CHINO VALLEY FIRE DISTRICT

VOLUME 3 OF 3 - RISK ASSESSMENT AND STATISTICAL ANALYSIS APPENDIX

STANDARDS OF COVER ASSESSMENT AND MASTER PLAN UPDATE

MARCH 13, 2018

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A.1 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

The third element of the Standards of Coverage (SOC) process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

- Identify the values at risk to be protected within the community or service area.
- Identify the specific hazards with the potential to adversely impact the community or service area.
- Quantify the overall risk associated with each hazard.
- Establish a foundation for current/future deployment decisions and risk-reduction/hazard-mitigation planning and evaluation.

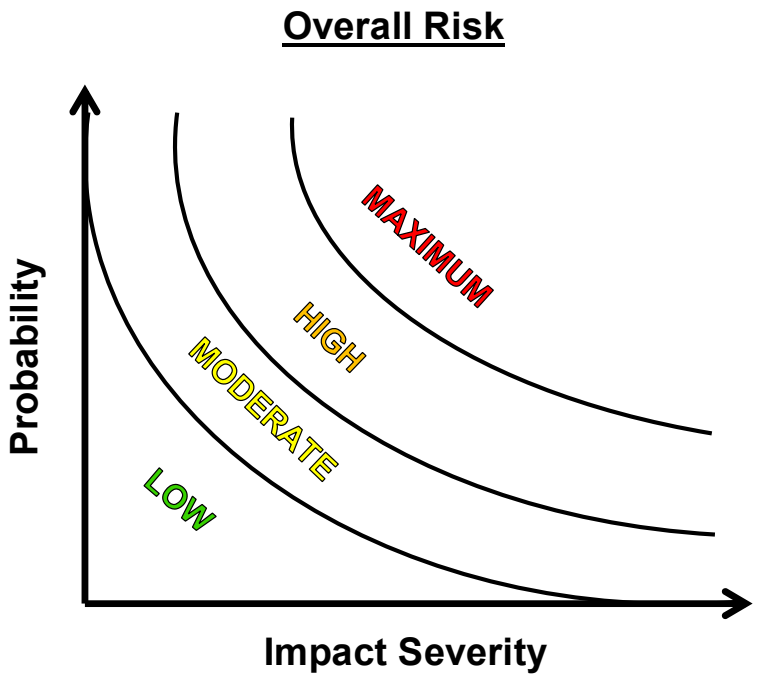
A hazard is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. Risk is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community as a whole.

A.1.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC study incorporates the following elements:

- Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- Identification of the fire and non-fire hazards to be evaluated.
- Determination of the probability of occurrence for each hazard.
- Identification and evaluation of multiple relevant Impact Severity Factors for each hazard by planning zone using agency/jurisdiction-specific data and information.
- Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity as shown in Figure 1.

Figure 1—Overall Risk



Citygate used multiple data sources for this study to understand the hazards and values to be protected in the District as follows:

- U.S. Census Bureau population and demographic data
- Insurance Services Office (ISO) building fire flow and construction data
- Chino Valley Fire District Geographical Information Systems (GIS) data
- Cities of Chino and Chino Hills General Plan and Zoning information
- Cities of Chino and Chino Hills Local Hazard Mitigation Plans
- Carbon Canyon Fire Safe Council Community Wildfire Protection Plan
- San Bernardino County Local Hazard Mitigation Plan
- Fire District data and information.

A.1.2 Risk Assessment Summary

Citygate's evaluation of the values at risk and hazards likely to impact the District's service area yields the following:

1. The District serves a diverse population, with densities ranging from less than 1,000 per square mile to more than 10,000 per square mile, over a widely varied land use pattern
2. The District's population is projected to grow 20.5 percent over the next 18 years to 2035, for an average annual growth of 1.15 percent
3. The District has a large inventory of residential, commercial, office, industrial, educational, and other non-residential uses typical of other southern California communities of similar size and demographics
4. The District has significant economic and natural resource values to be protected, as identified in this assessment
5. Several areas of the District within the City of Chino Hills are within a ***Very High*** wildland Fire Hazard Severity Zone as recommended by the California Department of Forestry and Fire Protection (CAL FIRE)
6. The District has established an effective year-round inspection program to ensure that required wildland defensible space is appropriately established and maintained
7. The Carbon Canyon Community Wildfire Protection Plan identifies multiple priorities to reduce wildland fire impacts within the canyon area
8. The Cities of Chino and Chino Hills and San Bernardino County have established appropriate emergency evacuation protocols, procedures, and resources in their Emergency Operations Plans
9. San Bernardino County has established a mass emergency telephone notification system to effectively communicate emergency information to the public in a timely manner
10. The District's overall risk for six hazards related to emergency services provided range from ***Low*** to ***High***, as summarized in Table 1.

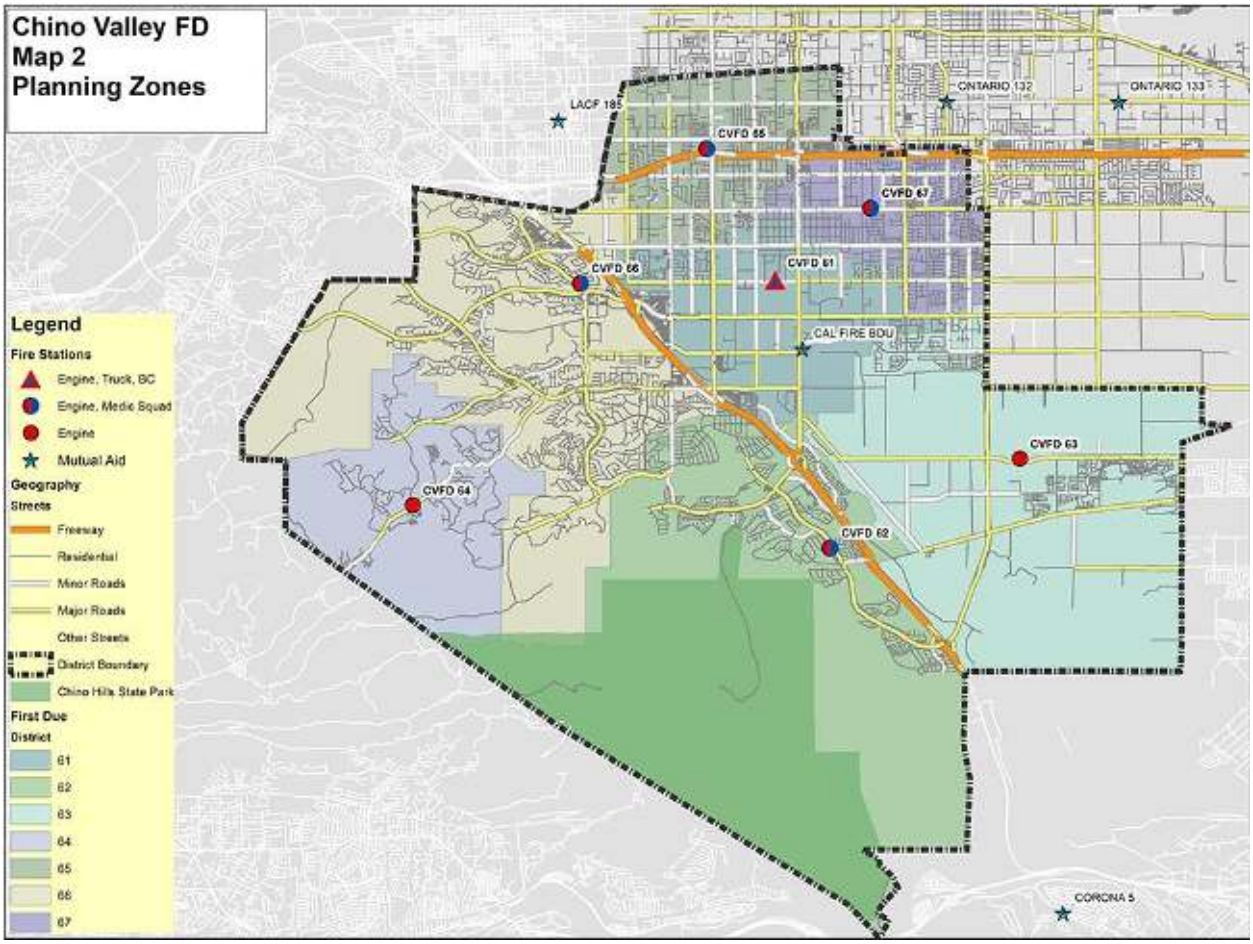
Table 1—Overall Risk by Hazard

Hazard		Planning Zone						
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
1	Building Fire	*High*	*Moderate*	*Moderate*	*Moderate*	*High*	*High*	*High*
2	Wildland Fire	*Moderate*	*Moderate*	*Moderate*	*High*	*Moderate*	*Moderate*	*Moderate*
3	Medical Emergency	*High*	*High*	*High*	*Moderate*	*High*	*High*	*High*
4	Hazardous Material	*Moderate*	*Moderate*	*Moderate*	*Low*	*Moderate*	*Moderate*	*Moderate*
5	Technical Rescue	*Moderate*	*Low*	*Moderate*	*Low*	*Moderate*	*Moderate*	*Low*
6	Aviation	*Low*	*Low*	*Moderate*	*Low*	*Low*	*Low*	*Low*

A.1.3 Planning Zones

The Commission on Fire Accreditation International (CFAI) recommends that jurisdictions establish geographic planning zones to better understand risk at a sub-jurisdictional level. For example, portions of a jurisdiction may contain predominantly moderate risk building occupancies, such as detached single-family residences, while other areas contain high or maximum risk occupancies, such as commercial and industrial buildings with a high hazard fire load. If risk were to be evaluated on a jurisdiction-wide basis, the predominant moderate risk could outweigh the high or maximum risk and may not be a significant factor in an overall assessment of risk. If, however, those high or maximum risk occupancies are a larger percentage of the risk in a smaller planning zone, then it becomes a more significant risk factor. Another consideration in establishing planning zones is that the jurisdiction's record management system must also track the specific zone for each incident to be able to appropriately evaluate service demand and response performance relative to each specific zone. For this assessment, Citygate utilized seven planning zones, incorporating each fire station's first-due response area as shown in Figure 2.

Figure 2—Risk Planning Zones



A.1.4 Values at Risk to Be Protected

This section identifies, describes, and quantifies (as data is available) the values at risk to be protected within the District's service area. *Values at risk*, broadly defined, are tangibles of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, and/or natural resources.

People

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children less than 10 years of age, the elderly, and people housed in institutional settings. Table 2 summarizes key District demographic data.

