligence Center, provide first responders with critical intelligence to prepare for anticipated acts of terrorism. The goal of terrorism is clear; it is to create fear and disruption in society by acts of violence and/or technological disruption to essential systems and services. The agency continues to acquire training at the first responder level as well as specialized terrorism training for the HazMat Unit. Cooperative training between HazMat teams in Santa Clara County continues to improve awareness and response. Furthermore, as previously identified, coordinated efforts by the ESC has led to greater awareness and preparedness for such an event.

Geographical Planning Zones

The last step to a risk assessment is to divide the jurisdiction into manageable sized zones for the consistent review of emergency response so that accurate comparisons can be made to both the distribution and concentration of resources. Furthermore, response zones can be assessed to better identify where specific types and classifications of risk are taking place, their frequency, and the characteristics of the risk faced by the community. This method allows for the agency to compare various risk categories across different portions of the jurisdiction. Because the agency does not currently have a way to provide for Geographic Information System (GIS) or Geographical Planning Zones (GPZ) plotting, it is unable to provide a specific risk score for individual properties. Instead, a risk score is assigned based on the type of property known to agency responders a part of the preplan and district familiarization training. The agency is currently working on a software upgrade to its CAD system that would allow for GIS and GPZ input.

City and Land Usage

Before describing the agency's 11 response zones, it is important to provide a brief synopsis of the agency's jurisdiction as a whole. Today, Santa Clara consists of vibrant residential neighborhoods and job centers that continue to grow and evolve. The city is adjacent to San José, the largest city in the Bay Area, the San José Norman Y. Mineta International Airport (Airport) and regional transportation corridors. Like its neighbor, Santa Clara is centrally located in Santa Clara County, one of the fastest growing counties in the State and home to numerous high technology companies. The city's industrial core includes Intel, Applied Materials, Sun Microsystems, NVIDIA, National Semiconductor and other major companies. Mission College, Santa Clara University and the UCSC Extension in Silicon Valley are also located within the city. As a result, the pressure for Santa Clara to absorb a substantial share of the region's growth is likely to continue. Geographically, it is comprised of an area that is land-locked by its neighboring cities: San Jose, Sunnyvale, and Cupertino.

Despite growth and transformation over many decades, Santa Clara values its historic resources and quality of life. The city's General Plan builds on these assets to ensure that the city's evolution preserves its core identity and character. South of the east-west Caltrain corridor are much of the city's residential developments, neighborhood-serving retail uses, schools, and parks. The central portion of the city, north of the Caltrain corridor and south of U.S. 101, consists predominately of light and heavy industrial uses, although some of the area has transitioned into office / research and development (R&D) and data centers. The northernmost portion of the city has the most diverse mix of use, including office/R&D, light industrial and regional entertainment and sports uses, including Great America theme park, the Santa Clara Convention Center, and Levi's Stadium.

A description of the land use by building classification, excluding roads and other rights of way, is as follows:

Residential

There are four basic housing types that make up the city's 44,166 housing units. The most common is the single-family unit (42% detached and 9% attached), representing 51% of the city's housing stock. Nine percent of the city's residential units are in two-to-four-unit complexes, and 40% are in five-or-more unit complexes. Multifamily units include duplex, apartment and condominium configurations, as well as some student housing near Santa Clara University. The majority of single family homes are located south of the Caltrain corridor. Higher density residential neighborhoods with multi-family units are often located along arterial streets, El Camino Real, and the edges of single family neighborhoods. (SC General Plan)

Retail Commercial

Commercial uses are located on 10% of the city's developable land area. Commercial uses include neighborhood uses, like grocery stores, personal services, small offices and banks, as well as tourist and entertainment uses and professional or medical offices. Retail commercial uses and professional offices are primarily located along El Camino Real, Stevens Creek Boulevard, and north of U.S. 101, including the Rivermark retail center and the Mercado Center. (SC General Plan)

Office/Research and Development

Over 11% of the city's developable land area, campus style office and R&D uses are located north of U.S. 101 along Great America Parkway and Mission College Boulevard. This area constitutes the core of the large-scale, intense office uses; however, over 30% of the city's office and R&D space is located between the Caltrain corridor and U.S. 101. (SC General Plan)

Industrial

Approximately 18% of the city's developable land area is comprised of low intensity heavy and light industrial uses, primarily located between the Caltrain corridor and U.S. 101. Approximately 36% of this space is located north of U.S. 101. The city's heavy and light industrial businesses are characterized by manufacturing, warehousing and wholesaling activities as well as by low intensity one and two-story development. (SC General Plan)

Public/Quasi Public

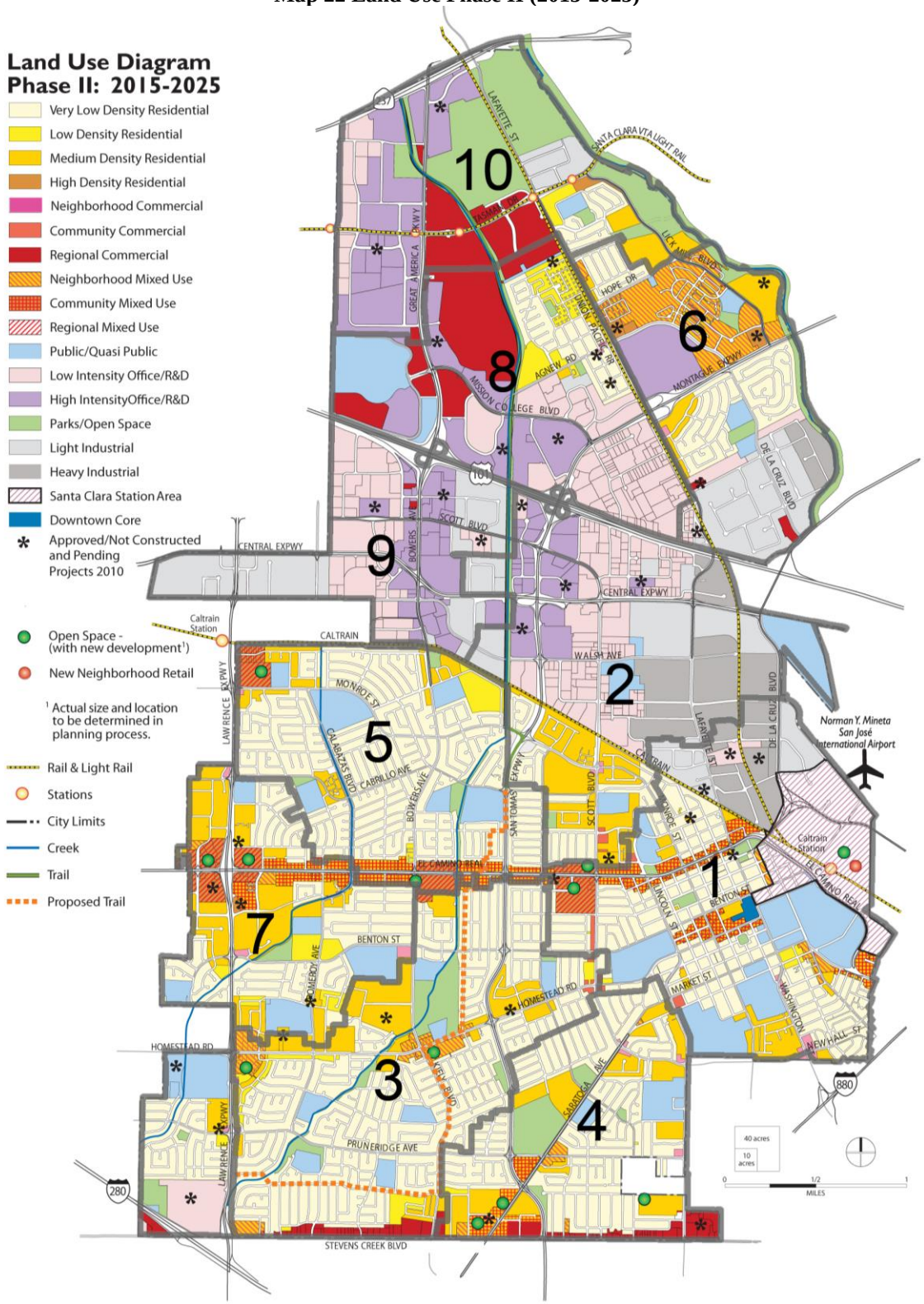
Public/quasi-public and institutional uses occupy approximately 11% of the developable land area in the city's jurisdiction. These uses include civic facilities, such as City Hall, police and fire stations, electric substations and libraries. As well as public and private educational institutions, such as Santa Clara

Unified School District facilities, Mission College and Santa Clara University properties, places of assembly, religious institutions, and medical facilities, such as Kaiser Permanente facilities. The majority of public/quasi-public uses are located south of U.S. 101 near residential neighborhoods.

Parks/Open Space

Approximately 8% of the city's developable land area is occupied by park and open space. Central Park is the largest area and is located near the center of the city. There are smaller parks, including playgrounds located throughout the city. And the city general plan included policies to maintain 2.4 acres of parkland per 1000 acres of city land. See following map for further details.

Map 22 Land Use Phase II (2015-2025)



Santa Clara's population is projected to grow by 30% over the next 20 years. However, the following table shows that the current planned percentage of land usage is going to develop at the same ratio that currently exists within the agency's jurisdiction. Thus, suggesting the projected growth and development throughout the agency's jurisdiction should not greatly affect the ratio of calls over the various fire and non-fire risk classifications. However, the categories within the fire risk classification will likely see a shift toward an increased number of high/special risks, as more multi-unit and high-density housing units are planned to increase. Of all the hazards, human hazard has the greatest influence on probability. Therefore, it would be appropriate to anticipate an increase in the probability of an incident occurring (increased call volume) due to the increase in population. Because planning zones six, nine, and ten are anticipated to have the greatest increase in population; the increase in call volume will not be evenly distributed across all planning zones.

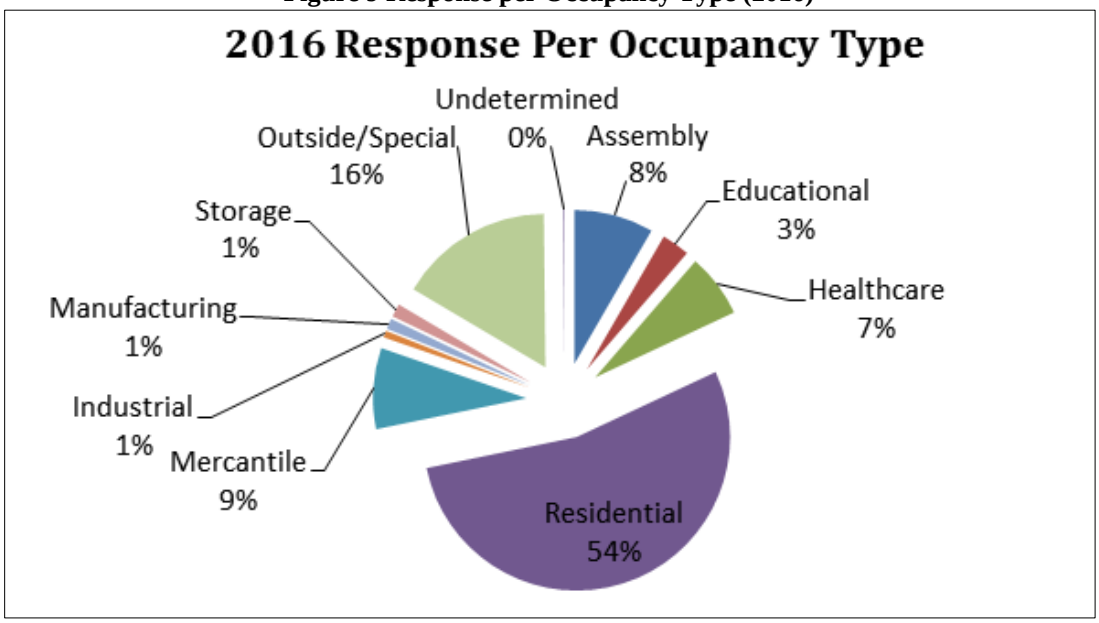
Table 19 Anticipated City Growth

Growth Factor	2016	2035	Projected Growth (Units)	Projected Growth (%)
Population	119,525	154,825	35,300	**29.5%**
Housing Units	45,147	60,345	15,198	**33.7%**
Commercial / Industrial / R&D	60,851[1]	82,364[1]	21,513[1]	**35.4%**
Employment	125,780	154,300	28,520	**22.7%**

Source: US Census Bureau and City of Santa Clara 2010-2025 General Plan
[1] 1,000 square feet

Just as it is important to examine the historical frequency of types of events, it is also important to understand where those events are taking place. Recognizing the type of structures emergencies are occurring adds another dimension of understanding to where the risks are taking place. The following graph shows a breakdown of all 2016 calls within the agency's jurisdiction according to occupancy type. The difference in percentage from year to year over the past four years was marginal and showed a 2% movement in either direction for any one category.

Figure 9 Response per Occupancy Type (2016)

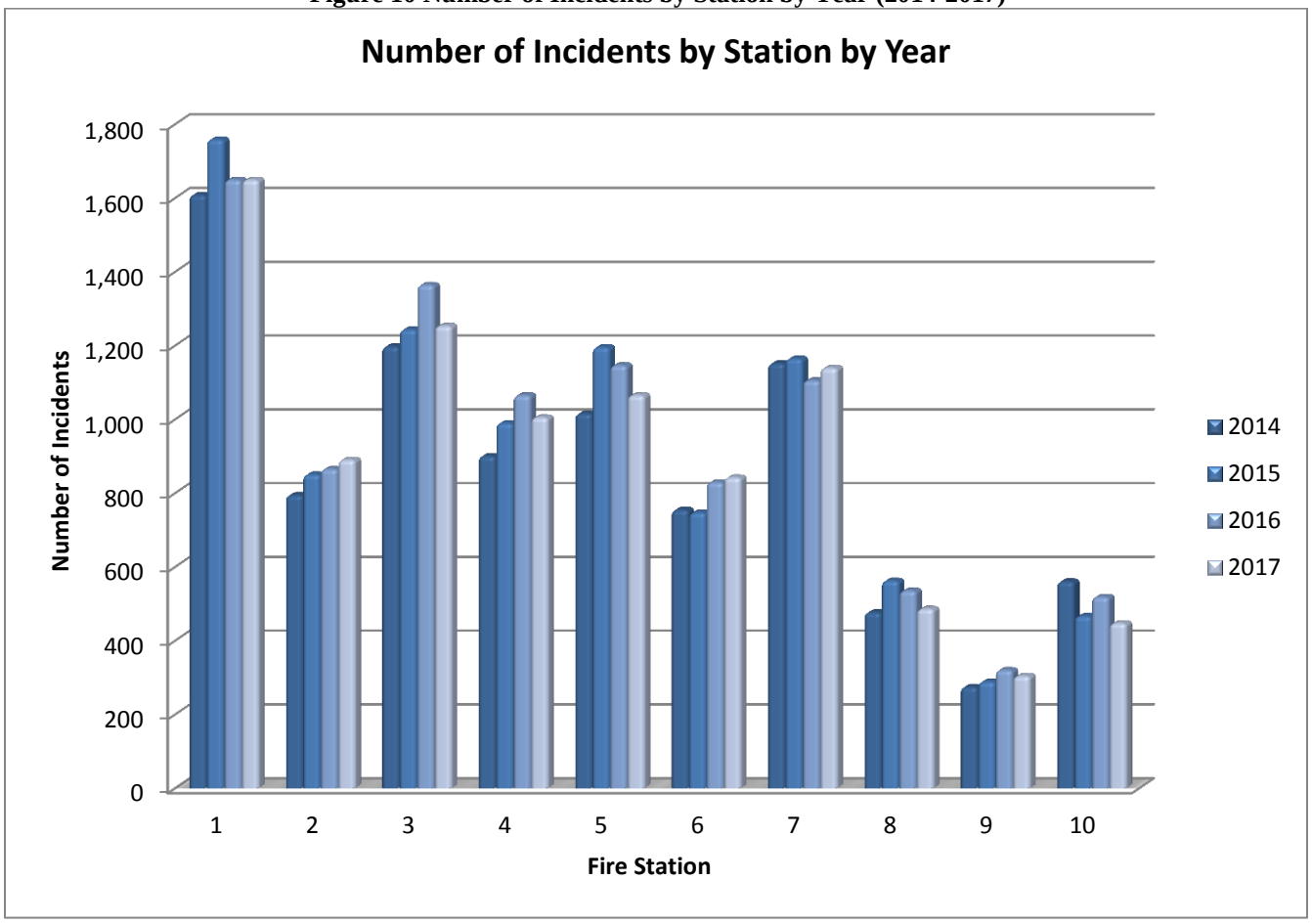


Response Areas

Santa Clara is divided into 11 geographical planning zones, 10 of which are known as fire districts. Each fire district is served by a fire station and defines the first-due response area for each station. Each fire station is located to ensure effective distribution of resources and limit undue risk from extended responses. Data on incident type, location and frequency is reviewed on an annual basis. Station 1, which is in the oldest part of the city, was the busiest of the 10 fire stations in Santa Clara, handling approximately 18.3% of the city's total calls from 2014-2017. Station 3, with 13.9%, Station 7 with 12.5%, and Station 5 with 12.1% of all calls were the next busiest stations. Station 9 was the least-busy station, handling 3.2% of the calls in the examined time frame. District 10 was subdivided into an eleventh zone to more accurately assess Levi's Stadium. On event days, the agency has a specific staffing and response modality completely independent and above the daily staffing for the other ten districts.

The following illustrations show the distribution of the overall calls for service in a given year across response zones. The following bar graph illustrates the total call volume (all call types) of each geographic planning zone each year.

Figure 10 Number of Incidents by Station by Year (2014-2017)



The following table shows the percentage of calls each planning zone (district) responds to in each of the given classifications of calls for each of the last four years (2014, 2015, and 2017).

Table 20 Percentage of Call Types by Station (2014-2017)

	Fire	HazMat	Medical	Vehicle Accidents	All Other	2014 Total
Station 1	16.5%	22.3%	18.4%	15.4%	18.5%	18.4%
Station 2	12.1%	8.6%	8.4%	3.8%	10.8%	9.1%
Station 3	9.3%	21.6%	13.3%	19.2%	14.8%	13.7%
Station 4	9.3%	5.0%	11.0%	7.7%	8.9%	10.3%
Station 5	14.3%	7.9%	12.7%	0.0%	8.9%	11.6%
Station 6	12.1%	5.8%	9.3%	3.8%	6.8%	8.6%
Station 7	6.0%	12.9%	13.1%	19.2%	13.9%	13.2%
Station 8	5.5%	7.2%	5.2%	3.8%	5.6%	5.4%
Station 9	4.9%	4.3%	2.5%	7.7%	4.6%	3.1%
Station 10	9.9%	4.3%	6.0%	19.2%	7.3%	6.4%

	Fire	HazMat	Medical	Vehicle Accidents	All Other	2015 Total
Station 1	19.8%	20.1%	19.1%	22.0%	18.4%	19.0%
Station 2	6.1%	9.1%	8.5%	7.3%	11.3%	9.2%
Station 3	10.7%	16.2%	14.1%	17.1%	11.5%	13.4%
Station 4	5.1%	10.4%	11.0%	2.4%	10.5%	10.7%
Station 5	10.2%	9.7%	14.4%	4.9%	9.5%	12.9%
Station 6	9.1%	9.7%	8.4%	9.8%	6.9%	8.1%
Station 7	20.3%	9.7%	12.3%	9.8%	12.9%	12.6%
Station 8	4.6%	4.5%	5.9%	7.3%	6.6%	6.1%
Station 9	3.0%	7.1%	2.3%	9.8%	5.0%	3.1%
Station 10	11.2%	3.2%	4.0%	9.8%	7.3%	5.0%

	Fire	HazMat	Medical	Vehicle Accidents	All Other	2016 Total
Station 1	12.6%	19.5%	17.1%	9.5%	19.0%	17.6%
Station 2	11.5%	8.5%	9.0%	4.8%	9.8%	9.2%
Station 3	17.6%	15.9%	15.3%	11.9%	12.1%	14.5%
Station 4	6.6%	3.7%	11.1%	2.4%	12.9%	11.3%
Station 5	11.0%	7.9%	13.8%	2.4%	8.5%	12.2%
Station 6	6.0%	11.6%	9.1%	14.3%	8.1%	8.8%
Station 7	11.5%	10.4%	12.0%	21.4%	11.0%	11.8%
Station 8	10.4%	5.5%	5.5%	14.3%	5.8%	5.7%
Station 9	6.6%	12.8%	2.4%	11.9%	5.0%	3.4%
Station 10	6.0%	4.3%	4.6%	7.1%	7.9%	5.5%

	Fire	HazMat	Medical	Vehicle Accidents	All Other	2017 Total
Station 1	16.5%	22.0%	18.4%	5.0%	17.5%	18.2%
Station 2	11.9%	10.2%	9.1%	12.5%	11.4%	9.8%
Station 3	11.9%	13.4%	14.3%	10.0%	12.8%	13.8%
Station 4	10.8%	10.2%	11.5%	2.5%	10.2%	11.1%
Station 5	8.0%	10.8%	12.8%	37.5%	8.8%	11.7%
Station 6	11.9%	9.1%	9.3%	2.5%	9.1%	9.3%
Station 7	9.1%	10.2%	12.9%	2.5%	12.2%	12.5%
Station 8	5.7%	3.8%	4.6%	10.0%	7.3%	5.4%
Station 9	4.0%	4.8%	2.7%	2.5%	4.9%	3.3%
Station 10	10.2%	5.4%	4.4%	15.0%	5.8%	4.9%

The following table is a 2017 unit hour utilization chart used to demonstrate the percentage of time a unit is utilized throughout the day. The chart is broken down into hours and can help reveal the when and where calls have a tendency to occur. It is important to note that this chart only represents the time a unit is tied to a 911 call. It does not include times the unit is involved in training, public relations events, Fire and Life Safety Inspections, or other required duties. For example, this chart shows that between the hours of 1100 and 1700, the apparatus located in central and south east areas of the jurisdiction are more likely to be utilized on a call. The greatest discrepancy can be seen in the 1200 hour where Engine 93 is utilized 11.75% of the hour where in Engine 90 is utilized 2.39% of the hour. That is a 492% increase or nearly five times the amount. This chart also demonstrates that based on the relatively low unit hour utilization usage for emergency calls that the agency has sufficient apparatus stationed in each district.

A small inconsistency in the unit hour utilization exists due to the use of reserve apparatus during scheduled or unscheduled vehicle repair. The agency's current CAD cannot relay to RMS which reserve apparatus are running as a front line piece of apparatus. Therefore, if Engine 97 must go in for routine maintenance personnel would then switch into a reserve apparatus (Engine 197). During that period, any call Engine 197 runs will be credited to Engine 197 rather than Engine 97. With three reserve Engines for six front line engines and one Reserve Truck for two Front line trucks, it is incredibly challenging to determine which engine should be credited for the calls the reserve apparatus are running. The three reserve Engines combined for a total unit hour utilization of 0.86%. When dispersed across the six front line apparatus you can see that these engine would receive a slightly increased unit hour utilization.

Table 30 Unit Hour Utilization 2017

Hour	E91	M91+M92	T92	E93	E94	E95	E96+E98	M96	E97	T96+T98	E99	E90
00:00	7.14%	3.50%	2.78%	4.16%	3.65%	2.51%	4.24%	2.40%	4.81%	2.18%	1.01%	1.87%
01:00	5.82%	2.80%	2.24%	4.11%	3.51%	2.90%	4.30%	1.64%	4.36%	1.81%	0.65%	1.26%
02:00	5.14%	2.70%	2.50%	3.61%	2.83%	4.38%	3.86%	1.98%	3.21%	1.97%	0.74%	1.10%
03:00	3.69%	1.51%	2.57%	4.09%	2.90%	2.97%	3.25%	0.76%	2.98%	1.04%	0.81%	1.24%
04:00	3.24%	1.49%	3.31%	2.89%	2.90%	2.46%	2.02%	1.14%	2.81%	1.11%	1.09%	0.84%
05:00	3.43%	1.38%	2.12%	3.07%	3.13%	3.67%	2.77%	1.62%	3.39%	2.46%	1.08%	0.42%
06:00	4.19%	2.53%	2.45%	3.45%	3.70%	4.06%	2.49%	1.78%	3.55%	3.06%	1.80%	1.53%
07:00	4.98%	3.46%	5.15%	4.53%	4.11%	5.69%	3.60%	1.55%	3.95%	1.90%	1.56%	1.75%
08:00	6.74%	5.92%	4.77%	7.47%	7.93%	6.62%	4.34%	2.85%	5.39%	3.08%	1.83%	2.59%
09:00	9.21%	7.12%	4.56%	7.47%	8.11%	8.02%	7.15%	3.00%	6.02%	3.89%	2.96%	2.26%
10:00	9.30%	7.99%	6.04%	8.38%	6.72%	8.28%	6.57%	4.14%	7.41%	4.68%	2.65%	3.21%
11:00	10.93%	8.15%	5.57%	10.56%	7.98%	9.08%	5.24%	3.87%	8.76%	4.46%	2.76%	2.90%
12:00	10.01%	7.21%	6.43%	11.75%	8.60%	10.74%	7.99%	4.62%	7.97%	3.67%	3.35%	2.39%
13:00	10.91%	8.34%	7.56%	9.91%	8.38%	8.01%	7.13%	3.05%	7.67%	3.79%	3.87%	2.28%
14:00	11.21%	10.17%	7.76%	9.82%	6.47%	8.38%	8.04%	3.26%	6.87%	3.84%	4.13%	3.08%
15:00	12.11%	8.79%	6.50%	8.45%	7.54%	8.45%	5.21%	3.74%	6.36%	3.65%	4.27%	4.17%
16:00	8.22%	7.71%	5.92%	9.50%	5.61%	9.48%	6.25%	4.94%	6.78%	3.48%	2.78%	3.89%
17:00	10.37%	8.10%	7.96%	9.48%	6.27%	8.63%	5.68%	5.54%	6.16%	4.54%	2.14%	3.42%
18:00	8.71%	8.61%	6.68%	7.63%	5.35%	8.68%	6.91%	5.02%	8.84%	4.25%	2.62%	3.39%
19:00	8.64%	6.98%	5.75%	8.27%	6.42%	8.43%	5.76%	4.24%	7.26%	3.61%	3.31%	3.18%
20:00	7.04%	5.28%	6.09%	7.96%	5.11%	7.29%	5.31%	3.91%	6.25%	3.80%	2.41%	3.41%
21:00	7.87%	6.92%	6.00%	7.66%	5.64%	8.37%	6.60%	5.48%	4.86%	4.38%	3.36%	3.30%
22:00	8.19%	3.54%	4.72%	5.64%	4.86%	7.35%	5.15%	3.36%	5.41%	3.31%	1.90%	2.91%
23:00	8.17%	3.71%	4.89%	4.08%	3.80%	5.34%	5.74%	2.82%	4.89%	2.79%	1.56%	2.06%
Overall	**7.72%**	**5.58%**	**5.01%**	**6.83%**	**5.48%**	**6.66%**	**5.23%**	**3.20%**	**5.67%**	**3.20%**	**2.28%**	**2.44%**
Responses	**1,774**	**1,250**	**1,053**	**1,435**	**1,126**	**1,332**	**945**	**824**	**1,173**	**676**	**461**	**417**

Geographical Planning Zone 1

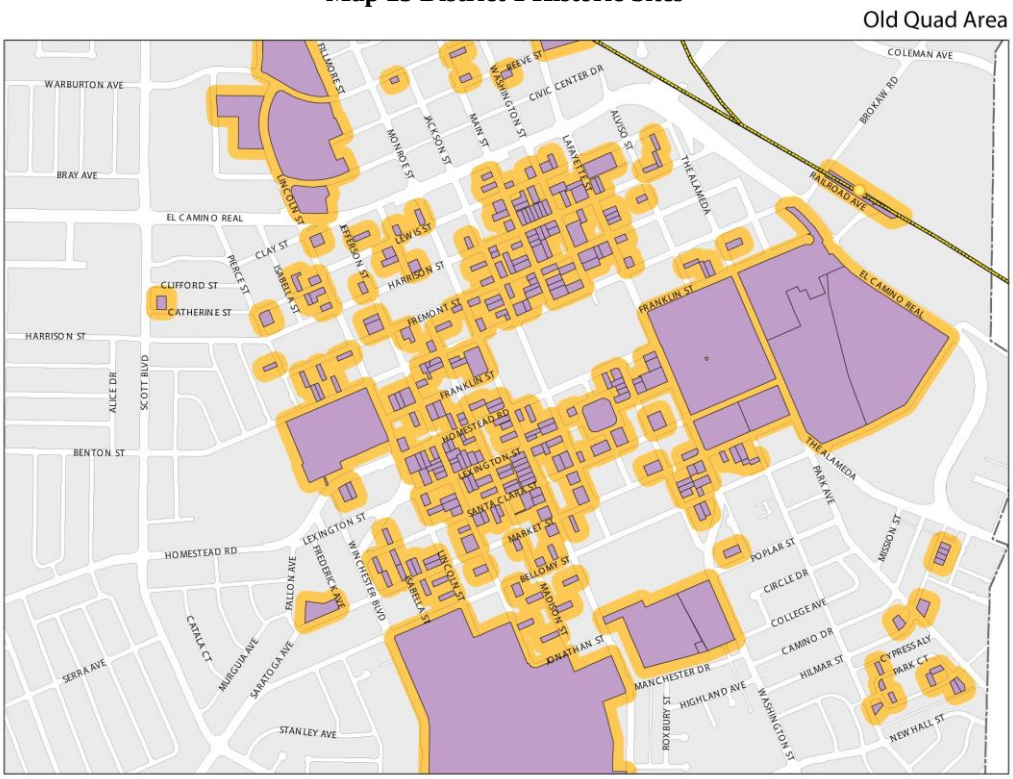
First Due Resources

Engine 91 staffed with three personnel, Medic 91 staffed with two personnel, and Battalion 91 staffed with one person. In October of 2017 Medic 91 was moved to district two to increase the number of first due ALS districts. Engine 91 is an ALS engine.

Community Profile

This area encompasses 2.4 square miles and has an estimated population of 17,360 accounting for approximately 14.5% of the city's overall population. It can best be described as the city's downtown district and encompasses the area known as the "Old Quad". This area houses many community events such as weekly farmers markets and annual parades. It is also the oldest portion of the city and the Old Quad is home to numerous original Victorian houses. The city celebrates and treasures its rich history in various ways, including recognizing buildings that meet criteria for architectural, cultural, historical, geographical or archeological significance. The city has recognized 308 sites (historical buildings) in this zone, which represents the vast majority of the city's historical buildings. This is also one of only two zones that have city recognized historical sites. Purple on the following map illustrates a recognized historical building.

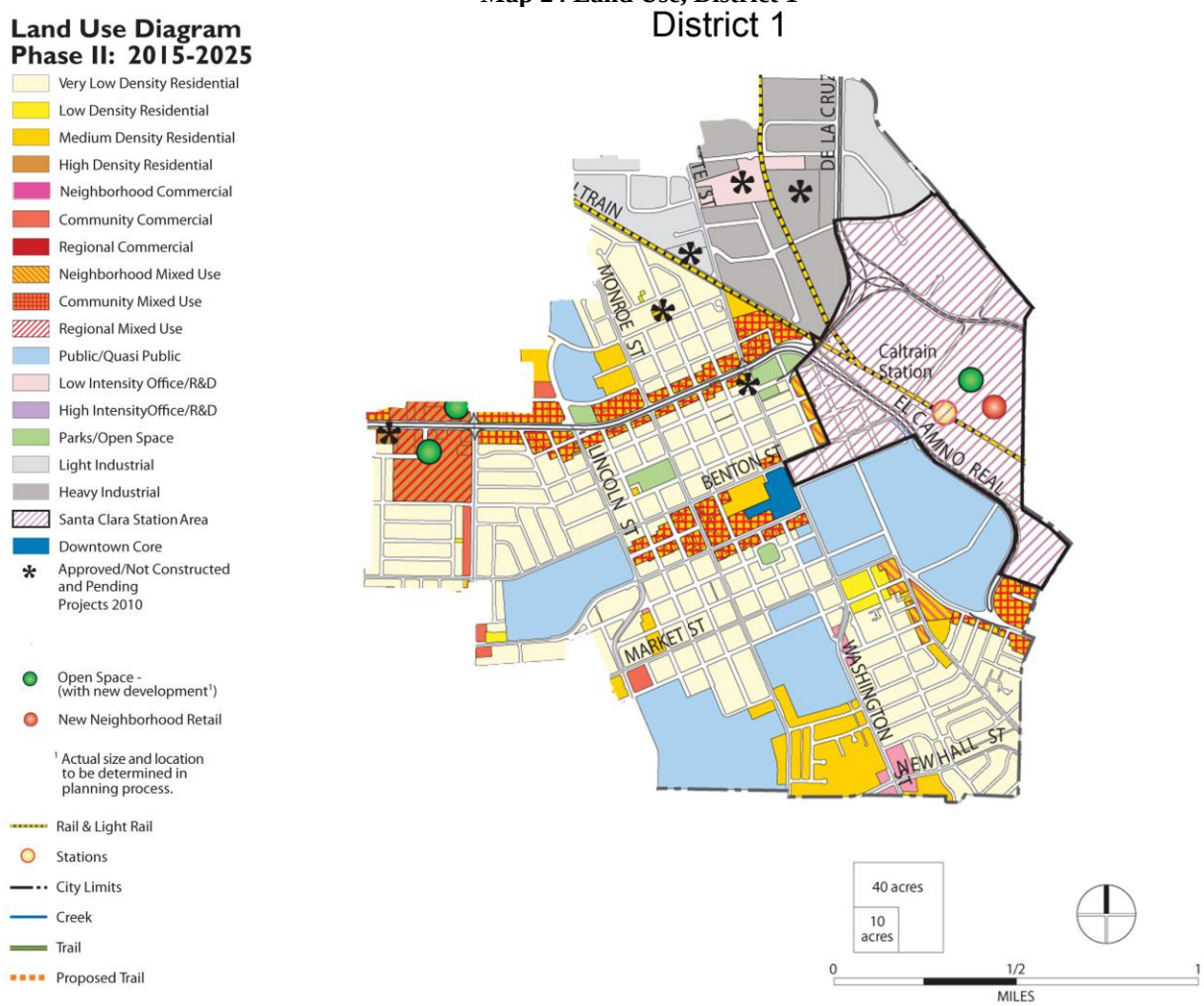
Map 23 District 1 Historic Sites



As a reminder, a structure deemed as a historical building was one of the modifying factors listed contributing to an increased risk score. Some of the historical buildings within this zone include: *The Berryessa Adobe* is the city's oldest adobe structure, which features documents, objects, and other artifacts from the era before California's Statehood in 1850. *The de Saisset Museum,* part of Santa Clara University (SCU), *The Harris-Lass Historic Preserve, Headen – Inman House*, *The Louis B. Mayer Theatre* at the Santa Clara University has two professional quality theaters to house University and community productions. *Mission Santa Clara,* also located on the SCU campus, dates back to 1777 and was the first outpost of Spanish civilization in the Santa Clara Valley. Today it serves as the SCU chapel and is open to the public. *Santa Clara Railroad Depot,* located at the Santa Clara Transit Center, was built in 1863. The Depot now incorporates the Edward Peterman Museum of Railroad History and is located on Railroad Avenue at the Santa Clara Caltrain Station. *Santa Clara Woman's Club Adobe* was one of several continuous rows of homes built in 1792-1800 as dwellings for the Native American families of Mission Santa Clara and is among the oldest adobes in Santa Clara Valley.

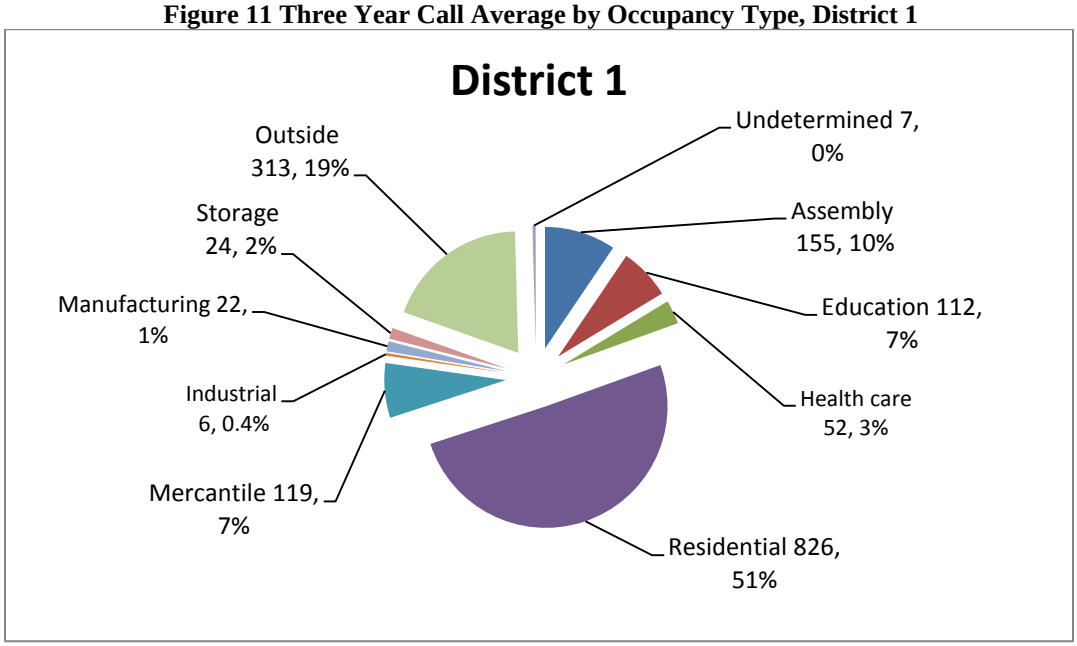
While the zone's land use is varied, the majority of this zone is residential and most of the residential is comprised of detached single-family homes. However, these structures are up to 120 years old and many are one-three stories that sit on top of basements, which present an added challenge. Furthermore, some of the single-family houses in the area around Santa Clara University have been rented for off campus housing. These include structures such as sorority and fraternity houses but also include single family homes that have been sublet with multiple tenants. Despite these buildings being similar in size to many of its neighbors, they present a greater risk for larger loss of life due to the high occupant loads of more than 16 people. There are also a number of apartment complexes, both garden and center hallway, located in the center of the zone and many medium medium/high-density residential along the El Camino Real, which runs east west across the zone. The El Camino also contains a large number of mixed use properties, such as strip malls. Furthermore, the western portion of the district is office and mixed use including multiple indoor storage facilities that are up to four stories high. The northern portion is a mixture of light industrial including wood working, metal fabrication and supply, auto repair, and machine shops, as well as heavy industrial including multiple plating/coating shops and paper and electronic recycling. There are is also a few high tech industry structures including server farms that are mostly located in the area of De La Cruz and Reed Street. There are a total of 15 locations that require a state or city hazardous material operating permit. Lastly, the Mineta San Jose International Airport and the San Jose Jet Center, containing private hangers and fuel storage border this zone/ city along its eastern boundary.

Map 24 Land Use, District 1



A summary of the call breakdown based on occupancy type is provided to follow. As with many of the districts that are predominantly residential, the majority of calls within this response zone are to residential structures. Proportionate to other zones, there is also heighted percentage of calls to assembly and educational facilities, which can be greatly attributed to the University of Santa Clara.

Figure 11 Three Year Call Average by Occupancy Type, District 1



Critical Infrastructure and High Risk Buildings

This zone has a number of properties that pose the potential for significant loss or consequence to the community. One of the more prominent areas is the Santa Clara University (SCU) Campus. SCU currently has a total enrollment of over 9000 students on over 100 acres of land. This area is dotted with approximately 60 buildings including a library, gymnasium, stadium, dormitories, a church, classrooms, as well as Mission Santa Clara. They have approximately 12 buildings that are three or more stories and Swig Hall represents one of the two high rise (11 story dormitory) structures in this zone. They have private security as well as on campus EMTs that serve as preliminary points of contact for EMS calls. The University has begun a program of expanding its types of on-campus housing with the intent of encouraging more students to live on campus. SCU is currently updating its master plan, but anticipates an increase in its student body and in the number of students served by on- campus housing, from 2,500 to 3,500.

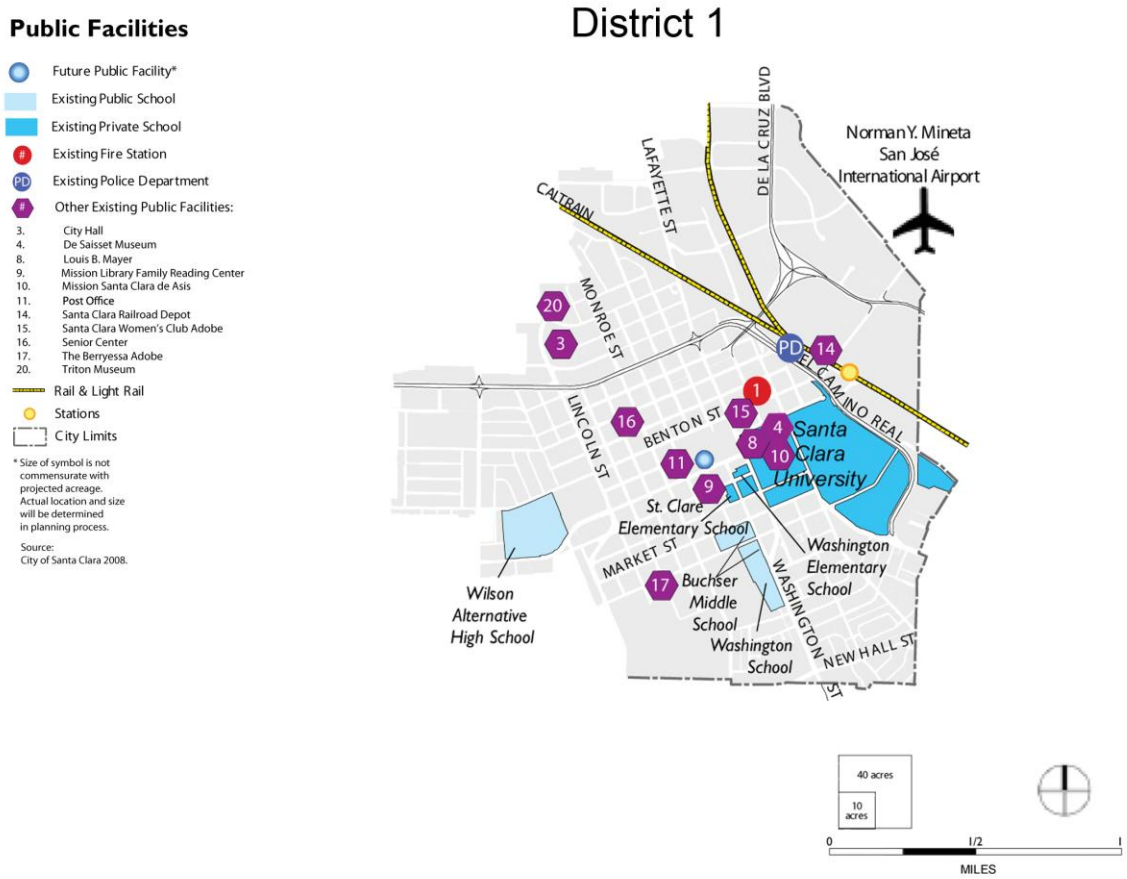
There are also four additional schools serving the community in this response zone. Those schools include: Wilson Alternative High grades 9-12 and has approximately 182 students, Buchser Middle School

grades 6-8 and has approximately 967 students, Washington Elementary grades K-5 grades and has approximately 347 students, and St. Clare School grades K-8 and has 298 students.

Most of the city's main service operations, including the Santa Clara City Hall Complex, Fire Administration and Fire Prevention Offices, the main police station, and the police and fire dispatching center, are located in this zone. These are all critical structures to the city and a loss of any one of them would be considered large. Other utility related critical infrastructure includes four storm drain pump stations scattered around the center part of the district, three electronic substations, one water pump stations and one well, two electronic substations are located in the north side of the district and the third is located on the east side of the district. There is also one Evacuation Center near Fire Station one which is located in the center of the district.