Table 2—Key Fire District Demographic Data

Demographic	2015	Percentage
Population	**165,049**	
Under 10 years	20,491	12.42%
10–19 years	22,512	13.64%
20–64 years	107,421	65.08%
65–74 years	8,893	5.39%
75 years and older	5,732	3.47%
Median age	**35.3**	N/A
Housing Units	**47,875**	
Owner-Occupied	31,563	65.93%
Renter-Occupied	14,761	30.83%
Median Household Size	3.29	N/A
Ethnicity		
White	25,549	15.48%
Hispanic/Latino	69,348	42.02%
Black/African-American	10,469	6.34%
Asian	38,542	23.35%
Other	21,142	12.81%
Education (population over 24 yrs. of age)	**108,774**	**65.90%**
High School Graduate	43,086	39.61%
Undergraduate Degree	23,617	21.71%
Graduate/Professional Degree	10,733	9.87%
Employment (population over 15 yrs. of age)	**131,233**	**79.51%**
In Labor Force	81,829	62.35%
Unemployed	7,943	9.71%
Population below Poverty Level	15,707	8.60%
Population without Health Insurance Coverage	18,808	11.40%

Source: U.S. Census Bureau

Of note from Table 2 is the following:

- Just over 21 percent of the population is under 10 or over 65 years of age
- The District's population is predominantly Hispanic/Latino (42 percent), followed by Asian (23 percent), White (15 percent), Other ethnic origins (13 percent), and Black/African-American (6 percent)
- Of the population over 24 years of age, 40 percent has completed high school or equivalency

- Of the population over 24 years of age, 31.5 percent has an undergraduate, graduate, or professional degree
- Nearly 80 percent of the population 15 years of age or older is in the workforce; of those, nearly 10 percent are unemployed
- The population below the federal poverty level is 8.6 percent
- Just over 11 percent of the population does not have health insurance coverage.

Buildings

The District's service area includes nearly 50,000 housing units, as well as office, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other non-residential building uses.

Building Occupancy Risk Categories

The CFAI identifies four risk categories that relate to building occupancy, as follows:

Low Risk – includes detached garages, storage sheds, outbuildings, and similar building occupancies that pose a relatively low risk of harm to humans or the community if damaged or destroyed by fire.

Moderate Risk – includes detached single-family or two-family dwellings; mobile homes; commercial and industrial buildings less than 10,000 square feet without a high hazard fire load; aircraft; railroad facilities; and similar building occupancies where loss of life or property damage is limited to the single building.

High Risk – includes apartment/condominium buildings; commercial and industrial buildings more than 10,000 square feet without a high hazard fire load; low-occupant load buildings with high fuel loading or hazardous materials; and similar occupancies with potential for substantial loss of life or unusual property damage or financial impact.

Maximum Risk – includes buildings or facilities with unusually high risk requiring an Effective Response Force (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.

Evaluation of the District's building inventory reveals 902 moderate and high-risk building uses as they relate to the CFAI building fire risk categories as summarized in Table 3 and Table 4.[1]

[1] No data was available relative to business, mercantile, or single-family residential occupancies.

Table 3—Building Occupancy Inventory by Risk Category

Building Occupancy Classification[2]		Number	Risk Category[1]
A	Assembly	300	***High***
E	Educational	57	***High***
H	Hazardous	14	***High***
I	Institutional (I-1.1, 1.2, 3, 4)	7	***High***
R	Residential: Hotels/Motels	11	***Moderate***
R	Multi-Family Residential	33	***High***
R	Residential Board and Care Facilities (R-3)	159	***High***
S	Storage	321	***Moderate***
Total		**902**	

[1] CFAI *Standards of Cover* (5th Edition)
Source: Chino Valley Fire District

Table 4—Building Occupancy Distribution

Building Occupancy	Planning Zone							Total
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67	
A – Assembly	88	12	4	2	55	97	42	**300**
E – Education	5	8	2	0	11	21	10	**57**
H – Hazardous	11	0	3	0	0	0	0	**14**
I – Institutional	1	0	0	0	2	1	3	**7**
R-1 – Hotels/Motels	4	1	0	0	3	2	1	**11**
R-2 – Multi-Family Residential	0	1	0	0	15	4	13	**33**
R-3 – Residential Care	18	10	9	0	62	23	37	**159**
S – Storage	225	5	45	0	26	6	14	**321**
Total	**352**	**37**	**63**	**2**	**174**	**154**	**120**	**902**

Critical Infrastructure / Key Resources

The U.S. Department of Homeland Security defines "Critical Infrastructure / Key Resources" (CIKR) as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. The City of Chino has identified 91 critical facilities and the City of Chino Hills has identified 41 critical facilities in their respective Local Hazard Mitigation Plans, as summarized

in Table 5 and Table 6. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

Table 5—Critical Facilities – City of Chino

Critical Facility Category	Number of Facilities
Fire Stations	4
Police Facilities	3
Local Government Facilities	3
Public Facilities	4
Schools	40
Utilities	8
Healthcare	3
Freeway Interchanges	8
Major Roads	11
Other Facilities	4
Total	**91**

Source: City of Chino Local Hazard Mitigation Plan, Section 4.3.3

Table 6—Critical Facilities – City of Chino Hills

Critical Facility Category	Number of Facilities
Fire Stations	3
Local Government Facilities	11
Public Facilities	2
Schools	19
Assisted Living	2
Healthcare	2
Freeway Interchanges	2
Total	**41**

Source: City of Chino Hills Local Hazard Mitigation Plan, Section 4.3.3

Economic Resources

Key economic resources within the District include the Chino Spectrum Towne Center (66 tenant businesses), the Shoppes at Chino Hills (81 tenant business), and Walmart and Best Buy

Distribution Centers. Key economic drivers include manufacturing, wholesale trade, distribution and logistics, and professional and business support companies. Major employers include:

- Chino Valley Unified School District
- California Department of Corrections and Rehabilitation
- City of Chino
- National Distribution Center
- Chino Valley Medical Center
- Hussman Group
- Nature's Best
- Mission Linen Supply
- Riggins Packaging and Display.

These nine employers, in aggregate, employ more than 10,000 people, or 13.45 percent of the total employment in both Cities.

Natural Resources

Natural resources within the District include Chino Hills State Park, Firestone Scout Reservation, and Prado Regional Park.

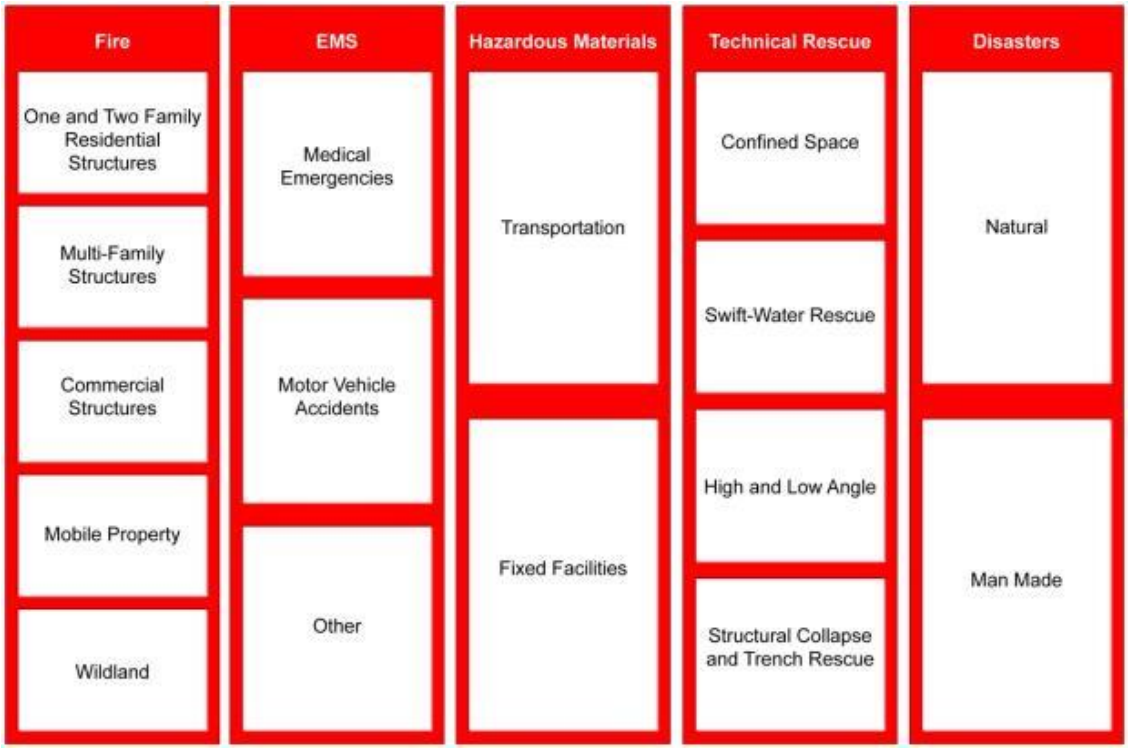
A.1.5 Hazard Identification

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency/jurisdiction-specific data and information to identify the hazards to be evaluated for this study.

The 2011 City of Chino Local Hazard Mitigation Plan (LHMP) Update, as well as the 2011 City of Chino Hills Local Hazard Mitigation Plan Update, contain a comprehensive assessment of the natural hazard risks in both Cities, including earthquakes, flooding/winter storms, and wildfire. Each respective LHMP uses the Federal Emergency Management Agency (FEMA) Calculated Priority Risk Index (CPRI) to develop the overall potentiality for those risks and related impacts for each City. The CPRI identifies risk potential citywide rather than by individual planning zone. Although the District has no legal authority or responsibility to mitigate earthquake or flood risk other than for District-owned facilities, it does provide services related to these hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

The CFAI groups hazards into fire and non-fire categories, as shown in Figure 3. Identification, qualification, and quantification of the various fire and non-fire hazards are important factors in evaluating how resources are or can be deployed to mitigate those risks.

Figure 3—CFAI Hazard Categories



Source: CFAI *Standards of Cover* (5th Edition)

Subsequent to review and evaluation of the hazards identified in the LHMPs for both Cities, and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the District, Citygate evaluated the following six hazards for this risk assessment:

- Building Fire
- Wildland Fire
- Medical Emergency
- Hazardous Material Release/Spill
- Technical Rescue
- Aviation.

A.1.6 Service Capacity

Service capacity refers to the District's available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities and competencies; resource distribution and concentration; availability of automatic and/or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

The District's service capacity for building fire risk consists of an ERF of 20 personnel staffing four Type-1 fire engines, one ladder truck, one medic squad, and one Battalion Chief from the District's seven fire stations; the District's wildland fire service capacity consists of a similar ERF with five Type-1 fire engines, one water tender, one medic squad, and one Battalion Chief.

Medical emergency service capacity consists of a daily, on-duty response force of 33 personnel, plus one Battalion Chief, staffing seven engines, one truck, and four medic squads, each staffed with a minimum of one EMT-Paramedic capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care, as well as ALS ground ambulance transportation provided by American Medical Response West under an exclusive operating area performance-based contract with the County of San Bernardino. Air ambulance services, when needed, are provided by the San Bernardino County Sheriff's Department, Mercy Air, REACH, and/or the San Bernardino County Fire Department. There are 10 hospitals with emergency services within the region, including two trauma centers and a burn center.

All District response personnel are trained to the U.S. Department of Transportation Hazardous Material First Responder Operational level to provide initial hazardous material incident assessment, hazard isolation, and support for a hazardous material response team. The District also has a Hazardous Material Response Team cross-staffed as needed with personnel trained to the Hazardous Material Specialist level. Additional hazardous materials service capacity is available from the West End Hazardous Material Team, one of three regional hazardous materials response teams in San Bernardino County.

Response personnel are also trained to the Confined Space Awareness, Low Angle Rope Rescue Operational (LARRO), and Swift Water Rescue Awareness levels. The District also has an Urban Search and Rescue (USAR) Team with 30 personnel trained to provide heavy wall breaching and low-angle and high-angle rope, confined space, trench/excavation, and swift-water rescue.

Aviation risk service capacity includes Foam 63, an Index A Aircraft Rescue Fire Fighting (ARFF) apparatus cross-staffed as needed from Station 63. Additional aviation risk service capacity support is available from the District's daily on-duty force of 34 personnel.

A.1.7 Probability of Occurrence

Probability of occurrence refers to the probability of a future hazard occurrence during a specific period. Because the CFAI agency accreditation process requires annual review of an agency's risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence evaluation. Table 7 describes the five probability of occurrence categories and related scoring criteria used for this analysis.

Table 7—Probability of Occurrence Scoring Criteria

Score	Probable Occurrence	Description	General Criteria
0–1.0	***Very Low***	Improbable	Hazard occurrence is *unlikely*
1.25–2.0	***Low***	Rare	Hazard *could occur*
2.25–3.0	***Moderate***	Infrequent	Hazard *should occur* infrequently
3.25–4.0	***High***	Likely	Hazard *likely to occur* regularly
4.25–5.0	***Very High***	Frequent	Hazard is *expected to occur* frequently

Citygate's SOC assessments use recent multiple-year hazard response data to determine the probability of hazard occurrence for the ensuing 12-month period.

A.1.8 Impact Severity

Impact severity refers to the extent a hazard occurrence impacts people, buildings, lifeline services, the environment, and the community as a whole. Table 8 describes the five impact severity categories and related scoring criteria used for this analysis.

Table 8—Impact Severity Scoring Criteria

Score	Impact Severity	General Criteria
0–1.0	***Insignificant***	No serious injuries or fatalities Few persons displaced for only a short duration None or inconsequential damage None or very minimal disruption to community No measurable environmental impacts Little or no financial loss
1.25–2.0	***Minor***	Some minor injuries; no fatalities expected Some persons displaced for less than 24 hours Some minor damage Minor community disruption; no loss of lifeline services Minimal environmental impacts with no lasting effects Minor financial loss
2.25–3.0	***Moderate***	Some hospitalizations; some fatalities expected Localized displacement of persons for up to 24 hours Localized damage Normal community functioning with some inconvenience Minor loss of lifeline services Some environmental impacts with no lasting effects, or small environmental impact with long-term effect Moderate financial loss
3.25–4.0	***Major***	Extensive serious injuries; significant number of persons hospitalized Many fatalities expected Significant displacement of many people for more than 24 hours Significant damage requiring external resources Community services disrupted; some lifeline services potentially unavailable Some environmental impacts with long-term effects Major financial loss
4.25–5.0	***Catastrophic***	Large number of severe injuries and fatalities Local/regional hospitals impacted Large number of persons displaced for an extended duration Extensive damage Widespread loss of critical lifeline services Community unable to function without significant support Significant environmental impacts and/or permanent environmental damage Catastrophic financial loss

A.1.9 Overall Risk

Overall hazard risk is determined by multiplying the *probability of occurrence score* by the *impact severity score*. The resultant total determines the overall *risk ranking* as described in Table 9.

Table 9—Overall Risk Score and Rating

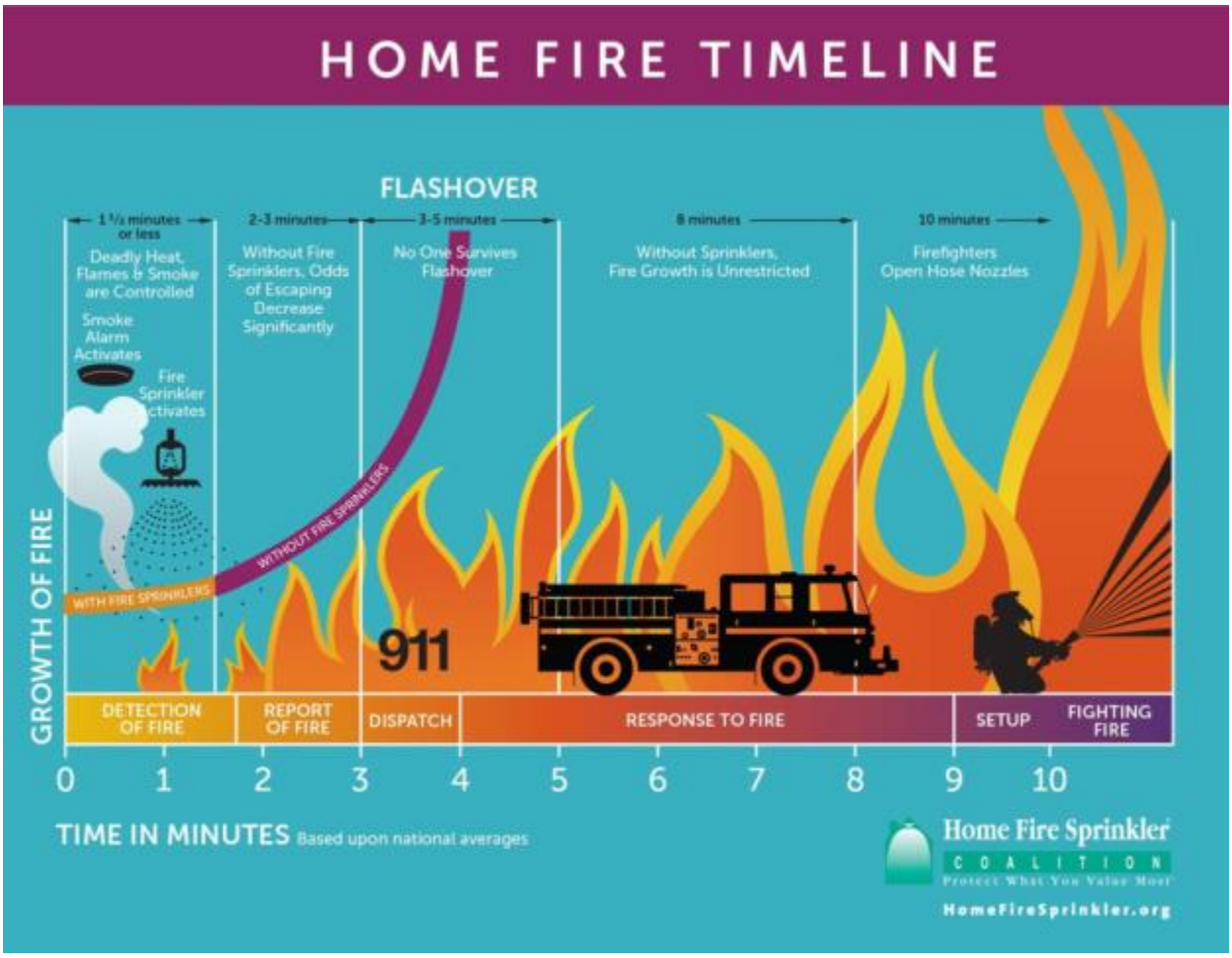
Overall Risk Score	Overall Risk Rating
0–4.99	***LOW***
5–11.99	***MODERATE***
12–19.99	***HIGH***
20–25	***MAXIMUM***

A.1.10 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building density, size, age, occupancy, and construction materials and methods, as well as the number of stories, the required fire flow, the proximity to other buildings, built-in fire protection/alarm systems, an available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the District, the U.S. Census Bureau, and the Insurance Services Office (ISO) to assist in determining the District's building fire risk.

Figure 4 illustrates the building fire progression timeline and shows that 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, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

Figure 4—Building Fire Progression Timeline



Source: http://www.firesprinklerassoc.org

Population Density

Population density within the District ranges from less than 1,000 to more than 10,000 people per square mile. Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire *occurrence*, it is reasonable to conclude that building fire *risk* relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

High Fire Flow Requirements

One of the many factors evaluated by the ISO is needed fire flow (NFF), which is the amount of water that would be required in gallons-per-minute (GPM) if the building were seriously involved in fire. For the District, the ISO database identifies 1,412 buildings evaluated, 313 of which have an NFF of 2,500 GPM or more, as shown in Table 10.

Table 10—High Fire Flow Sites

Risk Factor	Planning Zone							Total
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67	
NFF ≥ 2,500 GPM	161	13	13	0	47	61	18	**313**
Percentage of Total	**51.44%**	**4.15%**	**4.15%**	**0.0%**	**15.02%**	**19.49%**	**5.75%**	**100.00%**

Source: Insurance Services Office (ISO)

This is a significant amount of firefighting water to deploy, and a major fire at any one of these buildings would require commitment of the District's entire on-duty force plus mutual aid. Using a generally accepted figure of 50 GPM per firefighter on large building fires, a fire in a building requiring 1,000 GPM would require 20 firefighters, which is the District's current initial building fire ERF. A significant fire in any of these buildings not protected by an automatic fire sprinkler and/or fire detection/alarm system would likely have a high impact severity.

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 the potential impact severity of a community's building fire risk. Potable water in the District's service area is provided by the City of Chino, the City of Chino Hills, and the Monte Vista Water District.

According to District staff, available fire flow is excellent within most areas of the two Cities except for some areas of Carbon Canyon in Chino Hills with undersized mains and dead-end hydrants. Available water supply for fire suppression is, however, insufficient or not available in some of the unincorporated areas of the District.

Building Fire Service Demand

For the three-year period from January 1, 2014, through December 31, 2016, the District experienced 264 building fire incidents comprising 0.98 percent of total service demand over the same period, as summarized in Table 11.

Table 11—Building Fire Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Building Fire	2014	25	13	8	0	14	10	20	**90**	1.07%
	2015	11	7	4	4	13	15	24	**78**	0.90%
	2016	17	9	3	1	25	21	20	**96**	0.98%
Total		**53**	**29**	**15**	**5**	**52**	**46**	**64**	**264**	**0.98%**
Percent of Total Service Demand		1.10%	1.06%	0.86%	0.81%	0.96%	0.74%	1.20%	0.98%	

Source: Chino Valley Fire District incident records

As Table 11 shows, building fire service demand has remained relatively constant each year over the three-year study period, with the highest volume of incidents occurring at Station 67 and the lowest at Station 64. Overall, the District's building fire service demand is very low, comprising less than one percent of all calls for service, which is typical of other California fire districts of similar size and demographics.

Probability of Building Fire Occurrence

Table 12 summarizes Citygate's scoring of building fire probability by planning zone based on building fire service demand from Table 11.

Table 12—Building Fire Probability Scoring

Building Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	4.5	3.5	3.0	2.5	4.5	4.25	4.5

Building Fire Impact Severity

Table 13 summarizes Citygate's scoring of the District's probable building fire impact severity by planning zone.

Table 13—Building Fire Impact Severity Scoring

Building Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	3.0	3.0	3.0	2.5	3.0	3.0	3.0

Overall Building Fire Risk

Table 14 summarizes the District's overall building fire risk scores and ratings by planning zone.