There are a number of public buildings that are of high value to the community including The Senior Center, located on Fremont Street at Monroe Street, offers a variety of ongoing recreational activities to Santa Clara residents aged 50 and older. Services on-site include adult education classes, specialized workshops, notary, health insurance/Medicare representative, legal assistance and a nutrition program. Other public buildings include the Mission Library and Family Reading Center, Post Office, and Triton Museum, which are all located in the center of the zone. There are four major areas of recreation including Larry J. Marsalli Park, Fremont Park, War Memorial Playground, and Civic Park. The following map depicts some of the high-risk properties previously described.

Map 25 Public Facilities, District 1



Transportation

This zone contains approximately 50.57 road miles. Based on the roadway types, comparative to other zones, zone 1 is not a high risk for transportation incidents. This can be noted in it having approximately 33% less call volume in relation to the other classifications. The large streets include three arterial roads running east west they are El Camino Real, Benton Street, and Homestead Avenue. Homestead Avenue becomes a collector street shortly after entering the southeastern side of zone 1. There are three arterial streets running north south they are De La Cruz Boulevard, Monroe Street, and Lafayette Street. Lafayette Street becomes Washington near the center of zone 1. There is a natural gas transmission line that runs north from the intersection of Lafayette Street and Civic Center Drive and enters zone 2. There is also a passenger and freight train lines that travels east to west across the northern central portion of the district. To follow is a summary of the zones call volume over the last four years.

Table 31 Zone 1 Four Year Call Summary

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	30	31	1,123	4	420	1,608
Distribution of Calls	1.9%	1.9%	69.8%	0.2%	26.1%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	39	31	1,245	9	434	1,758
Distribution of Calls	2.2%	1.8%	70.8%	0.5%	24.7%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	23	32	1,117	4	473	1,649
Distribution of Calls	1.4%	1.9%	67.7%	0.2%	28.7%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	29	41	1,165	2	412	1,649
Distribution of Calls	1.8%	2.5%	70.6%	0.1%	25.0%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	121	135	4,650	19	1,739	6,664
Distribution of Calls	1.8%	2.0%	69.8%	0.3%	26.1%	100.0%

4-Year averages

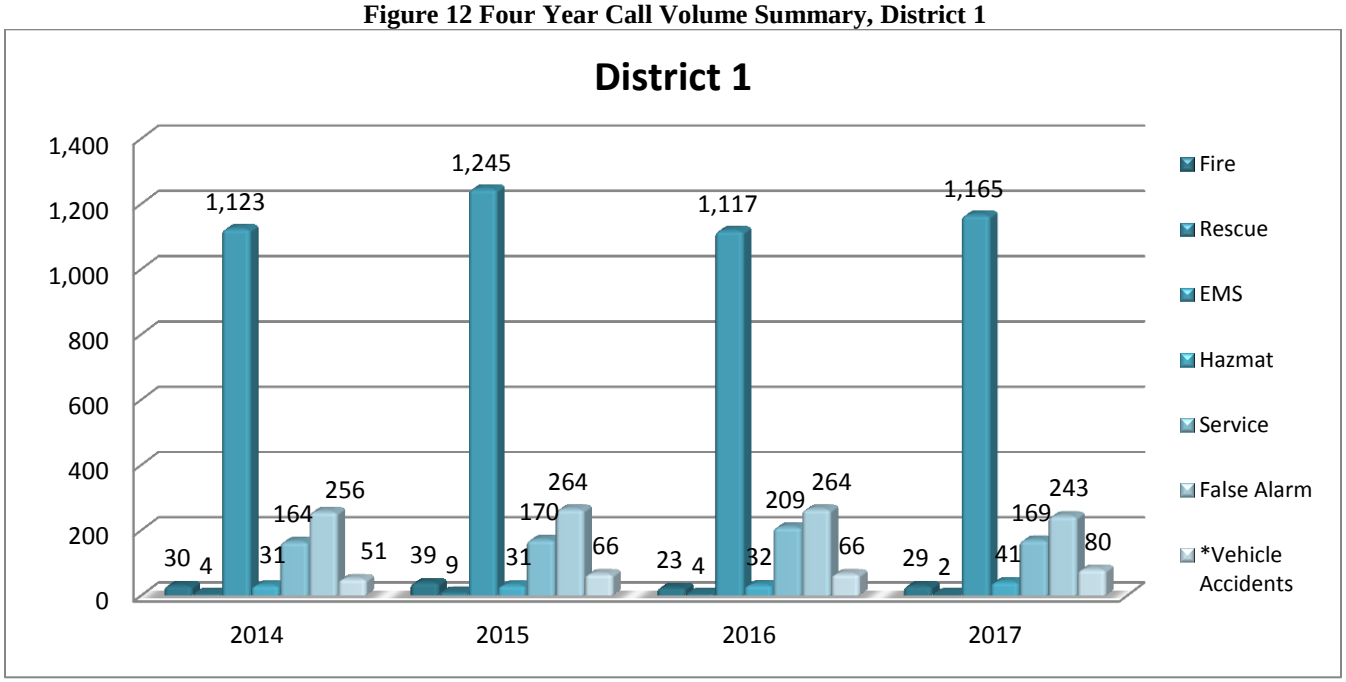
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	30	34	1,163	5	434.75	1,666
Distribution of Calls	1.8%	2.0%	69.8%	0.3%	26.1%	100.0%
Call Per Day	0.08	0.09	3.18	0.01	1.19	4.56

Percentage of Annual SCFD Calls Occurring in Zone 1

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	16.5%	22.3%	18.4%	15.4%	18.5%	18.4%
Calendar Year 2015	19.8%	20.1%	19.1%	22.0%	18.4%	19.0 %
Calendar Year 2016	12.6%	19.5%	17.1%	9.5%	19.0%	17.6%
Calendar Year 2017	16.5%	22.0%	18.4%	5.0%	17.5%	18.2%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 12 Four Year Call Volume Summary, District 1



Complex Structures

There are a number of current properties projects under construction that that pose a challenge in terms of fire suppression response. This challenge stems from the size, building type, layout and or building demographics of the structure. These properties include high density housing, senior living, or large commercial, industrial and mixed-use properties. This includes the newly renovated Santa Clara Town Square located at 2082 El Camino Real (ECR) sits on 20.9 acres including 283,917 square feet of commercial retail, including a 144,884-square foot Target and a 21,214-square foot grocery store, and multiple restaurants for a total value of approximately 30.8 million dollars.

Liberty Towers is the second high rise in the zone, an 11-story Senior Housing structure, located at 890 Main Street is a 100-unit apartment complex, with all of the units allocated for occupancy by low income seniors. This structure contains both a fire sprinkler system (FSS) and a vertical standpipe. There are two

other three story unassisted senior living apartment complex in the zone also protected by a FSS. El Presidio, located at 1450 ECR, is a three-story mixed-use property containing 3,025 square feet of retail space and 40 apartments. Downtown Gateway is a four-story mixed-use complex located at 1313 Franklin Street (at Monroe), located on 1.04 acres and contains 44 residential condominiums and 14,477 square feet of retail space, valued at 30 million dollars. Madison Place is a four-story mixed-use property currently under construction located at 1460 Monroe Street, sits on .68 acres of land and is 638,958 square feet of office and common space and has 28 housing units. Lastly, Domicilio, located at 431 ECR, is a large apartment complex comprised of 306 apartments spread across five buildings each four-stories tall. There is also subterranean parking at this location, which is mainly occupied by SCU students.

Fire Loss

Within District 1 in 2014 there were 30 total fires and seven of those were documented to have a loss. Of the 30 fires, 12 were structure fires and five (42%) resulted in a total documented loss of $108,050. The remaining 18 fires were classified as other (garbage, shed, and vehicle fires) and two (11%) of these fires resulted in a loss of $6,600. The result was a combined total of seven damaging fires for a loss, totaling $114,650 in damages.

In 2015, there were 39 total fires and 15 of those were documented to have a loss. 20 of those were structure fires and 10 (50%) resulted in a total documented loss of $78,080. The remaining 19 were classified as other (garbage, shed, and vehicle fires) and 5 (26%) of the "other" fires resulted in a loss of $28,505. The result was a combined total of 15 damaging fires for a loss, totaling $106,585 in damages.

In 2016, there were 23 total fires and nine of those were documented to have a loss. Eight of those were structure fires and 5 (63%) of those structure fires resulted in a total documented loss of $55,000. The remaining 15 were classified as other (garbage, shed, and vehicle fires) and 4 (27%) of the "other" fires resulted in a loss of $65,000. The result was a combined total of 9 damaging fires for a loss, totaling $120,000 in damages.

In 2017, there were 29 total fires and six of those were documented to have a loss. 10 of those fires were structure fires and four (40%) of those structure fires resulted in a total documented loss of $23,100. The remaining 19 were classified as other (garbage, shed, and vehicle fires) and 2 (11%) of the "other" fires resulted in a loss of $28,000. The result was a combined total of 48 damaging fires for a loss, totaling $392,335 in damages.

Therefore, in the four years studied (2014-2017), the District 1 mitigated 71 "other" fires and 13 (18%) resulted in a documented loss totaling $128,105. Furthermore, from 2014- 2017 District 1 had 50 structure fires and 24(48%) of those structure fires resulted in a documented loss of $264,230. The combined total

of 121 total fires and 37 (24 structure and 13 other) damaging fires that resulted in a loss totaled $392,335 in damages. The total dollar amounts can be seen in the following graphs.

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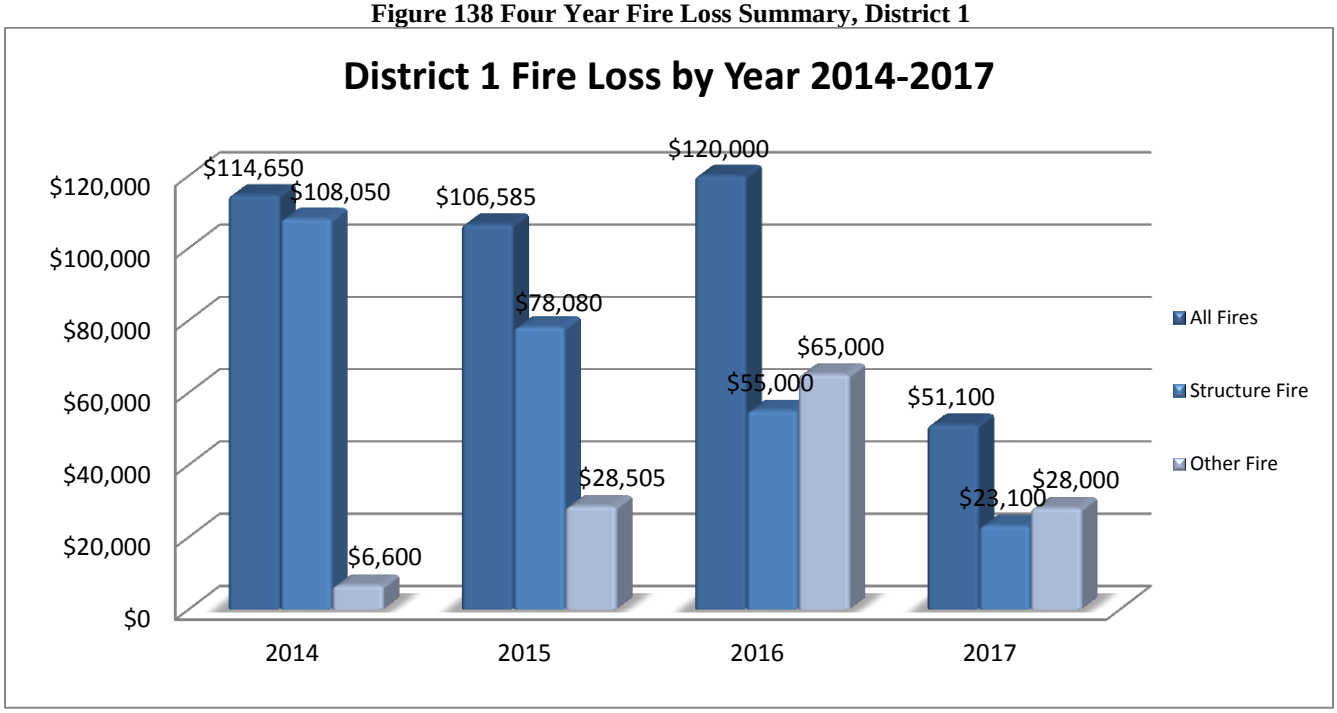
Table 32 District 1 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	30	7	$114,650	12	5	$108,050	18	2	$6,600
2015	39	15	$106,585	20	10	$78,080	19	5	$28,505
2016	23	9	$120,000	8	5	$55,000	15	4	$65,000
2017	29	6	$51,100	10	4	$23,100	19	2	$28,000
Total Loss	**121**	**37**	**$392,335**	**50**	**24**	**$264,230**	**71**	**13**	**$128,105**

This zone generated an estimated loss of $264,230 from structure fires and $128,105 in other types of fires for a total of $392,335 in fire loss over the four-year period

Figure 138 Four Year Fire Loss Summary, District 1



Geographical Planning Zone 2

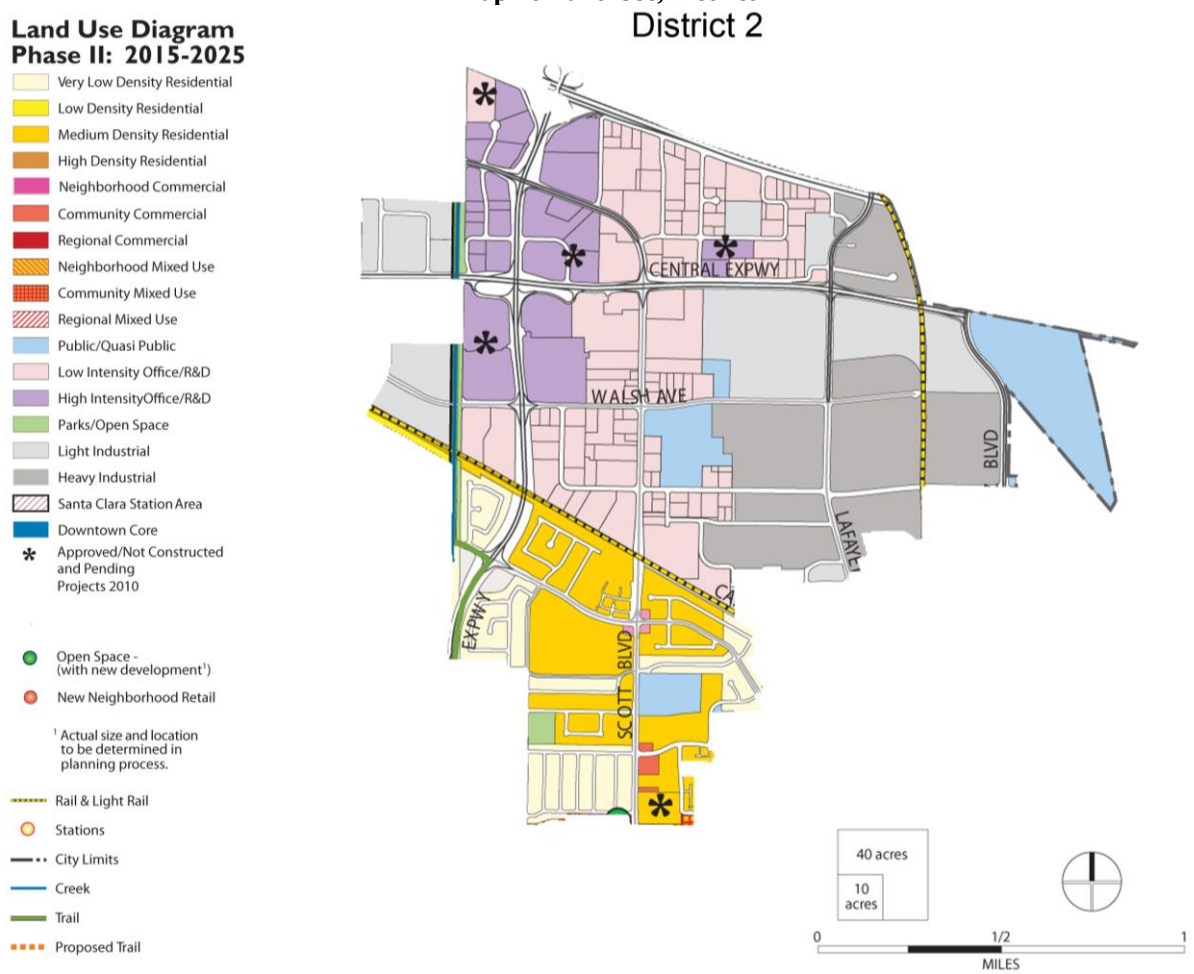
First Due Resources

Truck 92 staffed with four personnel, Rescue 92 staffed with one person, and Battalion 92 staffed with one person. In October of 2017 Medic 92 staffed with two personnel was moved to this district in addition to the above mentioned staffing. This was done to increase the number of first due ALS districts in the jurisdiction. District two was previously BLS.

Community Profile

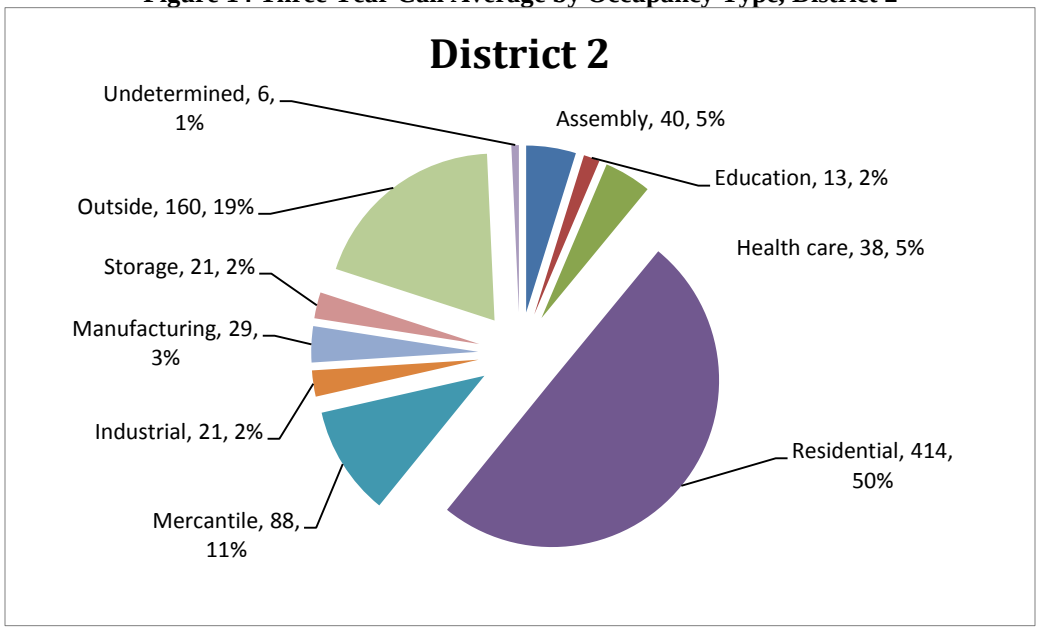
This area encompasses 2.2 square miles and has an estimated population of 8,746 accounting for approximately 7.30% of the city's overall population. It can best be described as the center of the city. The zone has a very diverse land use with the vast majority of its residential properties located in the south and southwestern portions of its district. These structures are a combination of single family residences, low income four-unit apartment complex, and high-density apartment complexes. The eastern portion of the district represents heavy industrial area. The center and northern end of the district is predominantly low intensity office and Research and Development (R&D). Lastly the northwest end of the district is high intensity Office and R&D this includes multiple technology manufactures including NVIDIA. There are multiple approved and in progress construction sites mostly located in the northwest corner of the district. Lastly, there are many large roadways, including Highway 101 and the zone borders the western edge of Mineta San Jose International Airport.

Map 26 Land Use, District 2



A summary of the call breakdown based on occupancy type is provided to follow. This zone is one of the fewer zones in the agency's jurisdiction that, at about 40%, has a minority of its land usage as residential. However, due to the number of high density apartment complexes and the high frequency of calls at the Westmont Retirement facility, both classified as residential structures, approximately 50% of calls in this zone are to residential structures. The high amount of "outside" calls, which includes roadway calls like vehicle accidents are a testament to the large amount of higher speed roadways within the response zone.

Figure 14 Three Year Call Average by Occupancy Type, District 2



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. While the number of buildings is not abundant, this zone contains some of the largest and or valuable properties in the city. These structures include the centrally located NVIDIA campus, a technology company, which spans more than a city block. The majority (seven) of the multi-story office buildings are located North of Walsh Avenue east of San Tomas Expressway. However, NVIDIA is nearing completion of a new building located North of Walsh, West of San Tomas Expressway. This is a state of the art facility that has received architectural and engineering notoriety. Its multi-story footprint is more than 500,000 square feet. The NVIDIA 2600 and 2800 San Tomas campus occupies 35.6 acres and 1.9 million square feet of office space one of the new building is set to be 8 stories (140 feet). The total valued of the new campus is 112 million dollars and will have 7,000 permanent jobs. The tax revenue and volume of jobs that would be lost if a significant fire were to occur would be significant to the city.

There are a number of public buildings that are of high value to the community and city including the Headen-Inman House, which is the sole historical property located in zone 2. Furthermore, the city Corp Yard, home to the cities central garage which is responsible for service and repair of all city vehicles including police and fire, radio shop, sign shop and major source location for fuel. Likewise, the Emergency Operations Center (EOC) is located adjacent to fire station 2. This structure would be used as a command post during a large-scale emergency. A few of the city hall buildings cross over from zone1 into zone 2. Lastly, of enormous importance is the Donald Von Raesfeld Power Plant. The City of Santa Clara owns and operates the municipal electric utility, Silicon Valley Power (SVP). SVP serves over 50,000

residential, commercial, industrial, and municipal customers within the city. It owns, operates and participates in the production of more than 510 megawatts of electricity. SVP can supplement this power through purchase agreements for an additional 261 megawatts of capacity. Loss, damage, or temporary loss of use to this structure could have an effect on businesses and residents city wide.

Other utility related critical infrastructure includes two storm drain pump stations. One is located in the southern side of the zone and the other is located near the center of the zone. There are five electric substations, three electric receiving stations located in the north side of the zone, a fourth electric substation is located in the center of the zone and a fifth electric junction station (switching station) located in the east side of the zone. There is a natural gas transmission line that runs north through zone two, along Lafayette Street, into zone six.

There are two schools serving the community in this zone. First is Scott Lane Elementary, grades K-5 with approximately 462 students. The second is Granada Islamic School, grades PreK-8 and responsible for the education of over 398 students. The Granada Islamic School is also a part of the Muslim Community Association, which is one of the largest Muslim community centers in the bay area. They offer prayer service and other community events multiple times throughout the week. This facility has seen been a target for anti-Muslim sentiment in the form of threats and bomb or other violent threats. There are three main areas of recreation in the zone including, Warburton Swim Center, Rotary Park, and Reed Street Park. There are also two creeks that run north to south through the zone. The first is the San Tomas creek, which has a bike and running trail alongside it, and the second is the Saratoga Creek. During large winter storm, both creeks serve as a potential site for a swift water rescue.

There are also a number of high hazard properties in the zone including Westmont Retirement at 1675 Scott Boulevard. This is a four-story independent senior living facility with over 60 apartments and serves as a frequent site for EMS calls. Owens Corning building, built in 1949, was the first industrial plant in the United States designed specifically to manufacture insulation. Today, the plant employs 300 people and produces approximately 250 million pounds of insulation annually. There are a total of 42 locations that require state or city hazardous materials operating permit mostly located along Martin, Richard, Memorex, and Lafayette Street. This zone also contains one of the five Cal ARP facilities. The following map depicts the some of the high-risk properties previously described.

Map 27 Public Facilities, District 2

Transportation

This zone contains approximately 36.25 road miles. Based on the types of roadways and their allotted speeds, zone 2 serves as a high risk for transportation incidents. U.S. 101 runs along the northern perimeter of zone 2. There are two expressways, Central Expressway runs east/west, and San Tomas Express way runs north/south. There are five arterial roads, four of which run north/south. These are Scott Boulevard, Monroe Street, Lafayette Street, and De La Cruz Boulevard. The fifth, which is Walsh Avenue, runs east/west. The Union Pacific Railroad runs on the east side and the Caltrain Rail runs east to west in the southern portion of the zone. Zone 2 has historical probability that lends itself to an increase transportation risk. To follow is a summary of the zones call volume over the last Four years.

Table 21 Zone 2 Four Year Call Summary

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	22	12	515	1	244	794
Distribution of Calls	2.8%	1.5%	64.9%	0.1%	30.7%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	12	14	553	3	268	850
Distribution of Calls	1.4%	1.6%	65.1%	0.4%	31.5%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	14	584	2	244	865
Distribution of Calls	2.4%	1.6%	67.5%	0.2%	28.2%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	19	578	5	267	890
Distribution of Calls	2.4%	2.1%	64.9%	0.6%	30.0%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	76	59	2,230	11	1,023	3,399
Distribution of Calls	2.2%	1.7%	65.6%	0.3%	30.1%	100.0%

4-Year averages

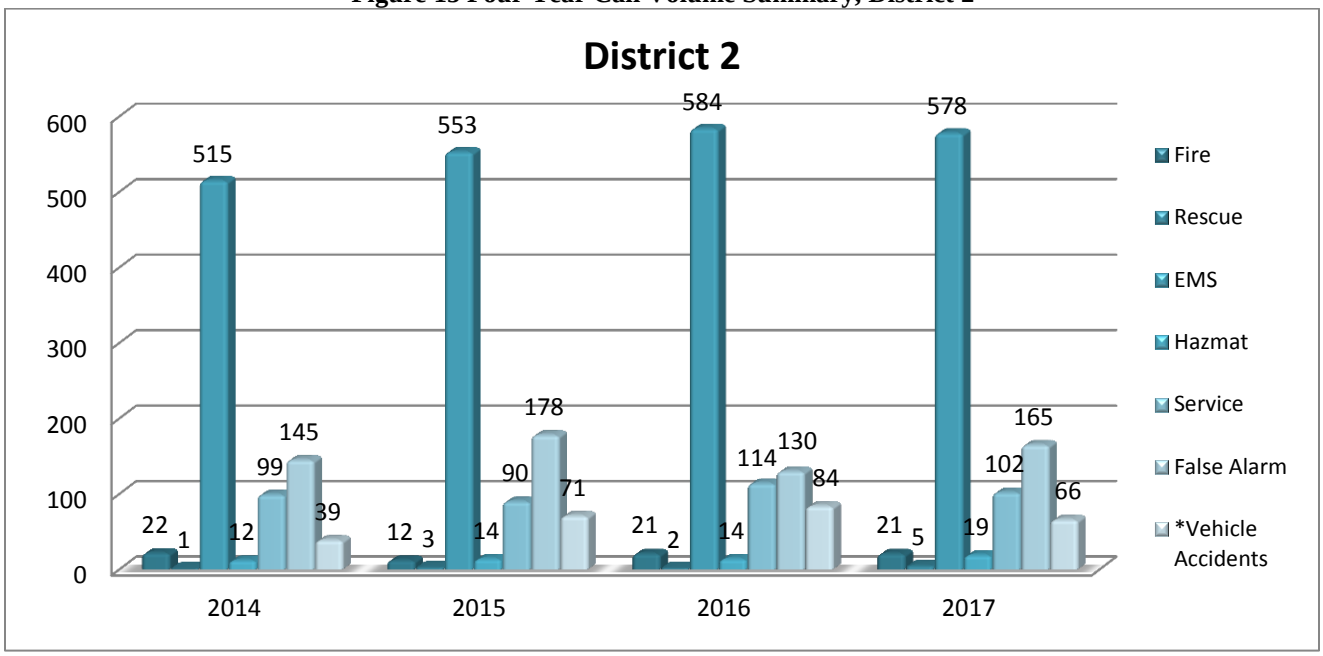
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	19	15	558	3	255.75	850
Distribution of Calls	2.2%	1.7%	65.6%	0.3%	30.1%	100.0%
Call Per Day	0.05	0.04	1.53	0.01	0.70	2.33

Percentage of Annual SCFD Calls Occurring in Zone 2

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	12.1%	8.6%	8.4%	3.8%	10.8%	9.1%
Calendar Year 2015	6.1%	9.1%	8.5%	7.3%	11.3%	9.2%
Calendar Year 2016	11.5%	8.5%	9.0%	4.8%	9.8%	9.2%
Calendar Year 2017	11.9%	10.2%	9.1%	12.5%	11.4%	9.8%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 15 Four Year Call Volume Summary, District 2



Fire Loss

Within District 2 jurisdiction in 2014 there were 22 total fires and nine of those were documented to have a loss. Of the 22 fires, six were structure fires and three (50%) resulted in a total documented loss of $111,110. The remaining 16 fires were classified as other (garbage, shed, and vehicle fires) and six (38%) of these fires resulted in a loss of $282,570. The result was a combined total of nine damaging fires for a loss, totaling $393,680 in damages.

In 2015, there were 12 total fires and five of those were documented to have a loss. Seven of those were structure fires and five (71%) resulted in a total documented loss of $1,274,330. The remaining five were classified as other (garbage, shed, and vehicle fires) and none of them were documented to have a loss. The result was a combined total of five damaging fires for a loss, totaling $1,274,330 in damages.

In 2016, there were 21 total fires and five of those were documented to have a loss. Eight of those were structure fires and one (13%) of those structure fires resulted in a total documented loss of $800. The remaining 13 were classified as other (garbage, shed, and vehicle fires) and 4 (31%) of the "other" fires resulted in a loss of $23,600. The result was a combined total of five damaging fires for a loss, totaling $24,400 in damages.

In 2017, there were 21 total fires and seven of those were documented to have a loss. Three of those 21 fires were structure fires and one (33%) of those structure fires resulted in a total documented loss of $1,000. The remaining 18 were classified as other (garbage, shed, and vehicle fires) and 6 (33%) of the "other" fires resulted in a loss of $41,300. The result was a combined total of seven damaging fires for a loss, totaling $42,300 in damages.

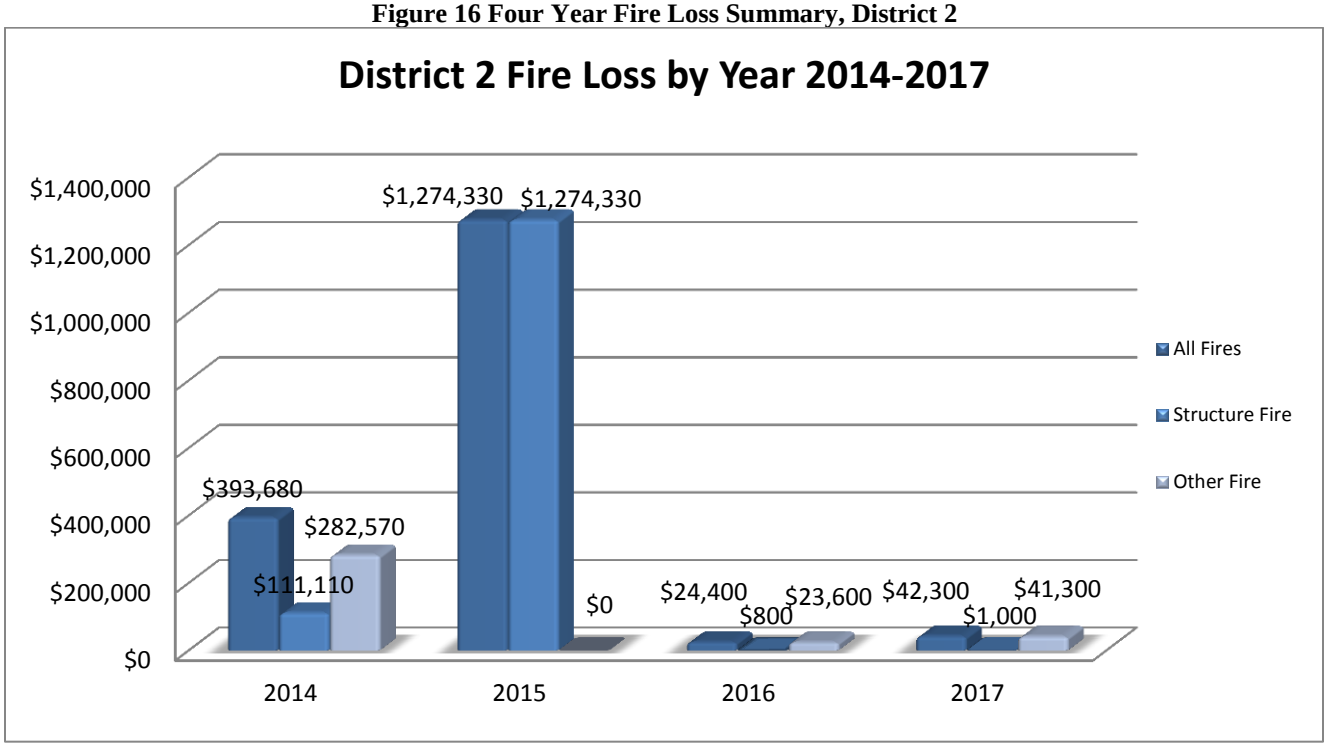
Therefore, in the four years studied (2014-2017), the District 2 mitigated 52 "other" fires and 16 (31%) resulted in a documented loss totaling $347,470. Furthermore, from 2014- 2017 District 2 had 24 structure fires and 10(24%) of those structure fires resulted in a documented loss of $1,387,240. The combined total of 76 total fires and 26 (10 structure and 16 other) damaging fires that resulted in a loss totaled $1,734,710 in damages. The total dollar amounts can be seen in the following graphs.

Table 34 District 2 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	22	9	$393,680	6	3	$111,110	16	6	$282,570
2015	12	5	$1,274,330	7	5	$1,274,330	5	0	$0
2016	21	5	$24,400	8	1	$800	13	4	$23,600
2017	21	7	$42,300	3	1	$1,000	18	6	$41,300
Total Loss	**76**	**26**	**$1,734,710**	**24**	**10**	**$1,387,240**	**52**	**16**	**$347,470**

This zone generated an estimated loss of $1,387,240 from structure fires and $347,470 in other types of fires for a total of $1,734,710 in fire loss over the four-year period.

Figure 16 Four Year Fire Loss Summary, District 2



Geographical Planning Zone 3

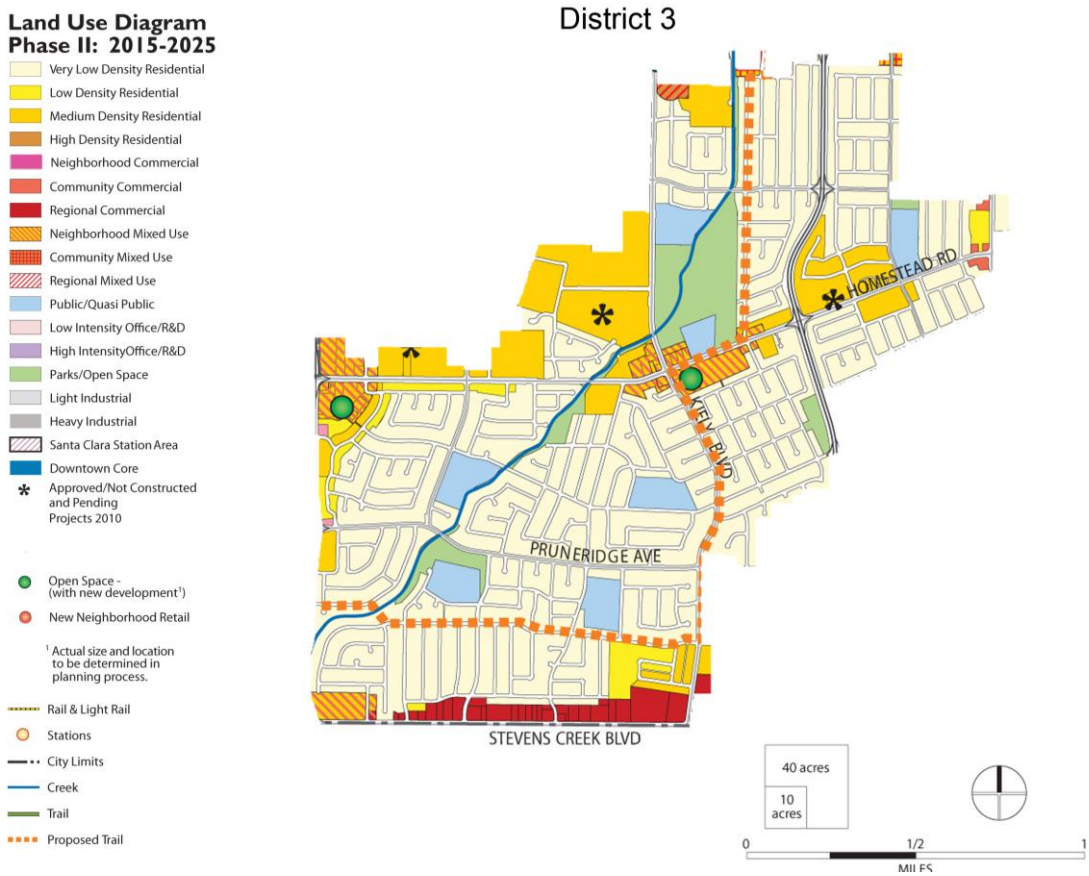
First Due Resources

Engine 93 staffed with 3 personnel.

Community Profile

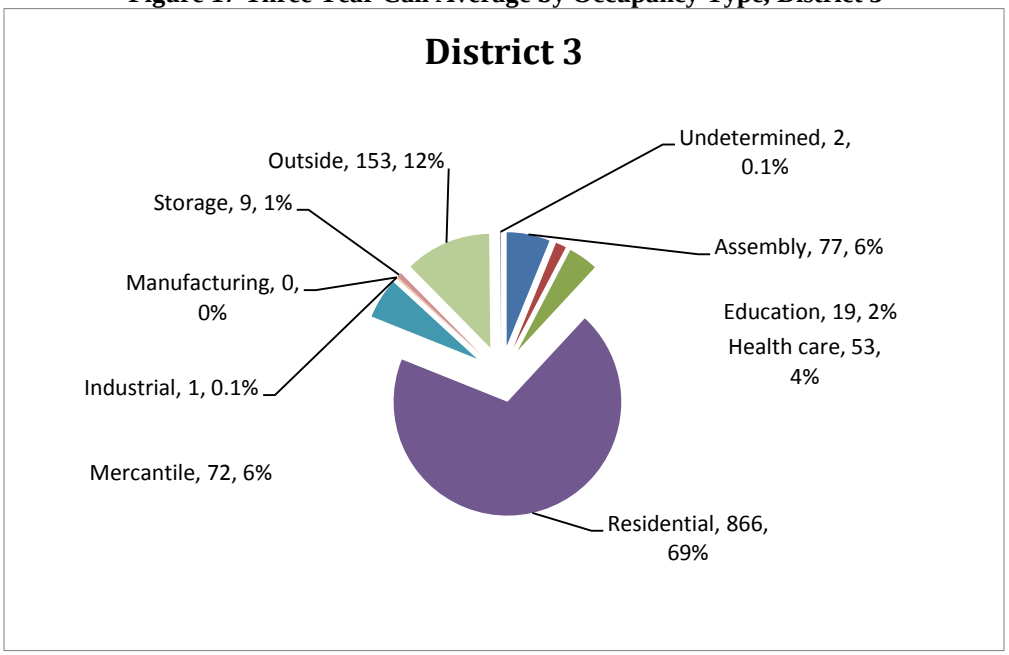
This area encompasses 2.3 square miles and has an estimated population of 20,838 accounting for approximately 17.4% of the city's overall population. With approximately 85% of its land use being used as residential properties, the vast majority of zone 3 is residential including multiple large high-density apartment and condominium complexes, four-unit apartment complexes and large pockets of single family homes. There are some areas in the center of the zone dedicated to neighborhood mixed use along Homestead Road. Furthermore, along the southern border, which is the city limits, Stevens Creek Boulevard offers a considerable amount of community mixed use properties. This zone is bordered by El Camino Real to the north and Stevens Creek Boulevard to the south. These stretches are commercial with many businesses and strip malls. Two of the community's highlights are the International Swim center, a facility that holds Olympic qualifying events, and Central Park, which represents the largest developed open space in the city and houses many annual events such as the art and wine festival, tree lighting ceremony, and Fourth of July celebrations. It borders San Jose to the south and a small amount of the western boundary borders Sunnyvale. See the following map for further details.

Map 28 Land Use, District 3



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to. As stated earlier, the zone is predominantly residential and approximately 70% of all calls in zone 3 were at residential structures.

Figure 17 Three Year Call Average by Occupancy Type, District 3



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are multifamily dwellings in the form of high density apartment complexes. Woodsborough Condos is a multi-story 477-unit common interest development that does not have a fire suppression system (FSS) and represents a high-risk classification due to the large potential for loss. This is the site of two previous fires with one being in the 2015. There are several smaller apartment complexes alongside Homestead Road and a number of private care homes located in the southern portion of the district. However, the largest single structure in the district is Hearth Apartments, located at 2870 Kaiser Drive. This is a recently completed High Density Housing Community comprised of apartments, townhomes, and single-family homes and is located on the North side of the zone. This development totals 550 units, located in a 4-story apartment complex. Adjacent to the apartment complex are an additional 250 3-story townhouses and 2-story single family residences valued at approximately 509 million dollars. This complex is all protected by FSS but due to its high density remains a potential challenge should an incident occur.

Recreation is a huge part of the character of zone three. There are four smaller parks including Maywood Park, Homeridge Park, Steve Carli Park, and Mary Gomez Park. However, the heart of the zone is Central

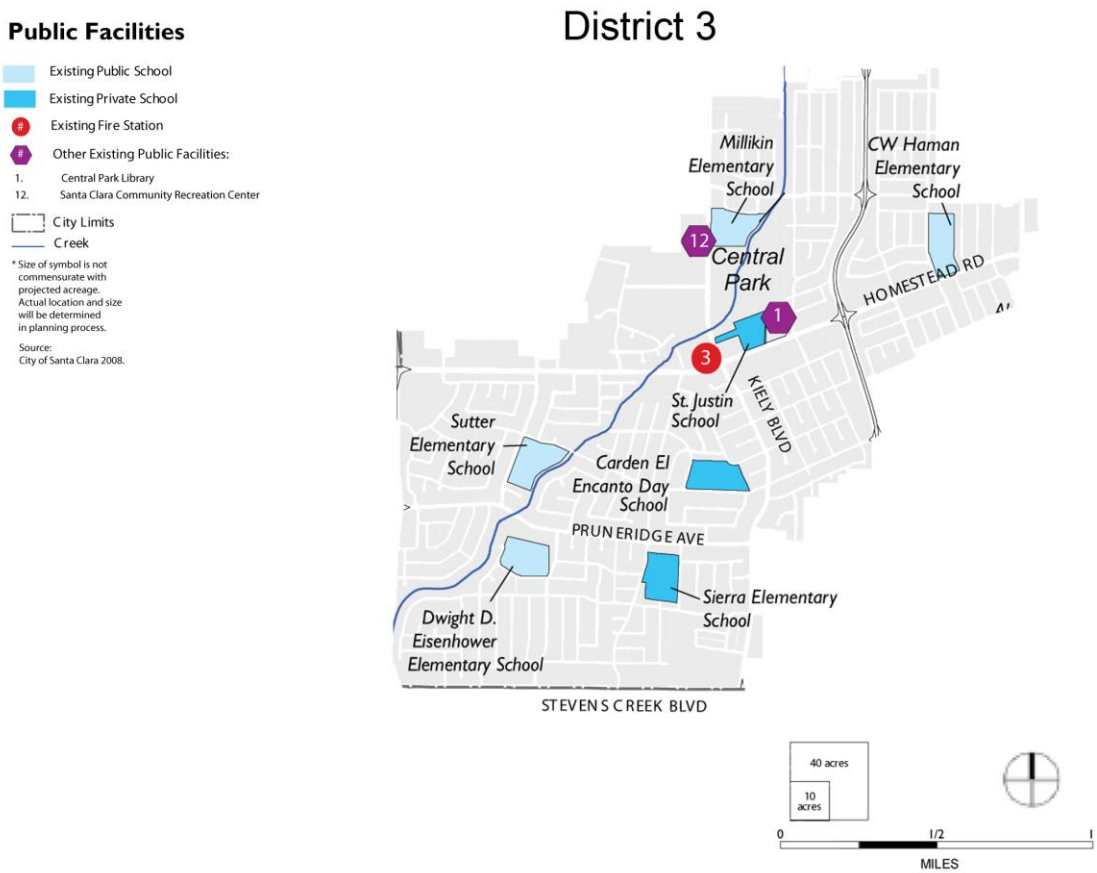
Park, A fifty-two-acre park home to many major facilities. The area west of Saratoga Creek contains group and individual picnic facilities, children's play area, public restrooms, amphitheater, parking, two lighted tennis courts, basketball courts, the Veterans Memorial, and a 30,000-square foot Community Recreation Center, which is the hub of the city's recreation programs.