Table 14—Overall Building Fire Risk

Building Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	13.5	10.5	9.0	6.25	13.5	12.75	13.5
Risk Rating	*High*	*Moderate*	*Moderate*	*Moderate*	*High*	*High*	*High*

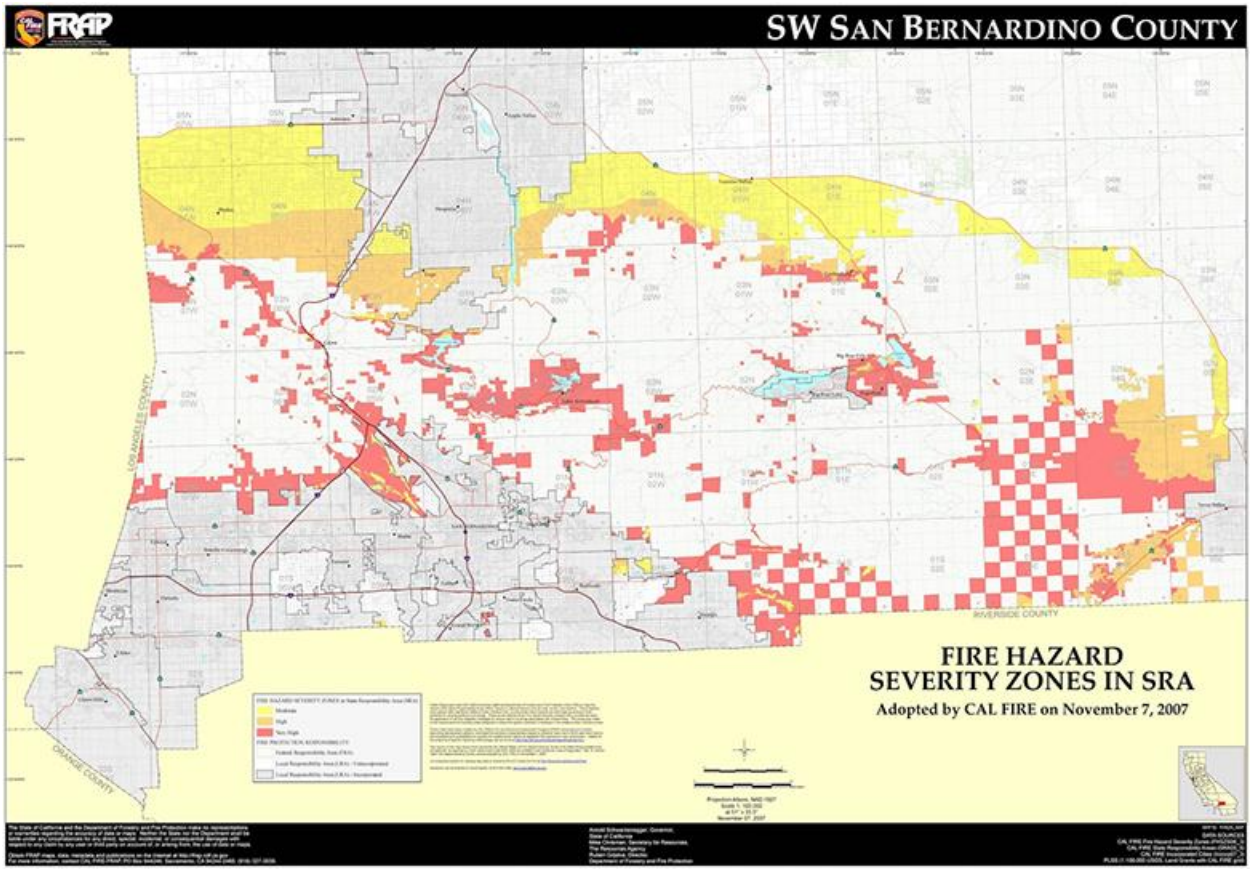
A.1.11 Wildland Fire Risk

Many areas of the District are vulnerable to a wildland fire; however, the highest risk is in the wildland-urban interface (WUI) areas where human population and related development exist within a predominantly wildland vegetation fuel environment.

Wildland Fire Hazard Severity Zones

The California Department of Forestry and Fire Protection (CAL FIRE) designates wildland Fire Hazard Severity Zones (FHSZ) throughout the State based on analysis of multiple wildland fire hazard factors and modeling of potential wildland fire behavior. For State Responsibility Areas (SRAs) where CAL FIRE has fiscal responsibility for wildland fire protection, CAL FIRE designates Moderate, High, and Very High FHSZs by county, as shown in Figure 5 for southwestern San Bernardino County.

Figure 5—SRA Wildland Fire Hazard Severity Zones



CAL FIRE also identifies recommended FHSZs for Local Responsibility Areas (LRAs), where a local jurisdiction bears the fiscal responsibility for wildland fire protection, including the Chino Valley Fire District, as shown in Figure 6.

Figure 6—LRA Wildland Fire Hazard Severity Zones

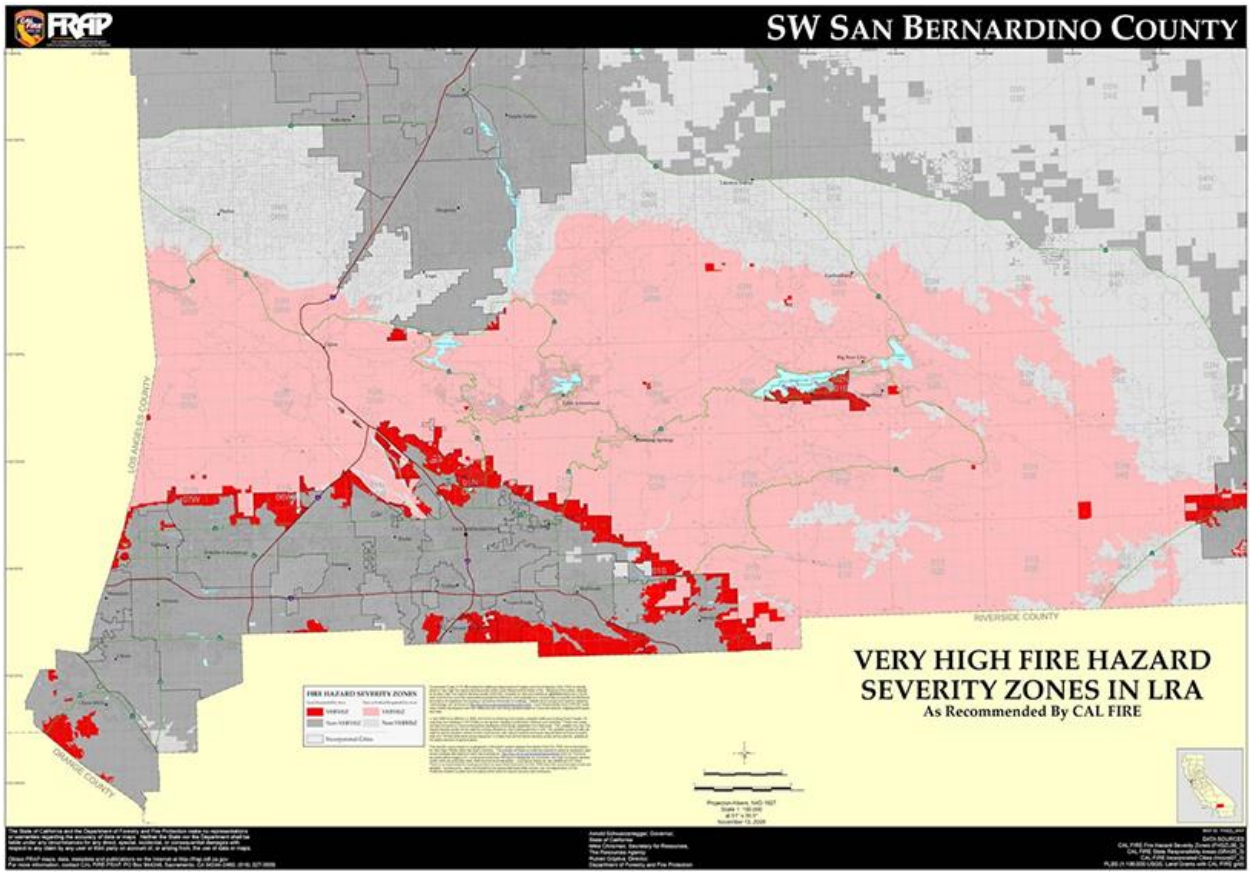
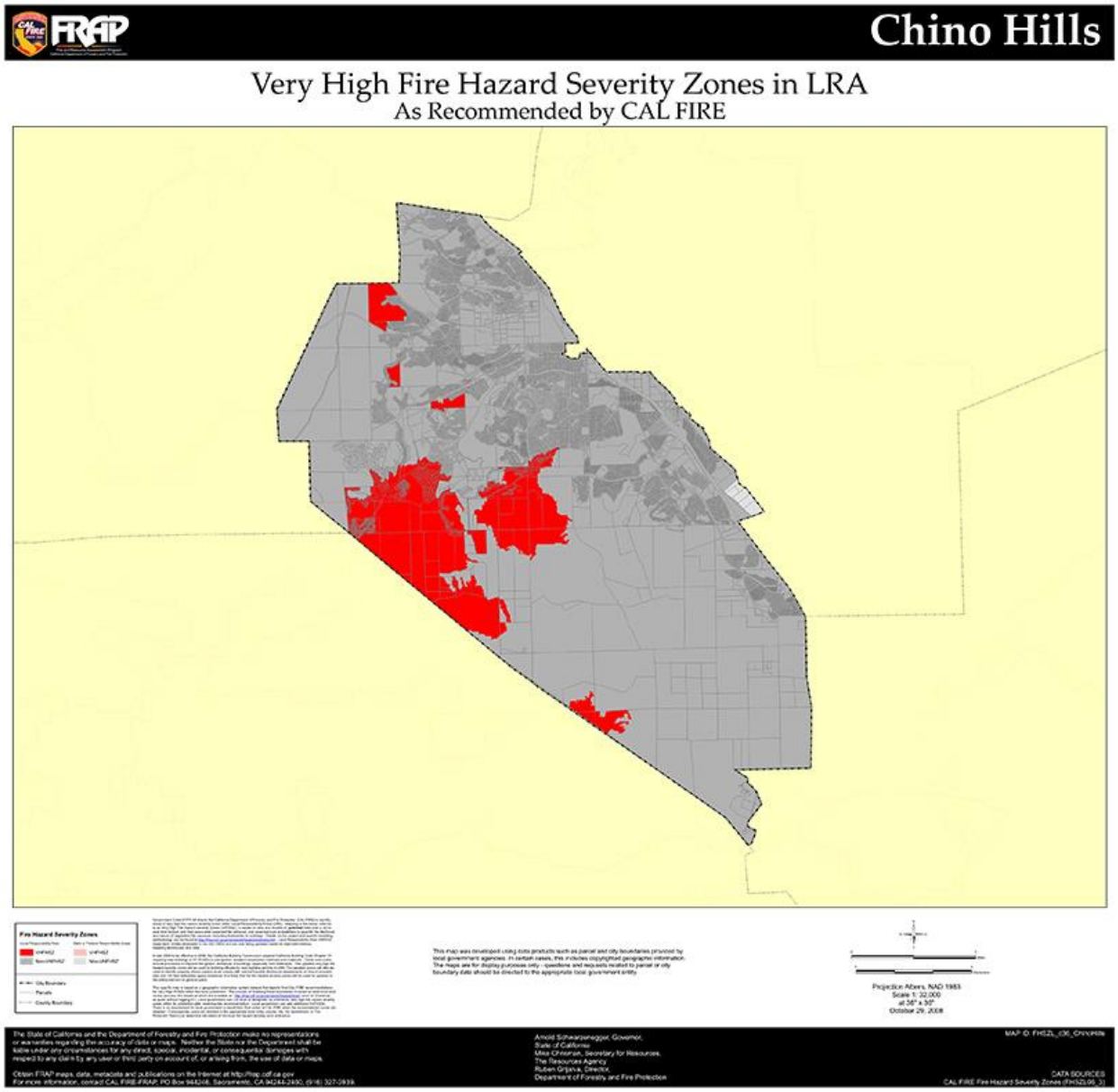


Figure 7 further illustrates CAL FIRE's recommended Very High FHSZs for the City of Chino Hills. There are no recommended Very High FHSZs in the City of Chino.

Figure 7—City of Chino Hills Wildland Fire Hazard Severity Zones



As Figure 5 through Figure 7 illustrate, the District has 3,273 acres within either a designated or recommended Very High wildland FHSZ, including Carbon Canyon and the Chino Hills State Park.

Wildland Fuels

Wildland fuel factors influencing fire intensity and spread include fuel type (vegetation species), height, arrangement, density, and moisture. Wildland fuels within the District consist of a mix of annual grasses and weeds, chaparral, and deciduous, eucalyptus, and mixed conifer trees. Once

ignited, wildland fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions.

Weather

Weather elements such as temperature, relative humidity, wind, and lightning also affect wildland fire potential and behavior. High temperatures and low relative humidity dry out wildland fuels, creating a situation where fuels will more readily ignite and burn more intensely. Wind is the most significant weather factor influencing wildland fire behavior; higher wind speeds increase fire spread and intensity. Wildland fire season, when wildland fires are most likely to occur due to fuel and weather conditions, is all year in San Bernardino County.

Topography

The District's varied topography, ranging from about 500 to 1,200 feet above sea level, is predominantly flat east of Highway 71 transitioning to gentle to moderate slopes west of Highway 71, with multiple drainages running both generally north/south and east/west. This topography influences wildland fire behavior and spread as fires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire.

Wildland Fire History

San Bernardino County has a long history of large damaging wildland fires, including multiple recent fires impacting the District's service area as summarized in Table 15.[2]

[2] City of Chino Hills 2011 Hazard Mitigation Plan Update – Section 4.2.1.3

Table 15—Large SW San Bernardino County Wildland Fires

Fire Name	Year	Acres Burned
Owl	1980	18,332
Shell	1985	1,634
Yorba	1990	7,884
Carbon	1980	6,664
Wagon	1994	757
Carbon Canyon	1998	733
Blue Gum	2002	496
Carbon Canyon	2004	17
Yorba Linda	2005	1,078
Rose	2007	8
Freeway Complex	2008	30,035
Carbon Canyon	2011	518

Source: Carbon Canyon CWPP (2017)

Water Supply

Another significant wildland impact severity factor is water supply immediately available for wildland fire suppression in High / Very High FHSZs. According to District staff, available fire flow is excellent within both Cities with good fire hydrant spacing; however, it is insufficient or not available in some of the unincorporated areas of the District. This deficiency is partially mitigated with the automatic dispatch of a water tender to all wildland fires within these zones.

Wildland Fire Hazard Mitigation

Hazard mitigation refers to specific actions or measures taken to prevent a hazard from occurring and/or to minimize the severity of impacts resulting from a hazard occurrence. While none of the hazards subject to this study can be entirely prevented, measures *can* be taken to minimize the consequences or impacts when those hazards do occur.

The 2017 Carbon Canyon Community Wildfire Protection Plan (CWPP) identifies 11 wildland fire mitigation priorities, including prior and continuing vegetation management projects as follows:

- Removal of non-native and dead vegetation in Carbon Creek and flood control channels

- Thinning of dead vegetation and ladder fuels within 100 feet of structures, including defensible space and fire safe landscaping education
- Assisting residents with disposal of cut vegetation
- Identification of sensitive species habitat
- Development of a post-fire native habitat restoration plan.

In addition to the Carbon Canyon CWPP, the District places a strong focus on community risk reduction, including fire-safe WUI development standards and a year-round inspection program to ensure that wildland defensible space is appropriately established and maintained.

Wildland Fire Service Demand

The District experienced 107 wildland fires from January 2014 through December 2016, comprising 0.40 percent of total service demand over the same period, as summarized in Table 16.

Table 16—Wildland Fire Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Wildland Fire	2014	2	5	7	0	6	4	0	**24**	0.28%
	2015	4	4	6	0	7	6	9	**36**	0.42%
	2016	7	7	21	1	4	4	3	**47**	0.48%
Total		**13**	**16**	**34**	**1**	**17**	**14**	**12**	**107**	0.40%
Percent of Total Service Demand		0.27%	0.58%	1.94%	0.16%	0.31%	0.23%	0.23%	0.40%	

Source: Chino Valley Fire District incident records

As Table 16 shows, wildland fire service demand has been relatively stable over the past three years, with the highest occurrence at Station 63 and the lowest occurrence at Station 64. Overall, the District's wildland fire service demand is very low.

Probability of Occurrence

Table 17 summarizes Citygate's scoring of wildland fire probability by planning zone based on wildland fire service demand from Table 16.

Table 17—Wildland Fire Probability Scoring

Wildland Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	3.0	3.0	3.75	3.0	3.0	3.0	3.0

Wildland Fire Impact Severity

Table 18 summarizes Citygate's scoring of probable wildland fire impact severity by planning zone.

Table 18—Wildland Fire Impact Severity Scoring

Wildland Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	2.0	2.5	2.0	4.0	2.0	3.0	2.0

Overall Wildland Fire Risk

Table 19 summarizes the District's overall wildland fire risk scores and ratings by planning zone.

Table 19—Overall Wildland Fire Risk

Wildland Fire	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	6.0	7.5	7.5	12.0	6.0	9.0	6.0
Risk Rating	*Moderate*	*Moderate*	*Moderate*	*High*	*Moderate*	*Moderate*	*Moderate*

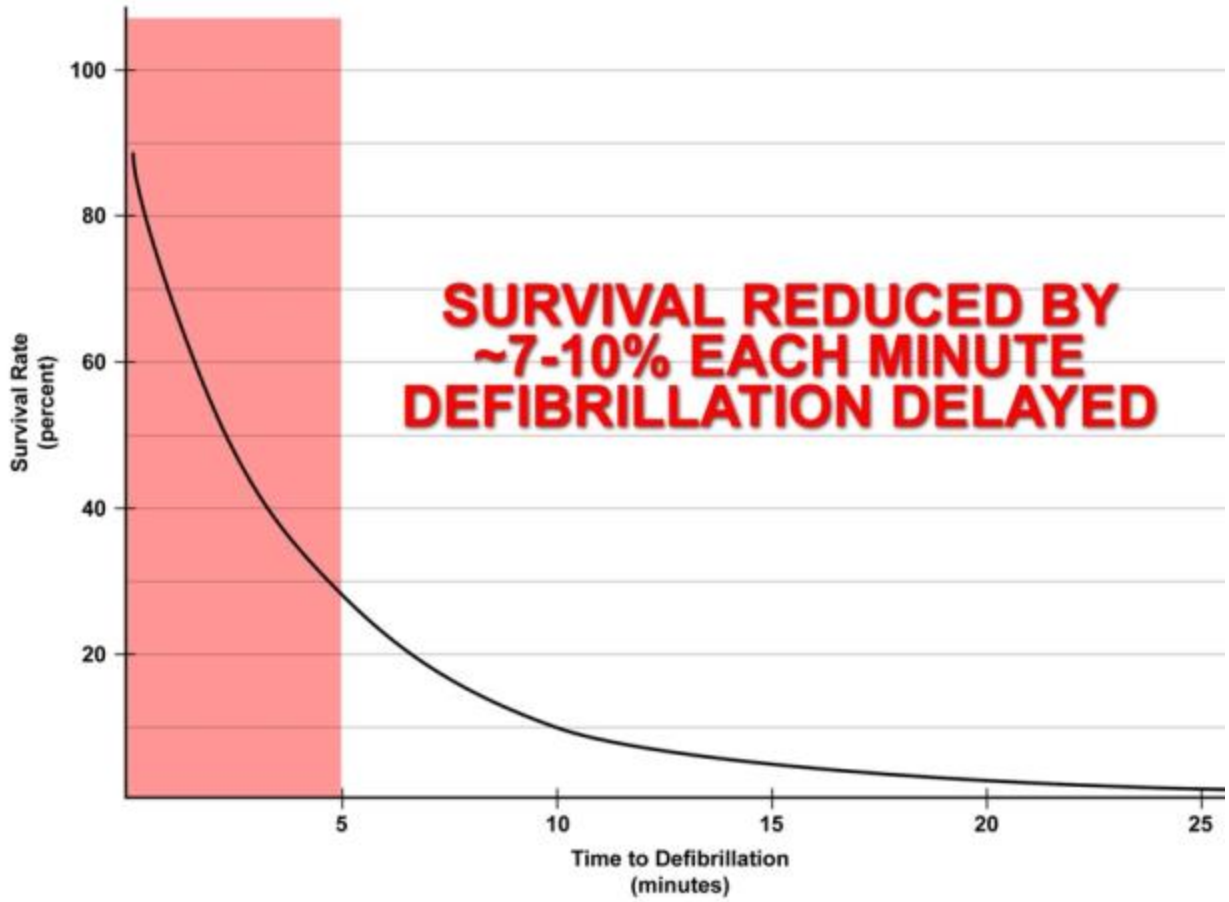
A.1.12 Medical Emergency Risk

Medical emergency risk in most communities is predominantly a function of population density, demographics, violence, health insurance coverage, and vehicle traffic.

Medical emergency risk can also be categorized as either a medical emergency resulting from a traumatic injury or a health-related condition or event. One serious medical emergency is cardiac arrest or some other event where there is an interruption or blockage of oxygen to the brain.

Figure 8 illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. While early defibrillation is one factor in cardiac arrest survivability, other factors can influence survivability as well, such as early CPR and pre-hospital advanced life support interventions.

Figure 8—Survival Rate versus Time to Defibrillation



Source: www.suddencardiacarrest.com

Population Density

Because medical emergencies involve people, it seems logical that higher population densities generate higher medical emergency service demand than lower population densities. In Citygate's experience, this is particularly true for urban population densities. The District's population density ranges from less than 1,000 per square mile to more than 10,000 per square mile.

Demographics

Medical emergency risk tends to be higher among older, poorer, less-educated, and uninsured populations. According to the U.S. Census Bureau, 8.86 percent of the District's population is 65 and older; 8.6 percent of the population is at or below poverty level; nearly 35 percent of the population over 24 years of age has less than a high school diploma or equivalent; and 11.4 percent of the population does not have health insurance coverage.[3]

Violence

As would be expected, medical emergency risk is also higher in communities or segments of communities with higher rates of violence. For 2014, the most recent year of available data, there were 247 violent crimes committed in the Cities of Chino and Chino Hills.[4] Given the 2015 population of 159,000, this represents a violent crime rate of 0.16 percent, suggesting that violent crime very minimally influences the District's medical emergency risk.