The city distributes a Recreation Activities Guide with class listings, events and programs by mail three times per year to all residents and the guide is also available online bringing countless visitors to the park annually. Furthermore, the 84,000 square feet Central Park Library, located on Homestead Road, is the main library for the city, and was reconstructed and expanded in 2004. The library is visited more than 1.4 million people per year, and over 3,000 people per day using the library. The Santa Clara International Swim center is home to the world famous Santa Clara Aquamaids. The Aquamaids have produced more than 58% of all the Olympic Synchronized Swimmers representing the USA since synchronized swimming became an Olympic sport. It is also home to the Santa Clara swim club and many Olympic Swimmers and Divers have affiliations with this elite training facility. These structures would offer a huge physical and psychological loss to the community should a large emergency event occur. The Saratoga Creek and San Tomas Aquino Creek, which runs under San Tomas Expressway, present a potential for a water rescue during a large winter storm.

In order to support the large amount of residences and high population in this zone there are a total of 9 schools including Santa Clara High School grades 9-12 with approximately 1,767 students, Millikin Elementary grades K-5 with approximately 368 students, Central Park Elementary grades K-4th (and expanding) with 200 students, St. Justin School grades K-8 with approximately 295 students, Sutter Elementary School grades K-5 with approximately 410 students, Carden El Encanto Day School grades K-8 with approximately 99 students, Dwight Eisenhower Elementary School grades K-5 with approximately 702 students, Sierra Elementary and High School grades K-12 with approximately 100 students, and C.W. Haman elementary school with approximately 375 students.

Other utility related critical infrastructure includes three water department wells, an Evacuation Center at Millikin School and two electric substations located near the center of the district and southern end of the zone. There are a total of four locations that require state or city hazardous materials operating permit within spread across zone three, which is one of the zones with the lowest amount of HMBP required facilities. Lastly, there is a large dialysis center located on Homestead Road at Lawrence Expressway that serves as site for frequent medical calls. Likewise, the size of the facility also increases its risk. The following map depicts the some of the high risk properties previously described.

Map 29 Public Facilities, District 3



Transportation

This zone contains approximately 51.30 road miles. This includes two expressways; San Tomas Expressway, which runs on the northeast side of zone three and Lawrence Expressway, which runs along the western perimeter. There are five arterial roads that run east/west in zone three; El Camino Real in the northern perimeter, Benton Street, Homestead Avenue, Pruneridge Road, and Stevens Creek in the southern perimeter. A sixth arterial road, Kiely Boulevard, runs north/south through the center of zone three. There also is a natural gas transmission line running along Lawrence Expressway on the western perimeter of zone 3. The following table shows a four-year summary of call volume.

Table 35 Zone 3 Four Year Call Summary

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	17	30	810	5	335	1,197
Distribution of Calls	1.4%	2.5%	67.7%	0.4%	28.0%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	25	918	7	272	1,243
Distribution of Calls	1.7%	2.0%	73.9%	0.6%	21.9%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	32	26	999	5	302	1,364
Distribution of Calls	2.3%	1.9%	73.2%	0.4%	22.1%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	25	903	4	300	1,253
Distribution of Calls	1.7%	2.0%	72.1%	0.3%	23.9%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	91	106	3,630	21	1,209	5,057
Distribution of Calls	1.8%	2.1%	71.8%	0.4%	23.9%	100.0%

4-Year averages

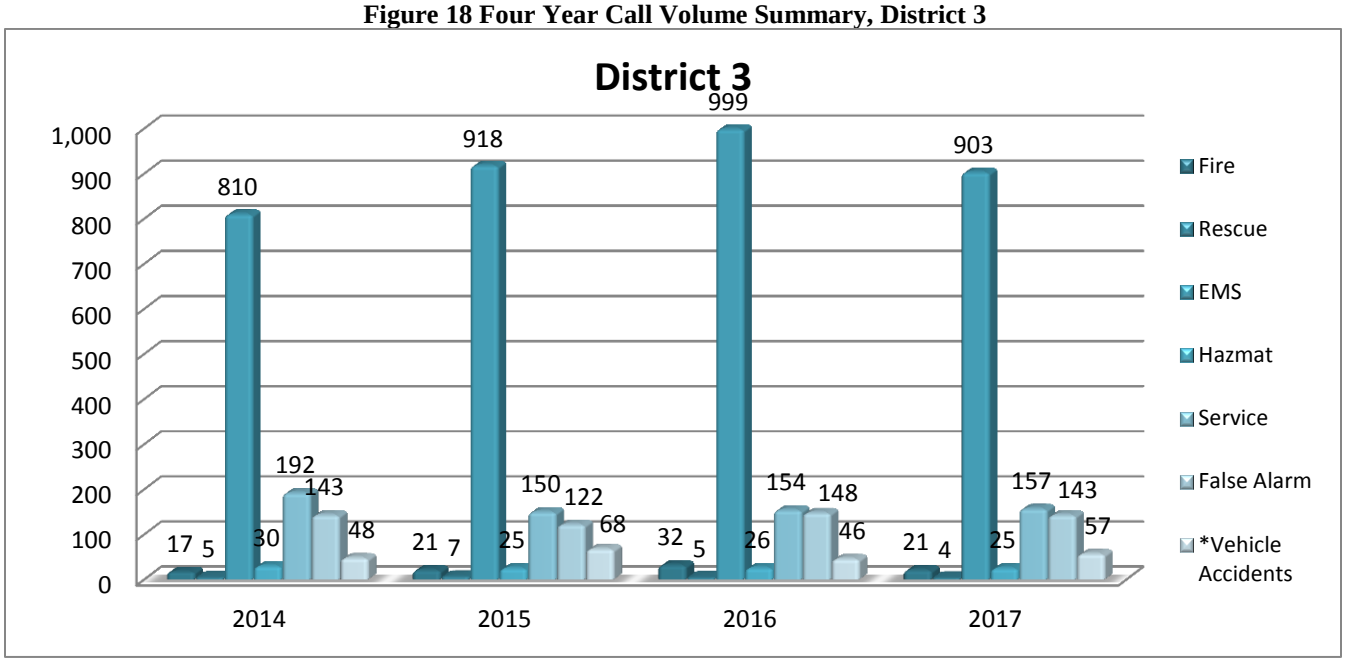
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	23	27	908	5	302.25	1,264
Distribution of Calls	1.8%	2.1%	71.8%	0.4%	23.9%	100.0%
Call Per Day	0.06	0.07	2.49	0.01	0.83	3.46

Percentage of Annual SCFD Calls Occurring in Zone 3

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	9.3%	21.6%	13.3%	19.2%	14.8%	13.7%
Calendar Year 2015	10.7%	16.2%	14.1%	17.1%	11.5%	13.4%
Calendar Year 2016	17.6%	15.9%	15.3%	11.9%	12.1%	14.5%
Calendar Year 2017	11.9%	13.4%	14.3%	10.0%	12.8%	13.8%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 18 Four Year Call Volume Summary, District 3



Fire Loss

Within District 3 jurisdiction in 2014 there were 17 total fires and seven of those were documented to have a loss. Of the 17 fires, eight were structure fires and five (63%) resulted in a total documented loss of $1,170. The remaining nine fires were classified as other (garbage, shed, and vehicle fires) and two (22%) of these fires resulted in a loss of $1,100. The result was a combined total of seven damaging fires for a loss, totaling $2,270 in damages.

In 2015, there were 21 total fires and 10 of those were documented to have a loss. 11 of those were structure fires and four (36%) resulted in a total documented loss of $99,000. The remaining 10 were classified as other (garbage, shed, and vehicle fires) and six (60%) of the "other" fires resulted in a loss of $134,050. The result was a combined total of 10 damaging fires for a loss, totaling $233,050 in damages.

In 2016, there were 32 total fires and nine of those were documented to have a loss. 17 of those were structure fires and five (29%) of those structure fires resulted in a total documented loss of $184,425. The remaining 15 were classified as other (garbage, shed, and vehicle fires) and four (27%) of the "other" fires resulted in a loss of $750. The result was a combined total of nine damaging fires for a loss, totaling $185,175 in damages.

In 2017, there were 21 total fires and eight of those were documented to have a loss. Five of those 21 fires were structure fires and two (40%) of those structure fires resulted in a total documented loss of $130,200.

The remaining 16 were classified as other (garbage, shed, and vehicle fires) and six (38%) of the "other" fires resulted in a loss of $8,225. The result was a combined total of eight damaging fires for a loss, totaling $138,425 in damages.

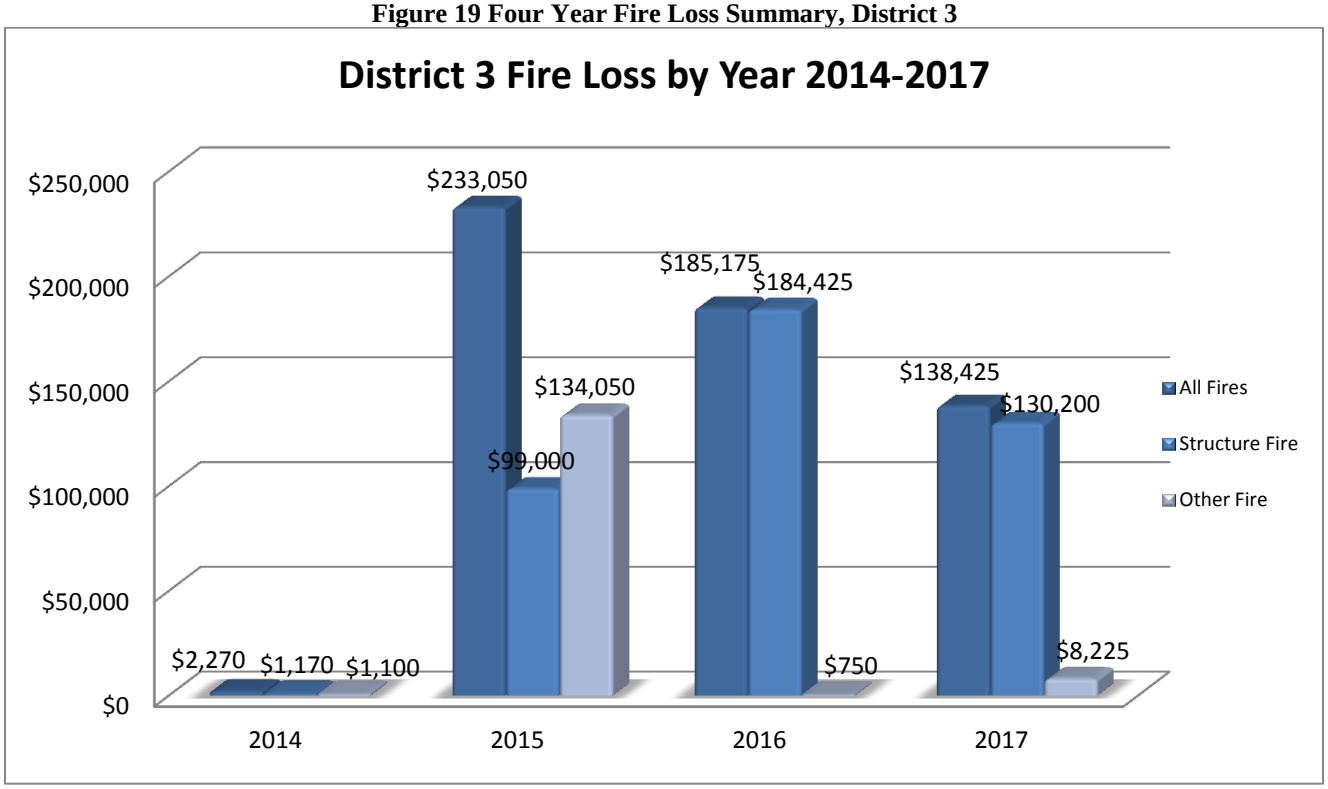
Therefore, in the four years studied (2014-2017), the District 3 mitigated 50 "other" fires and 18 (36%) resulted in a documented loss totaling $144,125. Furthermore, from 2014- 2017 District 3 had 41 structure fires and 16(39%) of those structure fires resulted in a documented loss of $414,795. The combined total of 91 total fires and 34 (16 structure and 18 other) damaging fires that resulted in a loss totaled $558,920 in damages. The total dollar amounts can be seen in the following graphs.

Table 36 District 3 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	17	7	$2,270	8	5	$1,170	9	2	$1,100
2015	21	10	$233,050	11	4	$99,000	10	6	$134,050
2016	32	9	$185,175	17	5	$184,425	15	4	$750
2017	21	8	$138,425	5	2	$130,200	16	6	$8,225
Total Loss	**91**	**34**	**$558,920**	**41**	**16**	**$414,795**	**50**	**18**	**$144,125**

This zone generated an estimated loss of $414,795 from structure fires and $144,125 in other types of fires for a total of $558,920 in fire loss over the four-year period.

Figure 19 Four Year Fire Loss Summary, District 3



Geographical Planning Zone 4

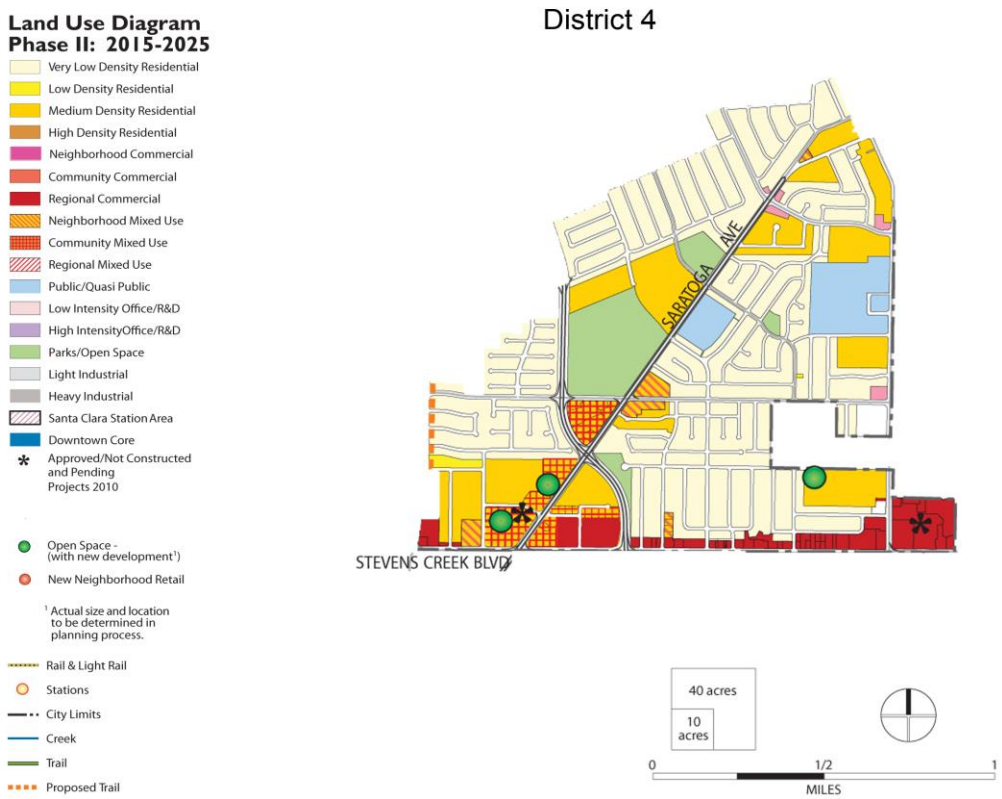
First Due Resources

Engine 94 staffed with three personnel.

Community Profile

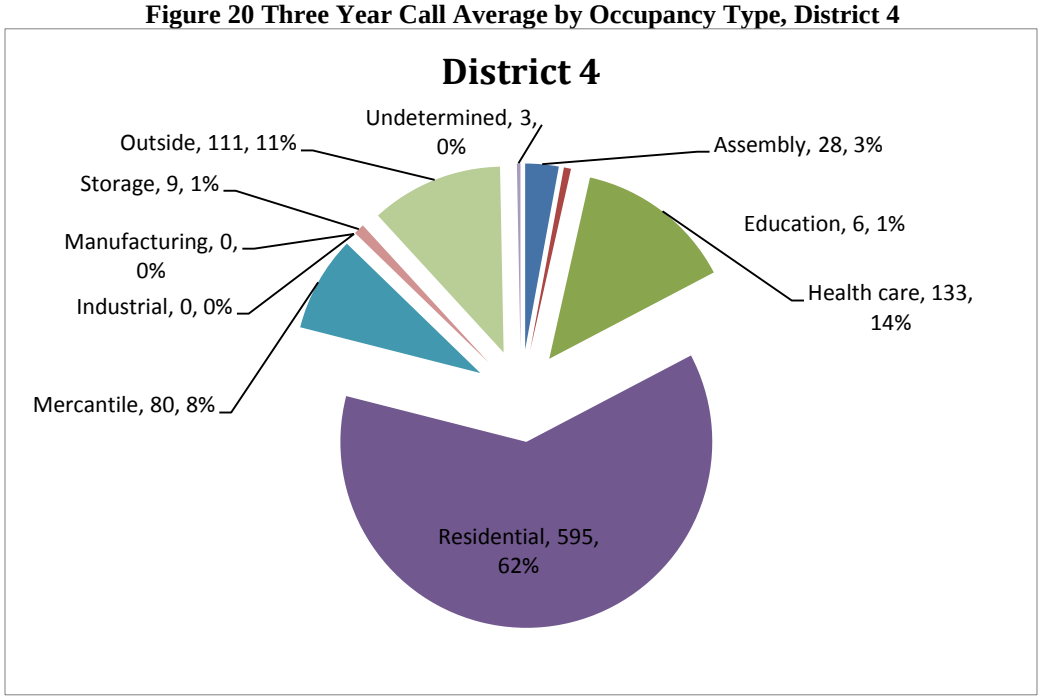
This area encompasses 1.4 square miles and has an estimated population of 13,134 accounting for approximately 10.97% of the city's overall population. Zone 4 is very similar to zone 3 and is approximately 85% residential but approximately 33 % smaller, making it mostly residential with commercial on the outskirts. The residential includes mostly detached single-family structures but there are some large high density multifamily apartment complexes scattered throughout. The southern edge of zone 4, along Stevens Creek Boulevard is largely regional commercial. There are many car dealerships and big box stores in this area, and the southwestern portion of the district is occupied by Westfield Valley Fair Shopping Mall, one of the largest indoor shopping malls in the bay area. The Southern end of Saratoga Avenue is laced with community mixed use properties which creates the potential for higher risk and increased loss. Lastly, the Pruneridge Golf Course, a 9-hole course, is the first of two golf courses located in the city and is situated in the in the center of this district. The zone borders San Jose along its South and East edges and responds to San Jose as part of the automatic aid agreement.

Map 30 Land Use, District 4



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to. As stated earlier, the zone is predominantly residential and approximately 62% of all calls in zone 4 were at residential structures. Furthermore, there are a high percentage of calls (14%) that take place in health care facilities. Zone 4 has one of the largest skilled nursing facilities in the city and is a source for relatively frequent calls which would explain the larger percentage of calls to health care facilities when compared to similar districts (Zone 3 is at 4% of calls to health care facilities).

Figure 20 Three Year Call Average by Occupancy Type, District 4



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are multifamily dwellings in the form of high density apartment complexes. However, as previously stated there are some regional mixed-use structures, such as Valley Fair Mall and Community mixed use structures in the southern portion of the zone. Valley Village, located at 390 North Winchester Boulevard, is an independent senior living facility consisting of 18 buildings and over 340 residents. Five of the buildings are four stories tall and contain a FSS as well as a stairway roof access. The remainders of the buildings are single story cottages that do not have a FSS. It does have a primary care clinic opened five days a week and on site medically trained staff available 24 hours a day that will begin care of a patient prior to EMS arrival. Mission Skilled Nursing and Subacute Center, located at 410 North Winchester, is an 11,000 square feet single story skilled nursing facility with a

133-bed capacity. Many of the patients here are not ambulatory without assistance but the building contains a FSS. There are also a few home health facilities containing low or non-ambulatory people on Jill and Sutter Avenue located in the center of the zone.

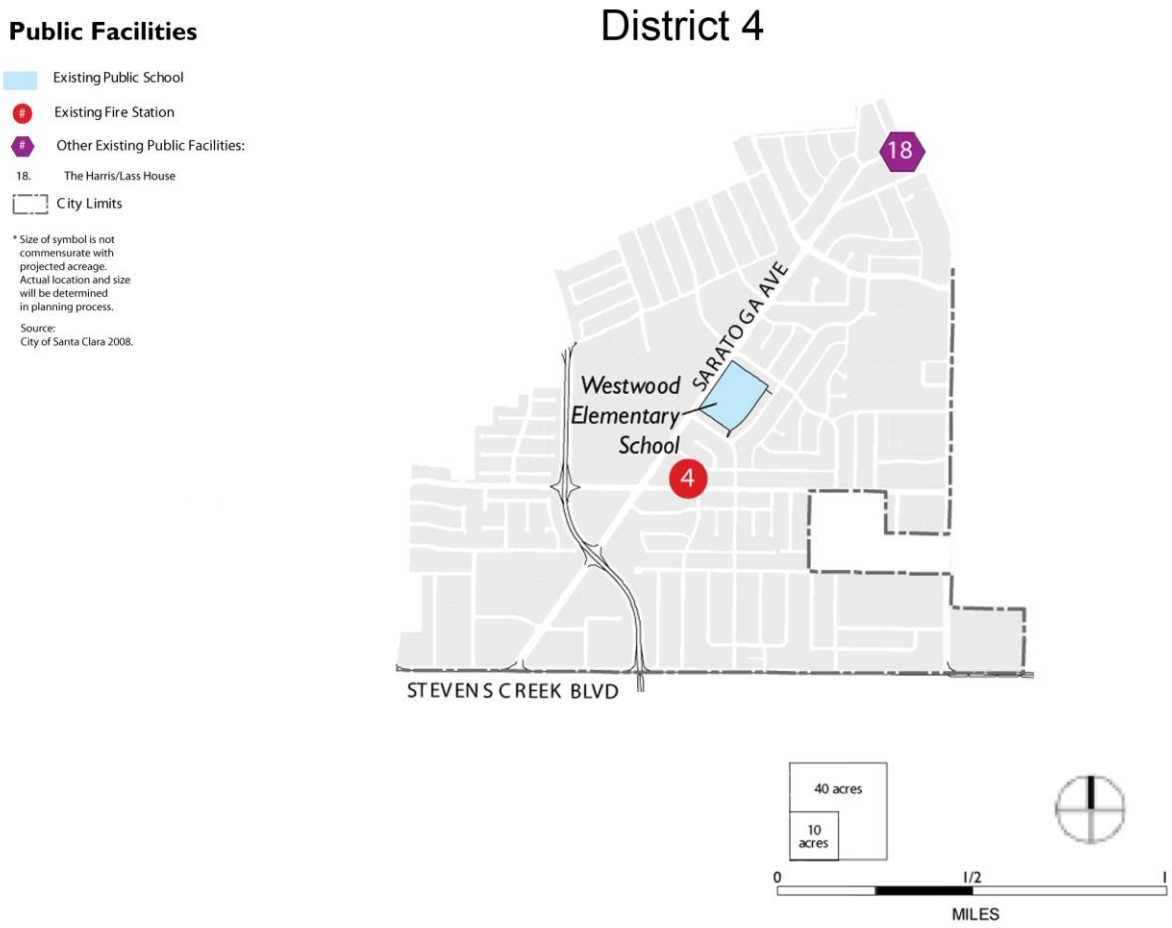
The high risk residential structures in zone 4 are mostly comprised of multi-level, multi-unit, high density apartment or condominium complexes. These include Orchard Glenn Apartments, located at 101 Saratoga Avenue, consist of multiple three-story structures totaling over 340 apartments, were built in 1986, and contain a FSS. Vista Del Lago Apartments, located at 2650 Keystone Avenue, were built in 1976 and contain multiple two-story structures totaling 124 units. Summerwood Apartments, located at 444 Saratoga Avenue, were built in 1971 and contain multiple two-story structures totaling 486 one and two-bedroom apartments. Lastly, Le Parc, located at 440 North Winchester Boulevard, contains multiple two-story structures totaling 140 units.

There also a few large high-density residential developments currently under construction, such as Midtown Village Development, located at 90 North Winchester Boulevard, is planned to contain 110 single family homes and 165 senior apartments each 2-3 stories high, on 17 acres of land and will all have FSS. Construction has begun at the Saratoga Avenue residential project, located at 166 Saratoga Avenue, will contain 33 townhomes in three-story structures that will be protected by a FSS. Saratoga Condominiums, located at 555 Saratoga, will contain 13 three-story units and will contain a FSS. Cobalt Apartments, located at 50 Saratoga Avenue, spans four acres, and is dotted with multiple 4-story buildings, containing 222 residential and a 5.5-story parking garage valued at $31,182,000.

The commercial structures that present a high risk in this zone include the previously mentioned Westfield Valley Fair Mall and two large grocery stores (Safeway and Lucky's). There are also multiple automobile dealerships, including Mini, Ford, Lexus and Cadillac, along Stevens Creek Boulevard. There are a total of two locations that require state or city hazardous materials operating permit within zone four, which is one of the zones with the lowest amount of HMBP required facilities.

There are a couple public facilities of high value to the community and these include Westwood Elementary School K-5th grades, 426 students, Stratford Elementary and Garden City Church, both located at 400 North Winchester Boulevard, and Pacific Autism Center for Education (PACE), located at 1880 Pruneridge Avenue. There are no utility related critical infrastructures in this zone. Lastly there are a few moderate sized park and recreational areas scattered across the district including the previously mentioned Pruneridge Golf Club, Mission City Memorial Park, Henry Schmidt Park, and Everett Alvarez Jr Park. The following map depicts the some of the high-risk properties previously described.

Map 31 Public Facilities, District 4



Transportation

This zone contains approximately 31.45 road miles**.** The major roadway hazard in zone 4 is San Tomas Expressway, which runs along the southwest side of zone four. There are five arterial roads in zone four. Stevens Creek runs along the southern perimeter, North Winchester boulevard runs along the eastern perimeter, Saratoga Avenue runs diagonally through zone 4, Pruneridge Avenue runs east/west through the center, and Scott Boulevard runs along the northwest side of zone 4. The following table shows a Four-year summary of call volume.

Table 22 Zone 4 Four Year Call Summary

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	17	7	673	2	201	900
Distribution of Calls	1.9%	0.8%	74.8%	0.2%	22.3%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	10	16	713	1	249	989
Distribution of Calls	1.0%	1.6%	72.1%	0.1%	25.2%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	12	6	725	1	321	1,065
Distribution of Calls	1.1%	0.6%	68.1%	0.1%	30.1%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	19	19	727	1	239	1,005
Distribution of Calls	1.9%	1.9%	72.3%	0.1%	23.8%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	58	48	2,838	5	1,010	3,959
Distribution of Calls	1.5%	1.2%	71.7%	0.1%	25.5%	100.0%

4-Year averages

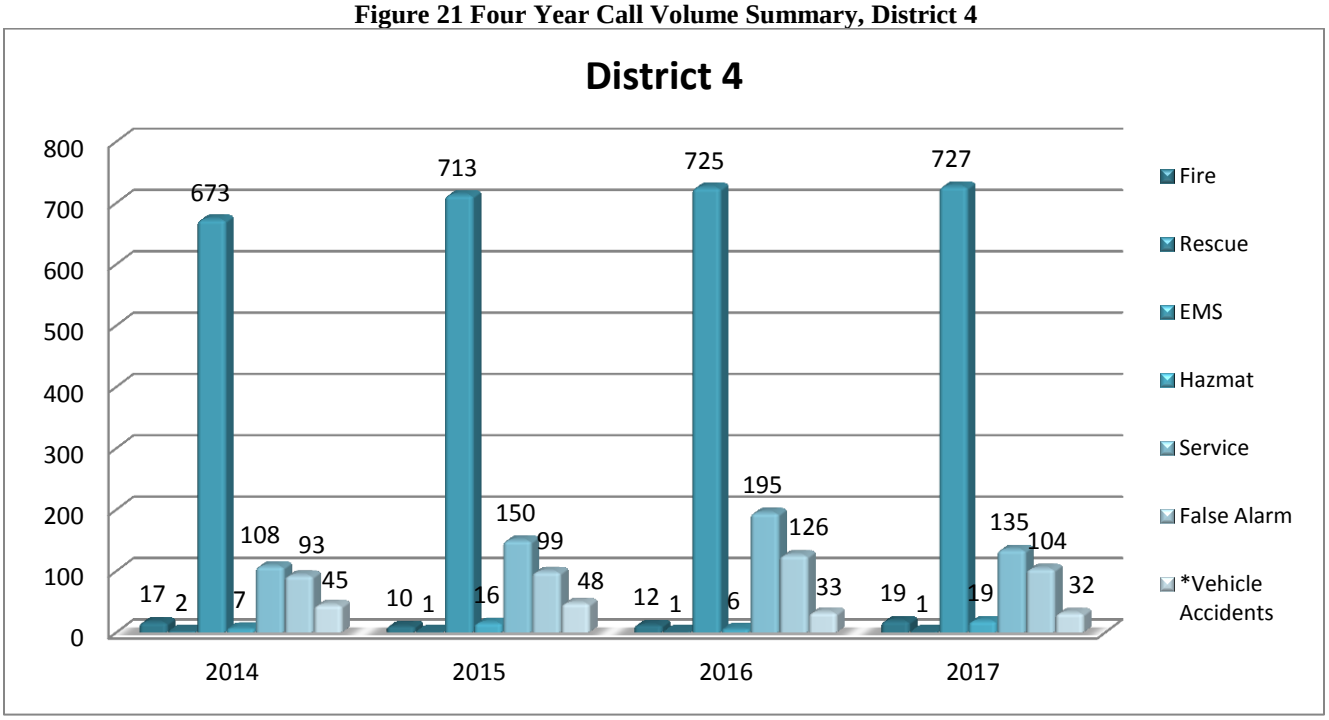
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	15	12	710	1	252.5	990
Distribution of Calls	1.5%	1.2%	71.7%	0.1%	25.5%	100.0%
Call Per Day	0.04	0.03	1.94	0.00	0.69	2.71

Percentage of Annual SCFD Calls Occurring in Zone 4

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	9.3%	5.0%	11.0%	7.7%	8.9%	10.3%
Calendar Year 2015	5.1%	10.4%	11.0%	2.4%	10.5%	10.7%
Calendar Year 2016	6.6%	3.7%	11.1%	2.4%	12.9%	11.3%
Calendar Year 2017	10.8%	10.2%	11.5%	2.5%	10.2%	11.1%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 21 Four Year Call Volume Summary, District 4



Fire Loss

Within District 4 jurisdiction in 2014 there were 17 total fires and five of those were documented to have a loss. Of the 17 fires, five were structure fires and 1 (20%) resulted in a total documented loss of $30,000. The remaining 12 fires were classified as other (garbage, shed, and vehicle fires) and four (33%) of these fires resulted in a loss of $5,635. The result was a combined total of five damaging fires for a loss, totaling $35,635 in damages.

In 2015, there were 10 total fires and six of those were documented to have a loss. Four of those were structure fires and two (50%) resulted in a total documented loss of $185,000. The remaining six were classified as other (garbage, shed, and vehicle fires) and four (67%) of the "other" fires resulted in a loss of $6,100. The result was a combined total of 10 damaging fires for a loss, totaling $191,100 in damages.

In 2016, there were 12 total fires and five of those were documented to have a loss. Five of those were structure fires and three (60%) of those structure fires resulted in a total documented loss of $11,075. The remaining seven were classified as other (garbage, shed, and vehicle fires) and two (29%) of the "other" fires resulted in a loss of $1,100. The result was a combined total of five damaging fires for a loss, totaling $12,175 in damages.

In 2017, there were 19 total fires and six of those were documented to have a loss. Seven of those 19 fires were structure fires and two (29%) of those structure fires resulted in a total documented loss of $112,500. The remaining 120 were classified as other (garbage, shed, and vehicle fires) and 4 (33%) of the "other" fires resulted in a loss of $396,700. The result was a combined total of six damaging fires for a loss, totaling $509,200 in damages.

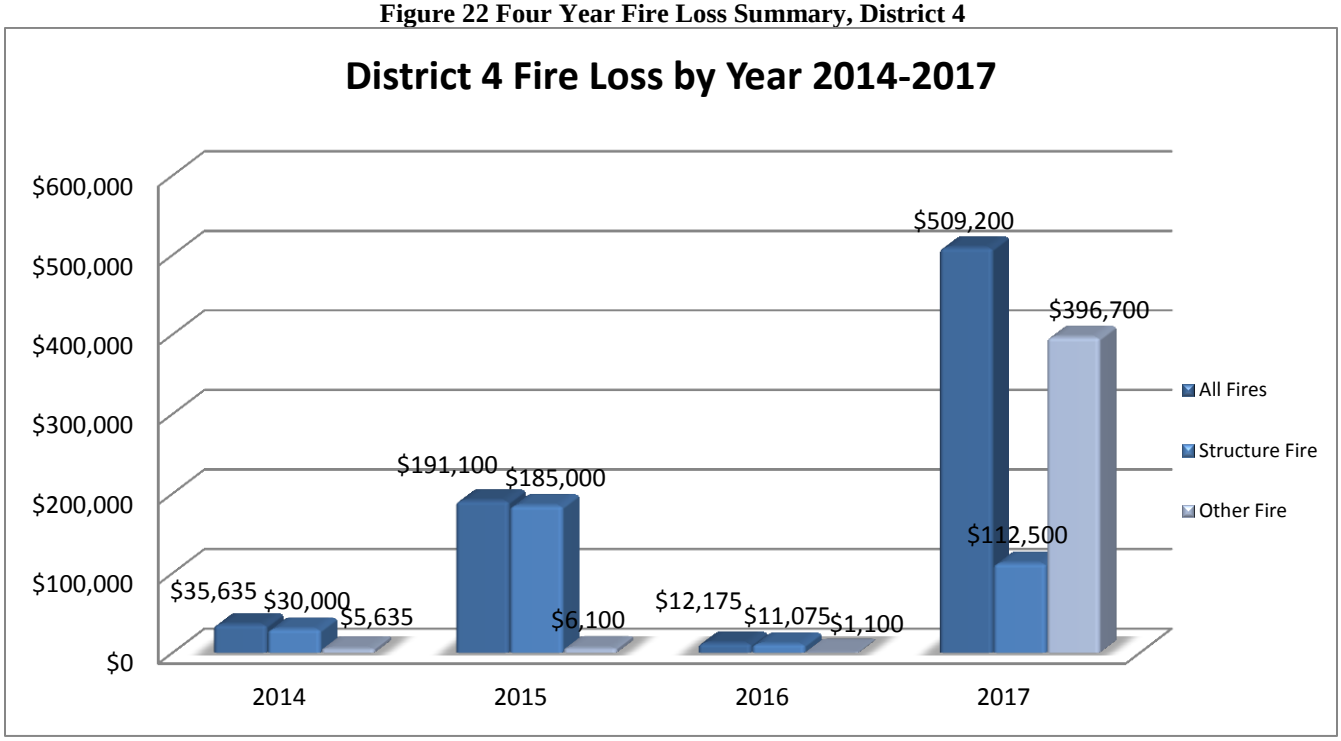
Therefore, in the four years studied (2014-2017), the District 4 mitigated 37 "other" fires and 14 (38%) resulted in a documented loss totaling $409,535. Furthermore, from 2014- 2017 District 4 had 21 structure fires and eight (38%) of those structure fires resulted in a documented loss of $338,575. The combined total of 58 total fires and 22 (eight structure and 14 other) damaging fires that resulted in a loss totaled $748,110 in damages. The total dollar amounts can be seen in the following graphs.

Table 38 District 4 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	17	5	$35,635	5	1	$30,000	12	4	$5,635
2015	10	6	$191,100	4	2	$185,000	6	4	$6,100
2016	12	5	$12,175	5	3	$11,075	7	2	$1,100
2017	19	6	$509,200	7	2	$112,500	12	4	$396,700
Total Loss	**58**	**22**	**$748,110**	**21**	**8**	**$338,575**	**37**	**14**	**$409,535**

This zone generated an estimated loss of $338,575 from structure fires and $409,535 in other types of fires for a total of $748,110 in fire loss over the four-year period.

Figure 22 Four Year Fire Loss Summary, District 4



Geographical Planning Zone 5

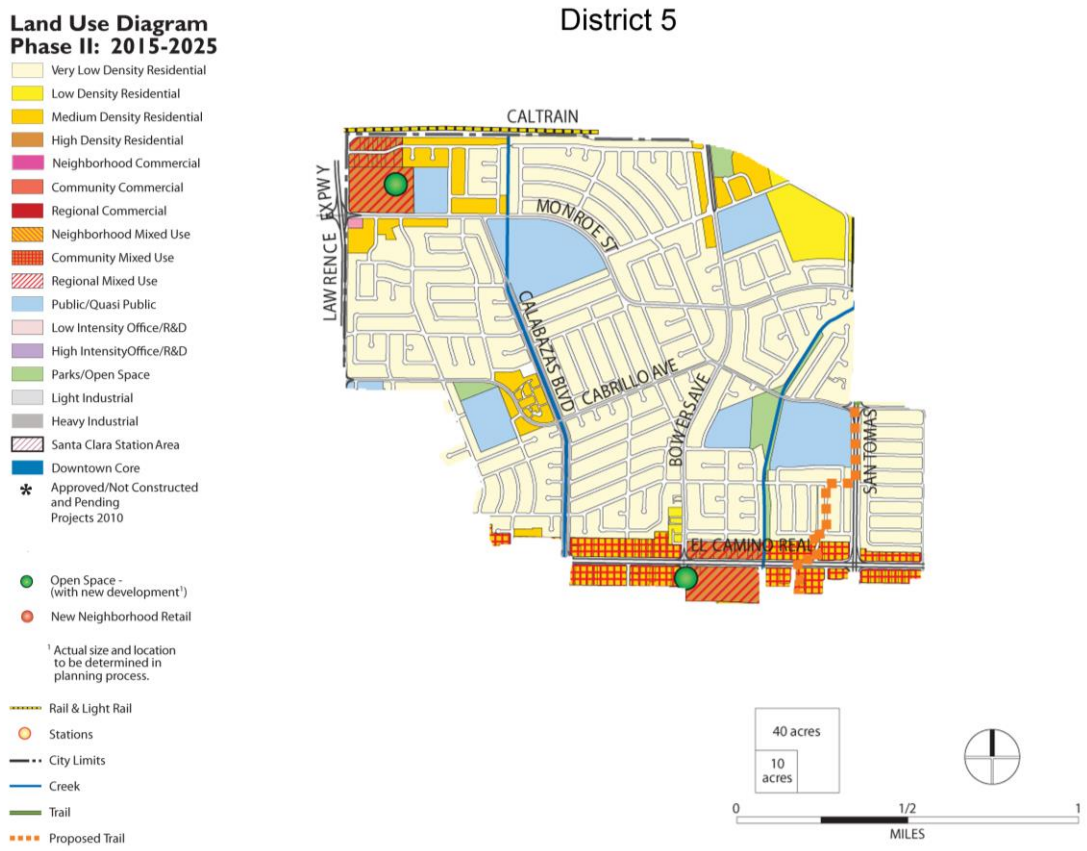
First Due Resources

Engine 95 staffed with three personnel, Medic is 95 available (not staffed) for fire department ambulance transport.

Community Profile

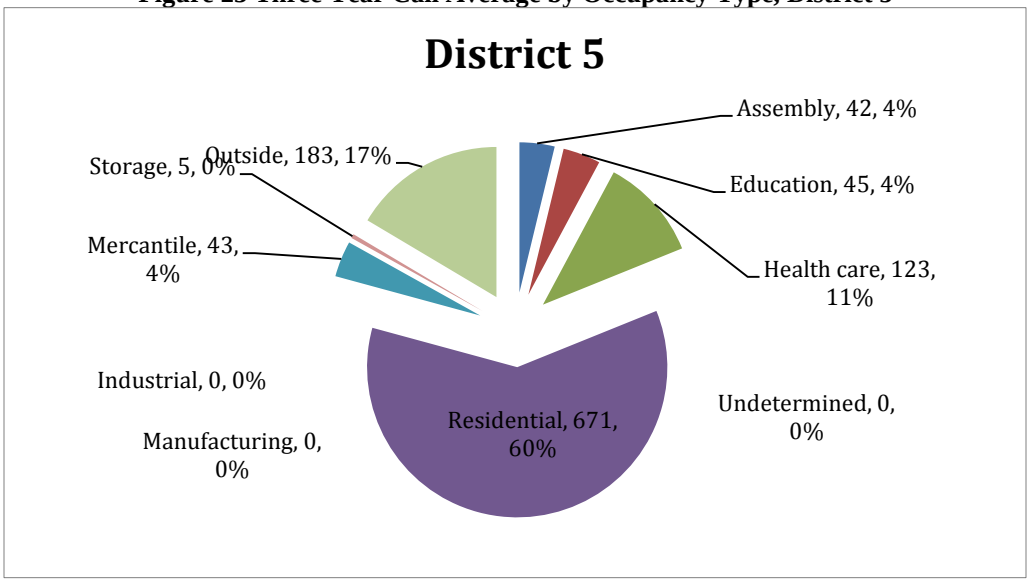
This area encompasses 1.8 square miles and has an estimated population of 16,578 accounting for approximately 13.85% if the city's overall population. Zone 5 is located in the center of the city and is mostly very low residential with a small amount of commercial business lining El Camino Real in the southern portion of the district. The vast majority of the residential properties are detached single-family residences. The north and northwestern portion of the zone contains small four-six units one and two-story apartment complexes. To the extreme northwest there is a high density-housing complex built on top of commercial use, which is the largest structure in this zone. The area west of Calabazas Boulevard, along Cabrillo Avenue contains three and four-story center hallway apartments. The area in the Northeast is low density residential comprised of two story town houses. The southern end of the district, along the revitalized El Camino Real, is community mixed use and includes restaurants, strip malls, budget hotel/motels, auto shops, grocery and other box stores as well as three newly constructed three and four-story apartment complexes.

Map 32 Land Use, District 5



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to**.** As stated earlier, the zone is predominantly residential and approximately 60% of all calls in zone 5 took place at a residential structure. Furthermore, there are a high percentage of calls (11%) that take place in health care facilities. Zone 5 has one of the largest assisted living facilities in the city, Pacific Gardens, as well as two large clinics, Palo Alto Medical Foundation, which serves as a source for relatively frequent calls. This would explain the larger percentage of calls to health care facilities when compared to similar districts (Zone 3 is at 4% of calls to health care facilities). Another increased percentage compared to other zones is education. Zone 5 has a similar quantity of schools as zone three, however there were more than twice as many calls to educational facilities in this zone (45) when compared to zone 3 (19). The city's largest high school (Wilcox) accounts for the majority of those calls.

Figure 23 Three Year Call Average by Occupancy Type, District 5



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are multifamily dwellings in the form of high density apartment complexes. However, as previously stated there are some regional mixed-use structures, especially along El Camino Real corridor. Furthermore, there are a number of critical facilities within this zone, including schools and other public buildings.

The medium to high density residential properties are scattered throughout the perimeter of this zone. The largest of those properties and the single largest structure in the district is Monticello Village, located at 3515 Monroe Street and sits on 16 acres of land. This location is comprised of 825 apartments located on the 3 to 4 stories above over 60,000 square feet of combined retail and amenity space. There are also two levels of subterranean parking located underneath the property and is valued at over 454 million dollars. The property has a FSS but one factor currently contributing to a slightly elevated risk is that construction continues in a portion of the structure while the majority of the property is occupied by tenants.

The El Camino Real, which creates the southern border of this zone, has seen large residential additions in the form of three large apartment complexes. All three of these complexes contain a FSS but still represent a high risk due to the occupancy load. Camino Del Ray, located at 2525 ECR, is a 3 story, senior housing facility containing 48 units. Villas on the Boulevard, located at 2655 ECR, is an apartment complex comprised of 186 apartments in 4 floors, sitting on top of one floor of parking. The last of these 3 developments is Alexis, located at 2585 ECR, contains 60 units spread over four stories. There are a number of commercial properties along ECR, including a number of strip malls, with McWhorters Village

Shopping center being the largest, restaurants, automobile service and repair shops, medical clinics and furniture stores. There are three locations that require state or city hazardous materials operating permit within zone 5.

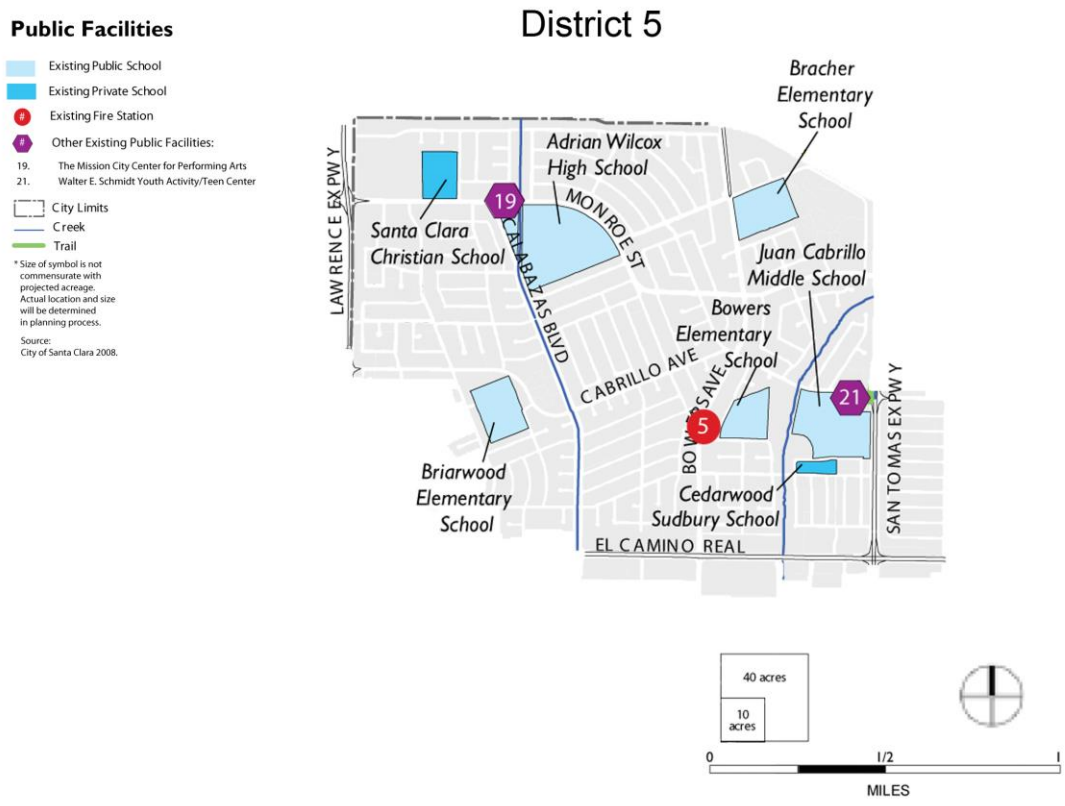
There are two other residential facilities that represent a higher risk categorization based on occupancy within this zone. The first is Pacific Gardens Assisted Living facility, located at 2384 Pacific Drive in the northwest corner of the zone. This facility is a two-story building with one side of the structure dedicated to assisted living, while the other side is a memory support unit. While there is a fire sprinkler system in this facility the mobility and capabilities of the occupancy raises its risk. Furthermore, this facility is a source of frequent medical calls. The other facility is Bracher Senior Housing, located at 2665 South Drive in the northeast corner of the zone. This is a two-story apartment building comprised of 72 units dedicated to seniors. While there are fire sprinkler systems in these facilities, the mobility and capabilities of the residents raises its risk. Furthermore, these facilities are a source of frequent medical calls.

There are a number of public facilities of high value to the community. There are seven schools including, Adrian Wilcox High School, grades 9-12, with 1,880 students; Juan Cabrillo Middle School, grades 6-8, with 843 students; Bowers Elementary School, grades K-5, with 388 students; Bracher Elementary School grades K-5, with 385 students; Briarwood Elementary School grades K-5, with 397 students; Santa Clara Christian School grades PK-5, with 85 students; and Cedarwood Sudbury School grades K-12, with 100 students. There are three other public buildings of high value to the agency. The first is The Walter E. Schmidt Youth Activity Center (YAC), which is located at the corner of Cabrillo Avenue and San Tomas Expressway, and offers active recreation programs for babies, toddlers, preschool, elementary school age, middle-school, and high school students. The Teen Center, located in front of the Youth Activity Center, offers a variety of activities and services to the teen community which consists of an after-school program and recreation classes. Lastly, The Mission City Center for Performing Arts, located adjacent to Wilcox High School, is a joint venture between the Santa Clara Unified School District and the City of Santa Clara, providing performance art facilities for school and community productions.

The recreational areas within the zone include, San Tomas Aquino Creek trail, which begins on the intersection of San Tomas Expressway and Cabrillo Avenue and travels north in between zones 2 and nine, toward zone 8. It then enters zone 10 and continues north through zone 10 until it reaches CA 237 which is the norther limit of the city. The three parks in the zone are Bowers, Machado, and Bracher. Lastly, there are two creeks that run north to south. The first is Calabazas, which is located toward the western edge of the zone, and the other is the Saratoga Creek, which runs along the eastern boundary of the zone. During heavy rains both of these creeks serve as potential sites for swift water rescue incidents.

Other utility related critical infrastructure includes two Evacuation Centers. One is Wilcox High in the northeast side of the district. The other is Cabrillo Middle School near the center of the district. There are also two water wells, and an electric substation in this zone. The following map depicts the some of the high-risk properties previously described.

Map 33 Public Facilities, District 5



Transportation

This zone contains approximately 41.69 road miles. There are two expressways in this zone. Lawrence Expressway runs north/south on the west side of the zone. On the opposite the east side, San Tomas Expressway also runs north/south. There are three arterial roads in zone 5. Monroe Street and El Camino real run east/west, and Bowers Avenue runs north/south. The Caltrain Rail runs along the northern perimeter of zone 5. There is a natural gas transmission line running along Lawrence Expressway on the western perimeter of zone 7. These transportation corridors increase the potential for an EMS, technical rescue and hazardous material incidents. The following table shows a four-year summary of call volume.

Table 23 Zone 5 Four Year Call Summary

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	26	11	775	0	203	1,015
Distribution of Calls	2.6%	1.1%	76.4%	0.0%	20.0%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	20	15	934	2	224	1,195
Distribution of Calls	1.7%	1.3%	78.2%	0.2%	18.7%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	20	13	900	1	212	1,146
Distribution of Calls	1.7%	1.1%	78.5%	0.1%	18.5%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	14	20	809	15	207	1,065
Distribution of Calls	1.3%	1.9%	76.0%	1.4%	19.4%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	80	59	3,418	18	846	4,421
Distribution of Calls	1.8%	1.3%	77.3%	0.4%	19.1%	100.0%

4-Year averages

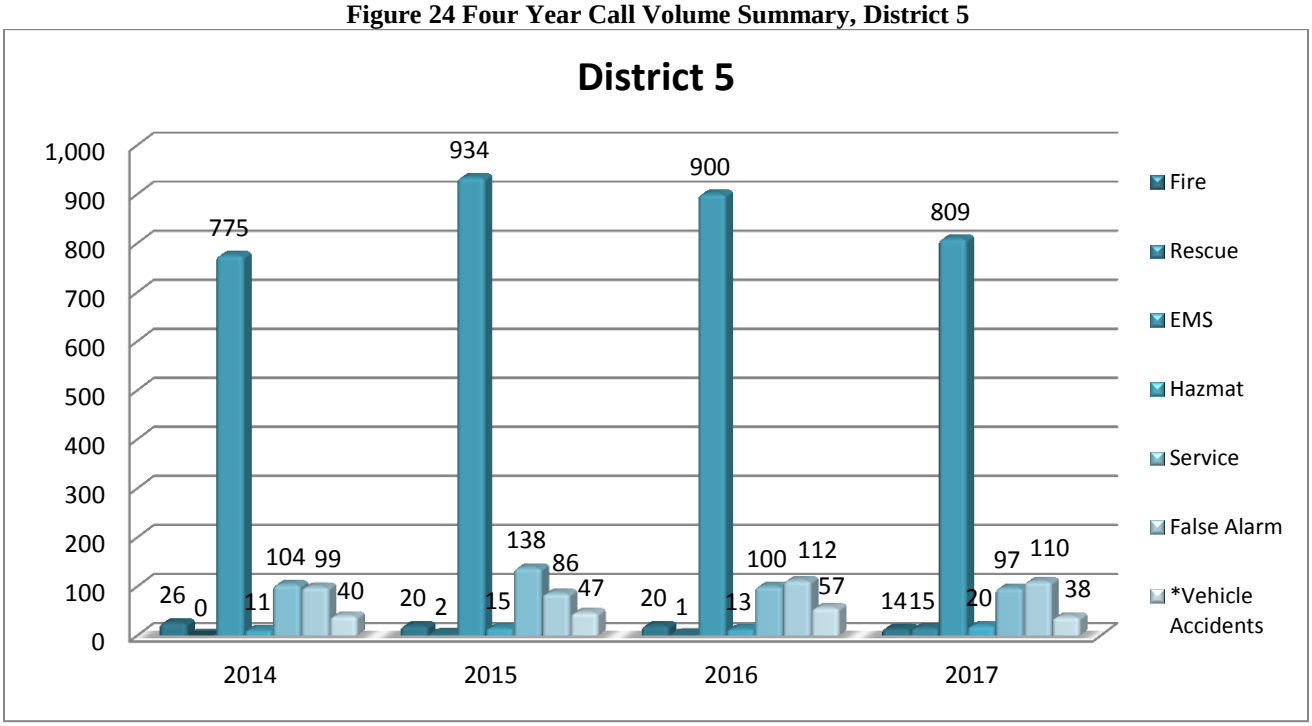
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	20	15	855	5	211.5	1,105
Distribution of Calls	1.8%	1.3%	77.3%	0.4%	19.1%	100.0%
Call Per Day	0.05	0.04	2.34	0.01	0.58	3.03

Percentage of Annual SCFD Calls Occurring in Zone 5

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	14.3%	7.9%	12.7%	0.0%	8.9%	11.6%
Calendar Year 2015	10.2%	9.7%	14.4%	4.9%	9.5%	12.9%
Calendar Year 2016	11.0%	7.9%	13.8%	2.4%	8.5%	12.2%
Calendar Year 2017	8.0%	10.8%	12.8%	37.5%	8.8%	11.7%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 24 Four Year Call Volume Summary, District 5



Fire Loss

Within District 5 jurisdiction in 2014 there were 26 total fires and 17 of those were documented to have a loss. Of the 26 fires, 13 were structure fires and 10 (77%) resulted in a total documented loss of $736,600. The remaining 13 fires were classified as other (garbage, shed, and vehicle fires) and seven (54%) of these fires resulted in a loss of $11,100. The result was a combined total of 17 damaging fires for a loss, totaling $747,700 in damages.

In 2015, there were 20 total fires and 12 of those were documented to have a loss. Seven of those were structure fires and four (57%) resulted in a total documented loss of $21,030. The remaining 13 were classified as other (garbage, shed, and vehicle fires) and eight (62%) of the "other" fires resulted in a loss of $18,950. The result was a combined total of 12 damaging fires for a loss, totaling $39,980 in damages.

In 2016, there were 20 total fires and eight of those were documented to have a loss. 16 of those were structure fires and seven (44%) of those structure fires resulted in a total documented loss of $229,125. The remaining four were classified as other (garbage, shed, and vehicle fires) and one (25%) of the "other" fires resulted in a loss of $1,000. The result was a combined total of eight damaging fires for a loss, totaling $230,125 in damages.

In 2017, there were 14 total fires and three of those were documented to have a loss. Seven of those 14 fires were structure fires and one (14%) of those structure fires resulted in a total documented loss of $75. The remaining seven were classified as other (garbage, shed, and vehicle fires) and two (28%) of the "other" fires resulted in a loss of $2,900. The result was a combined total of three damaging fires for a loss, totaling $2,975 in damages.

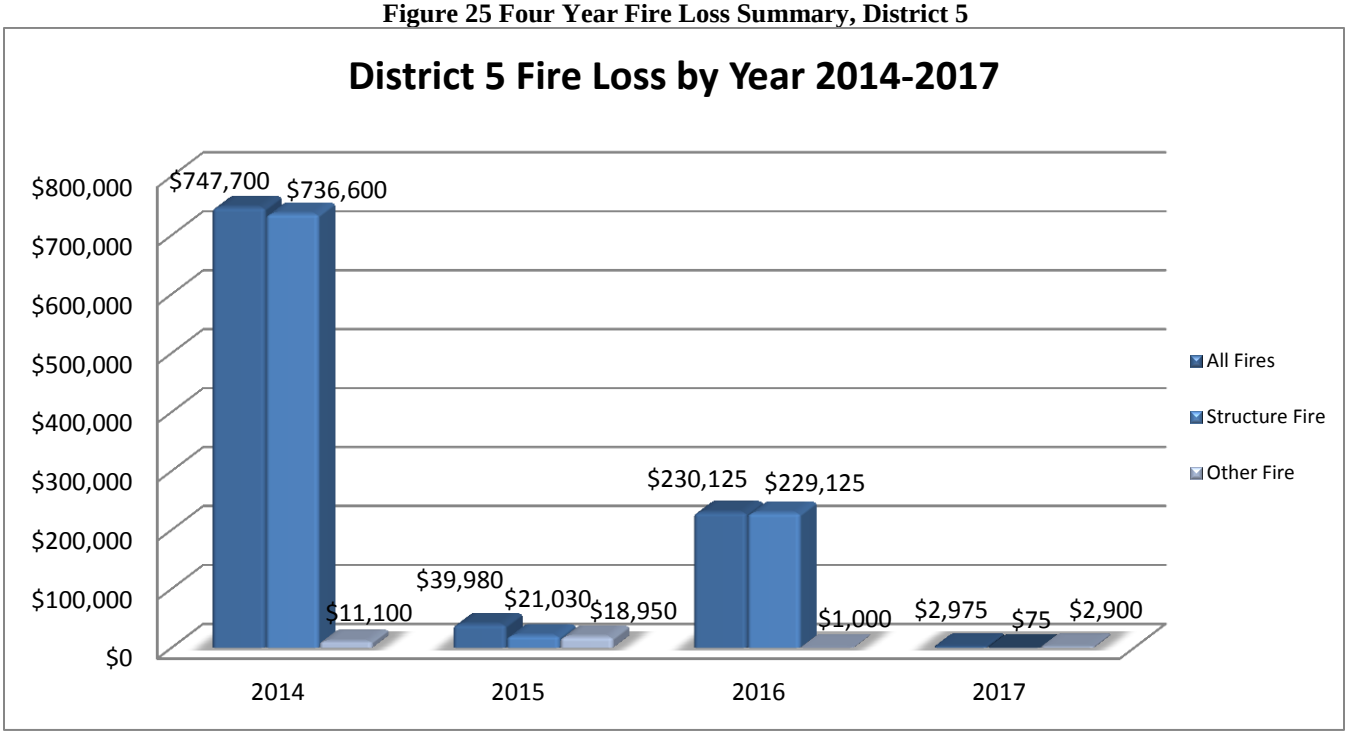
Therefore, in the four years studied (2014-2017), the District 5 mitigated 37 "other" fires and 18 (49%) resulted in a documented loss totaling $33,950. Furthermore, from 2014- 2017 District 5 had 43 structure fires and 22 (51%) of those structure fires resulted in a documented loss of $986,830. The combined total of 80 total fires and 40 (22 structure and 18 other) damaging fires that resulted in a loss totaled $1,020,780 in damages. The total dollar amounts can be seen in the following graphs

Table 40 District 5 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	26	17	$747,700	13	10	$736,600	13	7	$11,100
2015	20	12	$39,980	7	4	$21,030	13	8	$18,950
2016	20	8	$230,125	16	7	$229,125	4	1	$1,000
2017	14	3	$2,975	7	1	$75	7	2	$2,900
Total Loss	**80**	**40**	**$1,020,780**	**43**	**22**	**$986,830**	**37**	**18**	**$33,950**

This zone generated an estimated loss of $986,830 from structure fires and 33,950 in other types of fires for a total of $1,020,780 in fire loss over the four-year period.

Figure 25 Four Year Fire Loss Summary, District 5



Service and Utilities/Energy

San Tomas Aqino Creek trail begins on the intersection of San Tomas Expressway and Cabrillo Avenue in zone 5. It travels north in between zones 2 and 9, as it enters zone 8. It then enters zone 10 and continues north through zone 10 until it reaches CA 237 which is the norther limit of the city.

Recreation

- Two Creeks – Calabazas Creek, Saratoga Creek
- Three Parks – Bowers, Machado, Bracher

Geographical Planning Zone 6

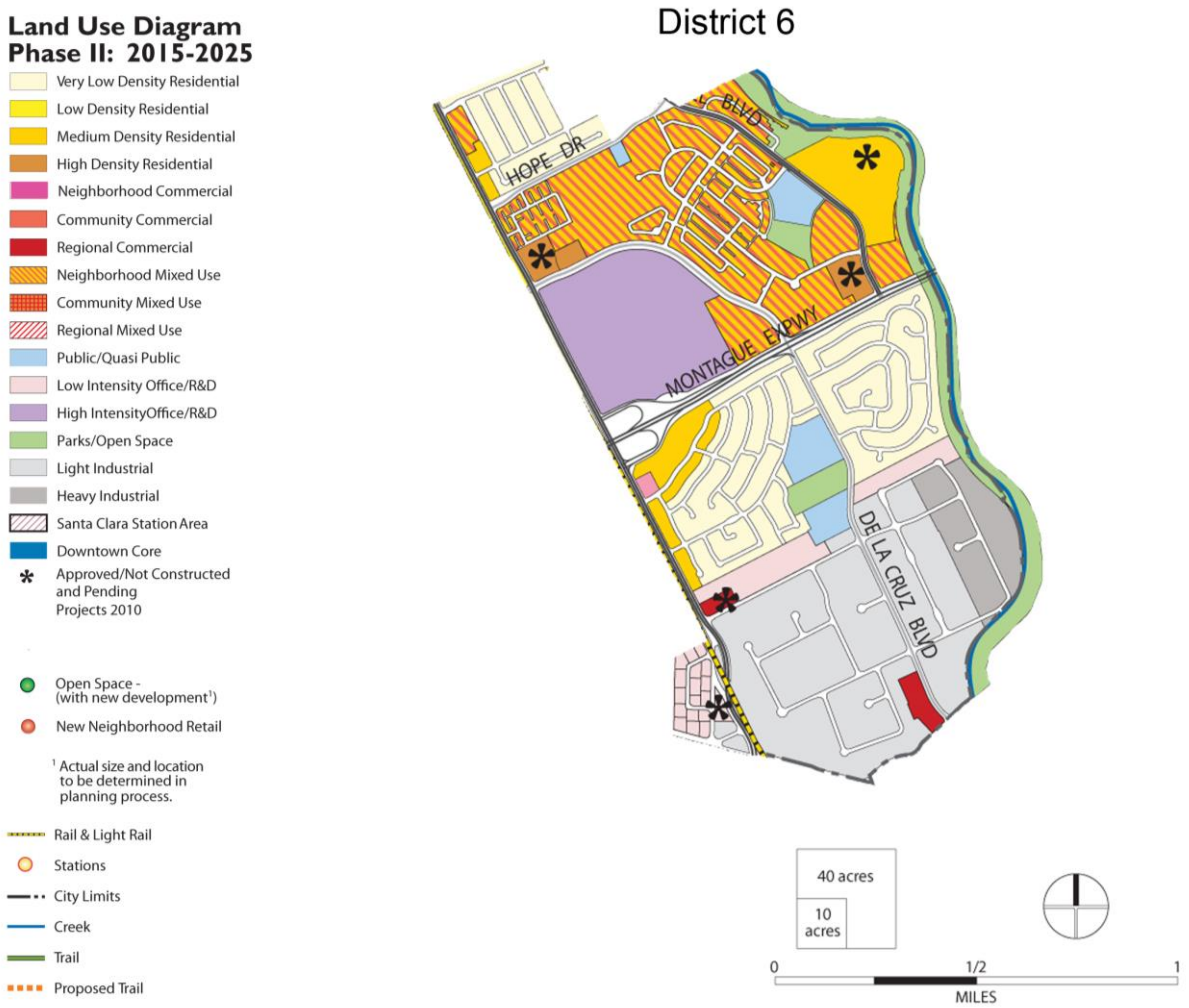
First Due Resources

Engine 96 staffed with three personnel, Medic 96 staffed with two personnel, and Medic Cart 96, is available (not staffed) for responses on the creek trail, which is not accessible with traditional apparatus. In October of 2017 Truck 98 began staffing this station with four personnel and Medic 96 continued to be staffed in this district with two personnel. Engine 96 was moved to District eight.

Community Profile

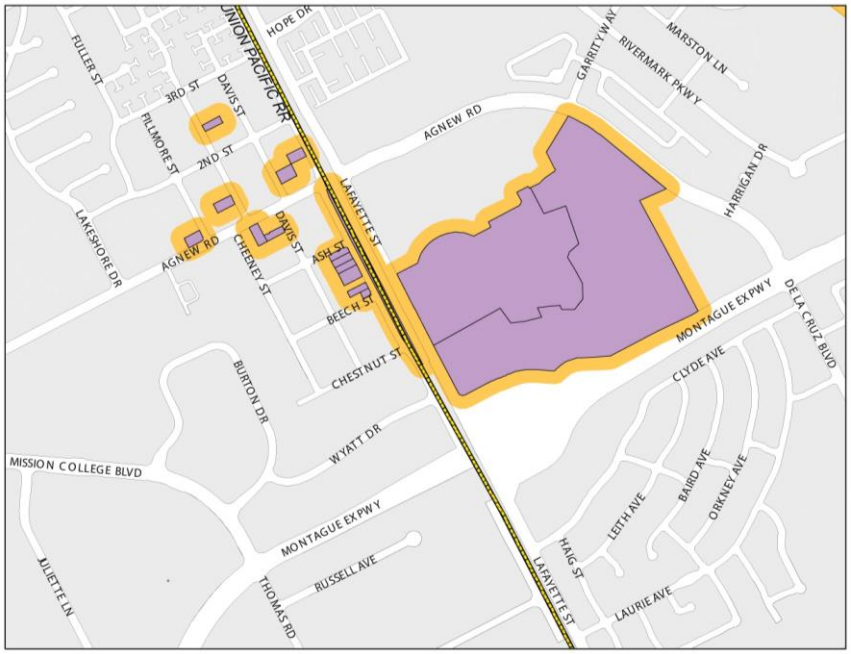
This area encompasses 1.5 square miles and has an estimated population of 15,047, accounting for approximately 12.7% if the city's overall population. Zone 6 is located in the northern portion of the city and is residential in the northwestern two thirds and light/heavy industrial in the southeastern third of the zone. This divide is clearly delineated by Aldo Avenue. It is bordered on the west by Union Pacific railway which carries both passenger and cargo trains and on the east by the Guadalupe River, its running trail, and San Jose. The residential area can be further subdivided into two distinct sections. The older residential portion of the district, located between Montague expressway and Aldo Avenue, is mostly single story single-family homes. The exception would be along Lafayette, south of Montague Expressway, where there are two-story, four- to six-unit, low income apartments. Within the quad north of Montague, created by Lafayette Street on the west, Hope Drive on the north, Lickmill Boulevard on the east, and Montague Expressway on the south is medium to high density housing. There are a number of large apartment complexes and three-story condo/town house style homes. This area is a newer development built around 2004 and many of these houses contain residential sprinklers. Also located in the quad is a large Rivermark Shopping complex that his home to a large grocery store, retail shops, restaurants, public library and a hotel. Oracle, an international software company, has an enormous campus that occupies the southwest corner of the zone. Many of these structures are considered historic buildings. The south side of the zone is home to many technology companies and machine shops.

Map 34 Land Use, District 6



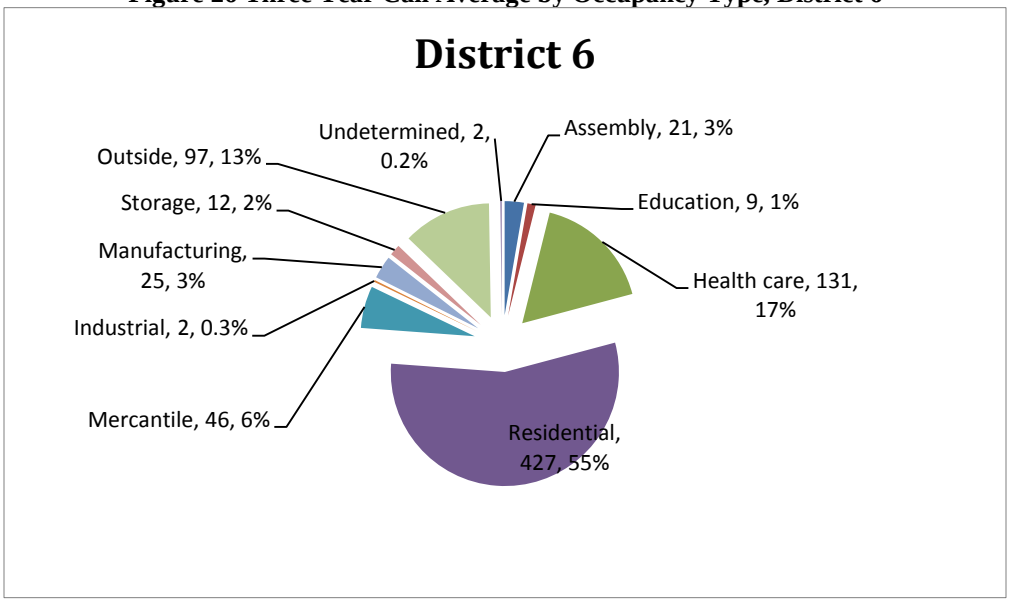
As previously mentioned there are 16 city recognized historic buildings located in this zone. Some of those buildings include what used to be the Agnews State Mental Hospital, Agnew Clock Tower, Agnew Auditorium, Agnew Mansion, Agnew Cemetery, Lick Mansion, Lick Cottage, Lick Granary, and the Intel museum.

Map 35 Agnew Village



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to**.** This zone is approximately 50% residential and 55% of calls were to residential structures. The second most commonly responded to occupancy type was health care (17%), which occurred due to one of the largest skilled nursing facilities, Valley House, in the city. This facility is a frequent source of calls, thus explaining the larger percentage of calls to health care facilities when compared to other districts (Zone 3 is at 4% of calls to health care facilities). The third most frequent occurrence for calls was "outside," which includes calls on roadways and parks. There are a number of large streets, a freeway, and a number of intersections where passenger vehicles can cross over rail tracks. There is also a large park and a trail that is located in this zone; these can account for the higher percentage of calls located outside.

Figure 26 Three Year Call Average by Occupancy Type, District 6



Critical Infrastructure and High Risk Buildings

This zone contains a moderate to high amount of properties that pose the potential for significant loss or consequence to the community. These building are comprised mostly of multifamily dwellings but also include schools, light and heavy industrial properties, and healthcare facilities. These structures are spread out throughout the zone.

There are a number of medium to high density apartment complexes located in the northern half of the district. One of the largest complexes is Mansion Grove Apartments, located at 502 Mansion Park Dr. off of Lick Mill Boulevard, this complex contains 33 three-story buildings, comprised of 945 apartments, and both underbuilding and underground parking. Archstone Estancia Apartments, located at 1650 Hope Drive, contains 19 three-stories of living over one story of parking, and totaling 475 apartments. Mooreland Apartments, located at 550 Moreland Way, contains eight buildings with two-, four-, and eight-stories, for a total of 424 apartments, and two floors of subterranean parking. Miraval Condos, located at 3901 Lick Mill Boulevard, contains three buildings four-stories each, totaling 276 apartments and underground parking. River Terrance Apartments, Agnew Road, contains 15 Buildings that are four-stories tall, totaling 254 apartments, and two large multi-story parking garages. Mission Terrace Apartments, located at 1883 Agnew Road next to the Mission Terrace town homes, is one large four-story building with one floor of parking and contains 218 apartments. John Burns Garden Apartments, located at 820 Agnew Road, is an affordable housing complex containing five one-to-three-story buildings and 108 units. Rivertown Apartments, located at 1340 Hope Drive, is comprised of 11 Buildings three story buildings and 100 units. Hyatt House, located near the Rivermark Village at 3915 Rivermark Plaza, is a seven-story building with 168 units containing electric ranges and other cooking equipment.

All previously noted complexes contain a fire sprinkler system. Sobrato Family Living Center, located at 1509 Agnew Road, is an affordable housing complex comprised of 12 two story buildings and 53 units, but does not contain fire sprinkler system. Lafayette Americana Condos, located at 1031 Clyde Avenue, is comprised of 20-2 story buildings totaling 80 Condos, and some units contain garages underneath but no units are protected by a fire sprinkler system.

There is one health care facility that presents a high-risk categorization based on occupancy. Valley House Skilled Nursing Facility, located at 991 Clyde Avenue, is a very large facility with low and non-ambulatory residents. There are 96 rooms and over 200 beds located on a single floor. Staff is on site 24 hours a day and the building is protected by a fire sprinkler system. Due to the lack of mobility of the residents, evacuation efforts would be high if an incident were to occur at this property.

There are a number of public facilities of high value to the community. There are four schools including Don Callejon elementary and middle school, grades K-8, is a 74,500-square-foot school home to over 438 students. Montague Elementary School, grades K-5, with 299 students. North Valley Baptist, grades K-12, with 241 students. Lastly, Golden State Baptist College, which is an undergraduate facility that houses over 400 students in on-campus dormitories, is the only college in this zone. There is also one city owned building in the Northside Branch Library. This 15,000-square-foot building has 40,000 items including books, movies, and digital collections, 2,000-square-foot community room, four small group study areas, and a technology center. These structures all contain fire sprinkler systems.

There are also a number of commercial properties in this zone that were categorized as high risk. First is the Rivermark Village, located at 3945 Rivermark Plaza, is a large shopping center comprised of multiple single-story buildings. There are over 35 Tenants including, a large grocery store, multiple restaurants and, the Northside police station. This shopping is a focal point for residents and business travelers alike. As previously mentions, the Oracle Campus, located in the center of the district off of Agnew Road, is comprised of 24 buildings, many of which are historical, used for R&D for their top of the line servers. The remainder of high risk buildings is located to the south of Aldo Avenue and is R&D, industrial, and manufacturing in nature. Dunn Business Park, comprised of 7 buildings and 12 Tenants, and Oxford Business Park, comprised of nine buildings and 96 suites are located off De La Cruz Boulevard. These buildings present a challenge to fire suppression based on the size and mixed occupancy. FedEx also has a large (four-acre) freight hub located at 3255 Victor Street, in the southeast corner of this zone. This property contains multiple buildings with the largest being over 26,000 square feet. There is a potential for this property to contain any number of hazardous materials. There is also one commercial refueling facility located at 3471 Lafayette Street. They have a 7,000-gallon underground diesel storage tank. This location has been a location for multiple moderate sized fuel spills.

There are multiple plating and machining shops located throughout the southern portion of this zone. There are fifteen locations that require state or city hazardous materials operating permit within zone 6, over 100 containing hazmat business plans, and one Cal ARP facility located at 491 Perry Court. The recreational areas within the zone include the Guadalupe River Trail, Live Oak Park located adjacent to Rivermark Village near the center of the zone, and the Ulistac Natural Area, 40 acres of open space that showcases seven distinctive natural habitats, located east of Lick Mill Boulevard, near the north east corner of the zone.

Some of the critical infrastructure within this zone includes three Storm Drain Pump Stations running along the Guadalupe River on the east side of the district, one water well, a Hetch Hetchy water pipe, two cellular hub facilities, and a Sanitary Sewer Pump Station in the center of the district.

Map 36 Public Facilities, District 6

Transportation

This zone contains approximately 31.08 road miles. There is one expressway, Montague Expressway, which runs east/west through the center of zone 6. There are two arterial roads in zone 6, Lick Mill Boulevard and De La Cruz Boulevard, which run north/south in zone 6. Lick Mill Boulevard dead ends onto Montague Expressway from the north side of the zone, and De La Cruz Boulevard begin on Montague Expressway heading south. The Union Pacific Railroad runs on the western perimeter of zone six and there are multiple locations, Agnew Road being the most frequent, where surface streets must

directly cross these tracks. This location has been the site for many auto or vehicle versus trains. There is a natural gas transmission line that runs north through zone 6, along Lafayette Street, into zone 10. The following table shows a four-year summary of call volume.

Table 41 Four Year Call Summary, Zone 6

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	22	8	569	1	154	754
Distribution of Calls	2.9%	1.1%	75.5%	0.1%	20.4%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	18	15	547	4	163	747
Distribution of Calls	2.4%	2.0%	73.2%	0.5%	21.8%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	11	19	592	6	201	829
Distribution of Calls	1.3%	2.3%	71.4%	0.7%	24.2%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	17	589	1	214	842
Distribution of Calls	2.5%	2.0%	70.0%	0.1%	25.4%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	72	59	2,297	12	732	3,172
Distribution of Calls	2.3%	1.9%	72.4%	0.4%	23.1%	100.0%

4-Year averages

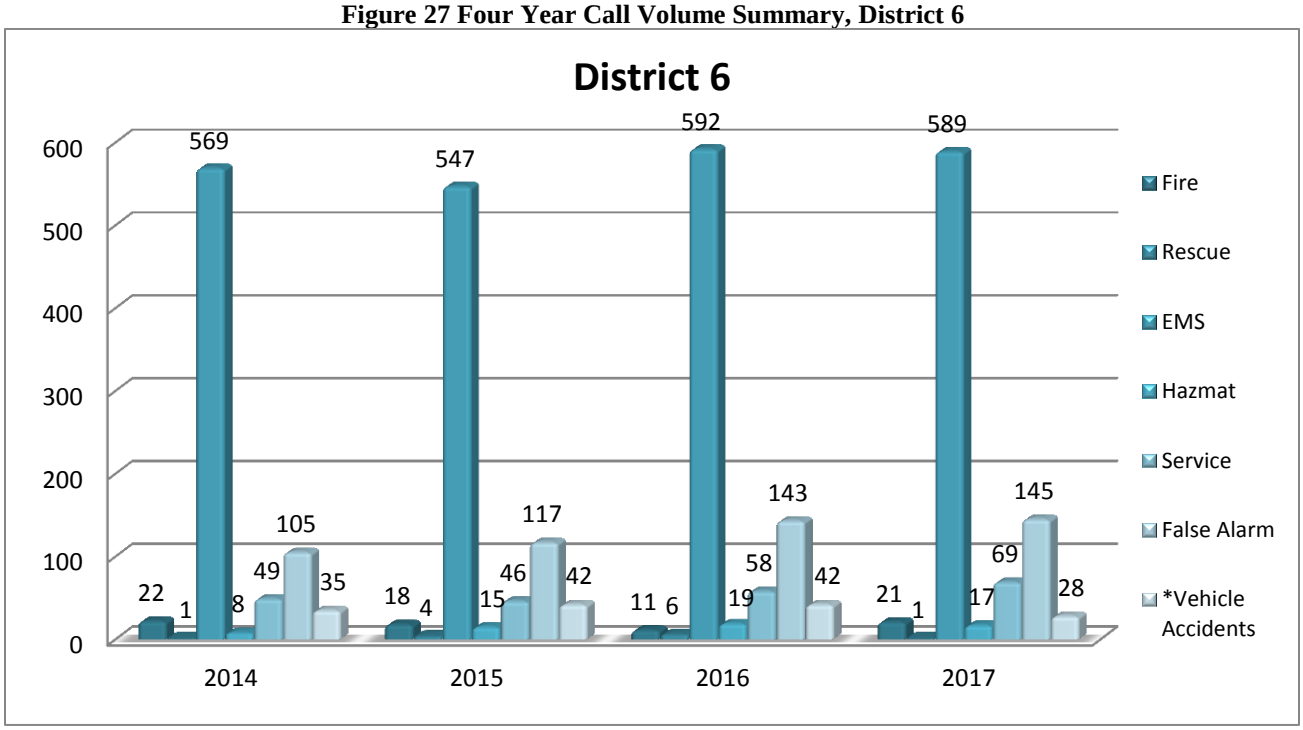
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	18	15	574	3	183	793
Distribution of Calls	2.3%	1.9%	72.4%	0.4%	23.1%	100.0%
Call Per Day	0.05	0.04	1.57	0.01	0.50	2.17

Percentage of Annual SCFD Calls Occurring in Zone 6

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	12.1%	5.8%	9.3%	3.8%	6.8%	8.6%
Calendar Year 2015	9.1%	9.7%	8.4%	9.8%	6.9%	8.1%
Calendar Year 2016	6.0%	11.6%	9.1%	14.3%	8.1%	8.8%
Calendar Year 2017	11.9%	9.1%	9.3%	2.5%	9.1%	9.3%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 27 Four Year Call Volume Summary, District 6



Fire Loss

Within District 6 jurisdiction in 2014 there were 22 total fires and eight of those were documented to have a loss. Of the 22 fires, nine were structure fires and five (56%) resulted in a total documented loss of $17,200. The remaining 13 fires were classified as other (garbage, shed, and vehicle fires) and three (23%) of these fires resulted in a loss of $16,000. The result was a combined total of eight damaging fires for a loss, totaling $33,200 in damages.

In 2015, there were 18 total fires and 12 of those were documented to have a loss. Five of those were structure fires and five (100%) resulted in a total documented loss of $182,020. The remaining 13 were classified as other (garbage, shed, and vehicle fires) and seven (54%) of the "other" fires resulted in a loss of $81,520. The result was a combined total of 12 damaging fires for a loss, totaling $263,540 in damages.

In 2016, there were 11 total fires and seven of those were documented to have a loss. Seven of those were structure fires and four (57%) of those structure fires resulted in a total documented loss of $7,310. The remaining four were classified as other (garbage, shed, and vehicle fires) and 2 (50%) of the "other" fires resulted in a loss of $40,700. The result was a combined total of seven damaging fires for a loss, totaling $48,010in damages.

In 2017, there were 21 total fires and eight of those were documented to have a loss. Twelve of those 21 fires were structure fires and four (33%) of those structure fires resulted in a total documented loss of $7,180. The remaining nine were classified as other (garbage, shed, and vehicle fires) and four (44%) of the "other" fires resulted in a loss of $86,500. The result was a combined total of eight damaging fires for a loss, totaling $93,680 in damages.

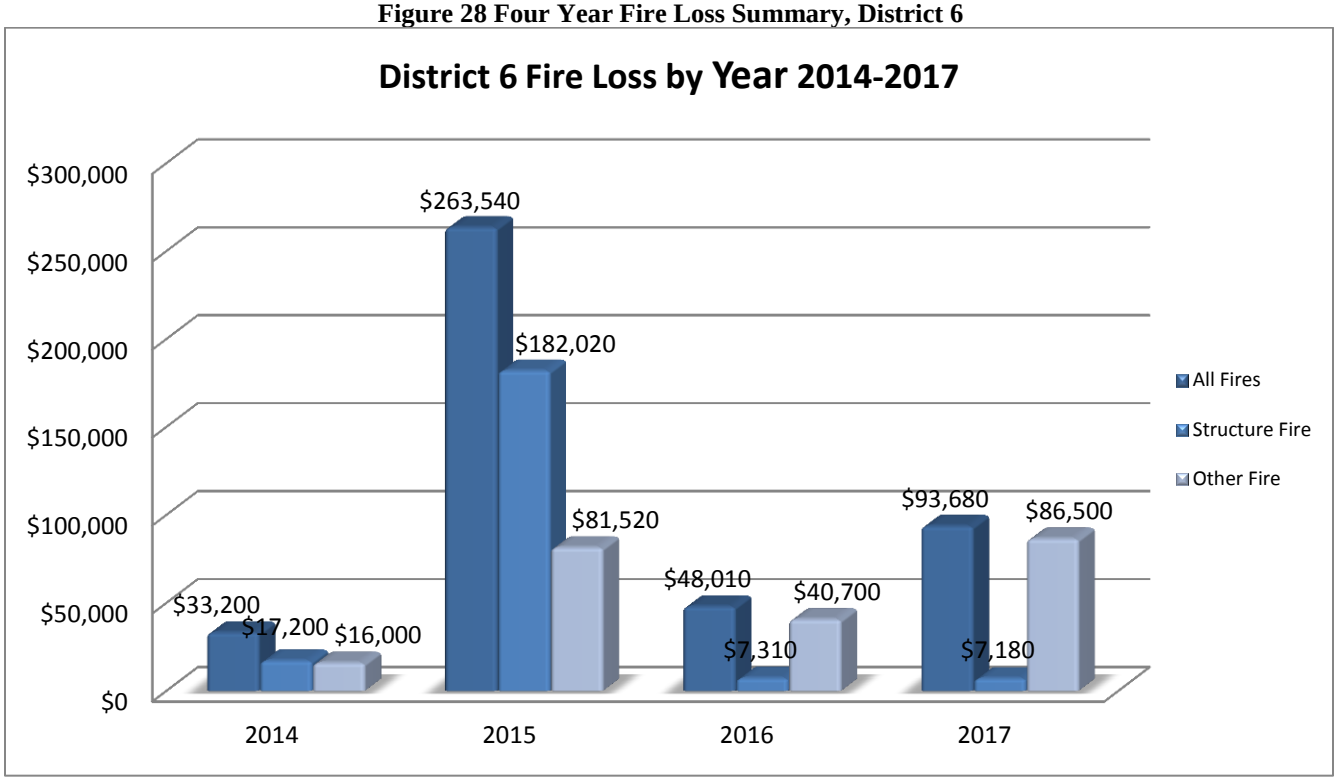
Therefore, in the four years studied (2014-2017), the District 6 mitigated 39 "other" fires and 16 (41%) resulted in a documented loss totaling $224,720. Furthermore, from 2014- 2017 District 6 had 33 structure fires and 19 (58%) of those structure fires resulted in a documented loss of $213,710. The combined total of 72 total fires and 35 (19 structure and 16 other) damaging fires that resulted in a loss totaled $438,430 in damages. The total dollar amounts can be seen in the following graphs

Table 42 District 6 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	22	8	$33,200	9	5	$17,200	13	3	$16,000
2015	18	12	$263,540	5	5	$182,020	13	7	$81,520
2016	11	7	$48,010	7	5	$7,310	4	2	$40,700
2017	21	8	$93,680	12	4	$7,180	9	4	$86,500
Total Loss	**72**	**35**	**$438,430**	**33**	**19**	**$213,710**	**39**	**16**	**$224,720**

This zone generated an estimated loss of $213,710 from structure fire and $224,720 in other types of fires for a total of $438,430 in fire loss over the four-year period.