Table 20—Violent Crime Data

Year	Number of Violent Crimes		Total
	Chino	Chino Hills	
2010	264	80	**344**
2011	247	68	**315**
2012	291	64	**355**
2013	258	63	**321**
2014	186	61	**247**
Total	**1,246**	**336**	**1,582**

Source: FBI Uniform Crime Reporting Data

Vehicle Traffic

Medical emergency risk tends to be higher in those areas of a community with high daily vehicle traffic volume, particularly those areas with high traffic volume travelling at high speeds. The District's transportation network includes Highways 60 and 71, which carry an annual average daily traffic volume of over 328,000 vehicles, with a peak-hour load of more than 24,300 vehicles.[5]

[3] Source: U.S. Census Bureau (2015)

[4] Source: FBI Uniform Crime Reporting Data

[5] Source: California Department of Transportation (2015)

Medical Emergency Service Demand

Medical emergency service demand over the previous three years includes 19,894 calls for service comprising 73.88 percent of total service demand over the same period, as summarized in Table 21.

Table 21—Medical Emergency Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Medical Emergency	2014	1,049	687	273	135	1,201	1,542	1,248	**6,135**	72.71%
	2015	1,169	596	490	168	1,135	1,603	1,309	**6,470**	74.70%
	2016	1,315	755	442	130	1,736	1,502	1,409	**7,289**	74.17%
Total		**3,533**	**2,038**	**1,205**	**433**	**4,072**	**4,647**	**3,966**	**19,894**	**73.88%**
Percent of Total Service Demand		73.16%	74.16%	68.82%	69.73%	74.80%	74.76%	74.59%	**73.88%**	

Source: Chino Valley Fire District incident records

As Table 21 shows, medical emergency service demand varies significantly by planning zone and is trending upward an average approximately 9 percent annually over the past two years. Overall, the District's medical emergency service demand is typical of other districts with similar demographics.

Probability of Occurrence

Table 22 summarizes Citygate's scoring of medical emergency probability by planning zone based on medical emergency service demand from Table 21.

Table 22—Medical Emergency Probability Scoring

Medical Emergency	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	4.75	4.5	4.5	4.25	4.75	4.75	4.75

Medical Emergency Impact Severity

Table 23 summarizes Citygate's scoring of probable medical emergency impact severity by planning zone.

Table 23—Medical Emergency Impact Severity Scoring

Medical Emergency	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	3.0	3.0	3.0	2.25	3.0	3.0	3.0

Overall Medical Emergency Risk

Table 24 summarizes the District's overall medical emergency risk scores and ratings by planning zone.

Table 24—Overall Medical Emergency Risk

Medical Emergency	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	14.25	13.5	13.5	9.5625	14.25	14.25	14.25
Risk Rating	***High***	***High***	***High***	***Moderate***	***High***	***High***	***High***

A.1.13 Hazardous Material Risk

Hazardous material risk factors include fixed facilities that store, use, or produce hazardous chemicals or waste; underground pipelines conveying hazardous materials; aviation, railroad, maritime, and vehicle transportation of hazardous materials into or through a jurisdiction; vulnerable populations; emergency evacuation planning and related training; and specialized hazardous material service capacity.

The Hazardous Materials Division of the San Bernardino County Fire Department, serving as the designated Certified Unified Program Agency (CUPA) for the County, has identified 527 facilities within the District's service area requiring a State or County hazardous material operating permit or Hazardous Materials Business Plan (HMBP), as summarized in Table 25.

Table 25—Hazardous Material Permit Sites

Risk Factor	Planning Zone							Total
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67	
Hazardous Material	265	10	57	4	66	84	41	527
Percentage of Total	**50.28%**	**1.90%**	**10.82%**	**0.76%**	**12.52%**	**15.94%**	**7.78%**	**100.00%**

Source: San Bernardino County Fire Department - Hazardous Materials Division

The District also has transportation-related hazardous material risk as a result of its road transportation network, including Highways 60 and 71 with heavy daily truck traffic volume, as summarized in Table 26.

Table 26—Average Annual Daily Truck Traffic

Highway	Crossing	AADT[1]	Truck AADT by Axles				% Truck AADT by Axles			
			2	3	4	5+	2	3	4	5+
60	Central Avenue	27,295	6,862	2,724	857	16,852	25.14%	9.98%	3.14%	61.74%
71	Los Angeles County Line	6,359	3,737	470	198	1,954	58.76%	7.39%	3.12%	30.73%

[1] AADT=Average Annual Daily Trips
Source: California Department of Transportation (2015)

Population Density

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. The District's population density ranges from less than 1,000 per square mile to more than 10,000 per square mile.

Vulnerable Populations

Persons vulnerable to a hazardous material release/spill include those individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they either cannot or are unable to leave voluntarily. Just more than 21 percent of the District's population is under age 10 or is 65 years of age and older.

Emergency Evacuation Planning, Training, Implementation, and Effectiveness

Another significant hazardous material impact severity factor is a jurisdiction's shelter-in-place / emergency evacuation planning and training. In the event of a hazardous material release or spill, time can be a critical factor in notifying potentially affected persons, particularly at-risk populations, to either shelter-in-place or evacuate to a safe location. Essential to this process is an effective emergency plan that incorporates one or more mass emergency notification capabilities, as well as pre-established evacuation procedures. It is also essential to conduct regular, periodic exercises involving these two emergency plan elements to evaluate readiness and to identify and remediate any planning and/or training gaps to ensure ongoing emergency incident readiness and effectiveness.

Although the District does not have its own emergency evacuation plan, it does have a subscription-based mass emergency notification system; however, very few District residents or

businesses have enrolled. Both Cities and San Bernardino County have active mass emergency notification systems; however, Citygate was unable to determine when these systems were last evaluated.

Both Cities and San Bernardino County have established emergency evacuation protocols, procedures, and resources in their respective Emergency Operations Plans; however, it is unknown when these protocols were last exercised or evaluated.

Hazardous Material Service Demand

The District experienced 155 hazardous material incidents over the past three years, comprising 0.58 percent of total service demand over the same period, as summarized in Table 27.

Table 27—Hazardous Material Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Hazardous Material	2014	15	9	2	1	9	14	8	**58**	0.69%
	2015	6	3	1	2	7	15	12	**46**	0.53%
	2016	12	6	4	0	6	19	4	**51**	0.52%
Total		**33**	**18**	**7**	**3**	**22**	**48**	**24**	**155**	**0.58%**
Percent of Total Service Demand		0.68%	0.66%	0.40%	0.48%	0.40%	0.77%	0.45%	**0.58%**	

Source: Chino Valley Fire District incident records

As Table 27 indicates, annual hazardous material service demand varies by planning zone and has been relatively constant over the past three years, with Station 66 having the highest demand and Station 64 the lowest. Overall, the District's hazardous material service demand is very low.

Probability of Occurrence

Table 28 summarizes Citygate's scoring of hazardous materials probability by planning zone based on hazardous material service demand from Table 27.

Table 28—Hazardous Material Probability Scoring

Hazardous Material	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	3.75	3.0	2.5	2.25	4.25	4.25	3.25

Hazardous Material Impact Severity

Table 29 summarizes Citygate's scoring of probable hazardous material impact severity by planning zone.

Table 29—Hazardous Material Impact Severity Scoring

Hazardous Material	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	2.5	2.5	2.5	2.0	2.5	2.5	2.5

Overall Hazardous Material Risk

Table 30 summarizes the District's overall hazardous material risk scores and ratings by planning zone.

Table 30—Overall Hazardous Material Risk

Hazardous Material	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	9.375	7.5	6.25	4.5	10.625	10.625	8.125
Risk Rating	***Moderate***	***Moderate***	***Moderate***	***Low***	***Moderate***	***Moderate***	***Moderate***

A.1.14 Technical Rescue Risk

Technical rescue risk factors include active construction projects; structural collapse potential; confined spaces, such as tanks and underground vaults; bodies of water and rivers or streams; industrial machinery; transportation volume; and earthquake, flood, and landslide potential.

Construction Activity

There is continual residential, commercial, industrial, and/or infrastructure construction activity occurring within the District.

Confined Spaces

There are confined spaces within the District, including tanks, vaults, open trenches, etc.

Bodies of Water

There are multiple bodies of water within the District, including Prado Reservoir, Lake Los Serranos, Chino Creek, and other smaller bodies of water.

Transportation Volume

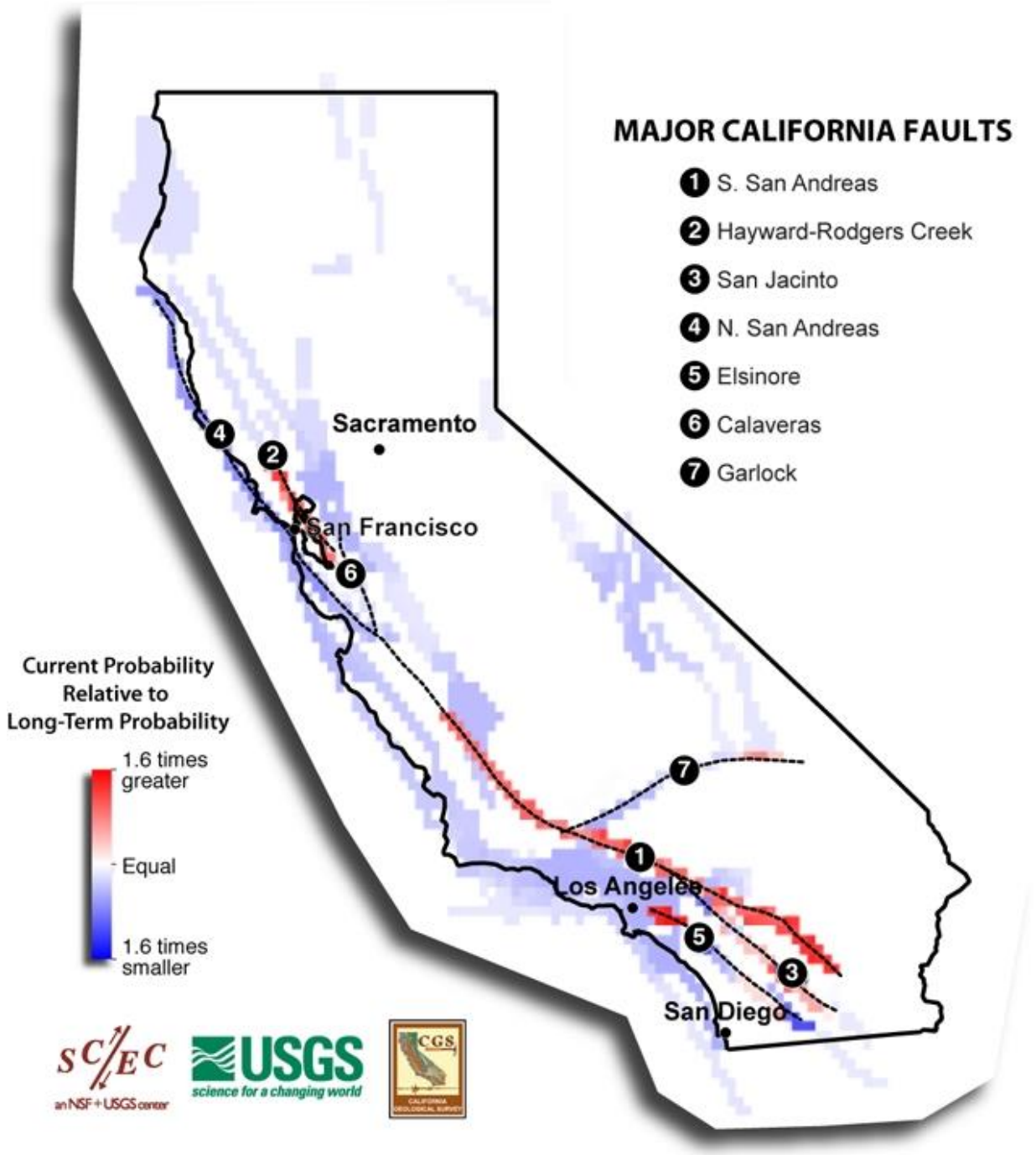
Another factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the District, with Highways 60 and 71 carrying more than 328,000 vehicles daily.