Figure 28 Four Year Fire Loss Summary, District 6



Geographical Planning Zone 7

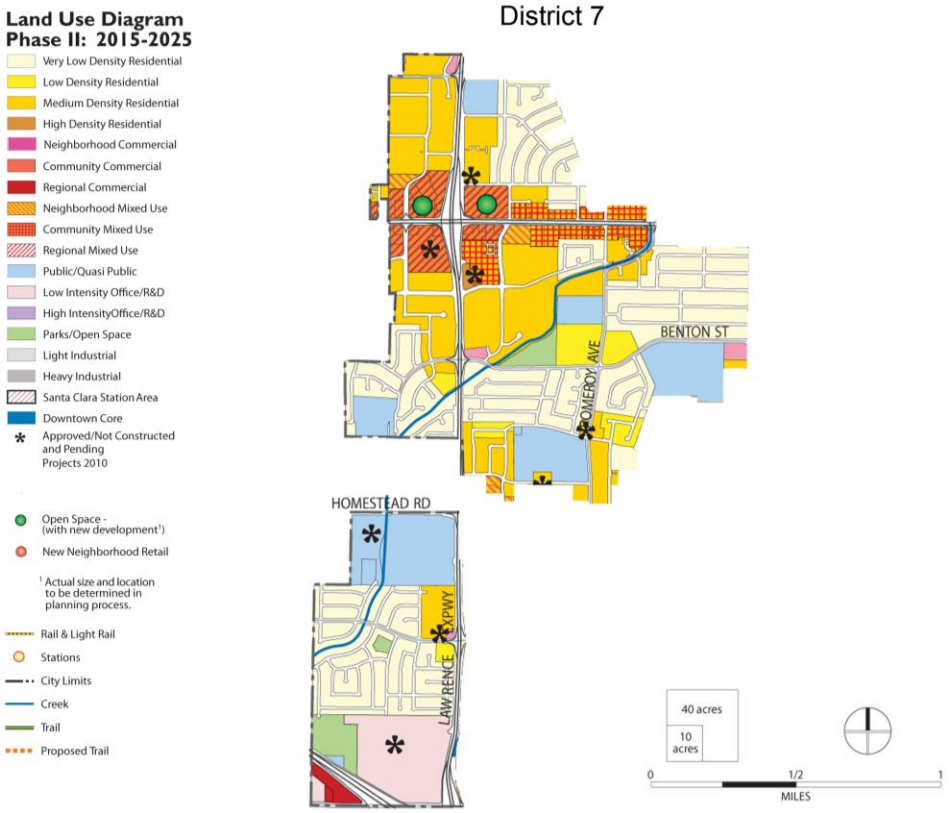
First Due Resources

Engine 97 staffed with three personnel

Community Profile

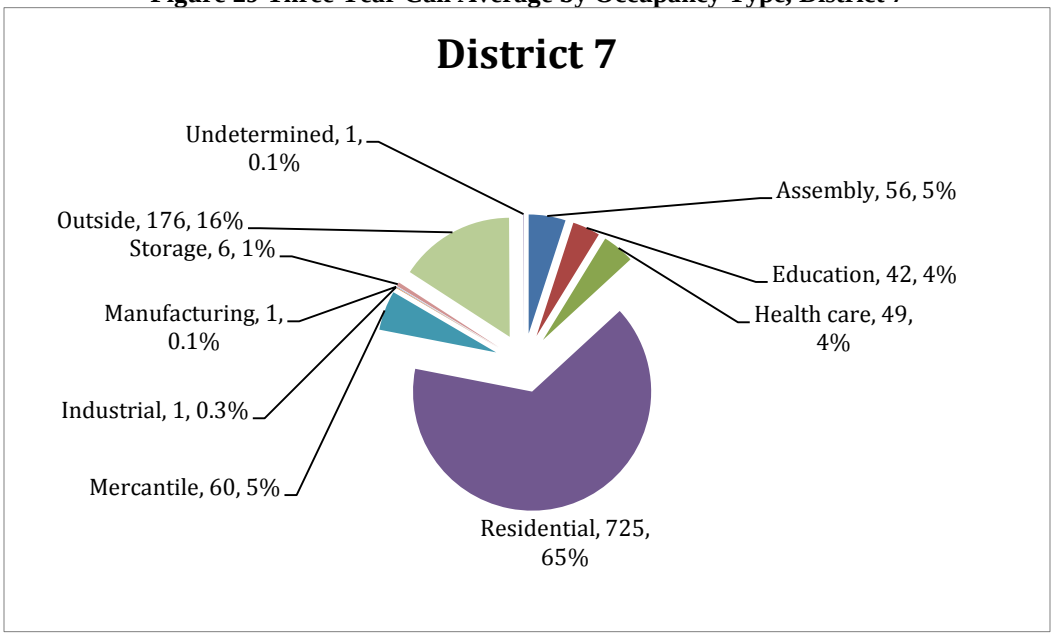
This area encompasses 1.8 square miles and has an estimated population of 19,485, accounting for approximately 16.27% if the city's overall population. Zone 7 is located in the southwestern corner of the city and is mostly low to high density residential with a small amount of commercial business lining El Camino Real in the northern portion of the district. About half of the residential properties are detached single-family residences, while the other half is comprised of moderate to high density apartment complexes. Most of the apartment complexes are located near the western border of the district, with the intersection of El Camino Real and Lawrence Expressway serving as the center the apartment laced area. The northern end of the district, El Camino Real, is community mixed use and includes restaurants, strip malls, budget hotel/motels, auto shops, grocery and other box stores. There is also a large hospital, Kaiser Santa Clara, located on the southwest corner of the intersection of Homestead Road and Lawrence Expressway. The zone is bordered on the west by Sunnyvale and Cupertino and on the south by San Jose.

Map 37 Land Use, District 7



A summary of the call breakdown based on occupancy type is provided to follow. With this zone, there is a strong correlation between land usage and structures the agency responds to. As stated earlier, the zone is predominantly residential and approximately 65% of all calls in zone 7 were to residential structures. Incidents located "outside," in areas like roadways and sidewalks were the second most frequent location (16%). An attempt to explain this would be traffic accidents on Lawrence Expressway and ECR. However, while it is more than three times more than the next occupancy type, it is equivalent to similar zones (3 at 12% and 5 at 17%). Kaiser Santa Clara and the large dialysis center can account for the majority of the health care facility calls, similarly, the four large schools will account for the educational facility calls.

Figure 29 Three Year Call Average by Occupancy Type, District 7



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are multifamily dwellings in the form of high density apartment complexes. However, as previously stated there are some regional mixed-use structures, especially along El Camino Real corridor. Furthermore, there are a number of critical facilities within this zone, including schools and other public building.

The medium to high density residential properties are mostly in the northwest portion of the zone. Tuscany homes, located at 3229 ECR at Calabazas Boulevard, is a newly built four-story apartment complex containing 133 apartments protected by a FSS and is valued at $38 million. Villa Granada, located at 3595 Granada Ave, is four-story 270-unit apartment complex with one level subterranean parking and has a FSS.

The remaining apartment complexes are designed similarly with older construction and are two-story structures and lack FSS. Marina Playa Apartments, located at 3500 Granada Ave, contains 11 two-story buildings totaling over 272 units. Boardwalk Apartments, located at 3770 Flora Vista Avenue, is comprised of multiple two-story buildings totaling 278 units. Marina Cove Apartments, located at 3475-3480 Granada Avenue, contains 292 units, Oakridge Apartments, located at 3655 Pruneridge Avenue, contains 266 units, Halford Garden Apartments, located at 1901 Halford Avenue, contains 234 units, Catalina Apartments, located at 3600-3616 Flora Vista Avenue, contain 228 units, Miramar Terrace, located at Halford & Miramar, contain 174 units, Lake Terrace Apartments, located at 3665 Benton Street, contains 150 units, Pomeroy West Condos, located at the corner of Benton Street & Pomeroy Avenue,

contains 138 units, Montecito Apartments, located at 3760-3765 Tamarack Lane, contains 110 units, Royal Ambassador Apartments I & II, located at 3421-3450 Granada Avenue, contains 110 units, Oakbrook Apartments, located at 3650-3651 Buckley Avenue, contains 108 units, and Station 101 Apartments, located at 3700 Lillick Drive, contains 108 units. Station 101 has recently added a FSS to the property. There are also 14 smaller apartment complexes spread throughout the zone that has anywhere from 17-86 units and are similar in design to the locations above.

Gateway Village, soon to be located at 3610 ECR (under construction), will sit on 2.6 acres and contain 476 residential units and 108,600 square feet of retail. There will be 1-2 to stories of retail and 4-5 stories residential, providing an estimated 227 permanent jobs and $2.7 million in sales tax revenue. This property is valued at $186 million. Villa Serena Assisted Living, located at 1340 Pomeroy Ave, contains 5-two story buildings with 110 units and 1-one story building where the community room, recreational room and kitchen are located. There are also a number of home care facilities located throughout the zone.

Some of the mixed use or commercial high-risk building include Stevens Creek Building Office, located at 5407 Stevens Creek, is a multiphase project (Phase I of II complete), is a six-story building containing 295,000 square feet of office space and is valued at $137 million. One of the highest risk facilities in terms of loss to the community is Kaiser Permanente Santa Clara Medical Center. This five-story, 911 ambulance receiving, general medical and surgical hospital is 1.26 million square feet with 327 beds and employs over 1300 doctors and nurses. Survey data for the latest year available shows that 63,596 patients visited the hospital's emergency room. The hospital had a total of 19,207 admissions. Its physicians performed 4,914 inpatient and 15,984 outpatient surgeries. The hospital does have a free-standing helipad located to the rear of the hospital but is not routinely used. There are three locations that require state or city hazardous materials operating permit within zone 7.

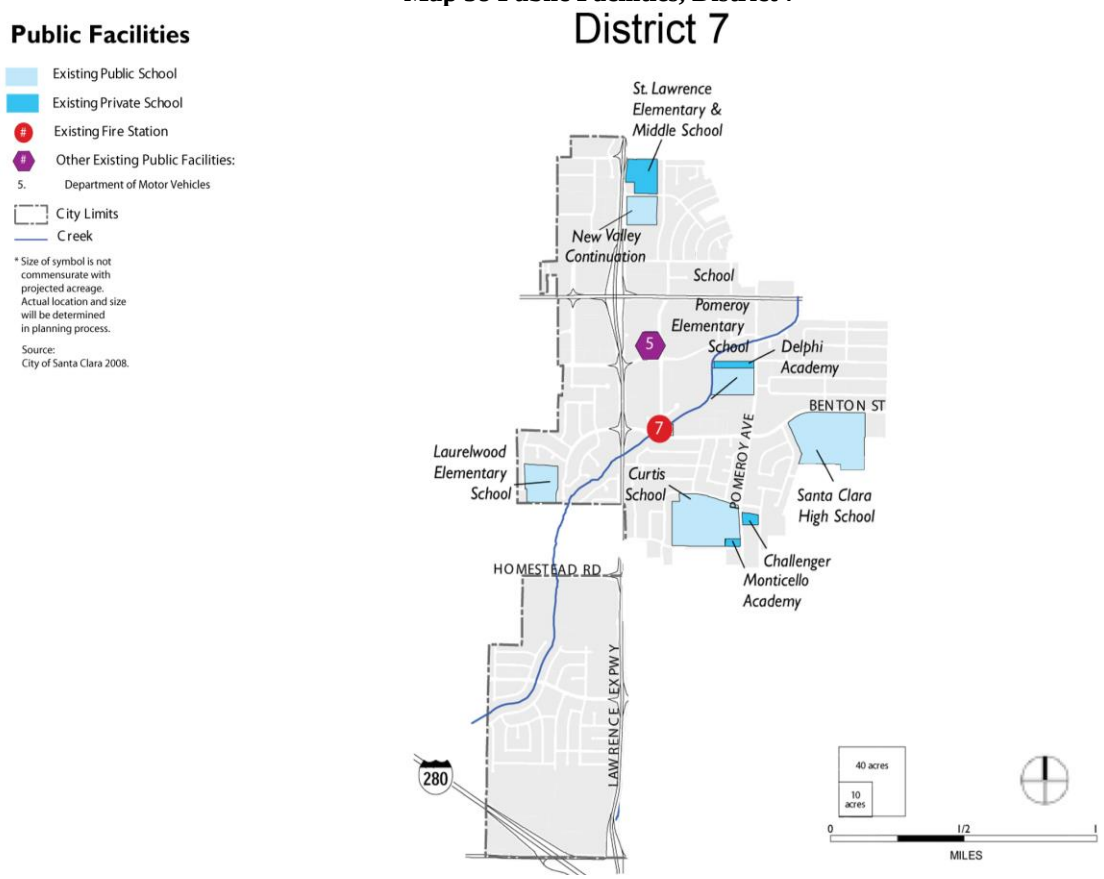
There are a number of non-sprinklered strip malls along El Camino Real that are considered high risk category structure fires. There are also 4 two story motels along El Camino real between Calabazas and Lawrence Expressway.

There are a number of public facilities of high value to the community. There are nine schools including Santa Clara High School grades 9-12, with 1,767 students, New Valley Continuation School grades 9-12, with 115 students, Stratford Charter School (Curtis School grades preK-6) with 500 students, Laurelwood Elementary School grades K-5, with 593 students, Pomeroy Elementary grades K-5, with 543 students, St Lawrence Elementary and Middle School PK-8th grades, 375 students, Monticello Academy, grades K-8, with 495 students, Challenger Preschool, grades PreK-K, with 100 students, and Delphi Academy, grades

K-8, with 135 students. Santa Clara North Baptist Church on Benton Street serves as a place for large community gatherings.

Zone 7 has an Evacuation Center located in the east side of the district and two water wells that serve as critical infrastructure to the city. The recreational areas within the zone include two parks, Earl R. Carmichael and Jenny Strand Park. There are two community pools, the Cabana Club located on Wood Duck and the Kona Kai Swim located on Hubbard. There are two creeks, Calabazas and Saratoga, with multiple access points running from south to north that are potential for swift water rescue during heavy rains. The following map depicts the some of the high-risk properties previously described.

Map 38 Public Facilities, District 7



Transportation

This zone contains approximately 37.80 road miles. Lawrence Expressway runs north/south on the east side of zone 7. There are five arterial roads in zone 7. El Camino Real, Pruneridge Avenue, Homestead Road, Stevens Creek Boulevard, and Benton Street run east/west. Kiely Boulevard runs north/south just outside the eastern perimeter of zone 7. Zone 7 covers an additional section in the southeast corner of the city. Highway CA-280 is part of this additional section. There is a natural gas transmission line running along Lafayette Expressway on the western perimeter of zone 7. The following table shows a four-year summary of call volume.

Table 43 Four Year Call Summary, Zone 7

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	11	18	801	5	316	1,151
Distribution of Calls	1.0%	1.6%	69.6%	0.4%	27.5%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	40	15	800	4	305	1,164
Distribution of Calls	3.4%	1.3%	68.7%	0.3%	26.2%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	21	17	784	9	274	1,105
Distribution of Calls	1.9%	1.5%	71.0%	0.8%	24.8%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	16	19	816	1	287	1,139
Distribution of Calls	1.4%	1.7%	71.6%	0.1%	25.2%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	88	69	3,201	19	1,182	4,559
Distribution of Calls	1.9%	1.5%	70.2%	0.4%	25.9%	100.0%

4-Year averages

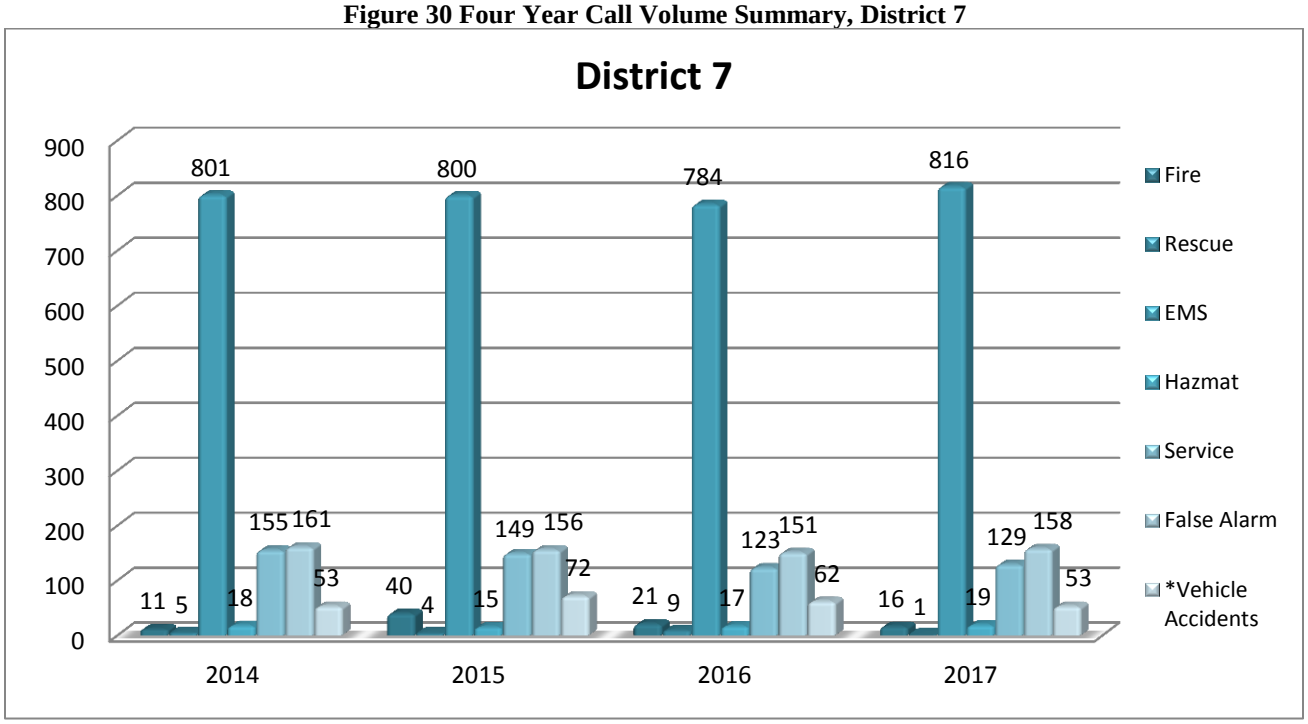
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	22	17	800	5	295.5	1,140
Distribution of Calls	1.9%	1.5%	70.2%	0.4%	25.9%	100.0%
Call Per Day	0.06	0.05	2.19	0.01	0.81	3.12

Percentage of Annual SCFD Calls Occurring in Zone 7

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	6.0%	12.9%	13.1%	19.2%	13.9%	13.2%
Calendar Year 2015	20.3%	9.7%	12.3%	9.8%	12.9%	12.6%
Calendar Year 2016	11.5%	10.4%	12.0%	21.4%	11.0%	11.8%
Calendar Year 2017	9.1%	10.2%	12.9%	2.5%	12.2%	12.5%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 30 Four Year Call Volume Summary, District 7



Fire Loss

Within District 7 jurisdiction in 2014 there were 11 total fires and four of those were documented to have a loss. Of the 11 fires, five were structure fires and three (60%) resulted in a total documented loss of $46,015. The remaining six fires were classified as other (garbage, shed, and vehicle fires) and one (17%) of these fires resulted in a loss of $5,000. The result was a combined total of four damaging fires for a loss, totaling $51,015 in damages.

In 2015, there were 40 total fires and 16 of those were documented to have a loss. Twenty-two of those were structure fires and 12 (55%) resulted in a total documented loss of $426,625. The remaining 18 were classified as other (garbage, shed, and vehicle fires) and four (22%) of the "other" fires resulted in a loss of $16,500. The result was a combined total of 16 damaging fires for a loss, totaling $443,175 in damages.

In 2016, there were 21 total fires and eight of those were documented to have a loss. Nine of those were structure fires and six (67%) of those structure fires resulted in a total documented loss of $2,124,260. The remaining 12 were classified as other (garbage, shed, and vehicle fires) and 2 (17%) of the "other" fires resulted in a loss of $80,500. The result was a combined total of eight damaging fires for a loss, totaling $2,204,760 in damages.

In 2017, there were 16 total fires and three of those were documented to have a loss. Eight of those 16 fires were structure fires and one (13%) of those structure fires resulted in a total documented loss of $20,000. The remaining eight were classified as other (garbage, shed, and vehicle fires) and 2 (25%) of the "other" fires resulted in a loss of $5,030. The result was a combined total of three damaging fires for a loss, totaling $25,030 in damages.

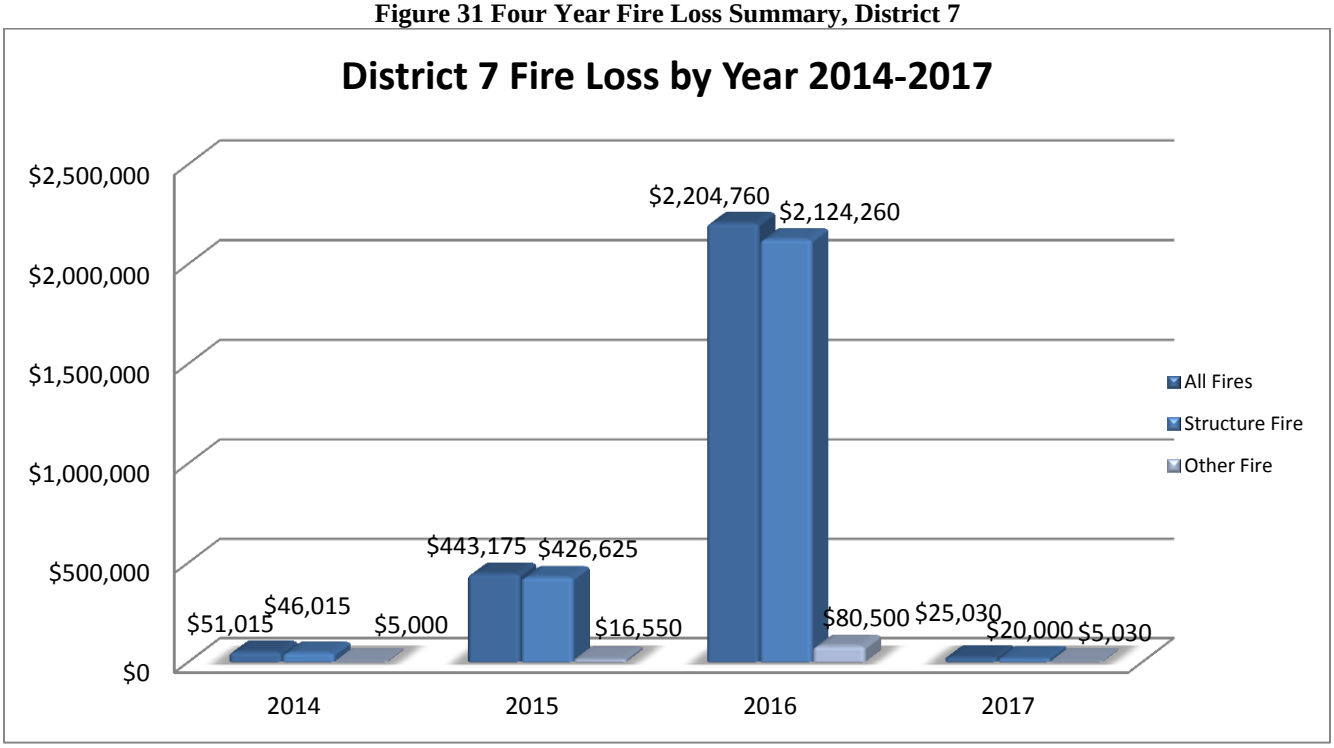
Therefore, in the four years studied (2014-2017), the District 7 mitigated 44 "other" fires and nine (20%) resulted in a documented loss totaling $107,080. Furthermore, from 2014- 2017 District 7 had 44 structure fires and 22 (50%) of those structure fires resulted in a documented loss of $2,616,900. The combined total of 88 total fires and 31 (22 structure and 9 other) damaging fires that resulted in a loss totaled $2,723,980 in damages. The total dollar amounts can be seen in the following graphs

Table 44 District 7 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	11	4	$51,015	5	3	$46,015	6	1	$5,000
2015	40	16	$443,175	22	12	$426,625	18	4	$16,550
2016	21	8	$2,204,760	9	6	$2,124,260	12	2	$80,500
2017	16	3	$25,030	8	1	$20,000	8	2	$5,030
Total Loss	**88**	**31**	**$2,723,980**	**44**	**22**	**$2,616,900**	**44**	**9**	**$107,080**

This zone generated an estimated loss of $2,616,900 from structure fire and $107,080 in other types of fires for a total of $2,723,980 in fire loss over the four-year period. The majority of this structure fire loss took place in 2016 during two strip mall fires.

Figure 31 Four Year Fire Loss Summary, District 7



Geographical Planning Zone 8

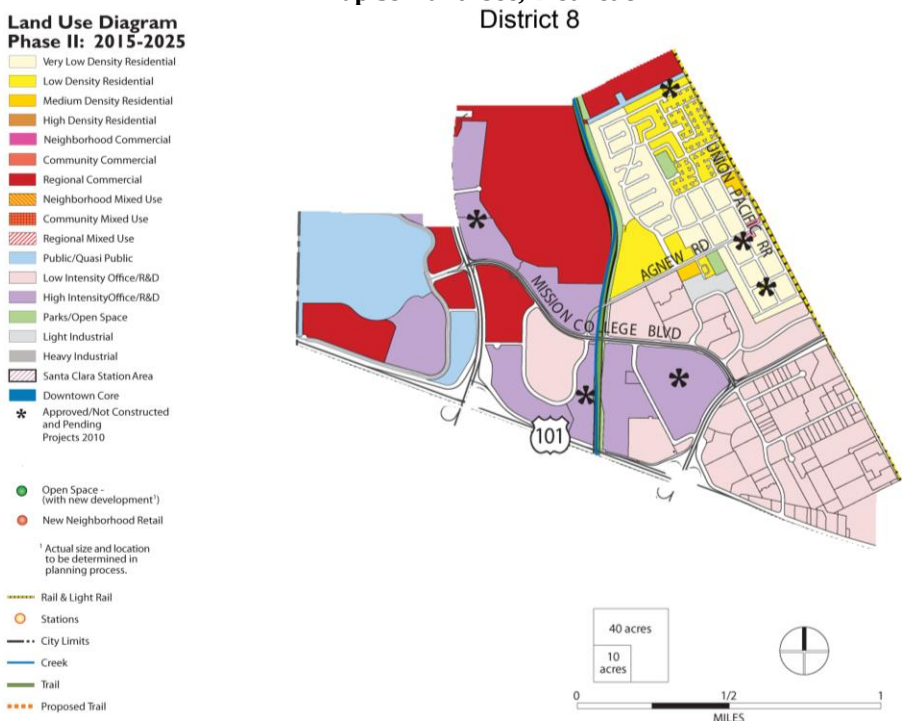
First Due Resources

Truck 98 staffed with four personnel and Medic Cart 98 is available (not staffed) for creek trail response. In October of 2017 Truck 98 was moved to station six and Engine 96 was moved to station eight. Engine 98 staffed with three personnel now occupies this station. Medic Cart 98 is still available (not staffed) for creek trail response.

Community Profile

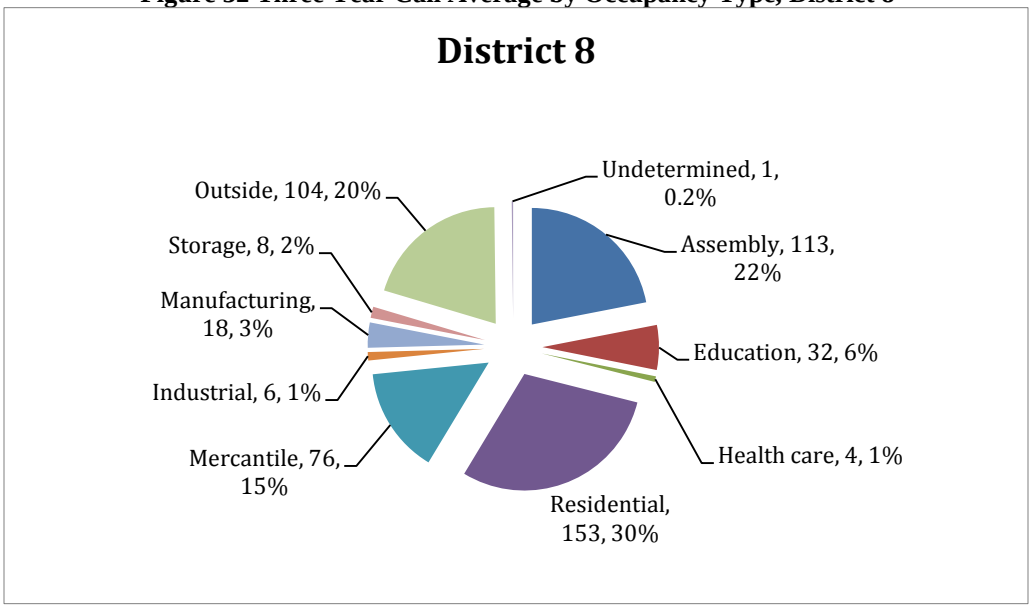
This area encompasses 1.9 square miles and has an estimated population of 4,372 accounting for approximately 3.65% if the city's overall population. Zone 8 is located in the northwestern portion of the city in between zones nine and ten. Its land usage is relatively diverse. The San Tomas Aquino Creek runs north to south through the center of the zone cutting it in half and creating an east and west side. The east side can then be divided into a north and south according to its land usage. The northeast portion of the zone is comprised of mostly single-family residences, however, Lake Santa Clara Condos, located on Lakeshore Drive north of Agnew road contains town home type residences. The southeast corner of the zone (south of Agnew Road) is low intensity research and development and some manufacturing. This area is home to a cement plant, Cemex, and technology companies such as Intevac, Comtech, 3M, Intel, Vishay Siliconix and Air Products. To the west of the creek is mostly high intensity office R&D, commercial, and public space. This includes many of the cities high rises, Marriott Hotel, Avatar Hotel, Great America Theme Park, Mercado Shopping Center and Movie Theater, and Mission College. The zone is bordered by the Union Pacific Railway on its east side, US Highway 101 on the South, and Sunnyvale on its east. The flight path for Mineta San Jose International Airport is over this zone.

Map 39 Land Use, District 8



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to**.** As stated earlier, the zone is has a much greater mix of land usage than many other districts. It is approximately 25% residential compared to districts on the south side that are near 75% residential. That correlates with 30% of calls occurring in residential structures (65% in zone 7). Assembly (22%), outside (20%), and mercantile (15%) were the next three highest occupancy types. Assembly and Outside are two common entries for Great America Theme Park.

Figure 32 Three Year Call Average by Occupancy Type, District 8



Critical Infrastructure and High-Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Unlike most zones the majority of these high-risk structures are buildings other than moderate to high density apartment complexes. There are eight high-rise buildings (75 feet from grade to the bottom of the top occupied floor) located in this zone. Four of them are located on Mission College Boulevard including 2350 Mission College Boulevard, Mission City center, a 235,883-square foot, a 13-story office building, 2700 Mission College Boulevard, Marriott Hotel, a 13-story full service hotel with 759 rooms, 2811 and 2821 Mission College Boulevard, Yahoo towers, are eight story office buildings, each over 384,000 square feet and containing raised floor server rooms with a 1,500 KW generator in each building. The other four are on Freedom Circle and these include 3945 Freedom Circle, Santa Clara Towers, is an eleven story 220,000 square foot office complex, 3965 Freedom Circle, also a part of Santa Clara Towers, is an 11-story office building with over 214,000 square feet, 3975 Freedom Circle, Mission Towers I, is a 12-story, office building totaling 292,906 square feet, and 3979 Freedom Circle, Mission Towers II, a twin 12-story, office buildings totaling 584,000 square feet. These structures are fully sprinklered and have vertical standpipes.

The Marriott hotel was already mentioned and there are two other large hotels in this zone. The first is the Biltmore Suites, located at 2151 Laurelwood Road, is a full-service hotel with over 263 guestrooms. The Avatar Hotel, located at 4200 Great America Parkway, is a four-story building with 168 guestrooms.

There are three public campuses that represent high risk for loss. The first is Great America Theme Park located in the northwest portion of the zone. It is a 100-acre theme park, featuring over 40 rides and attractions including roller coasters, thrill rides, an amphitheater, and a water park. The annual

attendance is over 2.6 million people. The high traffic and size of this facility creates a potential for high risk. Likewise, malfunctioning rides at this facility has been a source of high angle rescue. The second facility is Mission College, located at 3000 Mission College Boulevard in the northwest portion of the district. This is a large Junior College that has approximately 10,000 students enrolled as of Winter Semester of 2017. There are over 24 buildings (one to three stories in height) and 4 fields on this campus. There are no permanent living quarters on campus. The third public space is the Mercado Shopping Center, located at 3100 Mission College Boulevard, a 24-acre retail development including 11 restaurants, a Wal-Mart, an AMC 20 screen movie theater and multiple retail stores.

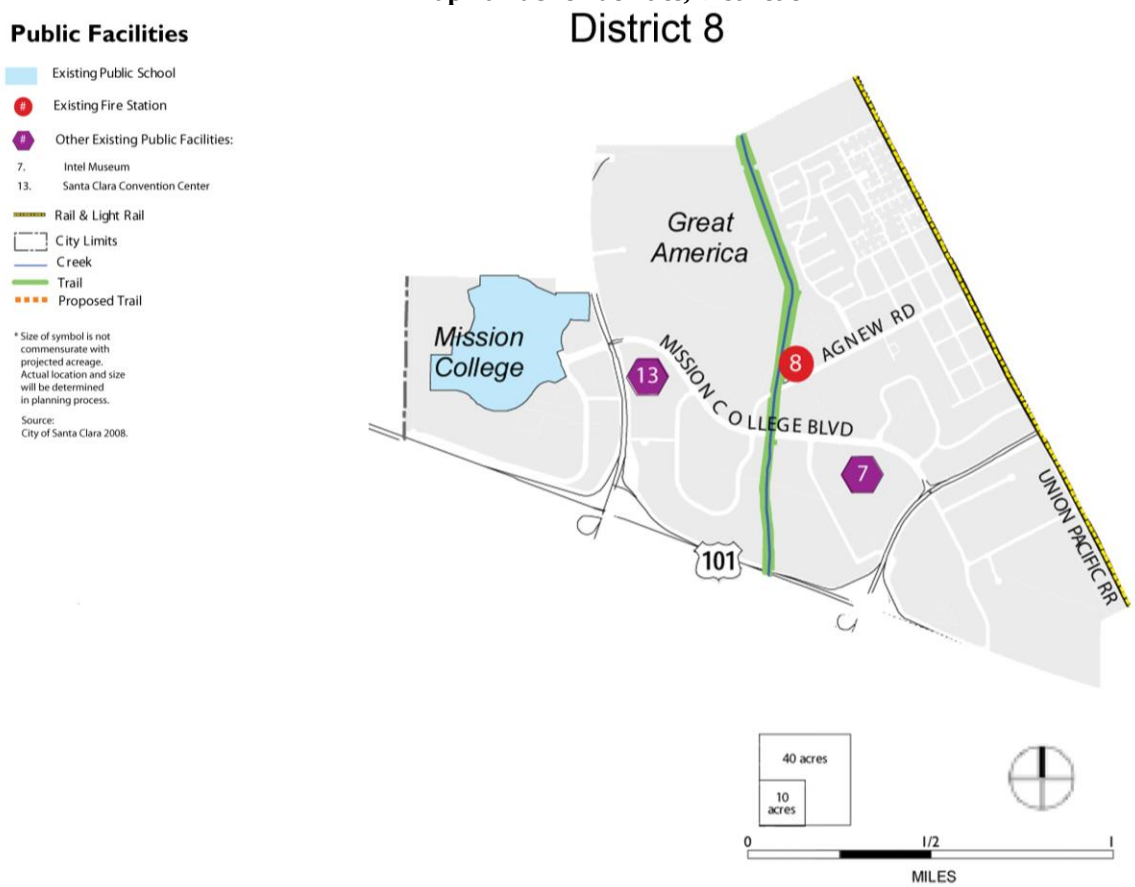
There is very little recreation in the form of community parks within this zone. However, the San Tomas Aquino Creek runs through this zone, which serves as a potential location for swift water rescue during heavy rains. The trail that parallels the creek is frequently utilized as a jogging path and serves as a relatively frequent location for medical calls. Due to the limited access (can be over half a mile from accessible street), responding to these calls can be challenging. However, the agency utilizes a gas powered all-terrain vehicle (Kubota), equipped with a gurney to access the remote portions of the trail.

There are a number of high risk industrial facilities located in the southern portion of this zone. Some of the facilities of note are as followed. Intel, located at Mission College Boulevard northwest of Montague Expressway, is Intel's corporate headquarters and home of the flagship Intel Museum, which showcases more than 40 years of Intel innovations. The Santa Clara site has multiple buildings and is involved in engineering, design, research and development, and software engineering, and houses several corporate organizations, including sales and marketing, legal, supply network, and human resources. With more than 7,000 employees, Intel is one of the largest employers in Santa Clara.

Vishay Siliconix, located at 2201 Laurelwood Road, is comprised of three large buildings totaling close to 200,000 square feet and the company is an industry leading developer and manufacturer of semiconductor products. Reaction Technologies, located at 3400 Bassett Street, is a leading supplier of silicon epitaxy and silicon coatings to the semiconductor and industrial sectors. They are located in a single story 52,000 square foot building. Cemex, located at 1555 Russel Avenue, is a ready mix concrete supplier and manufacturer. Air Products, located at 1515 Norman Avenue, is a world-leading Industrial Gas company. The company's core industrial gases business provides atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, and food and beverage. Air Products is also the world's leading supplier of liquefied natural gas process technology and equipment. These are a few of the locations in zone 8 containing hazardous materials, in total there are 19 locations that require state or city hazardous materials operating permit within zone 8 and one Cal ARP facility located on Laurelwood Road.

Other utility related critical infrastructure includes has four Storm Drain Pump Stations that run near the San Tomas Aquino Creek. Two are located on the north side of the district. Two are located in the center of the district. There are four electric substations, two located in the north side of the district near Levi Stadium, one is located in the center of the district, and the other is on the southern side of the district. There is also one water department "north side" storage tank. The following map depicts the some of the high-risk properties previously described.

Map 40 Public Facilities, District 8



Transportation

This zone is comprised of 25.91 road miles. US 101 runs along the south side of zone 8 and is a major source of high speed vehicle accidents. Montague Expressway the southeastern portion of this zone. There are two arterial roads, Great America Parkway which runs east/west through the center of zone eight, and Mission College Boulevard which runs east/west. The Union Pacific Railroad runs along the eastern perimeter. The following table shows a four-year summary of call volume.

Table 45 Four Year Call Summary, Zone 8

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	10	10	320	1	126	467
Distribution of Calls	2.1%	2.1%	68.5%	0.2%	27.0%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	9	7	387	3	156	562
Distribution of Calls	1.6%	1.2%	68.9%	0.5%	27.8%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	19	9	356	6	145	535
Distribution of Calls	3.6%	1.7%	66.5%	1.1%	27.1%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	10	7	293	4	172	486
Distribution of Calls	2.1%	1.4%	60.3%	0.8%	35.4%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	48	33	1,356	14	599	2,050
Distribution of Calls	2.3%	1.6%	66.1%	0.7%	29.2%	100.0%

4-Year averages

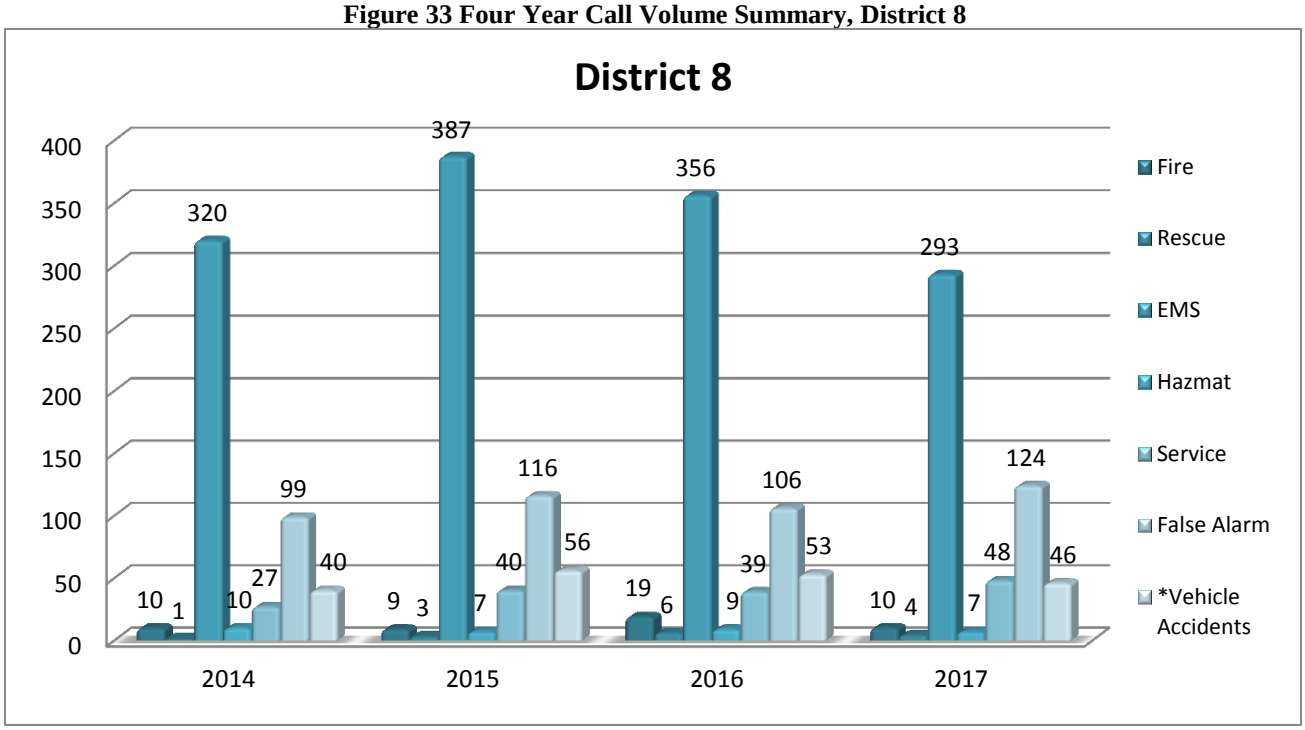
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	12	8	339	4	149.75	513
Distribution of Calls	2.3%	1.6%	66.1%	0.7%	29.2%	100.0%
Call Per Day	0.03	0.02	0.93	0.01	0.41	1.40

Percentage of Annual SCFD Calls Occurring in Zone 8

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	5.5%	7.2%	5.2%	3.8%	5.6%	5.4%
Calendar Year 2015	4.6%	4.5%	5.9%	7.3%	6.6%	6.1%
Calendar Year 2016	10.4%	5.5%	5.5%	14.3%	5.8%	5.7%
Calendar Year 2017	5.7%	3.8%	4.6%	10.0%	7.3%	5.4%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 33 Four Year Call Volume Summary, District 8



Fire Loss

Within District 8 jurisdiction in 2014 there were 10 total fires and two of those were documented to have a loss. Of the 10 fires, five were structure fires and one (20%) resulted in a total documented loss of $400. The remaining five fires were classified as other (garbage, shed, and vehicle fires) and one (20%) of these fires resulted in a loss of $1,000. The result was a combined total of two damaging fires for a loss, totaling $1,400 in damages.

In 2015, there were nine total fires and zero of those were documented to have a loss. Three of those were structure fires and zero (0%) resulted in no loss. The remaining six were classified as other (garbage, shed, and vehicle fires) and zero (0%) of the "other" fires resulted in zero loss. The result was a combined total of zero damaging fires for no loss.

In 2016, there were 19 total fires and six of those were documented to have a loss. Five of those were structure fires and two (40%) of those structure fires resulted in a total documented loss of $26,500. The remaining 14 were classified as other (garbage, shed, and vehicle fires) and four (29%) of the "other" fires resulted in a loss of 5,000. The result was a combined total of six damaging fires for a loss, totaling $31,500 in damages.

In 2017, there were 10 total fires and two of those were documented to have a loss. One of those 10 fires were structure fires and zero (0%) of those structure fires resulted in no documented loss. The remaining nine were classified as other (garbage, shed, and vehicle fires) and two (22%) of the "other" fires resulted in a loss of $3,525. The result was a combined total of two damaging fires for a loss, totaling $3,525 in damages.

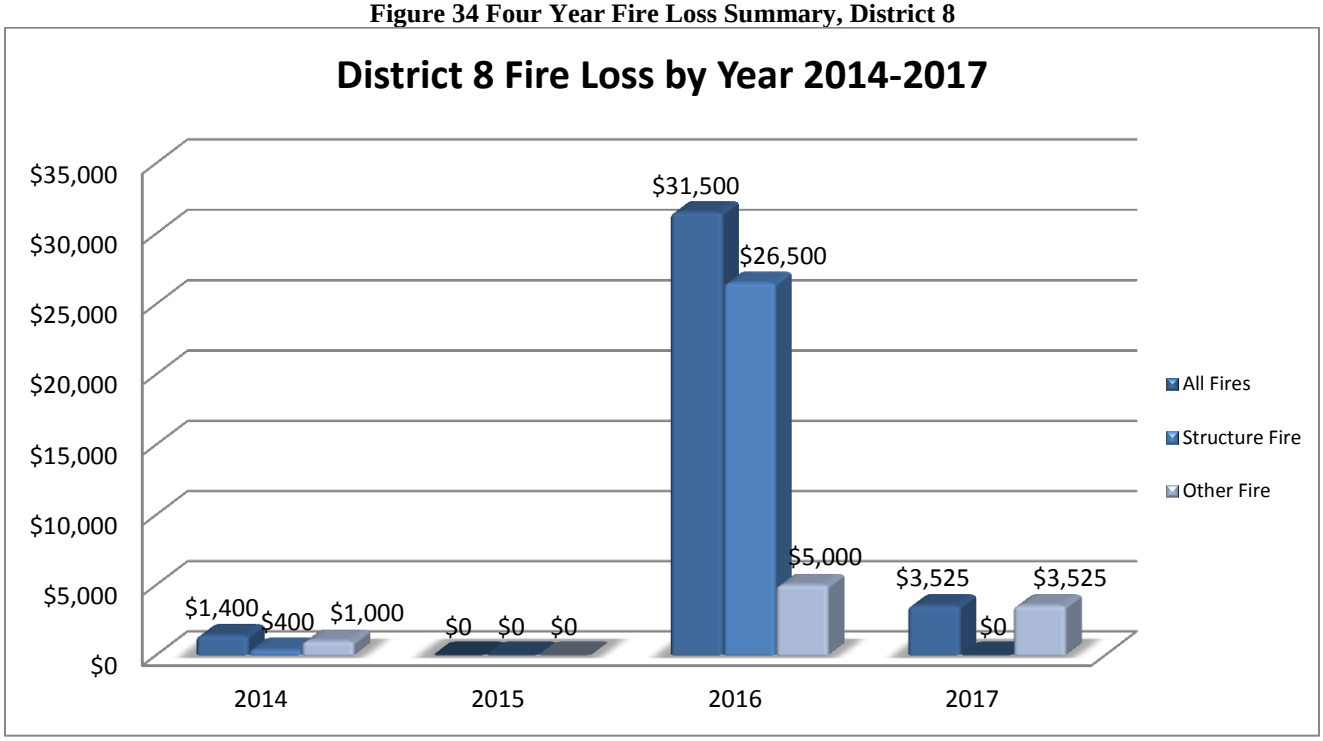
Therefore, in the four years studied (2014-2017), the District 8 mitigated 34 "other" fires and seven (21%) resulted in a documented loss totaling $9,525. Furthermore, from 2014- 2017 District 8 had 14 structure fires and three (21%) of those structure fires resulted in a documented loss of $26,900. The combined total of 48 total fires and 10 (three structure and seven other) damaging fires that resulted in a loss totaled $36,425 in damages. The total dollar amounts can be seen in the following graphs

Table 46 District 8 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	10	2	$1,400	5	1	$400	5	1	$1,000
2015	9	0	$0	3	0	$0	6	0	$0
2016	19	6	$31,500	5	2	$26,500	14	4	$5,000
2017	10	2	$3,525	1	0	$0	9	2	$3,525
Total Loss	**48**	**10**	**$36,425**	**14**	**3**	**$26,900**	**34**	**7**	**$9,525**

This zone generated an estimated loss of $26,900 from structure fire and $9,525 in other types of fires for a total of $36,425 in fire loss over the four-year period

Figure 34 Four Year Fire Loss Summary, District 8



Geographical Planning Zone 9

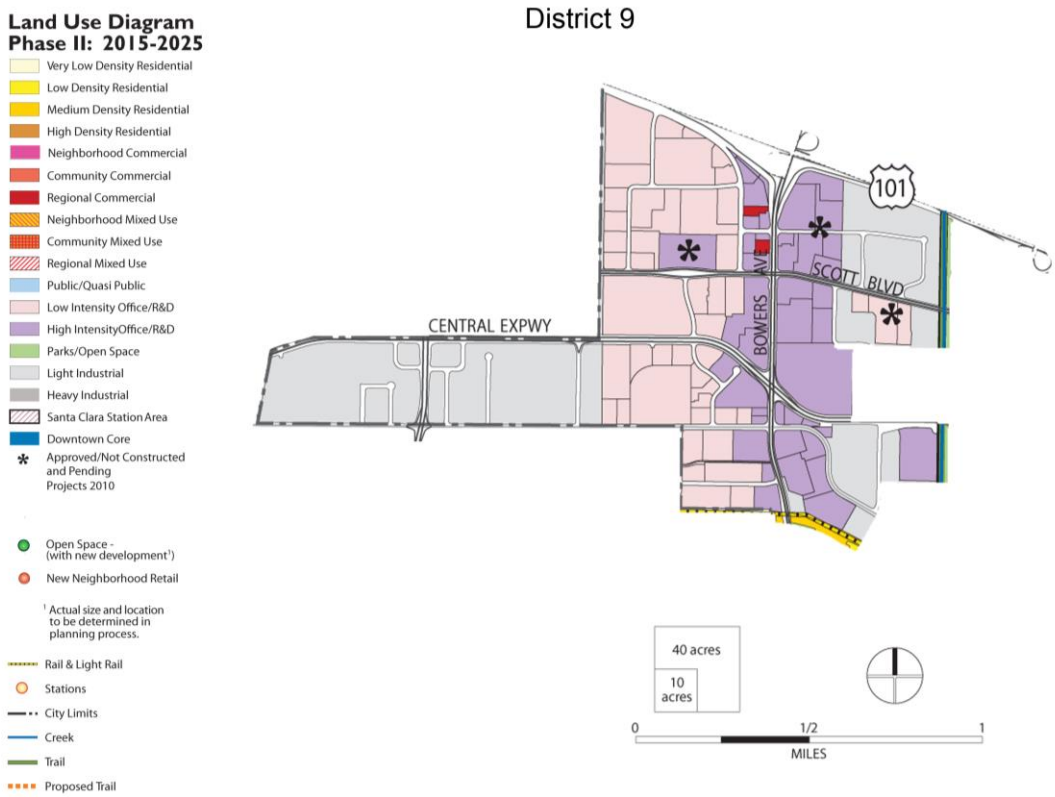
First Due Resources

Engine 99 staffed with three personnel and Hazmat 99 staffed with one person

Community Profile

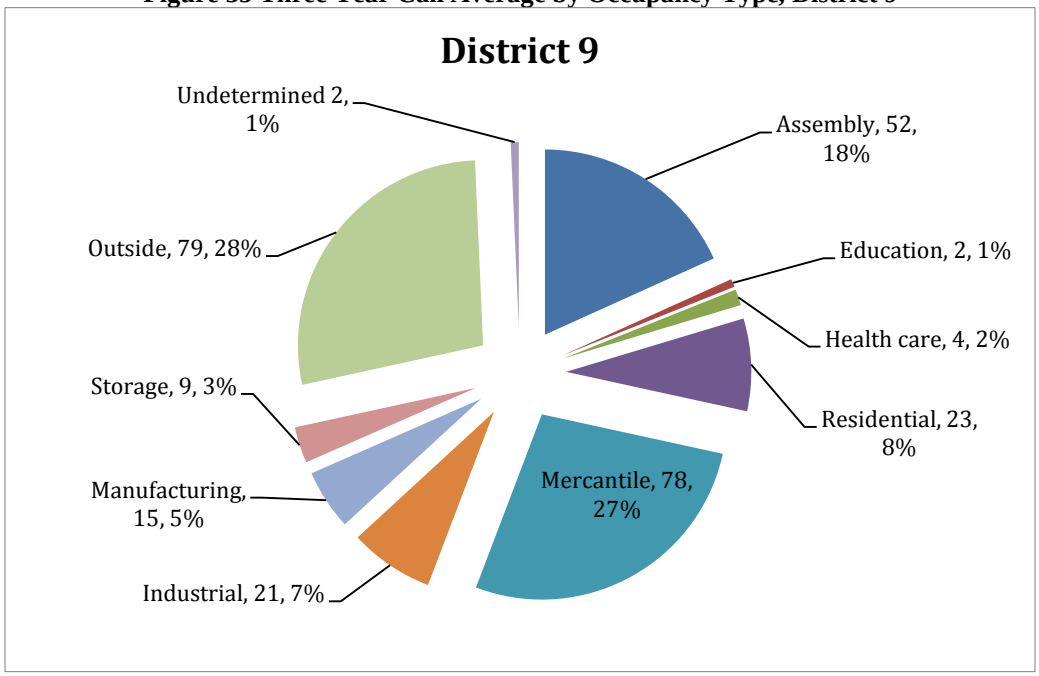
This area encompasses 1.2 square miles and has an estimated population of 23 accounting for approximately 0.02% if the city's overall population. Zone 9 currently has the fewest residential structures in the city, however, this zone will see the greatest transition of land use over the next five years including the addition of many residential structures. There are several approved plans for development encompassing the entire area south of Central Expressway and north of Kifer Road in between Lawrence Expressway and Bowers Avenue. Bowers Avenue splits the zone into east and west as it runs north/south through its center. The areas immediately west and east of Bowers Avenue are comprised of high intensity office and R&D. Further west from Bowers Avenue, the area becomes more low intensity office and R&D and the western most end of the district, which sticks westward into Sunnyvale, is considered light/heavy industrial. Eastern most portion of the zone is also light/heavy industrial. This zone is bordered on its north by US 101 and by San Tomas on its east. A portion of the southern edge of the district runs along the Caltrain Railway.

Map 41 Land Use, District 9



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there a little disconnect between the land usage and locations calls are taking place. The zone is predominantly industrial; however, only 7% of the calls occur in industrial buildings. The highest percentage of calls took place outside, (28%), mercantile (27%) and assembly (18%). The large percentage of outside calls can be explained by the major roadways in this zone which include three expressways and a highway. This is supported by analyzing the number of vehicle accidents. Zone 9 responded to 8.2 % of all vehicle accidents within the city, which does not sound like a lot. However, zone 9 is one of the zones with the lowest call volumes and on average accounted for 3.2% of the city's overall call volume. The number of vehicle accidents occurred at more than 2.5 times that percentage. Furthermore, many of the large industrial structures, such as server farms, have very few people inside them. As previously discussed, human factor is the leading contributor to an increased probability of a 911 activation.

Figure 35 Three Year Call Average by Occupancy Type, District 9



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are commercial properties that either contain large amounts of hazardous materials or are high valued structures.

There are many large office buildings including Scott Boulevard Office Campus, located at 3333 Scott Boulevard (partially complete), sits on 30.2 acres of land and will be a total of 1,350,713 square feet of office space in six different four- and five-story buildings estimated value of 395 million dollars. Ericsson, located at 2795 and 2755 Augustine Drive, is a worldwide leader in mobile technologies and has two-eight story buildings totaling over 400,000 square feet and employs over 2000 people. This is one of the two high-rise structures in this zone. Some of the development projects include Santa Clara Square Market Place, 2600 Augustine (Mixed use), which will sit on 39.7 acres, create 2,200 rental apartments, 160,000 square feet of retail space and 42,000 feet of amenity space. A portion of this project is complete and contains multiple restaurants, a Whole Food Grocery Store and multiple retail stores. Bowers Avenue Office Campus will be five-story structure containing 300,000 square feet of office space on 7.19 acres of land, and will create 1,150 permanent jobs with an estimated project valuation of $76,119,637.

There are a number of industrial/R&D labs in this zone including a second Intel location at 3065 Bowers Avenue is a three story 238,211 square foot structure. Applied Materials, has located at 3050 Bowers Avenue, is a world leader in high tech materials engineering and tool manufacturing for a wide range of high tech usage. This facility contains large quantities and a diverse amount of hazardous materials.

However, this facility does have a 24/7 emergency response team on the property. Nanusyn, located at 3100 Central Expressway, occupies a single story 39,176 square foot building. This company is a medicinal chemistry and biological services contract research organization providing made-to-order focused compound libraries. The microprocessor manufacturer, Texas Instruments, is located at 3833 and 3835 Kifer Road and 2900 Semiconductor Drive. They occupy six multi story buildings that are approximately 140,000 square feet each. There are two Cal Arp facilities in this zone and ten locations that require state or city hazardous materials operating permits.

There are also three large hotels in this zone, Hilton Embassy Suites, located at 2885 Lakeside Drive, is a ten-story hotel with 257 rooms and is one of the two high-rise structures in this zone. The Plaza Suites, located at 3100 Lakeside Drive, is a seven-story building with 219 rooms. Marriott Towne Place Suites, located at 2877 Lakeside Drive has 5 floors and 107 guestrooms.

Zone 9 also contains three large server farms including Terramark, located at 3030 Corvin Drive, is a 67,376-square foot building. Vantage Data Center, located at 2820 Northwestern Parkway, is 335,000 square foot of data center space and has Two (2) 50 MW dedicated substations on-site, 45 MW of critical IT load (operational), 75 MW of critical IT load (potential), and is Largest LEED Platinum Certified data center campus in North America. Telx also leases a two story 40,000 square foot building at 2820 Northwestern Parkway. These structures are considered are high risk due to the consequences to the community should a catastrophic incident occur here.

Other utility related critical infrastructure includes two Storm Drain Pump Stations. One is located in the southeast side of zone 9. The other is on the north side. It also has four Electric Sub Stations, two on the southeast part of the zone, one on the northeast portion of the zone, and the other on the west side of the zone. The following map depicts the some of the high-risk properties previously described.

Map 42 Public Facilities, District 9

Transportation

This zone contains approximately 18.70 road miles. US 101 runs along the north side of zone nine. Central Expressway runs through the center, San Tomas Expressway along the eastern boundary and a small section of Lawrence Expressway runs through the western portion. There are two arterial roads, Scott Boulevard and Walsh Avenue that run east/west near the center of the zone. A third arterial road, Bowers Avenue, runs north/south through the center of zone 9. The Caltrain Rail runs east/west in the southern part of zone 9. There is a natural gas transmission line running along Lafayette Expressway on the western perimeter. The following table shows a four-year summary of call volume.

Table 47 Four Year Call Summary, Zone 9

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	9	6	152	2	105	274
Distribution of Calls	3.3%	2.2%	55.5%	0.7%	38.3%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	6	11	149	4	118	288
Distribution of Calls	2.1%	3.8%	51.7%	1.4%	41.0%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	12	21	158	5	124	320
Distribution of Calls	3.8%	6.6%	49.4%	1.6%	38.8%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	7	9	172	1	115	304
Distribution of Calls	2.3%	3.0%	56.6%	0.3%	37.8%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	34	47	631	12	462	1,186
Distribution of Calls	2.9%	4.0%	53.2%	1.0%	39.0%	100.0%

4-Year averages

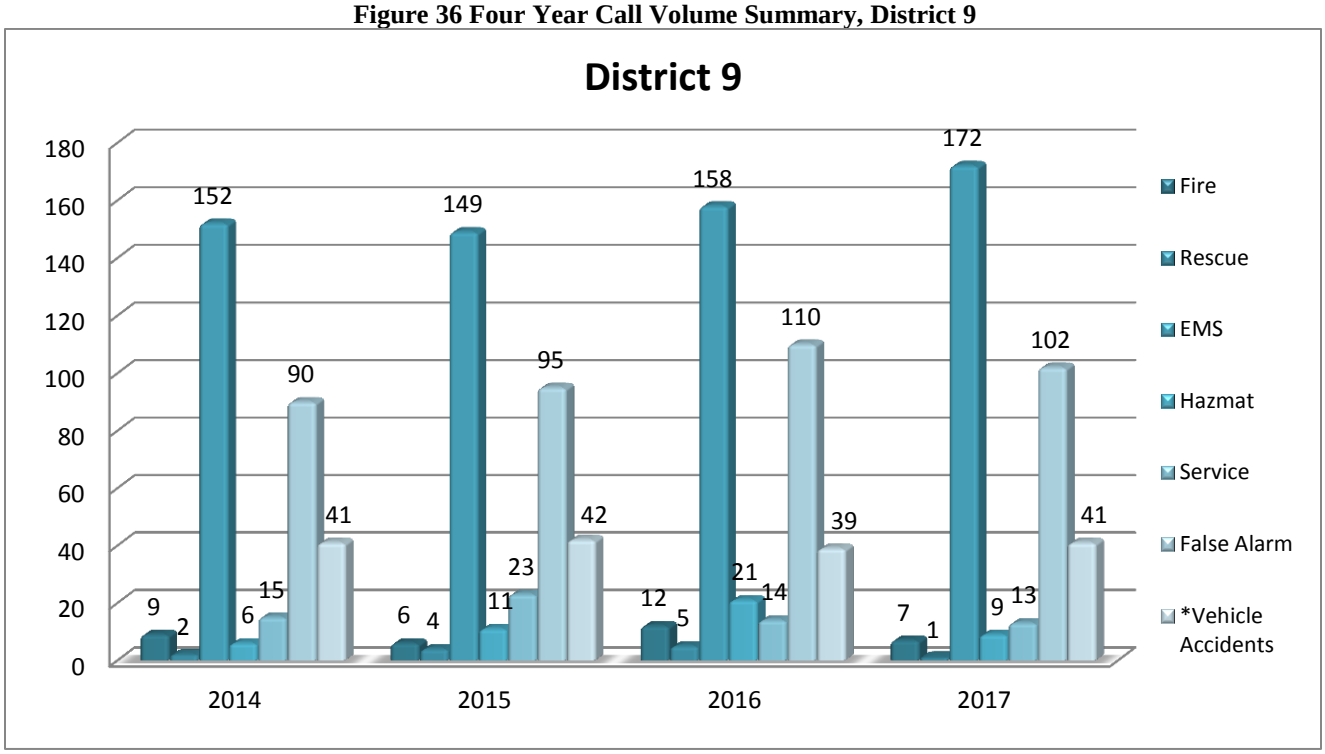
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	9	12	158	3	115.5	297
Distribution of Calls	2.9%	4.0%	53.2%	1.0%	39.0%	100.0%
Call Per Day	0.02	0.03	0.43	0.01	0.32	0.81

Percentage of Annual SCFD Calls Occurring in Zone 9

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	4.9%	4.3%	2.5%	7.7%	4.6%	3.1%
Calendar Year 2015	3.0%	7.1%	2.3%	9.8%	5.0%	3.1%
Calendar Year 2016	6.6%	12.8%	2.4%	11.9%	5.0%	3.4%
Calendar Year 2017	4.0%	4.8%	2.7%	2.5%	4.9%	3.3%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 36 Four Year Call Volume Summary, District 9



Fire Loss

Within District 9 jurisdiction in 2014 there were nine total fires and two of those were documented to have a loss. Of the nine fires, two were structure fires and one (50%) resulted in a total documented loss of $45,000. The remaining seven fires were classified as other (garbage, shed, and vehicle fires) and one (14%) of these fires resulted in a loss of $22,000. The result was a combined total of two damaging fires for a loss, totaling $67,000 in damages.

In 2015, there were six total fires and two of those were documented to have a loss. None of those were structure fires leading to no loss due to structure fire in this year in district nine. The remaining six were classified as other (garbage, shed, and vehicle fires) and 2 (33%) of the "other" fires resulted in a loss of $200. The result was a combined total of two damaging fires for a loss, totaling $200 in damages.

In 2016, there were 12 total fires and three of those were documented to have a loss. Three of those were structure fires and one (33%) of those structure fires resulted in a total documented loss of $500. The remaining nine were classified as other (garbage, shed, and vehicle fires) and two (22%) of the "other" fires resulted in a loss of $25,250. The result was a combined total of three damaging fires for a loss, totaling $25,750 in damages.

In 2017 there were seven fires. None of these fires were structure so all seven were classified as other (garbage, shed, and vehicle fires). However, no fire in either category had a documented loss due to fire in this year in district nine.

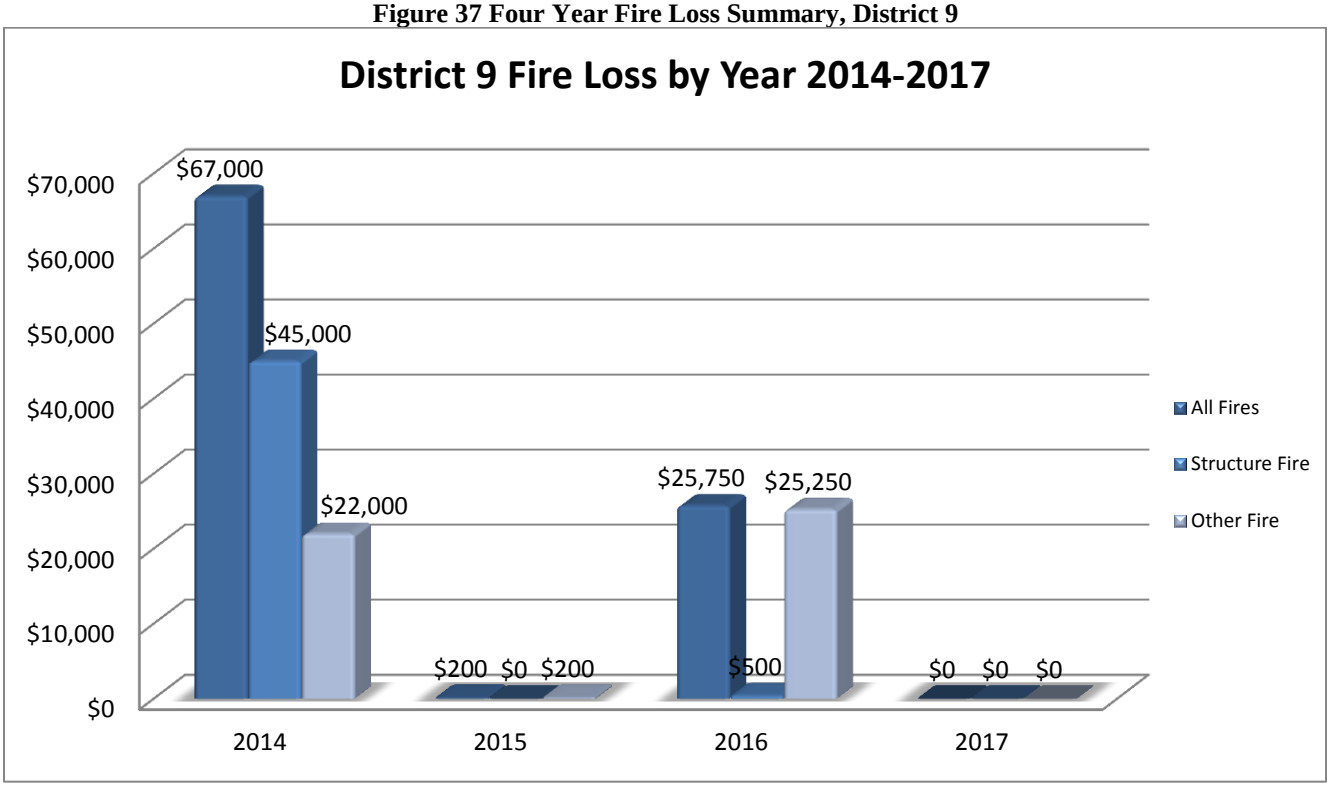
Therefore, in the four years studied (2014-2017), the District 9 mitigated 29 "other" fires and five (17%) resulted in a documented loss totaling $47,450. Furthermore, from 2014- 2017 District 9 had five structure fires and two (40%) of those structure fires resulted in a documented loss of $45,500. The combined total of 34 total fires and seven (two structure and five other) damaging fires that resulted in a loss totaled $92,950 in damages. The total dollar amounts can be seen in the following graphs

Table 48 District 9 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	9	2	$67,000	2	1	$45,000	7	1	$22,000
2015	6	2	$200	0	0	$0	6	2	$200
2016	12	3	$25,750	3	1	$500	9	2	$25,250
2017	7	0	$0	0	0	$0	7	0	$0
Total Loss	**34**	**7**	**$92,950**	**5**	**2**	**$45,500**	**29**	**5**	**$47,450**

This zone generated an estimated loss of $45,500 from structure fire and $47,450 in other types of fires for a total of $92,950 in fire loss over the four-year period.

Figure 37 Four Year Fire Loss Summary, District 9



Geographical Planning Zone 10

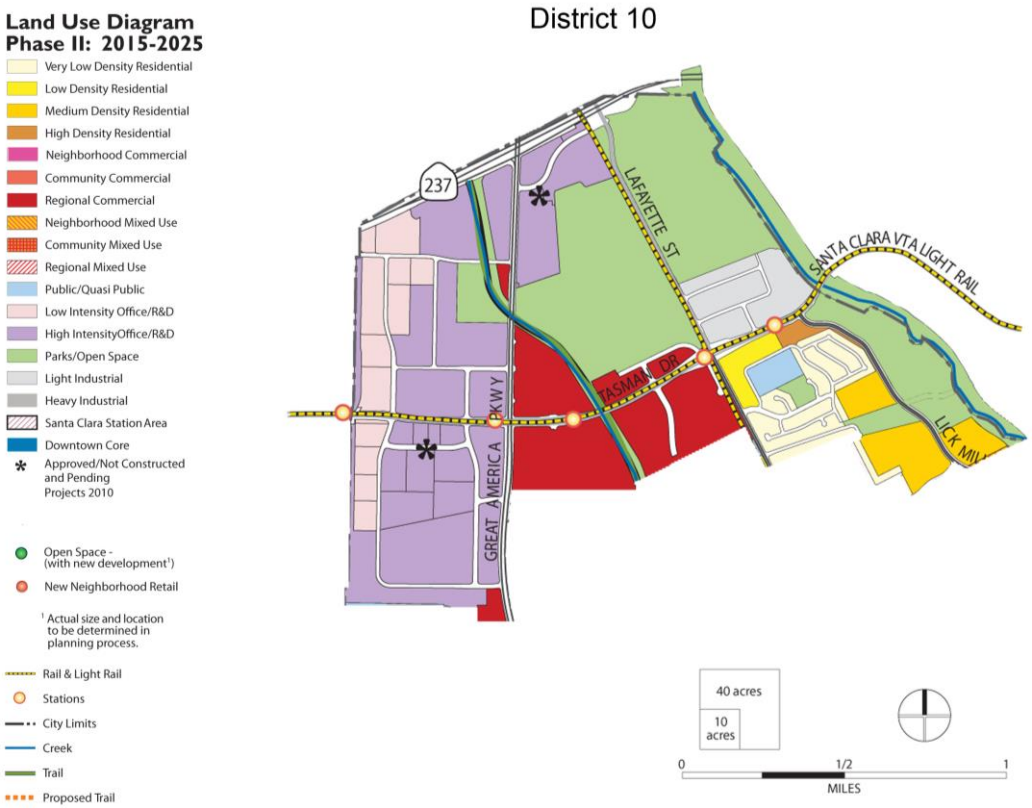
First Due Resources

Engine 90 staffed with three personnel

Community Profile

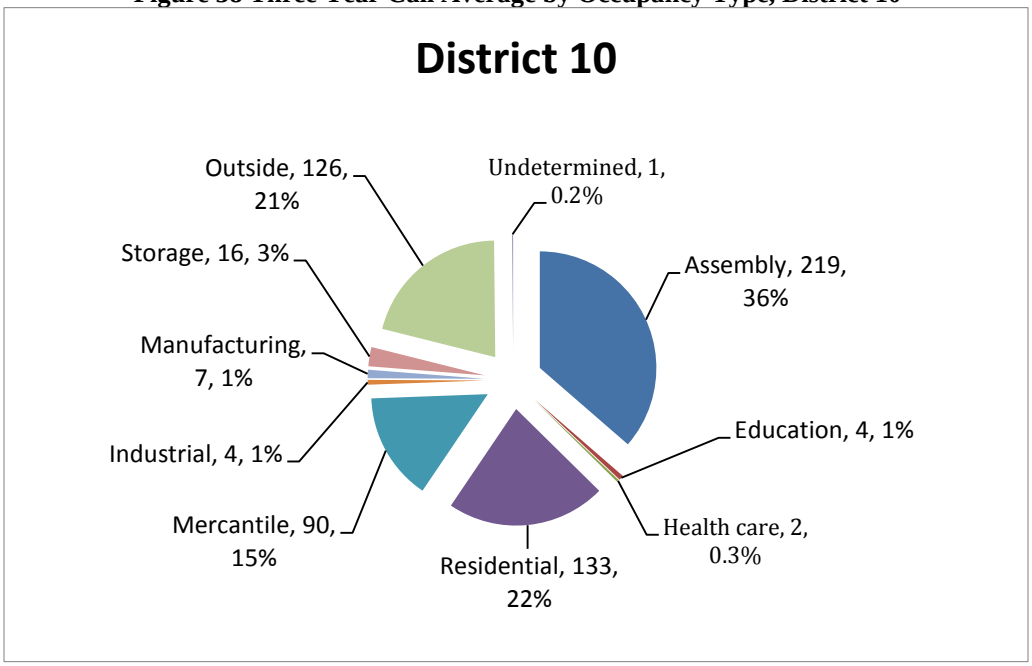
This area encompasses 1.9 square miles and has an estimated population of 4,153, accounting for approximately 3.47% if the city's overall population. Zone 10 is located in the northern most portion of the city and is comprised of a diverse land use types. Zone 10 is the area of town that has seen the most change over the last three years. There is a portion of residential properties in the southeastern portion of the district. Most of these residential structures are single family detached one and two-story homes. There are a few medium- to high-density apartment complexes especially in the most southeastern portion of the zone. Zone 10 has the most park an open space use of all the districts due to it containing the Santa Clara Golf and Tennis Club, which is the only 18-hole golf course within city limits. The BMX track is located at the northern portion of the district and the Santa Clara Youth Soccer Park is located east of Levi Stadium on the south side of Tasman Drive. The southern portion of the district, between Great America Parkway and Lafayette Street, contains hotels such as the Hyatt and Hilton, the Santa Clara Convention Center and Levi Stadium. The area west of Great America Parkway is almost completely comprised of low to high intensity office and R&D. There is a small section of land located north of Tasman Drive and east of Lafayette Street that contains light industrial properties. It is important to note that many of the local businesses around the golf course are required to have gas monitoring due to the area being comprised of landfill. The district is bordered on the north by CA-237/Sunnyvale, on the west by Calabazas Creek/Patrick Henry Drive/Sunnyvale, and on the east by the Guadalupe River/San Jose.

Map 43 Land Use, District 10



A summary of the call breakdown based on occupancy type is provided to follow. With this zone there is a strong correlation between land usage and structures the agency responds to**.** The highest percentage of calls took place in assembly structures. This is due to the presence of Levi Stadium and the Santa Clara Convention Center, the two very large structures that fit this category. The second most frequented type of occupancy is residential (22%), which relatively consistent with the land usage in this zone. Calls taking place outside were the third highest type (21%). This can be explained by the large amounts of recreation and transient population. This zone contains many hotels, a convention center, stadium, commuter rail line, and a golf course. These facilities either promote a great deal of movement in and out of this zone or are outdoor areas people will congregate. Between the transit and foot traffic, there is a high potential for outside calls, which is reflected in this zone's call volume.

Figure 38 Three Year Call Average by Occupancy Type, District 10



Critical Infrastructure and High Risk Buildings

This zone contains a moderate amount of properties that pose the potential for significant loss or consequence to the community. Most of these buildings are very large and have a high occupancy load. While many of the zones in the city are predominantly residential, zone 10 has a much more diverse and balanced use of land.

There are a few high density residential properties that fall into the high-risk category. Bella Vista Apartments, located at 1500 Vista Club Circle, contains multiple three-story building totaling 634 units. Nantucket Apartments, located at 1600 Nantucket Circle, is comprised of six three-story structures containing 252 units. The Carlyle Santa Clara, located at 4500 Carlyle Court, is comprised of 10 three story building totaling 276 units. Riverwood Grove, located at 2150-2158 Tasman Drive, contains 4 three story structures totaling 71 units of condo or town home style design. Riverwood Place Studio, located at 5090 Lick Mill Boulevard, contains one large three-story structure with 148 total units.

There are multiple large high tech and R&D facilities located on or near the west side of Great America Parkway including Marvell Semiconductor Inc. 5488 Marvell Lane, Santa Clara, CA 95054, six-story 940,000 square foot structure. Dell, located at 5450 Great America Parkway, contains a large four-story structure with 307,000 square feet of office space. Horton Works, located at 5470 Great America Parkway, is a four-story structure with 300,000 square feet of office space. Palo Alto Networks, one of the companies located at 4301-4401 Great America Parkway, which contains two six-story structures totaling 368,000 square feet. The size and contents of these structures place them in the high-risk category. There are also

ten locations that require state or city hazardous materials operating permits within this zone. There has been a large development added to this zone called Santa Clara Gateway, located at 5451, 5453, and 5455 Great America Parkway and 2550, 2600, and 2755 Great America, a newly built office complex that sits on 40.1 acres and contains 911,155 square feet of office space in six buildings ranging from five to six stories each. This property added 5000 permanent jobs and valued at 169 million dollars. Two of these buildings, 2550 and 2600 Great America Parkway, meet high rise criteria.

There are also two high rise structures within this zone that also contain a high occupancy load placing these structures at a high risk. These include the Hyatt Regency, located at 5101 Great America Parkway, is a large 14-story high-rise hotel containing 502 guestrooms. The Santa Clara Convention Center is also attached to this hotel and contains over 246,000 square feet of total space, 146,000 square feet of meeting space, and a max capacity of over 45,000 people. There are many large conferences held here throughout the year. Hilton Santa Clara, located at 4949 Great America parkway, is an eight-story high rise hotel containing 280 guestrooms and 7,000 square feet of meeting space.

The largest and most complex structure in the city is Levi's Stadium, which is home to the National Football League's San Francisco 49ers. While it is physically within the geographical planning zone 10, it has been categorized as a specialized zone 11, due to its intermittent and unique risk. A full description of this structure, its risks, staffing and the agency's response capabilities will be provided later in the document. However, risk associated with the building, accompanying businesses such as restaurants and a museum, and employees are present even when there is no event/event day staffing. These events occur outside the operating period of an event as people enter and exit the city. Therefore, the presence of Levi Stadium does present some risk, mostly in the form of low to moderate risk EMS calls. For further details regarding Levi Stadium, see geographical planning zone 11 description.

This zone also stands to undergo the greatest change over the next five years as there are approved plans to build a large mixed-use complex on what is now the golf course. City Place Santa Clara is the approved complex located in and around the area of 5155 Stars and Stripes Drive will occupy 240 acres of mixed-use land and will be separated into five parcels which will be developed different phases. It will include 5.7 million square feet of office space, 1.1 million square feet of retail, 250 thousand square feet of food and beverage, and 190 thousand square feet of entertainment. It will also include 700 hotel rooms and up to 1,680 residential units. The project will develop a new urban retail and entertainment city center boasting multiple districts - each with its own unique personality and lifestyle affiliation - incorporated into one coherent community through multiple pedestrian and bike-friendly paths and beautiful, unifying landscape. New office campuses that border the city center will feature an exclusive mix of office space,

convenience retail and food and beverage offerings. It will also bring in an estimated 25,000 permanent jobs.

Kathryn Hughes Elementary School, grades K-5, with 433 students, is located in the southeast portion and is the only school located in this zone. The recreational areas within the zone include three creeks and two trails. The Guadalupe River Trail, which runs along the eastern limit of zone between hope and CA 237. San Tomas Aquino Creek and associated trail runs north to south through the center of the zone from Levi Stadium to CA-237. The Calabazas Creek runs along the entire western border of the zone. The Santa Clara Golf and Tennis Club is located in the northeastern portion and is the only 18-hole golf course in the city. The two parks offering a variety of recreation include Lick Mill and Fairway Glen Park. The Santa Clara Youth Soccer Park is another recreational attraction to this zone and is located adjacent to Levi Stadium on its east side. In the northern portion of the zone is a BMX track that hosts event year-round. Zone 10 also covers the northern portion of Great America theme park, including the parking lots.

Other utility related critical infrastructure includes four storm drain pump stations and four sanitary sewer pump stations scattered throughout the district. It also has an electric substation located in the southwest part of zone. There are also two above-ground municipal water storage tanks totaling 9.4 million gallons and a Hetch Hetchy water pipe going through this zone. There is a natural gas transmission line that runs north through zone 10, along Lafayette Street, reaching the northern limit of the city. There are two natural gas transmission lines that run from the eastern to western border of zone ten. One is along the southern part of the zone, the other on the northern part of the zone.

Map 44 Public Facilities, District 10

Transportation

This zone contains approximately 24.57 road miles. There is one large highway, CA-237, which runs east/west along the northern border. The following arterial roads run north/south in zone 10: Great America Parkway (west side of the district), Lafayette Street (center of the district), and Lick Mill Boulevard (east side of the district). The Union Pacific Railroad also runs north/south in zone 10 along Lafayette Street. The Santa Clara VTA Light Rail runs east/west through the center of the zone. This zone is also in proximity to Mineta San Jose International Airport flight path. The following table shows a four-year summary of call volume.

Table 49 Four Year Call Summary, Zone 10

2014 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	18	6	366	5	165	560
Distribution of Calls	3.2%	1.1%	65.4%	0.9%	29.5%	100.0%

2015 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	22	5	262	4	173	466
Distribution of Calls	4.7%	1.1%	56.2%	0.9%	37.1%	100.0%

2016 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	11	7	301	3	196	518
Distribution of Calls	2.1%	1.4%	58.1%	0.6%	37.8%	100.0%

2017 Call Summary

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	18	10	277	6	136	447
Distribution of Calls	4.0%	2.2%	62.0%	1.3%	30.4%	100.0%

4-Year totals

	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	69	28	1,206	18	670	1,991
Distribution of Calls	3.5%	1.4%	60.6%	0.9%	33.7%	100.0%

4-Year averages

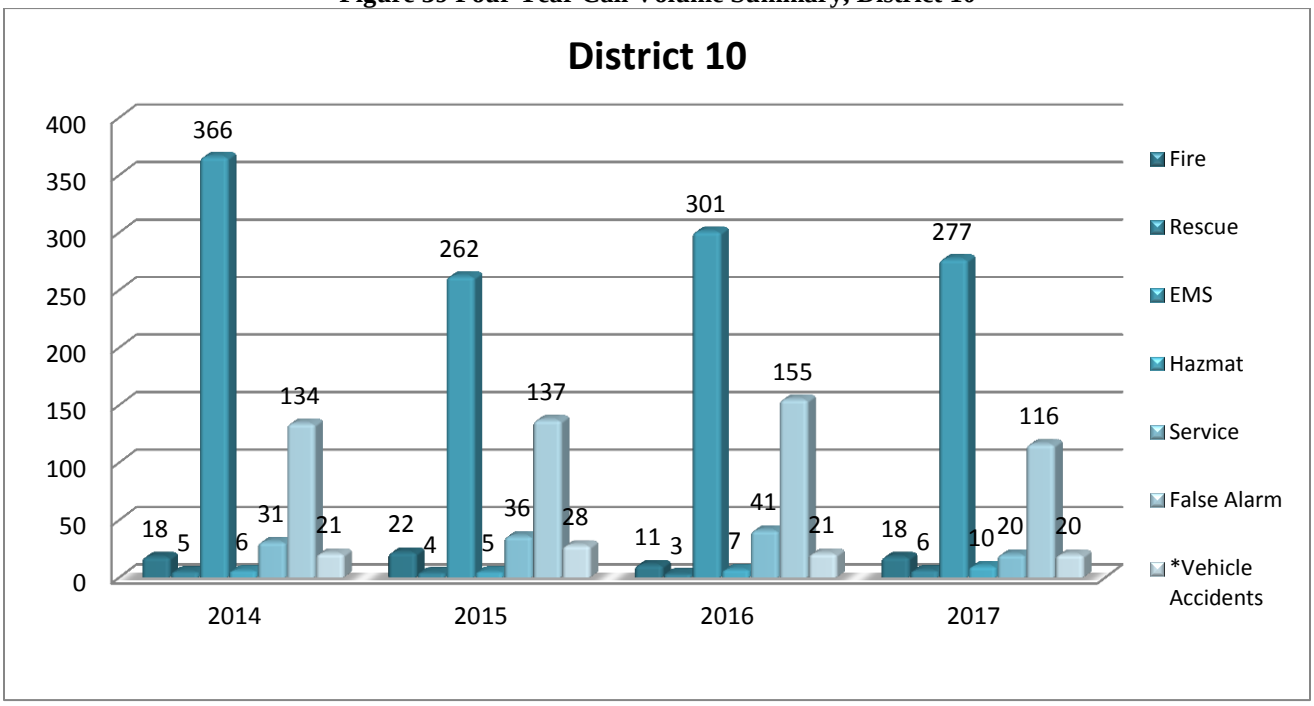
	Fire	HazMat	Medical	Rescue	All Other	Total
Calls Per Classification	17	7	302	5	167.5	498
Distribution of Calls	3.5%	1.4%	60.6%	0.9%	33.7%	100.0%
Call Per Day	0.05	0.02	0.83	0.01	0.46	1.36

Percentage of Annual SCFD Calls Occurring in Zone 10

	Fire	HazMat	Medical	Rescue	All Other	Total
Calendar Year 2014	9.9%	4.3%	6.0%	19.2%	7.3%	6.4%
Calendar Year 2015	11.2%	3.2%	4.0%	9.8%	7.3%	5.0%
Calendar Year 2016	6.0%	4.3%	4.6%	7.1%	7.9%	5.5%
Calendar Year 2017	10.2%	5.4%	4.4%	15.0%	5.8%	4.9%

To follow is a graph provided for easier comparison between the different classifications of call types as well as a year to year comparison.

Figure 39 Four Year Call Volume Summary, District 10



Fire Loss

Within District 10 jurisdiction in 2014 there were 18 total fires and seven of those were documented to have a loss. Of the 18 fires, six were structure fires and three (50%) resulted in a total documented loss of $660,200. The remaining 12 fires were classified as other (garbage, shed, and vehicle fires) and four (33%) of these fires resulted in a loss of $49,800. The result was a combined total of seven damaging fires for a loss, totaling $710,000 in damages.

In 2015, there were 22 total fires and four of those were documented to have a loss. Nine of those were structure fires and two (22%) resulted in a total documented loss of $800. The remaining 13 were

classified as other (garbage, shed, and vehicle fires) and two (15%) of the "other" fires resulted in a loss of $25,700. The result was a combined total of four damaging fires for a loss, totaling $26,500 in damages.

In 2016, there were 11 total fires and four of those were documented to have a loss. Three of those were structure fires and two (67%) of those structure fires resulted in a total documented loss of $1,250. The remaining eight were classified as other (garbage, shed, and vehicle fires) and two (25%) of the "other" fires resulted in a loss of $5,100. The result was a combined total of four damaging fires for a loss, totaling $6,350 in damages.

In 2017, there were 18 total fires and five of those were documented to have a loss. Three of those 18 fires were structure fires and one (33%) of those structure fires resulted in a total documented loss of $500. The remaining 15 were classified as other (garbage, shed, and vehicle fires) and four (27%) of the "other" fires resulted in a loss of $9,500. The result was a combined total of five damaging fires for a loss, totaling $10,000 in damages.