Earthquake Risk[6]

There are four major and multiple minor seismic faults in San Bernardino County, including the Southern San Andreas, San Jacinto, Elsinore, Chino-Central, and Garlock Faults as shown in Figure 9. Although earthquake activity has occurred in this area historically, including the San Fernando (1971) and Northridge (1994) earthquakes, no major damage has resulted to date. The U.S Geological Survey and California Geological Survey, however, predict that three of the four faults are expected to have a Magnitude 6.7 or greater earthquake within the next 30 years.

[6] Reference: City of Chino Hills Local Hazard Mitigation Plan Update, Section 4.2.2 (2011)

Figure 9—Earthquake Fault Zones

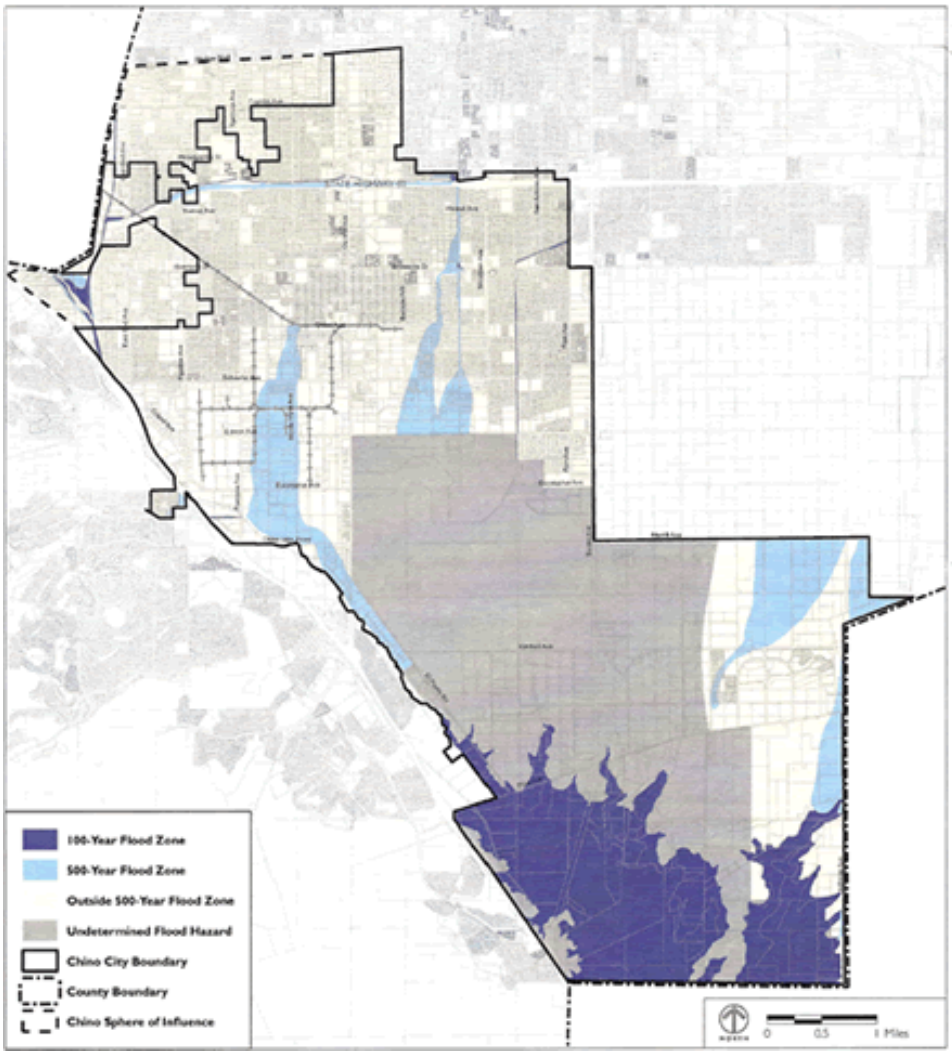


Source: San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan Update (20110, Figure 29)

Flood Risk[7]

As Figure 10 and Figure 11 illustrate, the greater southwest section of Chino and areas of Chino Hills are subject to flooding from local streams/creeks and flooding associated with Prado Dam. In addition, flash-flood cycles are common in Southern California, and some minor localized flooding occurs annually during winter storms.

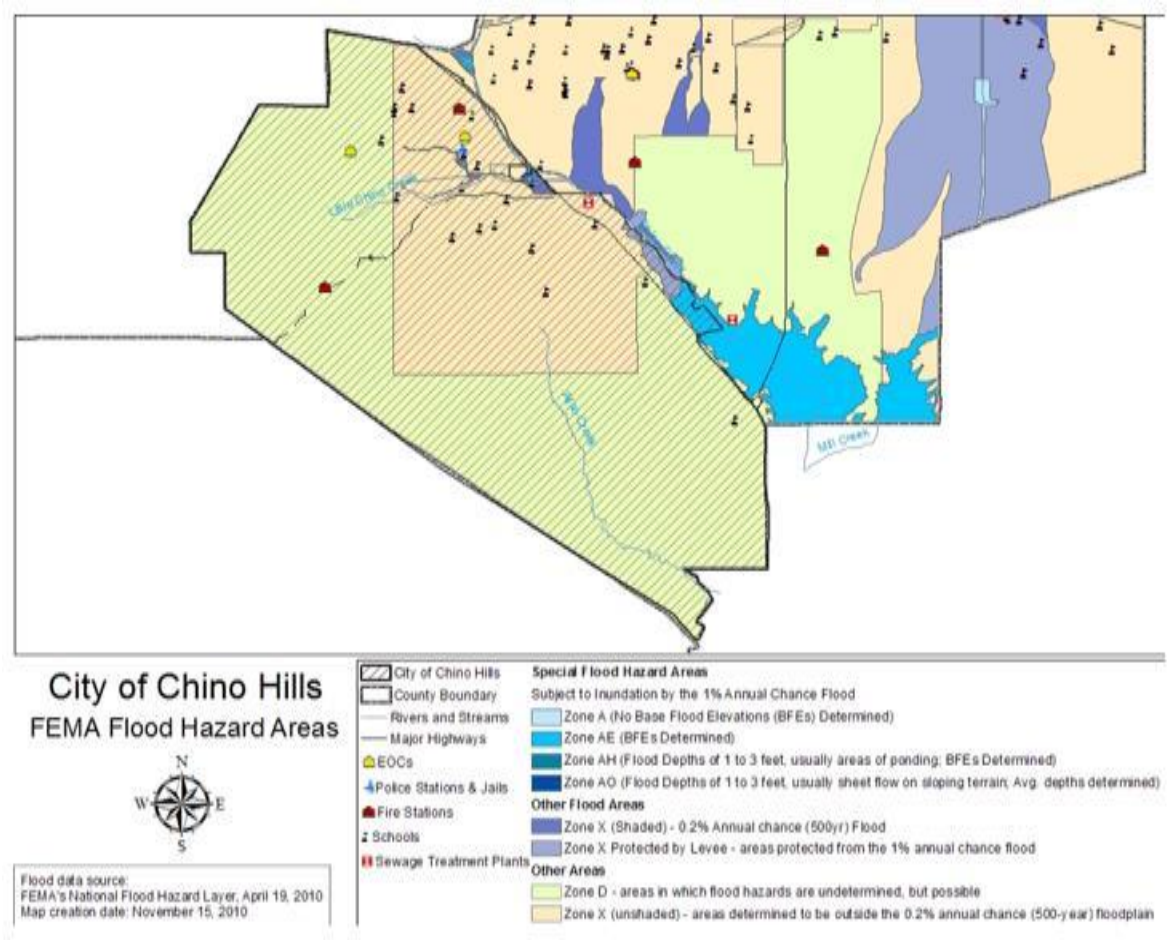
Figure 10—Flood Hazard Areas – City of Chino



Source: City of Chino Local Hazard Mitigation Plan, Figure 7 (2011)

[7] Reference: Chino Local Hazard Mitigation Plan Update, Section 4.2.2 (2011); City of Chino Hills Local Hazard Mitigation Plan Update, Section 4.2.3 (2011)

Figure 11—Flood Hazard Areas – City of Chino Hills



Technical Rescue Service Demand

Over the most recent three years, there were nine technical rescue incidents comprising 0.03 percent of total service demand for the same period, as summarized in Table 31.

Table 31—Technical Rescue Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Technical Rescue	2014	2	0	0	0	0	1	0	**3**	0.04%
	2015	1	0	0	0	1	1	0	**3**	0.03%
	2016	2	0	1	0	0	0	0	**3**	0.03%
Total		**5**	**0**	**1**	**0**	**1**	**2**	**0**	**9**	**0.03%**
Percent of Total Service Demand		0.10%	0.00%	0.06%	0.00%	0.02%	0.03%	0.00%	**0.03%**	

Source: Chino Valley Fire District incident records

As Table 31 shows, technical rescue service demand is very low, with Station 61 having the highest demand.

Probability of Occurrence

Table 32 summarizes Citygate's technical rescue probability scoring by planning zone based on service demand from Table 31.

Table 32—Technical Rescue Probability Scoring

Technical Rescue	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	2.5	1.25	2.25	1.25	2.25	2.25	1.25

Technical Rescue Impact Severity

Table 33 summarizes Citygate's scoring of probable technical rescue impact severity by planning zone.

Table 33—Technical Rescue Impact Severity Scoring

Technical Rescue	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Overall Technical Rescue Risk

Table 34 summarizes the District's overall technical rescue risk scores and ratings by planning zone.

Table 34—Overall Technical Rescue Risk

Technical Rescue	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	6.25	3.125	5.625	3.125	5.625	5.625	3.125
Risk Rating	*Moderate*	*Low*	*Moderate*	*Low*	*Moderate*	*Moderate*	*Low*

A.1.15 Aviation Risk

Aviation Risk Factors

Aviation risk factors include commercial airline passenger and commercial air cargo activity and/or commercial airship and general aviation activity into, from, and over a community or jurisdiction.

The Chino Airport, located in the southeastern area of the City of Chino, is a general aviation facility with a staffed Federal Aviation Administration control tower. In addition to being a leading Southern California general aviation facility with more than 175,000 flights annually, including light engine to heavy jet aircraft, the airport is home to three business aviation operations.