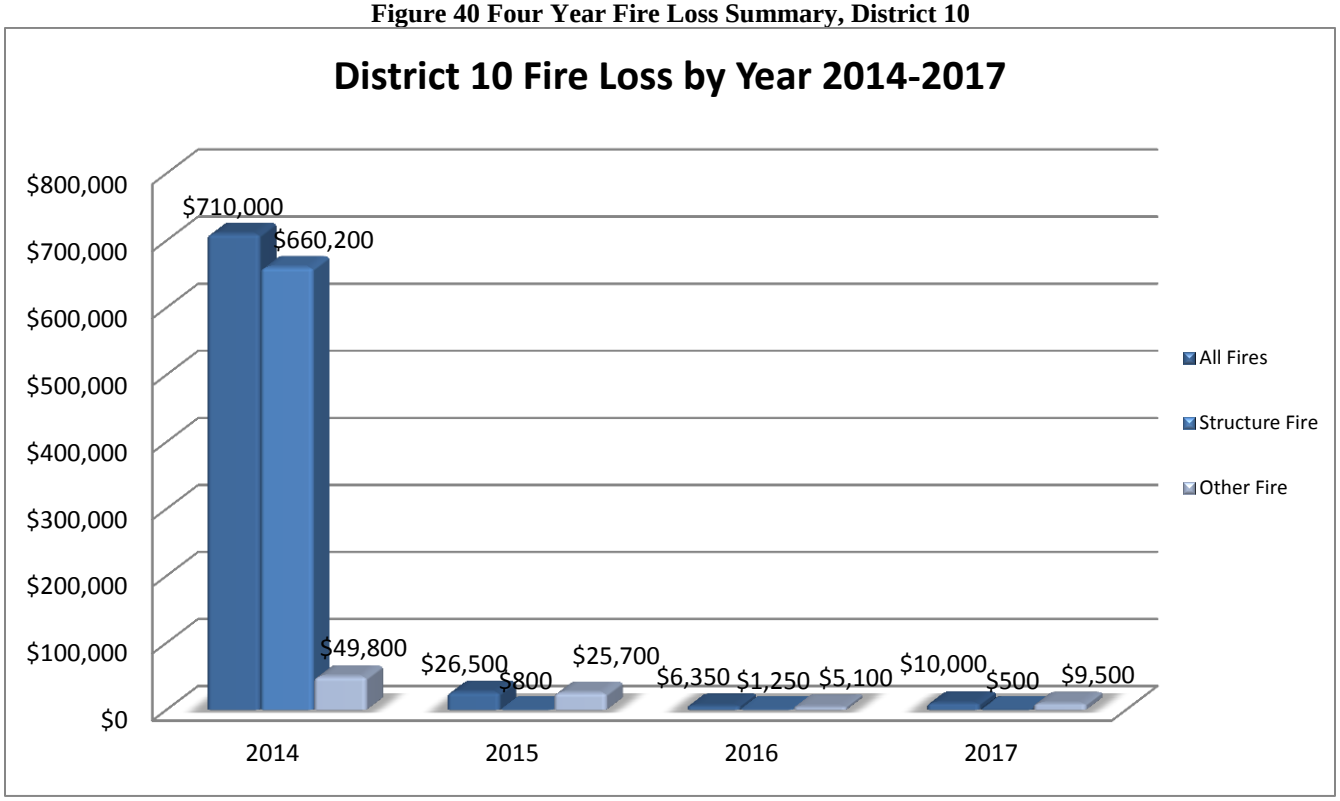
Therefore, in the four years studied (2014-2017), the District 10 mitigated 48 "other" fires and 12 (25%) resulted in a documented loss totaling $90,100. Furthermore, from 2014- 2017 District 10 had 21 structure fires and eight (38%) of those structure fires resulted in a documented loss of $662,750. The combined total of 69 total fires and 20 (eight structure and 12 other) damaging fires that resulted in a loss totaled $752,850 in damages. The total dollar amounts can be seen in the following graphs

Table 50 District 10 Fire Loss Summary

Year	Total Fires	Total Fires With Loss	Dollar Amount	Structure Fires	Structure Fires With Loss	Dollar Amount	Other Fires	Other Fires With Loss	Dollar Amount
2014	18	7	$710,000	6	3	$660,200	12	4	$49,800
2015	22	4	$26,500	9	2	$800	13	2	$25,700
2016	11	4	$6,350	3	2	$1,250	8	2	$5,100
2017	18	5	$10,000	3	1	$500	15	4	$9,500
Total Loss	**69**	**20**	**$752,850**	**21**	**8**	**$662,750**	**48**	**12**	**$90,100**

This zone generated an estimated loss of $662,750 from structure fire and $90,100 in other types of fires for a total of $752,850 in fire loss over the four-year period

Figure 40 Four Year Fire Loss Summary, District 10



H. Historical Perspective and Summary of System Performance

Distribution Factors

Distribution factors refer to the geographical location of resources in each district and how they directly impact response times and service levels. Along with concentration and reliability factors, the department can use this information to evaluate station location, distribution of apparatus and personnel. A geographical analysis using ArcGIS was conducted to measure the square miles and road miles in each fire district. The square miles and road miles outside the four-minute travel time of each district have also been calculated for each district. A summary of all 10 stations can be seen in the following table.

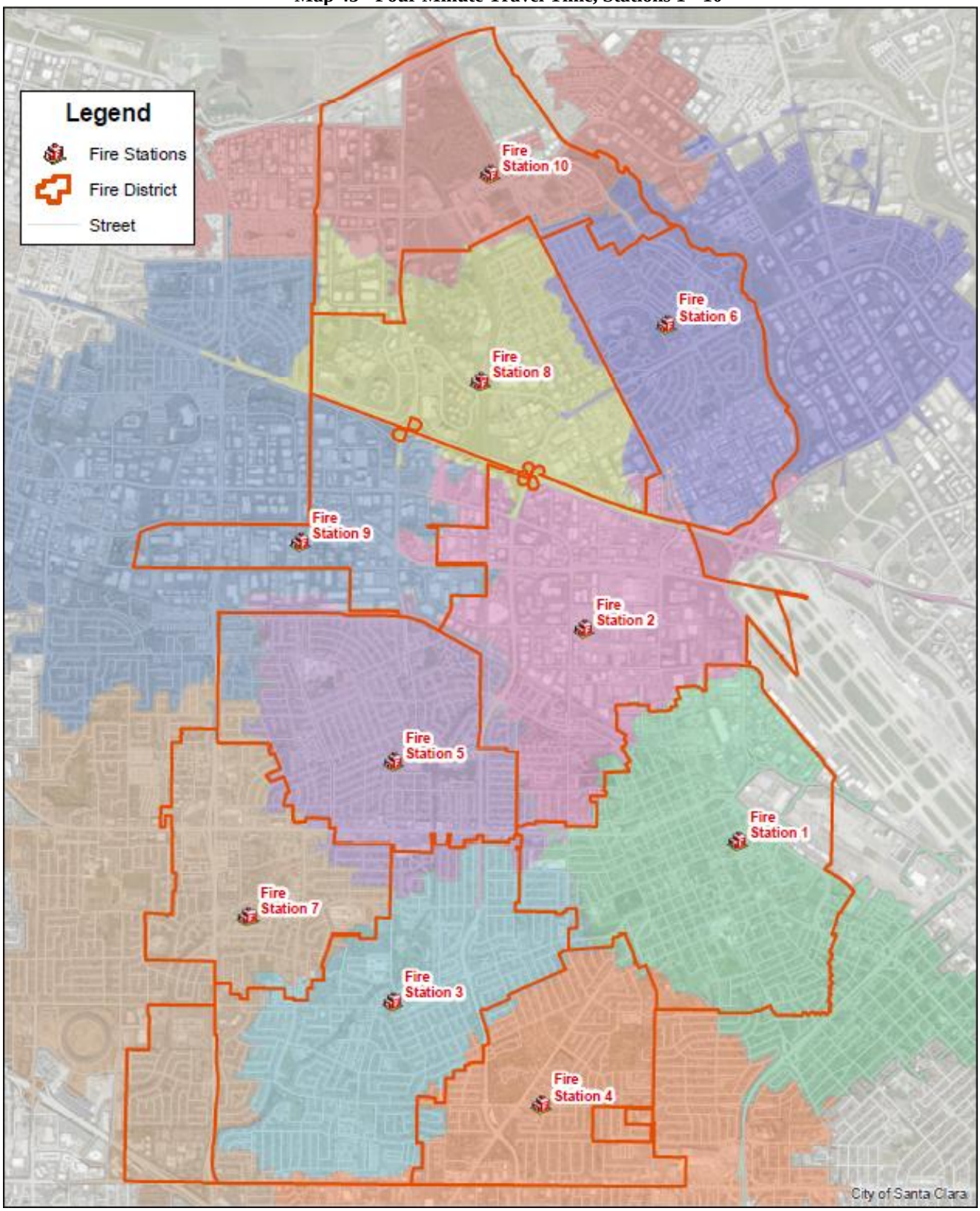
Table 51 Geospatial Analysis of Fire Districts

District	Total Square Miles	Total Square Miles not in 1st in 4 min Coverage area	Total Road Miles Served	Total Road Miles not in 1st in 4 min coverage area
1	2.4	0.17	50.57	0
2	2.2	0.08	36.25	0
3	2.3	0	51.30	0
4	1.4	0	31.45	0
5	1.8	0	41.69	0
6	1.5	0.06	31.08	0
7	1.8	0	37.80	0
8	1.9	0.02	25.91	0
9	1.2	0	18.70	0
10	1.9	0.56	24.57	0
Total	**18.4**	**0.90**	**349.2**	**0**

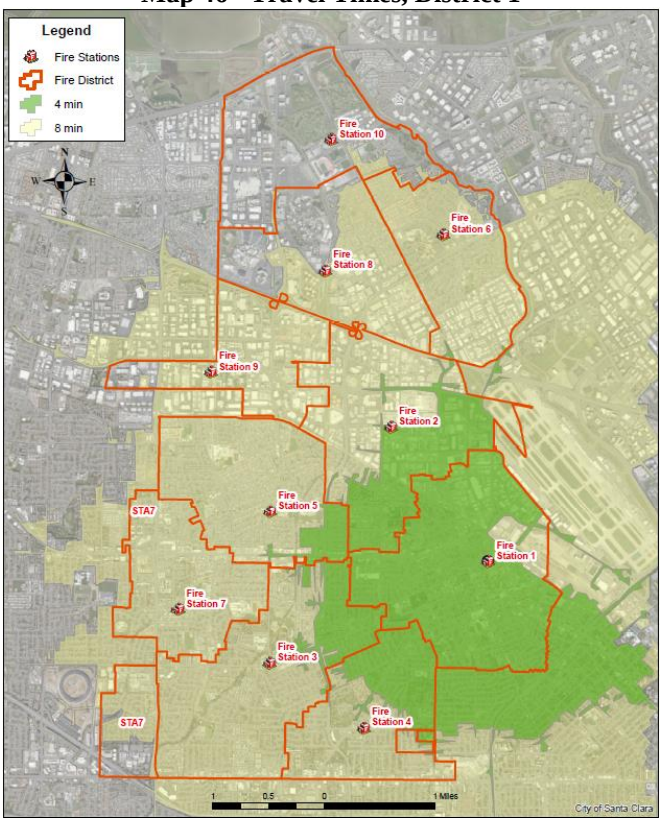
*Actual total area and road miles not covered due to overlap from other districts.

The drive times were calculated using ArcGIS by entering each fire station as a starting point with a four-minute and eight-minute drive time. These maps are only based on speed limit and distance. This calculation does not take traffic, certain apparatus speed, stop signs, stopping at intersections, etc. into account. Map 45 illustrates the four-minute drive times of all ten districts. This map shows which station can get to what location the fastest and does not show the overlap into other districts. Maps 46-55 illustrate the four-minute and eight-minute coverage capability of all 10 districts.

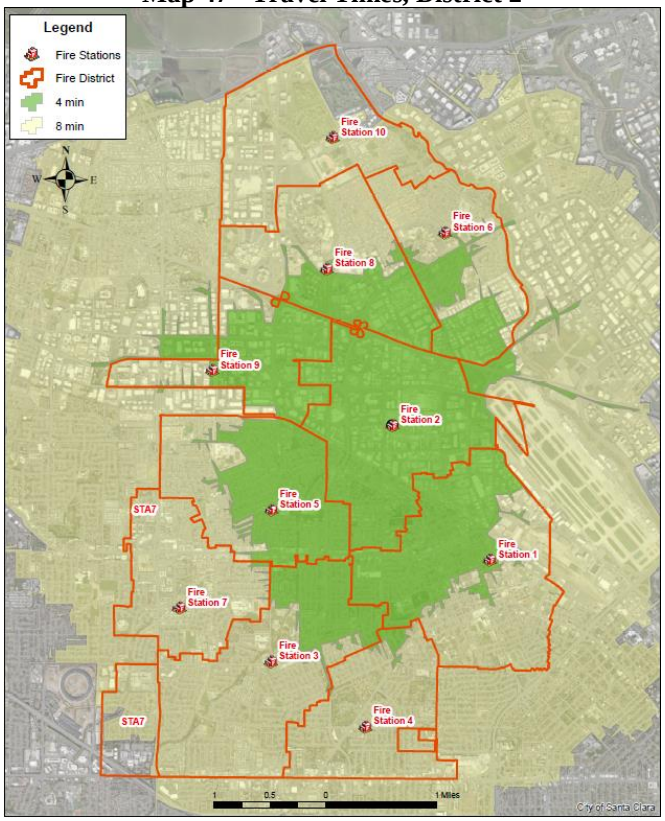
Map 45 - Four Minute Travel Time, Stations 1 - 10



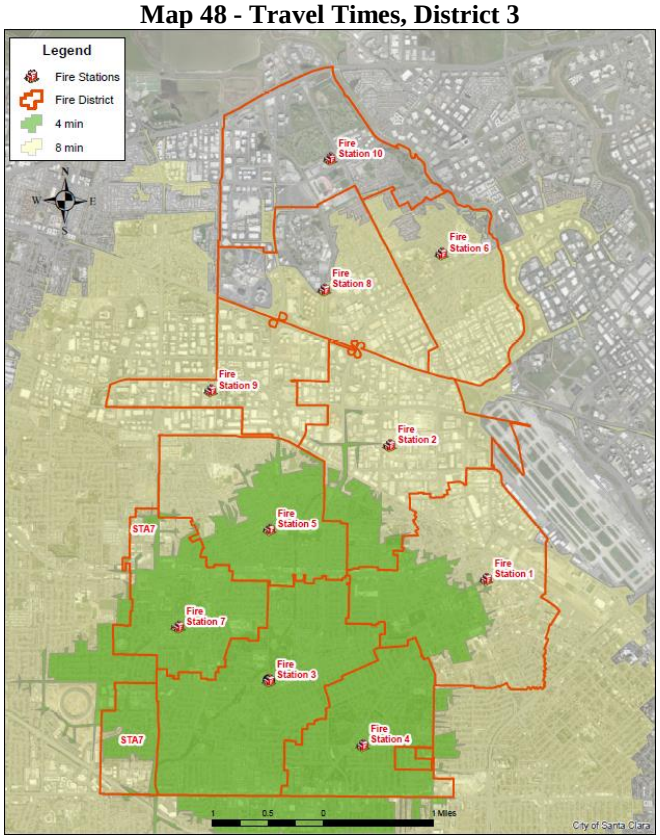
Map 46 - Travel Times, District 1



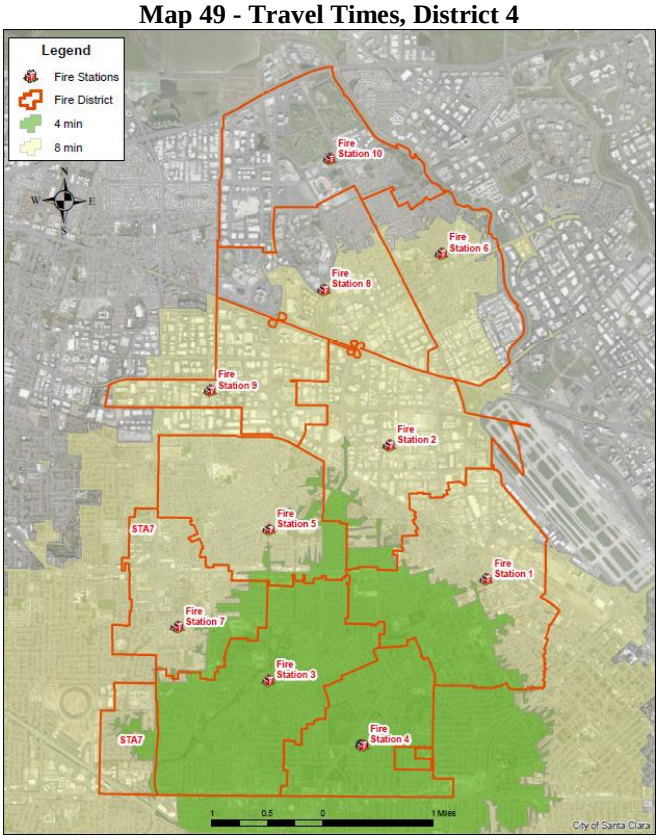
Map 47 - Travel Times, District 2



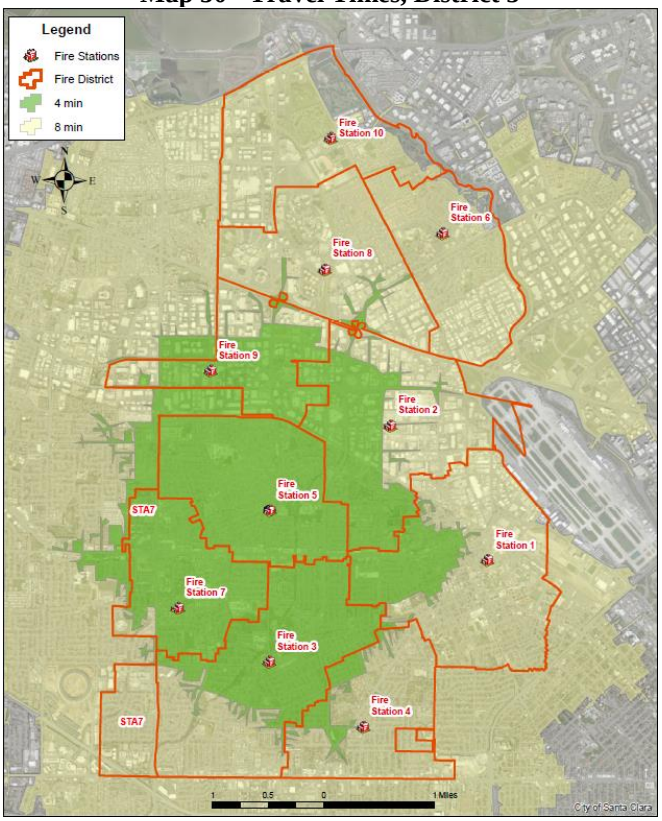
Map 48 - Travel Times, District 3



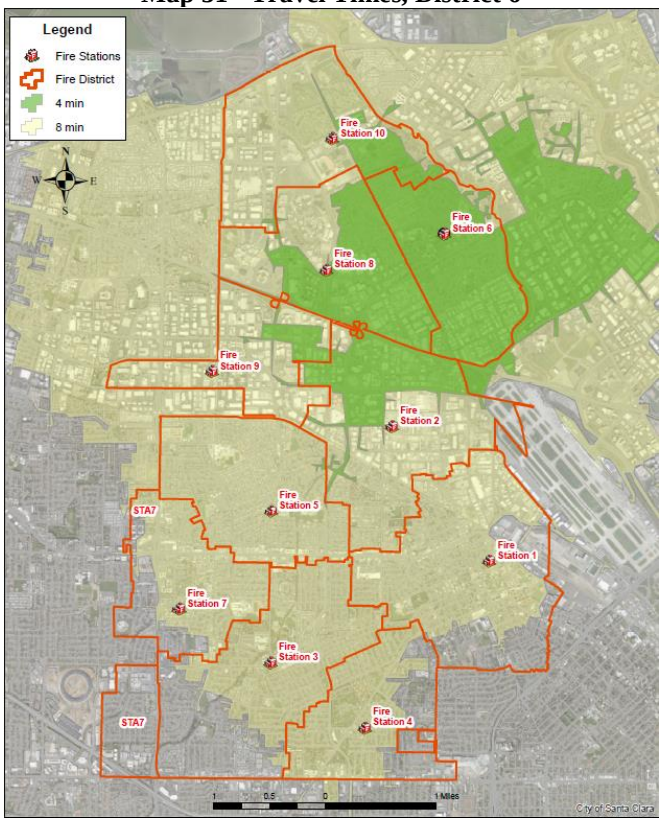
Map 49 - Travel Times, District 4



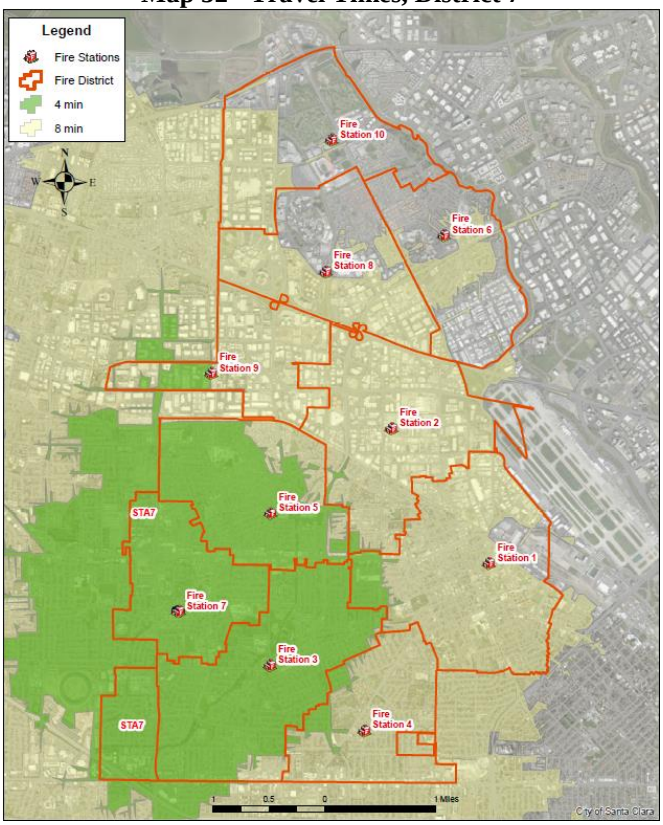
Map 50 - Travel Times, District 5



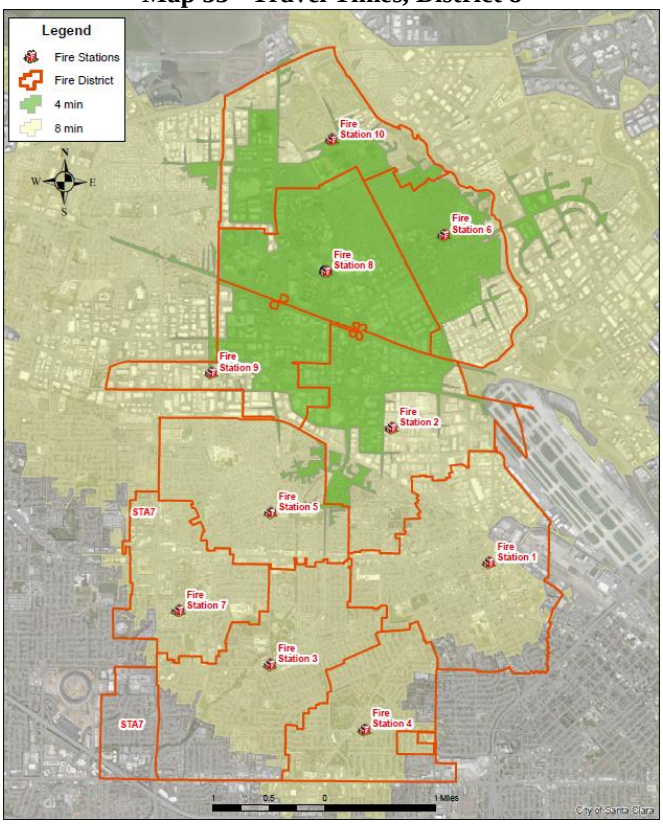
Map 51 - Travel Times, District 6



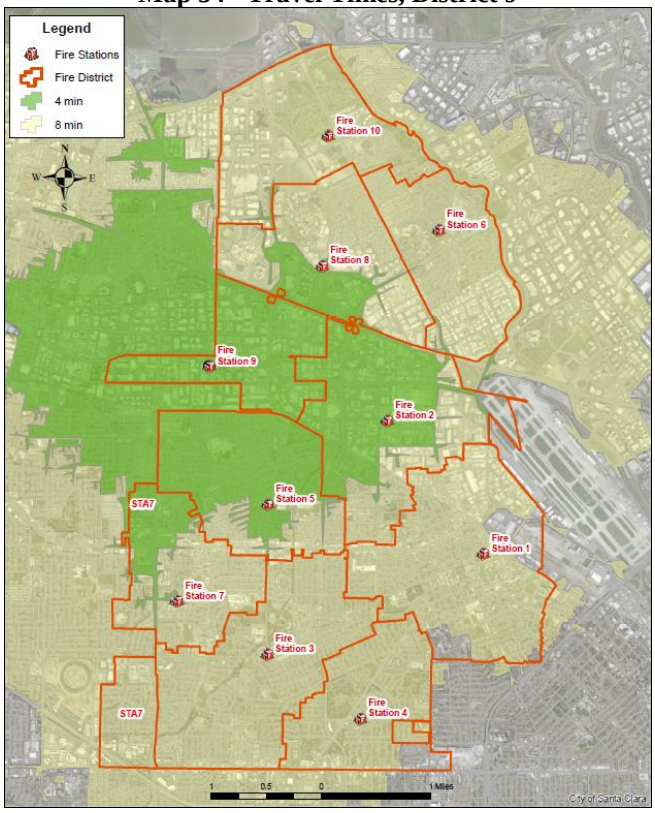
Map 52 - Travel Times, District 7



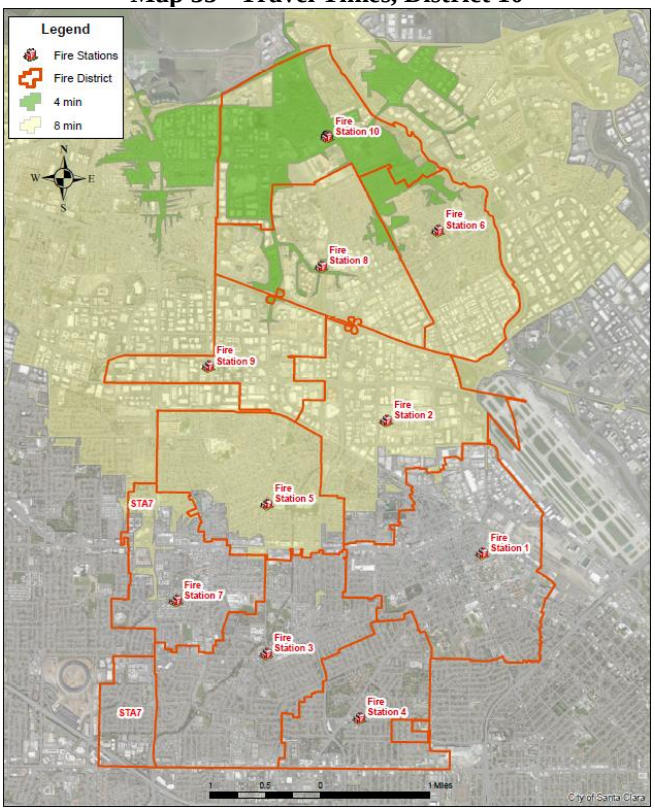
Map 53 - Travel Times, District 8



Map 54 - Travel Times, District 9



Map 55 - Travel Times, District 10



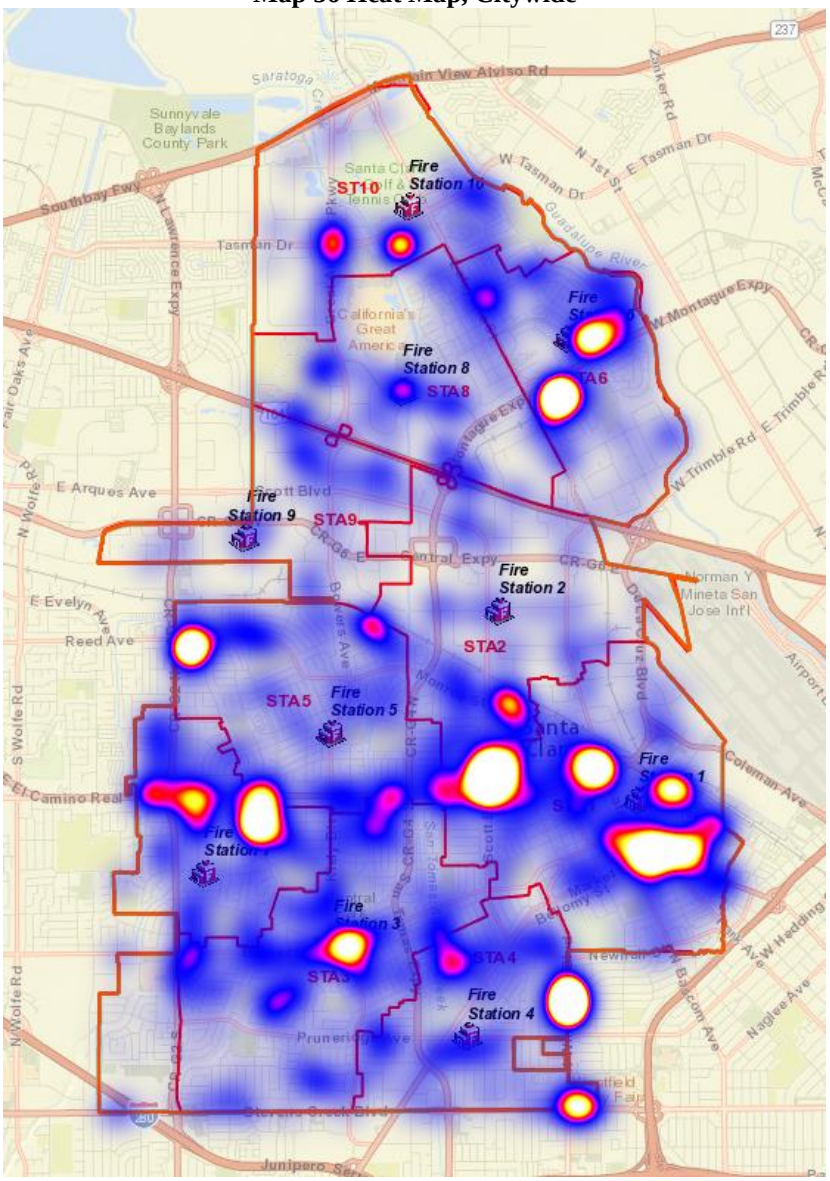
Concentration Factors

Concentration factors focus on resource disbursement within the city. These factors look at what apparatus are available and how they can effectively respond to incidents within the city. They also analyze the overall spacing and arrangement of all units throughout the city based on their ability to render services. By reviewing these factors, the department will be able to evaluate and implement adequate incident support based on the first-in apparatus response, effective response force (ERF), and determined benchmarks. Concentration factors not only rely on initial unit response but the ability to deliver the needed personnel (ERF) on scene to stabilize and mitigate the incident in a timely manner. Concentration factors include in-district call volume (see table), city wide call density (maps 56-66), second unit two-in/two-out, ERF and district make-up. Maps 67-69 illustrate coverage areas of the battalion chief and assistant training officer, trucks and light/air units.

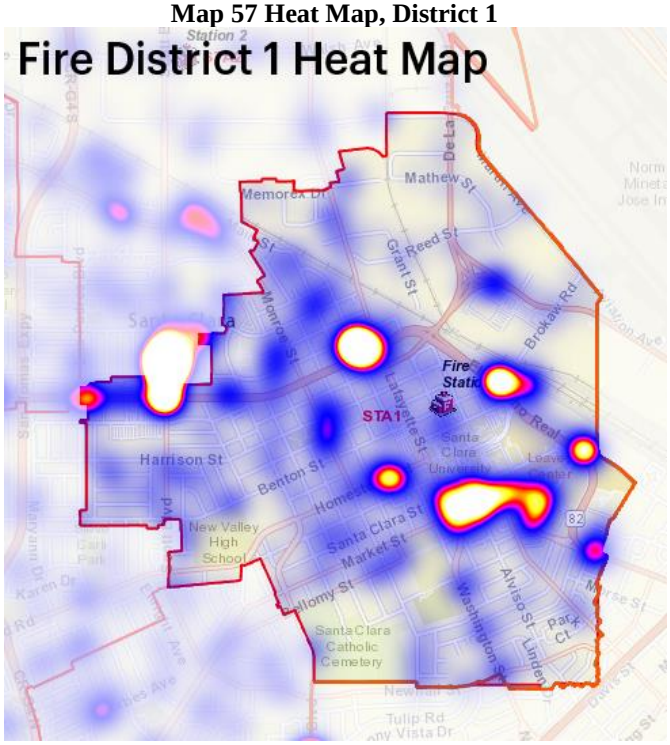
Table 52 Concentration Factors by District

Zone	Call Per Year (2017)	Crews at Station	First In Apparatus Total Response Time	2in/2out Time Difference	Number of Calls Review	Area Served By
1	1649	1	05:41	01:23	8	Engine
2	890	2	06:32	00:40	5	Truck, Medic, Rescue
3	1253	1	05:59	03:14	4	Engine
4	1005	1	06:01	01:38	6	Engine
5	1065	1	05:48	01:11	3	Engine
6	842	2	06:02	01:18	6	Truck, Medic
7	1139	1	07:13	00:28	1	Engine
8	486	1	10:50	NA	1	Engine
9	304	2	NA	NA	0	Engine, Hazmat
10	447	1	05:39	01:36	2	Engine

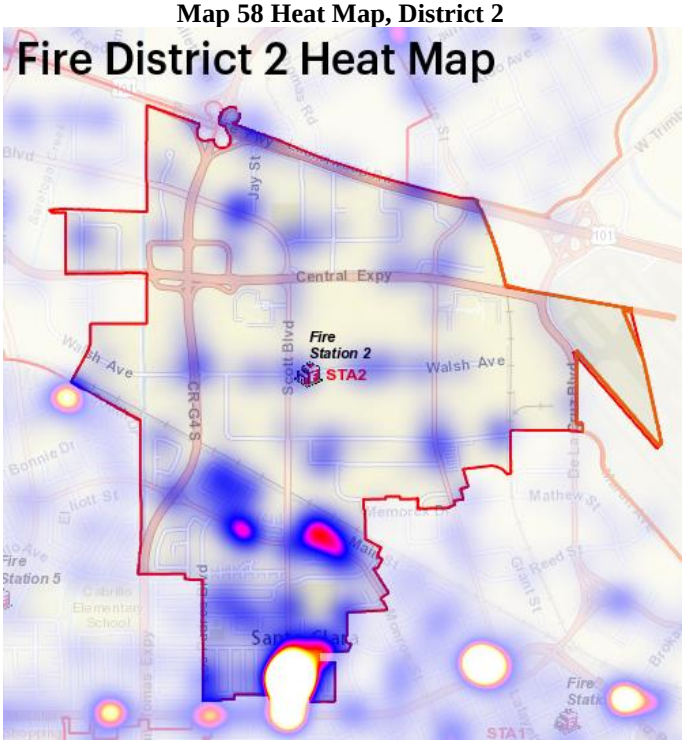
Map 56 Heat Map, Citywide



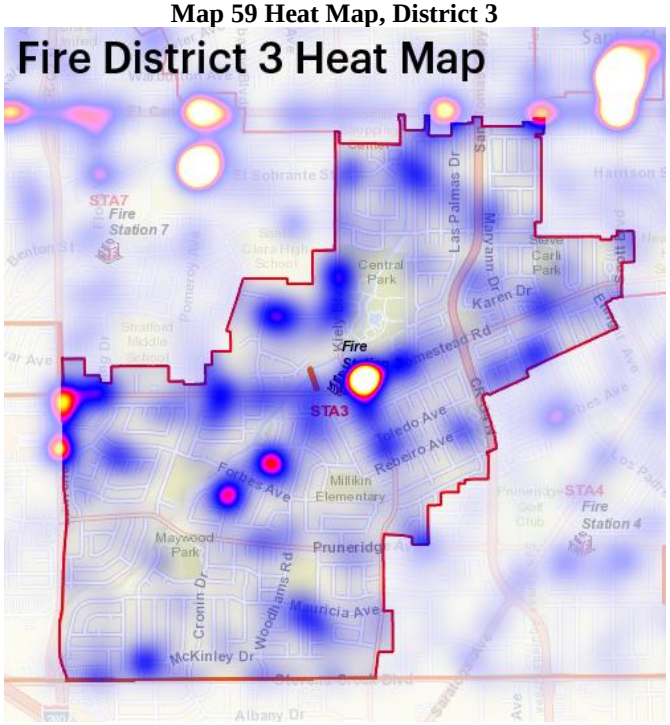
Map 57 Heat Map, District 1



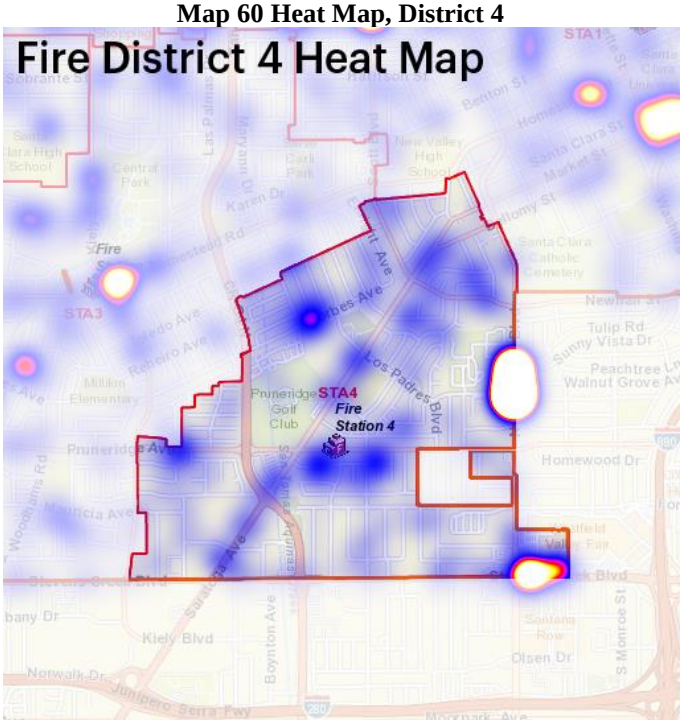
Map 58 Heat Map, District 2



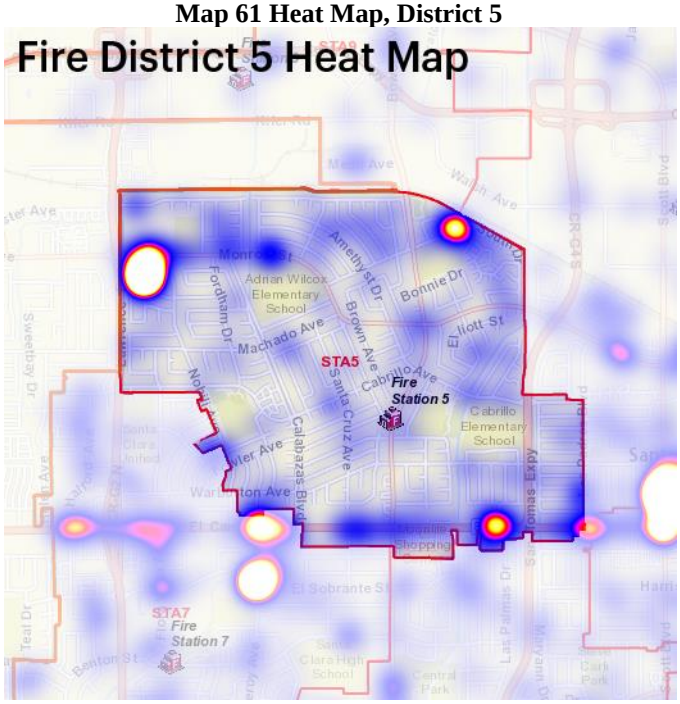
Map 59 Heat Map, District 3



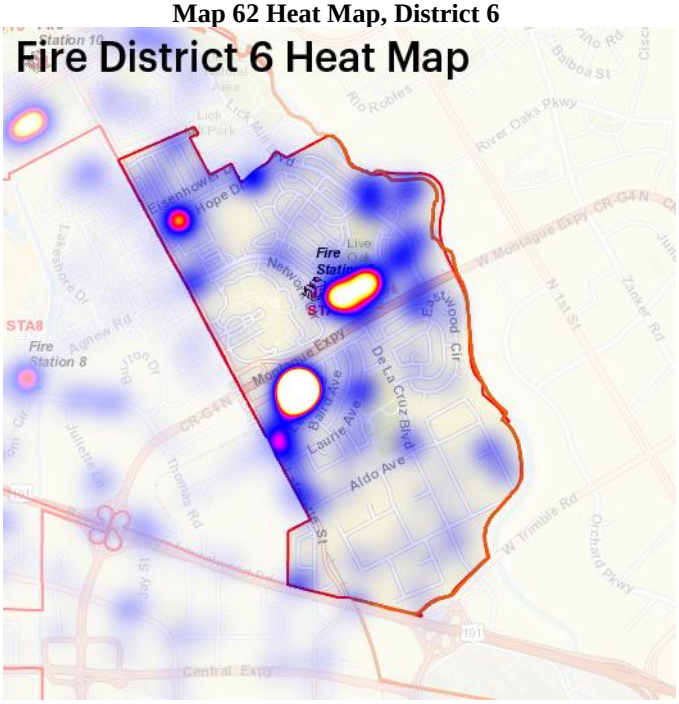
Map 60 Heat Map, District 4



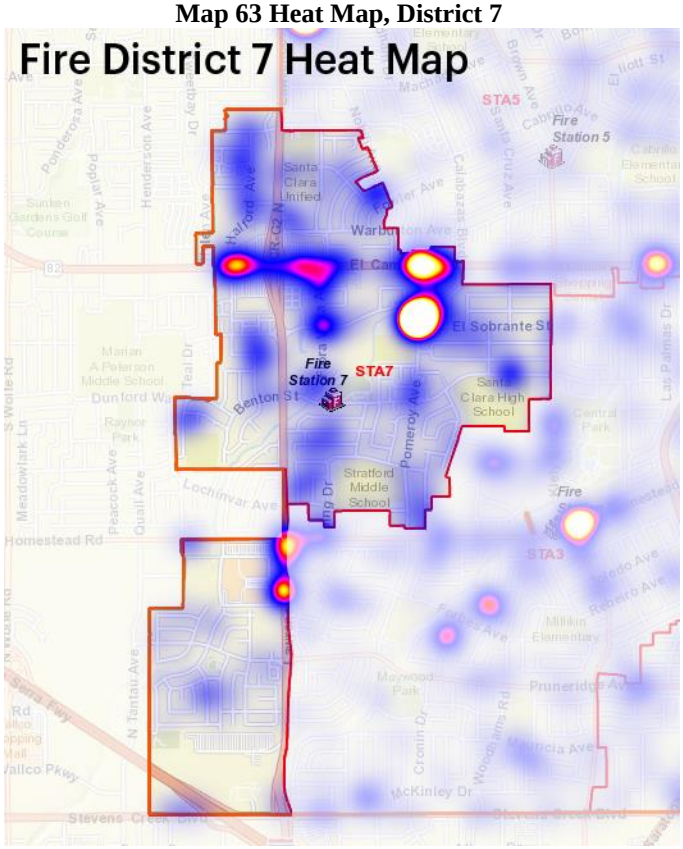
Map 61 Heat Map, District 5



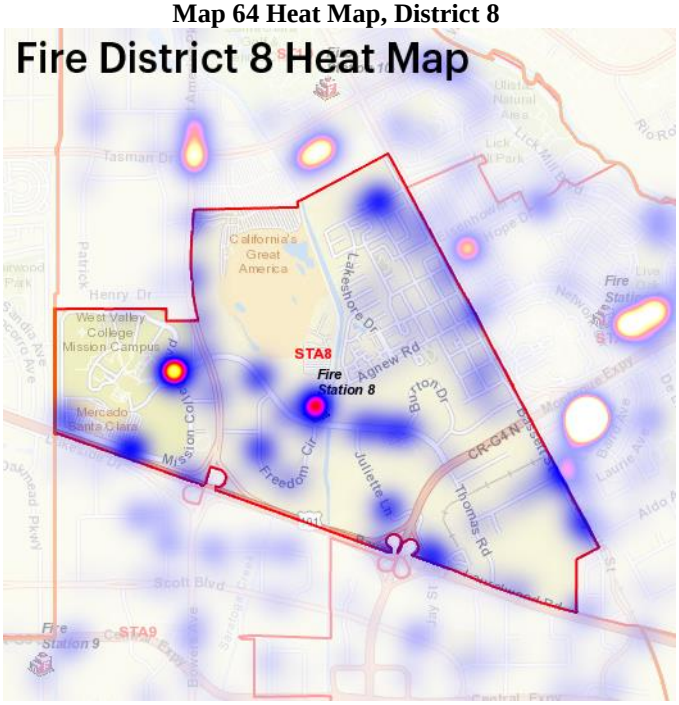
Map 62 Heat Map, District 6



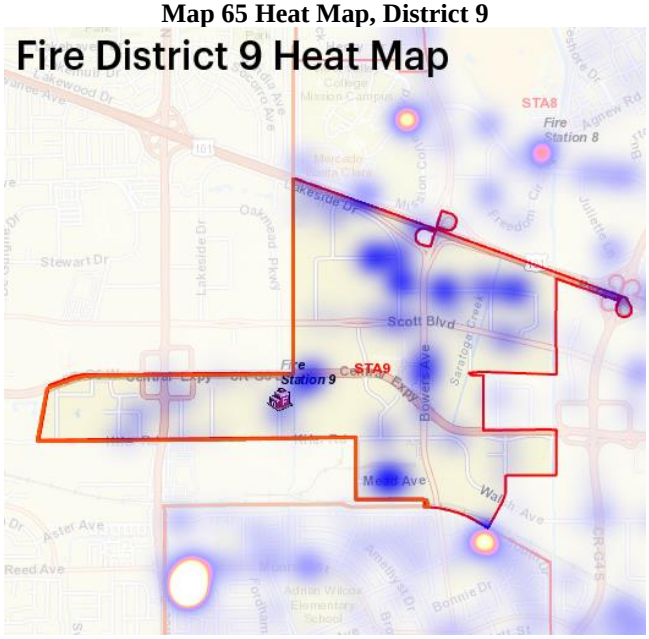
Map 63 Heat Map, District 7



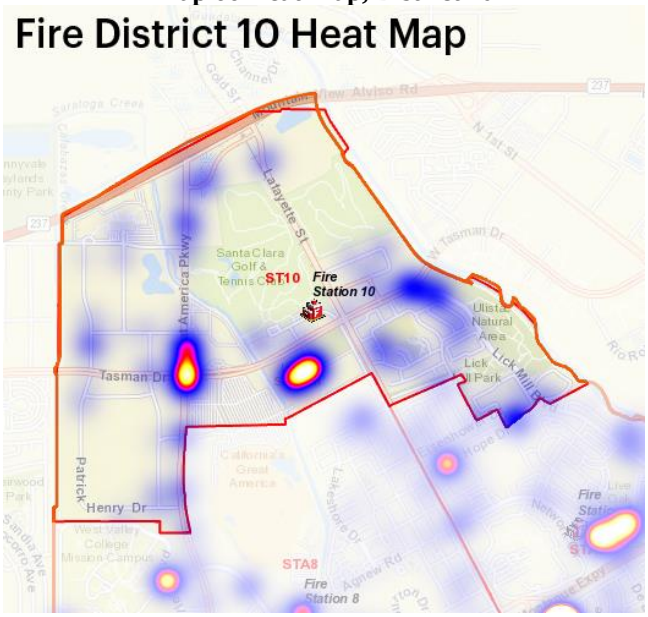
Map 64 Heat Map, District 8



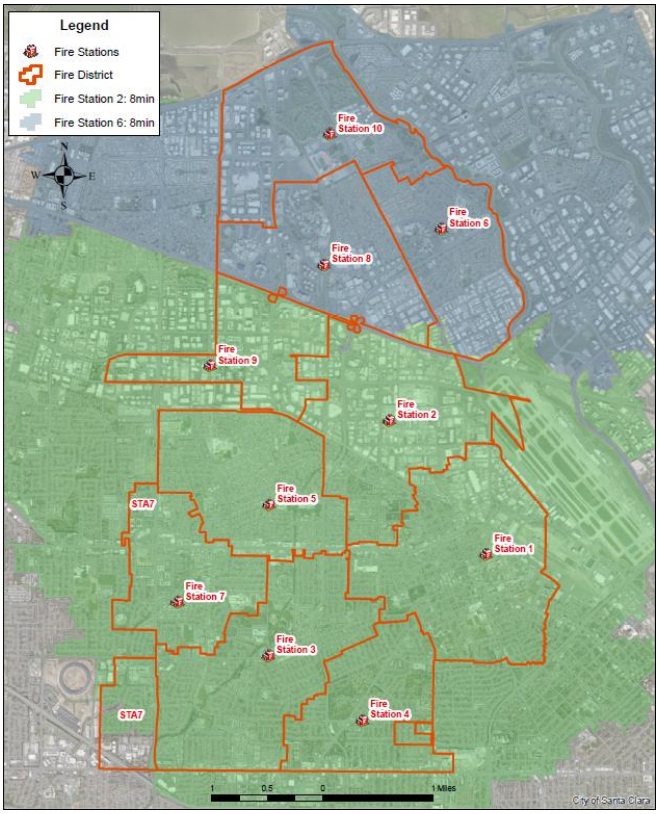
Map 65 Heat Map, District 9



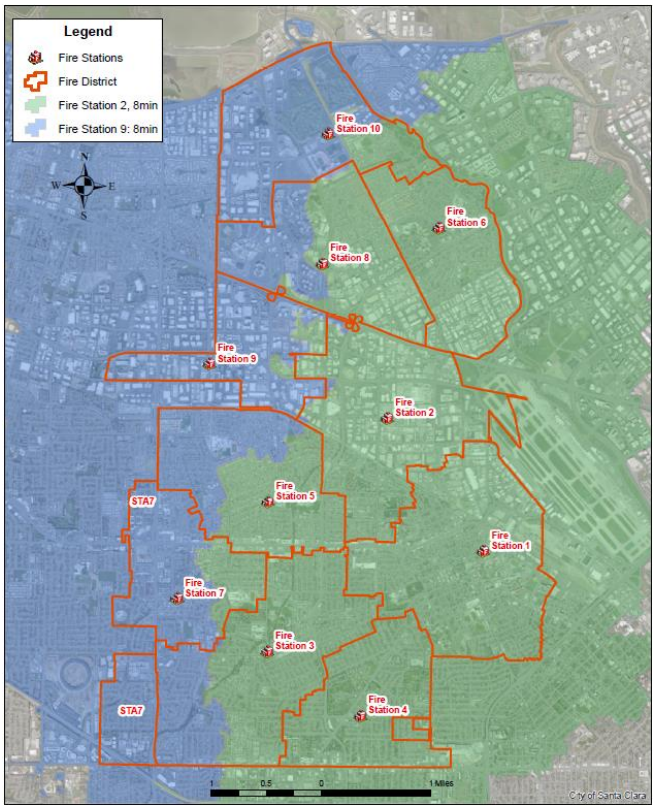
Map 66 Heat Map, District 10



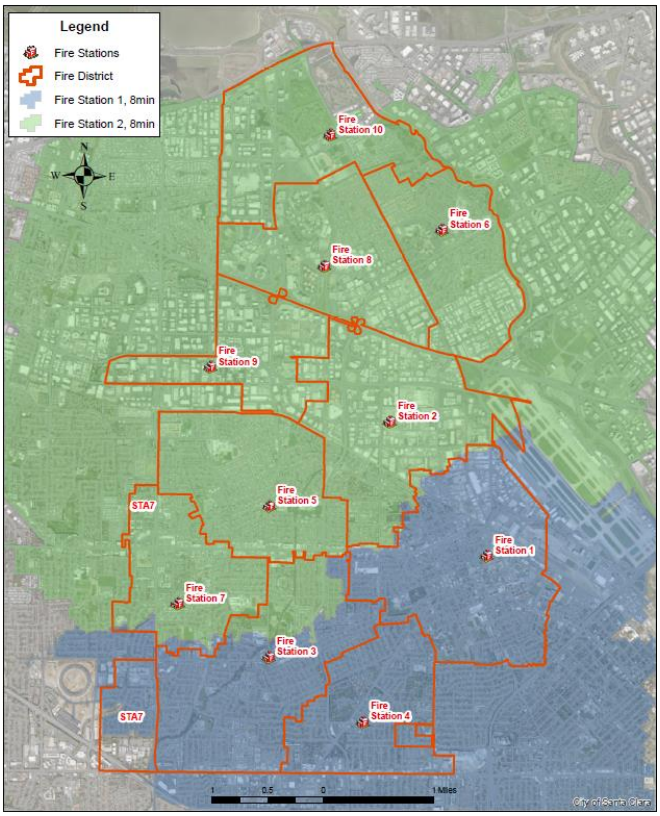
Map 67 - 8 min Truck Coverage Map – Station 2/8



Map 68 - 8 min Light/Air Unit Coverage Map – Station 2/9



Map 69 - 8 min BC and ATO Unit Coverage Map – Station 1/2



Reliability Factors

Reliability factors are the ability of assigned apparatus to provide emergency response coverage for its assigned district. With 100% reliability, an apparatus will respond to every incident within its first due area. Due to various factors such as multiple calls in the same district, crews put out of service for training or mechanical problems, etc., incidents must be covered by apparatus from a neighboring district. The following table illustrates the number of calls in all ten districts for the past three years and the percentage of which were covered by the assigned apparatus. High percentages indicate that a district is adequately covered by the assigned apparatus. A low percentage may indicate that an area is understaffed and may need additional resources assigned to best meet the demands of the district.

While the majority of the results are in the 80th to 90th percentile, there is one anomaly with district 7 receiving a low seventies reliability percentage in 2016. The cause of this drop was due to Engine 97 being browned out for training for the 2016-1 recruit academy. For 16 of the 18-week recruit academy, from May 9th to August 27th, Engine 97 was placed out of service from approximately 0700 hours in the morning until approximately 2000 hours during all weekdays. M91 was moved up from station 1 to cover medical calls in the district while Engine 97 was gone. Engine 97 crew members were used as academy cadre to train and evaluate new recruits.

Table 53 Reliability Factors

District	2014		2015		2016		2017	
	Call Volume	Reliability	Call Volume	Reliability	Call Volume	Reliability	Call Volume	Reliability
1	1,608	88.94%	1,758	90.76%	1,649	94.38%	1,649	94.85%
2	794	85.29%	850	85.02%	865	87.41%	890	82.61%
3	1,197	85.34%	1,243	84.48%	1,364	85.04%	1,253	84.52%
4	900	83.80%	989	89.43%	1,065	88.58%	1,005	84.74%
5	1,015	84.37%	1,195	84.54%	1,146	84.57%	1,065	86.75%
6	754	90.49%	747	88.90%	829	87.85%	842	89.78%
7	1,151	81.31%	1,164	80.82%	1,105	71.05%	1,139	82.60%
8	467	85.59%	562	85.87%	535	83.37%	486	86.32%
9	274	84.91%	288	86.62%	320	83.01%	304	86.62%
10	560	86.34%	466	84.65%	518	85.32%	447	88.24%

Dataset Qualification

The department has analyzed four years' of data for all baseline performance tables in all risk categories. All data points will be used to calculate the 90th percentile of each table. The department is challenged in the resolution and accuracy in its data due to its aging CAD (Computer Aided Dispatch) and RMS (Records Management System) systems. In particular, alarm handling times are unable to be collected and are interpolated through RMS instead of being populated directly from CAD. For this reason, 90th percentile calculations will be performed using the percentile.exc function in excel. This method uses linear interpolation and is a more conservative calculation.

The department is in the process of procuring new CAD, RMS and AVL systems which will improve data collection and accuracy. The department is also in the process of migrating all of its data into a program called Intterra. The analytics calculations in Intterra are very similar to the percentile.exc function in excel. The department will be using this tool for analytics and reporting in the future.

Fire Incident Baseline Performance

The department has analyzed four years' worth of data to determine its history in meeting target benchmarks. These benchmarks have been established by the agency using the NFPA 1710 standards. The department does not currently disposition calls based on the level of risk. However, the department does dispatch accordingly based on the level of risk for certain call types (i.e. Vehicle Fire vs Structure Fire) but does not differentiate between building occupancies or construction. A manual analysis was performed to sort calls from the low risk and moderate categories.

The established benchmarks are as follows: for all fire calls (Low, Moderate, High, and Maximum Risk) time of receipt to dispatch shall be within 1 minute. Time from receipt of dispatch at each station to

beginning travel to incident shall be 2 minutes. Travel time from station to incident shall be within 4 minutes. Total ERF travel time for multi-unit response shall be within 8 minutes. Total combined response time from receipt at dispatch to arrival of first unit shall be within 7 minutes. Total combined response time from receipt at dispatch to arrival of ERF shall be within 11 minutes.

Low Risk Fires

Low risk fires are those that require an ERF of 3. Examples of these fires are vehicle fires, transformer fires, dumpster/trash fire, and small grass fires. The department has determined the first unit to be the first arriving apparatus with pumping capability.

Table 54 Baseline Performance - Low Risk Fire

Fire – Low Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:31	2:45	2:13	2:42	2:23	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:44	2:46	2:38	2:52	2:50	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:15	5:20	4:59	5:48	5:42	4:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	9:02	9:26	8:05	9:45	9:08	7:00
			n=500	N=130	n=118	n=124	n=128	

Moderate Risk Fires

Moderate risk fires are those that require an ERF of at least 17 personnel. Responses in this category require a first alarm assignment. A total of 21 personnel are sent for a first alarm assignment. The department has determined the first unit to be the first arriving apparatus with pumping capability and the ERF to be when the 17th person arrives on scene regardless of apparatus.

Table 55 Baseline Performance - Moderate Risk Fires

Fire - Moderate Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:27	2:50	2:23	3:21	2:30	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:50	2:55	2:40	2:42	3:21	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:08	4:32	4:00	3:55	4:05	4:00
	Travel Time ERF **Concentration**	Urban	11:53	12:10	10:37	12:00	12:57	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:42	7:52	7:42	7:12	7:49	7:00
			n=181	n=34	n=49	n=55	n=43	
	Total Response Time ERF **Concentration**	Urban	15:36	21:20	13:19	15:16	16:09	11:00
			n=59	n=10	n=14	n=23	n=12	

High Risk Fires

Moderate risk fires are those that require an ERF of at least 27 personnel. Responses in this category require a second alarm assignment. The department has determined the first unit to be the first arriving apparatus with pumping capability and the ERF to be when the 27th person arrives on scene regardless of apparatus.

Table 56 Baseline Performance - High Risk Fires

Fire - High Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:47	N/A	N/A	N/A	N/A	1:00
Turnout Time	Turnout Time 1st Unit	Urban	3:06	N/A	N/A	N/A	N/A	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	5:02	N/A	N/A	N/A	N/A	4:00
	Travel Time ERF **Concentration**	Urban	N/A	N/A	N/A	N/A	N/A	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:58	N/A	N/A	N/A	N/A	7:00
			n=13	n=2	n=5	n=3	n=3	
	Total Response Time ERF **Concentration**	Urban	N/A	N/A	N/A	N/A	N/A	11:00
			n=1	n=0	n=1	n=0	n=0	

Maximum Risk Fires

Maximum risk fires are those that require an ERF of at least 41 personnel. Responses in this category pose the potential for a catastrophic event involving large loss of life and/or significant economic impact to the community. The department only had two fire responses in buildings for this classification and does not have enough data to perform statistics.

EMS Incident Baseline Performance

The department has analyzed four years' worth of data to determine its history in meeting target benchmarks. These benchmarks have been established by the agency using the NFPA 1710 standards. Currently, our low and moderate risk incidents require only a single unit response unless required due to Paramedic distribution, which is between six of the ten stations. High risk incidents primarily fall into vehicle accidents and cardiac arrests. These incidents are tasked, generally, with a minimum of two of the closest units. In 2014, 2015, and a large part of 2016 the department was still utilizing a dual apparatus response for all EMS calls prior to triage. This discrepancy has been corrected by looking only at the first unit response for all low and moderate risk responses. There were no maximum risk responses (mass casualty or infectious diseases) to report over the four-year data cycle.

The established benchmarks are as follows: for all EMS calls (Low, Moderate, High, and Maximum Risk) time of receipt to dispatch shall be within 1 minute. Time from receipt of dispatch at each station to beginning travel to incident shall be 2 minutes. Travel time from station to incident shall be within 4 minutes. The total ERF travel time for high risk EMS is 6 minutes and the total ERF travel time for maximum risk 8 minutes. Total combined response time from receipt at dispatch to arrival of first unit shall be within 7 minutes. These time standards are established to provide basic and advanced life support 90 percent of the time.

Low Risk EMS

Low risk EMS calls are those that require an ERF of 2. Low risk EMS calls require a single unit response. This includes Code 3 Bravo calls. The department has determined the ERF to be when the first unit is on scene.

Table 57 Baseline Performance - Low Risk EMS

Emergency Medical Services – Low Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:18	2:40	2:09	2:10	2:10	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:37	2:29	2:40	2:34	2:39	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:26	4:34	4:21	4:26	4:29	4:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:34	8:02	7:31	7:27	7;27	7:00
			n=2164	n=535	n=546	n=588	n=495	

Moderate Risk EMS

Moderate risk EMS calls are those that require an ERF of at least 2. This includes Code 3 Charlie and Delta calls. The department has determined the ERF to be when the first unit is on scene.

Table 58 Baseline Performance - Moderate Risk EMS

Emergency Medical Services – Moderate Risk **90th Percentile Times** **Baseline Performance**			**2014-2017**	**2017**	**2016**	**2015**	**2014**	**Target (Agency Benchmark)**
Alarm Handling	Pick-up to Dispatch	Urban	2:17	2:30	2:15	2:10	2:09	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:34	2:33	2:37	2:33	2:34	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:07	4:11	4:05	4:00	4:13	4:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:21	7:33	7:26	7:12	7:14	7:00
			n=13788	n=3407	n=3498	n=3495	n=3388	

High Risk EMS

High risk EMS calls are those that require an ERF of 5. High risk EMS calls necessitate a two-unit response. This includes Code 3 Echo and EMS 80 responses. The department has determined the ERF to be when the second unit is on scene.

Table 59 Baseline Performance - High Risk EMS

Emergency Medical Services – High Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:36	2:43	2:44	2:32	2:25	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:30	2:28	2:31	2:27	2:33	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:40	4:39	4:43	4:39	4:54	4:00
	Travel Time ERF **Concentration**	Urban	7:06	7:20	7:13	6:27	7:14	6:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:52 n=2012	7:55 n=471	7:57 n=550	7:57 n=536	7:18 n=455	7:00
	Total Response Time ERF **Concentration**	Urban	10:12 n=1307	10:14 n=302	10:23 n=358	9:57 n=353	10:13 n=294	9:00

Maximum Risk EMS

Maximum risk EMS calls are those that require an ERF of at least 17. Maximum risk EMS calls require a first alarm structure response. This includes Code 3 responses for a mass casualty incident or infectious disease release. The department has determined the ERF to be when the fifth unit (engine or truck) is on scene. The department had no Maximum Risk EMS calls in the last four years.

Hazardous Materials Incident Baseline Performance

The department has analyzed four years' worth of data to determine its history in meeting target benchmarks. These benchmarks have been established by the agency using the NFPA 1710 standards. The Department does not currently disposition calls based on the level of risk. However, the Department does dispatch accordingly based on the level of risk for certain call types (i.e. small leak vs gas investigation) but does not differentiate between building occupancies or construction. A manual analysis was performed to sort calls from the low risk and moderate categories.

The established benchmarks are as follows: for all code 3 Hazardous Materials calls (Low, Moderate, High, and Maximum Risk) time of receipt to dispatch shall be within 1 minute. Time from receipt of dispatch at each station to beginning travel to incident shall be 2 minutes. Travel time from station to incident shall be within 4 minutes. Total combined response time from receipt at dispatch to arrival of first unit shall be within 7 minutes.

Low Risk Hazardous Materials

Low risk hazardous materials calls are those that require an ERF of 3. Examples of these calls are hazmat 2's and small spills. The department dispatches all of these calls code 2. All SCFD resources have enough equipment to handle small spills. If more equipment or specialized equipment is needed, then E99/H99 is dispatched code 2 for assistance. A table was not created for low risk hazardous material calls because the majority if not all responses were code 2.

Moderate Risk Hazardous Materials

Moderate risk hazardous materials calls are those that require an ERF of 10. These are dispatched as a "mini structure" response. These are typically hazmat 3's and gas investigations. The department has determined the ERF to be when the 10th person arrives on scene. This would achieve an ERF of 10.

Table 60 Baseline Performance - Moderate Risk Hazardous Materials

Hazardous Materials – Moderate Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	2:52	3:26	2:16	2:53	2:26	1:00
Turnout Time	Turnout Time 1st Unit	Urban	2:50	2:59	2:57	2:40	2:39	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:39	6:17	4:48	4:14	5:22	4:00
	Travel Time ERF **Concentration**	Urban	10:05	11:24	10:09	9:57	9:50	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	8:39	9:47	8:44	6:22	8:49	7:00
			n=183	n = 42	n=48	n=55	n=38	
	Total Response Time ERF **Concentration**	Urban	13:51	13:52	12:57	13:48	13:58	11:00
			n=31	n = 10	n=6	n=12	n=3	

High Risk Hazardous Materials

In the last four years there has only been 1 hazardous materials call in the high risk category. One data point is not statistically significant to calculate turnout and first-in /ERF travel times. The call will be analyzed individually.

The call analyzed occurred at a Muslim community center for an unknown white powder mailed to the facility. The first unit arrived 4:06 after dispatch. This call was dispatched as a NBC3 which sends the first in unit and E99/H99 code 3 only. First arriving unit advised the need for additional units due the required resources required for a hazmat entry and decontamination. Two additional engine companies were dispatched and mutual aid was also received from the Santa Clara County Hazmat team.

Technical Rescue Baseline Performance

Four years of data were analyzed to determine the ability to meet benchmarks for technical rescue responses. Low risk technical rescues include machinery entanglement, elevator extrication, vehicle lockouts, low angle rope rescue, and swift water rescue. Moderate risk includes vehicles into structures and high angle rescue. High / special risk includes trench rescue, confined space rescue, and vehicle extrications. Finally, maximum risk is limited to building collapse.

Several challenges were found in the research of technical rescue incidents. While hundreds of calls included dispositions such as rescue or remove from harm, the majority of such calls were incidents involving people stuck in elevators or children locked in vehicles. These responses are typically single code 2 unit. Additionally, several technical rescues, such as vehicle extrications, received an inaccurate disposition, such as vehicle accident with injuries, resulting in the incident being included with all other vehicle accidents.

With these limitations considered, baselines will be extrapolated from varying sources to examine Low Risk rescue in the form of elevator rescues, lockouts and machinery entanglements. Moderate Risk will examine vehicle into structure responses. Over the past four years, there have been eight vehicle extrications and one low angle rope rescue, all of which will be examined individually.

Low Risk Technical Rescue

Low risk technical rescue calls include elevator extrications, vehicle lockouts, and machinery entanglement. Effective response force for such incidents is a single code 2 unit. Due to the code 2 nature of the dispatch, responses are not applicable.

One Low Risk rescue of note was performed in February 2016. A low risk / low angle rescue was performed in Santa Clara. This is the only event of its type in the past years. Response times for this incident cannot be accurately gauged due to the specifics of the call. Santa Clara Police were originally dispatched to the scene of a person who fell down a hill. PD then requested a single fire unit code 2, and then upgraded the unit to code 3. Upon arrival, the first arriving unit realized the nature of the incident and requested the balance of the ERF of 9 personnel. As such, initial alarm time was 0620 hours and the first due arrived seven minutes later. Due to staggered dispatch, the ERF was not established until 0639, approximately 19 minutes later. Call handling time was 1:11, first due turn out time was 2:23 and travel time was 3:21.

Moderate Risk Technical Rescue

Moderate risk technical rescues include high angle rope rescue and vehicles into structures, with an ERF of 10, including two engines, one truck, and a chief officer. In the past four years there have been no high angle rope rescues and only fifteen vehicles into structures in which the entire ERF has arrived on scene. Table 12 analyzes those responses. Call volume includes one vehicle into structure responses in 2014, five in 2015 and 2016, and four in 2017. First due times are also included using responses where the first due arrived and cancelled the balance of the response.

Table 61 Baseline Performance - Moderate Risk Technical Rescue

Technical Rescue – All Risk 90th Percentile Times Baseline Performance			2014-2017	2017	2016	2015	2014	Target (Agency Benchmark)
Alarm Handling	Pick-up to Dispatch	Urban	3:03	2:58	3:04	3:58	3:36	1:00
Turnout Time	Turnout Time 1st Unit	Urban	3:05	3:23	3:35	2:52	3:11	2:00
Travel Time	Travel Time 1st Unit **Distribution**	Urban	4:14	4:41	6:24	3:24	5:19	4:00
	Travel Time ERF **Concentration**	Urban	8:44	7:38	9:07	7:19	4:51	8:00
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	7:47	8:39	10:23	7:27	8:09	7:00
			n=48	n=13	n=14	n=11	n=10	
	Total Response Time ERF **Concentration**	Urban	10:31	10:13	9:12	10:58	7:07	11:00
			n=15	n=4	n=5	n=5	n=1	

High / Special Risk Technical Rescue

Over the past four years, there have been eight vehicle extrications falling in the high / special risk category. This does not provide a sufficient sample to calculate response times. To follow are the details on the individual incidents. ERF for vehicle extrication is 10 personnel.

The first incident was a vehicle rollover on a highway. Incident was located at highway 101 and San Tomas Expressway. 11 total personnel were dispatched to the scene. Dispatch time was 0026 hours. First due turnout time was 2:52 and travel time was 4:10. ERF was established at 0037 hours, 11 minutes after dispatch.

The second incident was a two-vehicle accident in district 1. One vehicle was on its side with the driver inside. 10 total personnel were dispatched; the rescue was out of service that day. Dispatch time was at 1720 hours. First due turnout time was 1:58 and travel time was 2:56. ERF was established at 1726 hours, 6.5 minutes after dispatch.

In 2015 the third vehicle extrication occurred when a vehicle fell 40' of a highway overpass in district 10. 11 personnel were dispatched to the single vehicle on its side in a lot under the overpass. Dispatch time was 1202 hours, first due turnout time was 1:21 and travel time was 4:51. ERF was established at 1209, 7 minutes after dispatch.

An extrication occurred during 2016 in district 3 for a single vehicle vs a tree. 15 personnel were dispatched to the incident. Initial dispatch was at 1233 hours. First due turnout time was 1:28 and response time was 3:36. ERF of 10 personnel was established at 1241 hours, 8 minutes after dispatch.

Through 2017, four vehicle extrications were performed. Of these, only two were dispatched as a full rescue response initially. The other two were dispatched as a regular vehicle accident, with two units responding code 3, and were upgraded to a rescue response after initial size up by first due apparatus. The following is a summary of the response times:

> Incident 1: 10 personnel dispatched at 1700 hours, first due turnout time was 2:02 and response time was 4:00. ERF was established at 1709, 9:26 after dispatch.
>
> Incident 2: Two units dispatched at 1453 hours, first due turnout time was 1:44 and response time was 2:06. Incident was then upgraded to a rescue response and ERF was established at 1501, 9:23 after dispatch.
>
> Incident 3: Full rescue response dispatched at 1820 hours. First due turnout time was 2:12, travel time was 4:11, ERF established in 10:48 at 1830.

Incident 4: Two units dispatched at 1809 hours, first due turnout time was 1:18, travel time was 2:24. Incident was upgraded to a rescue response and ERF was dispatched. ERF was established 19:16 later, at 1827 hours.

I. Evaluation of Service Delivery

Performance Objectives – Benchmarks

Setting benchmarks involve comparing one's business processes and performance metrics to industry bests and best practices from other organizations. The process drives the organization toward continuous improvement, and adapting the organization based on community needs. Information is gathered to determine what and where improvements are needed. This information is then used to improve performance. Performance indicators typically measured are coverage, time effectiveness and efficiency. In other words, Benchmarks are the improvement goals/standards an organization sets for itself.

Fire Suppression Services Program

For 90 percent of all fire suppression incidents, the total response time for the arrival of the first due unit, staffed with at least two firefighters and 1 company officer shall be: seven minutes. The first due unit shall be capable of: providing 500 gallons of water and 1,500 gallons per minute (gpm) pumping capacity; initiating command; requesting additional resources; establishing and advancing an attack line flowing a minimum of 150 gpm; establishing an uninterrupted water supply; containing the fire; rescuing at-risk victims; and performing salvage operations. 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 low risk fires, the total response time for the arrival of the effective response force (ERF), staffed with 3 firefighters and officers, shall be: 7 minutes. For 90 percent of all moderate structure fires, the total response time for the arrival of the ERF, staffed with 17 firefighters and officers, shall be: 11 minutes. 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; controlling utilities; and performing salvage and overhaul. The ERF for high and maximum risk fires shall also be capable of placing large, flow fire lines, elevated master streams, establishment of lobby control and overall additional support where needed. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

Emergency Medical Services Program

For 90 percent of all emergency medical services (EMS) responses, the total response time for the arrival of the first-due unit, staffed with at least 2 firefighters, shall be: 7 minutes. Each Firefighter is trained to the EMT level and on eight of the fourteen apparatus (60%) at least one of the 2 firefighters will be a paramedic. The first-due unit shall be capable of: assessing scene safety and establishing command; sizing-up the situation; conducting an initial patient assessment; obtaining vitals and patient's medical history; providing initial treatment including automatic external defibrillation (AED); initiating cardio-pulmonary resuscitation (CPR); and providing intravenous (IV) access-medication administration and assisting transport personnel with packaging the patient.

For 90 percent of all high risk EMS response incidents, the total response time for the arrival of the effective response force (ERF), staffed with 5 firefighters and officers, shall be: 9 minutes. Each Firefighter is trained to the EMT level and at least one of the firefighters will be a paramedic. The ERF shall be capable of: providing incident command and producing related documentation; coordinating transportation efforts with county supervisor (when needed; asses the need for any specialty services such as Hazardous Materials or Rescue; provide supportive patient care for unstable patients.

Hazardous Materials Services Program

For 90 percent of all hazardous materials response incidents, the total response time for the arrival of the first-due unit, staffed with a total of 3 people (2 firefighters and 1 company officer), shall be: 7 minutes. The first-due unit shall be capable of: establishing command; sizing up and assessing the situation to determine the presence of a potential hazardous material or explosive device; determining the need for additional resources; and estimating the potential harm without intervention.

For 90 percent of all moderate and high risk hazardous materials response incidents, the total response time for the arrival of the effective response force (ERF) including the hazardous materials response team, staffed with 10 firefighters and officers (moderate risk) and 18 firefighters and officers (high risk), shall be: 11 minutes. The ERF shall be capable of providing the equipment, technical expertise, knowledge, skills and abilities to mitigate a hazardous materials incident in accordance with department standard operating guidelines.

Technical Rescue Services Program

For 90 percent of all technical rescue incidents, the total response time for the arrival of the first-due unit, staffed with 2 firefighters and an officer, shall be: 7 minutes. The first-due unit shall be capable of: establishing command; sizing up to determine if a technical rescue response is required; requesting additional resources; and providing basic life support to any victim without endangering response personnel.

For 90 percent of all moderate technical rescue incidents, the total response time for the arrival of the effective response force (ERF) including the technical rescue response team, staffed with at least 10 firefighters and officers, shall be: 11 minutes. The ERF shall be capable of: appointing a site safety officer; establishing patient contact; staging and apparatus set up; providing technical expertise, knowledge, skills, and abilities during technical rescue incidents; and providing first responder medical support.

Performance Objectives – Baselines

Baseline measurements are what are needed to determine the exact starting point of an organization. It is a snapshot of the agency's current performance standards (current response times). They are clearly defined starting points (point of departure) from where implementation begins, improvement is judged, or comparison is made. When the primary interest is to improve efficiency/effectiveness, it is imperative to know the current level of performance. Therefore, the agency must examine its current performance, as well as why they are performing at a certain level, also known as the positive/negative contributing. Then the agency can determine the gap between its benchmarks and current performance as well as decide the best means of reaching the desired benchmark. Thus, obtaining clear baselines affords the agency a greater understanding of progress achieved over time. The agency requires 10 data points in a calendar year in order to be determined a reliable.

Fire Suppression Services Program

The department's baseline statements reflect actual performance during 2014 to 2017. The department does not rely on the use of automatic aid and mutual aid from neighboring fire departments to provide its effective response force complement of personnel for low and moderate risk fires. For high risk fires, mutual aid is provided to backfill for city coverage. In the event of a maximum risk fire, mutual aid would be required to fulfill the ERF. These resources are immediately available as part of a seamless response system. The department's actual baseline service level performance is as follows:

For 90 percent of all low risk fires, the total response time for the arrival of the first-due unit, staffed with at least 1 officer, 1 driver/engineer and 1 firefighter is: 9 minutes and 2 seconds. For 90 percent of all moderate risk fires, the total response time for the arrival of the first-due unit, staffed with at least 1 officer, 1 driver/engineer and 1 firefighter is: 7 minutes and 42 seconds. For 90 percent of all high risk fires, the total response time for the arrival of the first-due unit, staffed with at least 1 officer, 1 driver/engineer and 1 firefighter is: 7 minutes and 58 seconds. The first-due unit for all risk levels is capable of: providing 500 gallons of water and 1,500 gpm pumping capacity; initiating command; requesting additional resources; establishing and advancing an attack line flowing a minimum of 150 gpm; establishing an uninterrupted water supply; containing the fire; rescuing at-risk victims; and performing

salvage operations. These operations are 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 fires, the total response time for the arrival of the ERF, staffed with 17 personnel, is: 15 minutes and 36 seconds. The ERF for moderate risk is 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; controlling utilities; and performing salvage and overhaul. The ERF for high and maximum risk fires is also capable of placing large, flow fire lines, elevated master streams, establishment of lobby control and overall additional support where needed. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public.

Emergency Medical Services Program

The department's baseline statements reflect actual performance during 2014 to 2017. The department does rely on the use of automatic aid for transport in all EMS calls. However, these additional resources are not included in the total ERF. The department does not rely on the use of automatic aid and mutual aid from neighboring fire departments to provide its effective response force complement of personnel. The department's actual baseline service level performance is as follows:

For 90 percent of all low risk emergency medical services (EMS) responses, the total response time for the arrival of the first-due unit, staffed with at 2 firefighters, is: 7 minutes and 34 seconds. For 90 percent of all moderate risk emergency medical services (EMS) responses, the total response time for the arrival of the first-due unit, staffed with 2 firefighters, is: 7 minutes and 21 seconds. For 90 percent of all high risk emergency medical services (EMS) responses, the total response time for the arrival of the first-due unit, staffed with 2-4 firefighters, is: 7 minutes and 52 seconds. The first-due unit is capable of: assessing scene safety and establishing command; sizing-up the situation; conducting an initial patient assessment; obtaining vitals and patient's medical history; providing initial treatment including automatic external defibrillation (AED); initiating cardio-pulmonary resuscitation (CPR); and providing intravenous (IV) access-medication administration and assisting transport personnel with packaging the patient.

For 90 percent of all high risk EMS response incidents, the total response time for the arrival of the remaining ERF, totaling 5 firefighters, is: 10 minutes and 12 seconds. The ERF is capable of: providing incident command and producing related documentation; coordinating transportation efforts with county supervisor (when needed); asses the need for any specialty services such as Hazardous Materials or Rescue; provide supportive patient care for unstable patients.

Hazardous Materials Services Program

The department's baseline statements reflect actual performance during 2014 to 2017. The department does not rely on the use of automatic aid and mutual aid from neighboring fire departments to provide its effective response force complement of personnel. The department's actual baseline service level performance is as follows:

For 90 percent of all moderate risk hazardous materials response incidents, the total response time for the arrival of the first-due unit is: 8 minutes and 39 seconds. The first-due unit is capable of: establishing command; sizing up and assessing the situation to determine the presence of a potential hazardous material or explosive device; determining the need for additional resources; and estimating the potential harm without intervention.

For 90 percent of all moderate hazardous materials response incidents, the total response time for the arrival of the ERF, staffed with at least 10 firefighters and officers including the hazardous materials response team is: 13 minutes and 51 seconds. The ERF is capable of providing the equipment, technical expertise, knowledge, skills and abilities to mitigate a hazardous materials incident in accordance with department standard operating guidelines.

Technical Rescue Services Program

The department's baseline statements reflect actual performance during 2014 to 2017. The department does not rely on the use of automatic aid and mutual aid from neighboring fire departments to provide its effective response force complement of personnel. The department's actual baseline service level performance is as follows:

For 90 percent of all technical rescue incidents, the total response time for the arrival of the first-due unit, staffed with 2-3 firefighters and 1 officer, is: 9 minutes and 05 seconds. The first-due unit is capable of: establishing command; sizing up to determine if a technical rescue response is required; requesting additional resources; and providing basic life support to any victim without endangering response personnel.

The department did not have sufficient technical rescue incidents, which required an effective response force to be assembled for 2014-2017, to provide a sufficient data set to study. Therefore, no baseline service level performance statements are provided for the effective response force in this study. However, the agency has still set benchmarks to be achieved and baselines will be established over the next 5 years should there be a large enough data set.

Performance Gaps – Baseline to Benchmark Time Gap

Table 62 Baseline to Benchmark Time Gap - Low Risk Fire

Low Risk Fire 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:31**	**1:00**	**1:31**
Turnout Time	Turnout Time 1st Unit	Urban	**2:44**	**2:00**	**0:44**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**5:15**	**4:00**	**1:15**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**9:02**	**7:00**	**2:02**

Table 63 Baseline to Benchmark Time Gap - Moderate Risk Fire

Moderate/High Risk Fire 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:27**	**1:00**	**1:27**
Turnout Time	Turnout Time 1st Unit	Urban	**2:50**	**2:00**	**0:50**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**4:08**	**4:00**	**0:08**
	Travel Time ERF **Concentration**	Urban	**11:53**	**8:00**	**3:53**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**7:42**	**7:00**	**0:42**
	Total Response Time ERF **Concentration**	Urban	**15:36**	**11:00**	**4:36**

Table 64 Baseline to Benchmark Time Gap - High Risk Fire

Moderate/High Risk Fire 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:47**	**1:00**	**1:47**
Turnout Time	Turnout Time 1st Unit	Urban	**3:06**	**2:00**	**1:06**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**5:02**	**4:00**	**1:02**
	Travel Time ERF **Concentration**	Urban	**N/A**	**8:00**	**N/A**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**7:58**	**7:00**	**0:58**
	Total Response Time ERF **Concentration**	Urban	**N/A**	**11:00**	**N/A**

Table 65 Baseline to Benchmark Time Gap - Low Risk EMS

Emergency Medical Services – Low Risk 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:18**	**1:00**	**1:18**
Turnout Time	Turnout Time 1st Unit	Urban	**2:37**	**2:00**	**0:37**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**4:26**	**4:00**	**0:26**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**7:34**	**7:00**	**0:34**

Table 66 Baseline to Benchmark Time Gap - Moderate Risk EMS

Emergency Medical Services – Moderate Risk 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:17**	**1:00**	**1:17**
Turnout Time	Turnout Time 1st Unit	Urban	**2:34**	**2:00**	**0:34**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**4:07**	**4:00**	**0:07**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**7:21**	**7:00**	**0:21**

Table 67 Baseline to Benchmark Time Gap - High Risk EMS

Emergency Medical Services – High Risk 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:36**	**1:00**	**1:36**
Turnout Time	Turnout Time 1st Unit	Urban	**2:30**	**2:00**	**0:30**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**4:40**	**4:00**	**0:40**
	Travel Time ERF **Concentration**	Urban	**7:06**	**6:00**	**1:06**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**7:52**	**7:00**	**0:52**
	Total Response Time ERF **Concentration**	Urban	**10:12**	**9:00**	**1:12**

Table 68 Baseline to Benchmark Time Gap - Moderate Risk HazMat

Moderate Risk HazMat 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**2:52**	**1:00**	**1:30**
Turnout Time	Turnout Time 1st Unit	Urban	**2:50**	**2:00**	**0:50**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**4:39**	**4:00**	**0:39**
	Travel Time ERF **Concentration**	Urban	**10:05**	**8:00**	**2:05**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**8:39**	**7:00**	**1:39**
	Total Response Time ERF **Concentration**	Urban	**13:51**	**11:00**	**2:51**

Table 69 Baseline to Benchmark Time Gap - Technical Rescue

Technical Rescue – All Risk - 90th Percentile Times Baseline Performance			2014-2017	Target (Agency Benchmark)	Time Gap
Alarm Handling	Pick-up to Dispatch	Urban	**4:20**	**1:00**	**3:20**
Turnout Time	Turnout Time 1st Unit	Urban	**2:52**	**2:00**	**0:52**
Travel Time	Travel Time 1st Unit **Distribution**	Urban	**3:30**	**4:00**	**0:30**
	Travel Time ERF **Concentration**	Urban	**10:23**	**8:00**	**2:23**
Total Response Time	Total Response Time 1st Unit on Scene **Distribution**	Urban	**9:47**	**7:00**	**2:47**
	Total Response Time ERF **Concentration**	Urban	**13:25**	**11:00**	**2:25**

Areas of Program Delivery and Coverage Improvement

Current apparatus placement for the two truck companies, two light / air units and Battalion Chief/Assistant Training Officer creates gaps in the department's ability to meet the 8-minute ERF travel times for areas in the southwest section of the city for structure fire responses. Additionally, the department has previously used flexible staffing models that created inconsistency in the ERF times and the ability to deliver the full complement of 17 personnel on scene to a structure fire response. The Hazmat unit and Rescue have not been consistently staffed, thus affecting the ERF's for rescue and hazardous material responses.

Recommendations for Improved Effectiveness in Deployment and Coverage

1. Work through the budget process to secure funding for a remodel of Fire Station 5 to be able to accommodate a ladder truck (T92) to improve the coverage for the Southwest side of Santa Clara.
2. Complete the RFP process to select and implement the use of a new Computer Aided Dispatch (CAD) and begin the RFP process to select and implement the use of a new Record Management System (RMS).
3. Purchase and install new tablet-based mobile dispatch technology prior to new CAD implementation.
4. Develop procedures / guidelines to ensure consistent NFIRS coding and train all personnel in reporting writing to ensure better data for ERF's and call type.
5. Evaluate and implement the use of automated vehicle locator (AVL) for proximity dispatch vs. boundary dispatch.
6. Budget, purchase and implement the use of the Intterra analytics software which will provide better data analytics and visual representation of SOC statistics.
7. Install turnout timers in the fire stations that are integrated with the station alerting system.
8. Publish unit responses with the total response time, including turnout times monthly and distribute through the Operations Chief to all personnel.
9. Develop a plan and assign responsibility of ensuring that fire department pre-emption systems are being installed and maintained. This includes local and state agencies, following the VTA project model in Santa Clara County.
10. Evaluate the benefit of increasing ALS coverage to reduce two unit responses and the use, placement and staffing of the ambulances.
11. Evaluate the use of web-based training tools to keep apparatus in-district more often by reducing the number of hours spent at the Training Center for department wide training.
12. Evaluate the possibility of converting one of the stations into a logistics station to keep apparatus in-district more often.

13. Form a special work group / project team to develop a system for categorizing building risk during company-level and Prevention Division inspections that can then be used to determine the best ERF based on the actual risk each building presents.

J. Performance Maintenance and Improvement Plans

Compliance Team / Responsibility

To ensure the agency is meeting current service level objectives, continuous monitoring of service level baselines must be conducted in a regular basis. The compliance team is made up of the Standards of Cover (SOC) team, which is comprised of eight core members including the ranks of Battalion Chief, Assistant Training Officer, Fire Captain, Firefighter and staff from administration. The lead for the Standard of Cover team is Acting Training Battalion Chief Matt Queen and Assistant Training Officer Nick Restani. The team regularly reports to the Accreditation Manager and Deputy Chief of Operations. The Department is committed to monitoring the issues related to the SOC and will be continually using the data to evaluate and justify future operational deployment needs. The Compliance Team will review service level baselines on a quarterly basis. Included in the review shall be a summary of the results of the service level objectives, a comparison of current results to previous results and calculations of the difference in results between time periods.

Performance Evaluation and Compliance Strategy

In addition to the review of service level objectives, the Operations Staff will review the response demands within each zone and the identified risks within. The Operations Staff will determine if there have been any changes within a planning zone, changes to service demands or changes in standards or operations that impact the service level objectives or the Standard of Cover document. These reviews will be conducted on a quarterly basis.

The quarterly reporting will include call volume, levels of service and response time metrics. The evaluation will include location of calls (density), as well as, fluctuations in call volume based on new deployment or population spikes (frequency). The reports will be prepared by the SOC team and reviewed by the Deputy Chief of Operations. The Deputy Chief of Operations will provide a briefing at the monthly Command Staff meeting and then distribute the findings to the entire department via email. The Operations Staff, with input from company officers, will then determine if there have been any changes that would necessitate changes to the deployment model. All changes to the deployment model would be to better achieve the service level objectives identified in the SOC document.

Compliance Verification Reporting

The department will produce an annual SOC document as a comprehensive review of yearly performance data. The SOC document will serve as a basis for reporting in the department Annual Report. The SOC contains three years of historical data during our initial accreditation period, and will include the most recent five years during subsequent periods. The report shows data trending which helps identify areas that need further analysis. The department Annual Report will be published each calendar year no later than the end of February. In addition to the yearly report, issues identified during the monthly performance evaluation will also include a plan for improvement. Compliance issues will be handled by the Deputy Chief of Operations. The department will be using software (Intterra) to provide real time analysis of response time data that can be accessed and viewed at any time by all personnel.

Constant Improvement Strategy

To aid in the collection and presentation of this information, the Compliance Team will work as a group to assemble all required information and assist the Operations Staff in the interpretation of data and considerations for improvement towards achieving targets (benchmarks). The final report will be presented to Deputy Chief of Operations at the monthly Operations meetings. Careful consideration will be made toward looking at trends in data and not just unusual events. The meeting will be structured to allow for discussion of possible solutions, as well as, identification of areas of outstanding performance. The SCFD is committed to utilizing comprehensive data analysis to ensure that the SOC document is current and used for continuous improvement efforts to best serve the community.