Aviation Risk Service Demand

Over the most recent three-year period, the District responded to four aviation-related incidents comprising less than .01 percent of total service demand for the same period, as summarized in Table 35.

Table 35—Aviation Risk Service Demand

Hazard	Year	Planning Zone							Total	Percent Total Service Demand
		Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67		
Aviation Risk	2014	0	0	0	0	0	0	0	**0**	0.00%
	2015	0	0	2	0	0	1	1	**4**	0.05%
	2016	0	0	0	0	0	0	0	**0**	0.00%
Total		**0**	**0**	**2**	**0**	**0**	**1**	**1**	**4**	**0.01%**
Percent of Total Service Demand		0.00%	0.00%	0.11%	0.00%	0.00%	0.02%	0.02%	**0.01%**	

Source: Chino Valley Fire District incident records

Probability of Occurrence

Table 36 summarizes Citygate's aviation incident probability scoring by planning zone based on service demand from Table 35.

Table 36—Aviation Incident Probability Scoring

Aviation Risk	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Probability Score	1.25	1.25	2.25	1.25	1.25	1.5	1.5

Aviation Risk Impact Severity

Table 37 summarizes Citygate's scoring of probable aviation incident impact severity by planning zone.

Table 37—Aviation Risk Impact Severity Scoring

Aviation Risk	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Impact Severity Score	2.25	2.25	2.25	2.25	2.25	2.25	2.25

Overall Aviation Risk

Table 38 summarizes the District's overall aviation risk scores and ratings by planning zone.

Table 38—Overall Aviation Risk

Aviation Risk	Planning Zone						
	Sta. 61	Sta. 62	Sta. 63	Sta. 64	Sta. 65	Sta. 66	Sta. 67
Total Risk Score	2.8125	2.8125	5.0625	2.8125	2.8125	3.375	3.375
Risk Rating	*Low*	*Low*	*Moderate*	*Low*	*Low*	*Low*	*Low*

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APPENDIX B—INCIDENT STATISTICAL ANALYSIS

Citygate Associates, LLC (Citygate) performed an in-depth analysis of incident response statistics for the Chino Valley Fire District (District) utilizing StatsFD. This analysis considered three years of data and is intended to identify broad trends and areas in need of additional study.

B.1 DATASET IDENTIFICATION

This section describes the sources and quality of data used in this study.

The District provided both NFIRS 5 incident and CAD apparatus response data for the period encompassing 1/1/2014 through 12/31/2016. NFIRS 5 data resulted in 32,335 incidents and 78,711 apparatus response records. Of the provided apparatus response records, 51,157 were Fire Department apparatus with the remainder being ambulance responses.

B.1.1 Data Quality

The District uses the current NFIRS 5 reporting standard.

Dataset strengths include:

- Use of seconds in time fields
- Multiple years of data available
- Standardized incident numbers in NFIRS 5 and apparatus response data
- Incident location geo-coordinates (latitude and longitude) are tracked in CAD data (99.99 percent geocoded).

Dataset weaknesses include:

- 5,085 records (15.73 percent of total) have no entry in the Station ID field, not including 322 incidents where the District provided aid to another agency.

B.1.2 Analysis Period

Data was assembled into the following calendar years:

- 2014
- 2015
- 2016

B.2 DEMAND FOR SERVICE

In 2016, the District responded to 11,465 incidents. During this period, the District had a daily demand of 31.41 incidents. Fire incidents formed 2.65 percent of responses, 73.74 percent were to EMS incidents, and 23.61 percent were to other incident types.

During this same period, there were 34,348 apparatus responses. This means there was an average of three apparatus responses per incident.

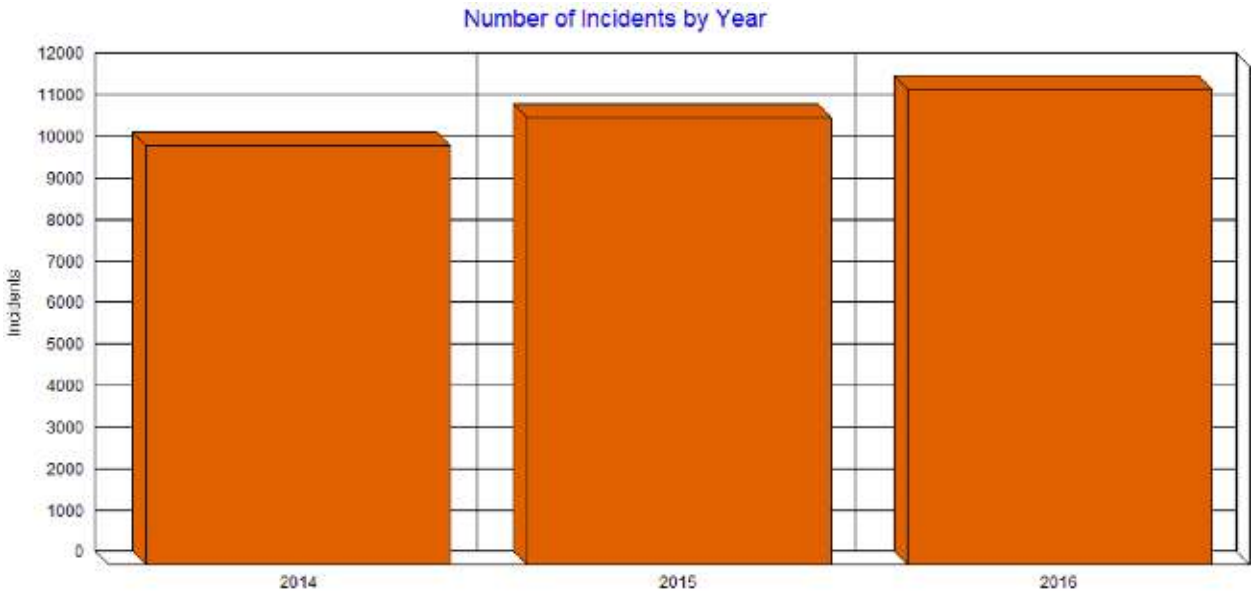
The District experienced a steady growth in the number of incidents from 2014 through 2016, averaging 6.6 percent annually.

Table 39—Annual Service Demand

Year	Incidents
2014	10,087
2015	10,783
2016	11,465
Total	**32,335**

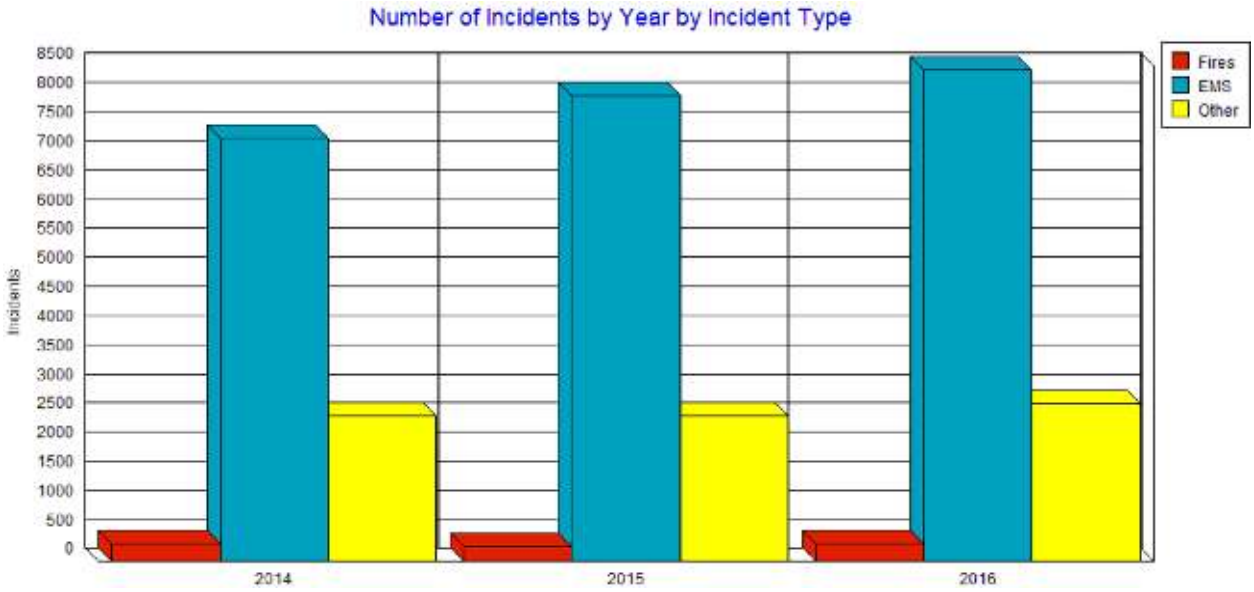
Source: Chino Valley Fire District incident records

Figure 12—Number of Incidents by Year



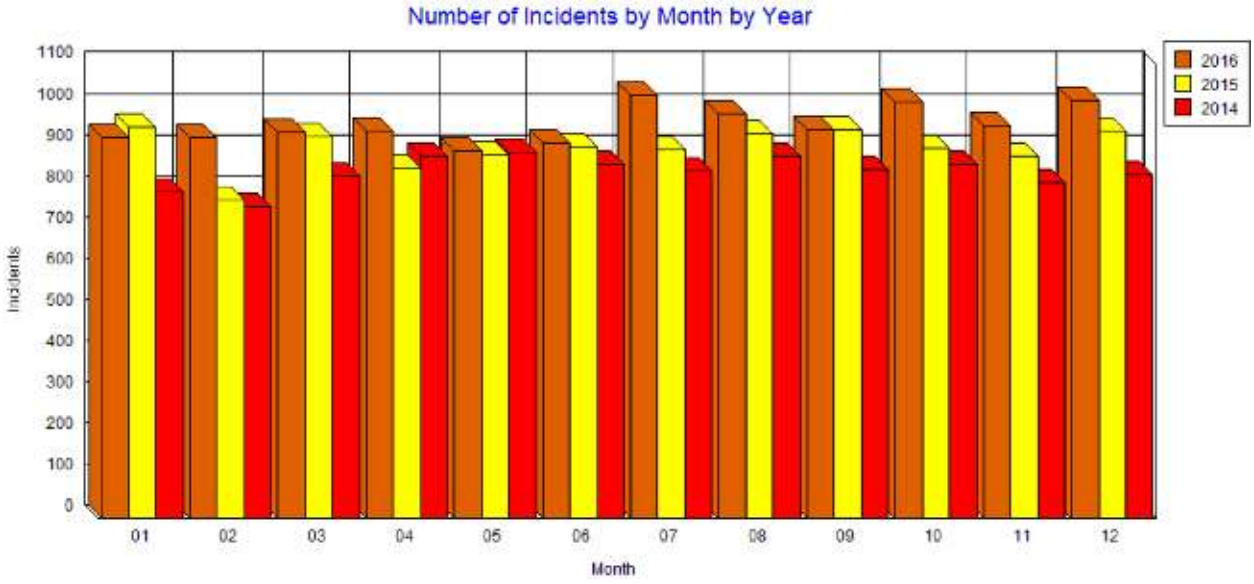
The following graph illustrates the number of incidents by incident type. The number of EMS incidents grew steadily from 2014 to 2016. Other incidents types grew slightly from 2015 to 2016.

Figure 13—Number of Incidents by Year by Incident Type



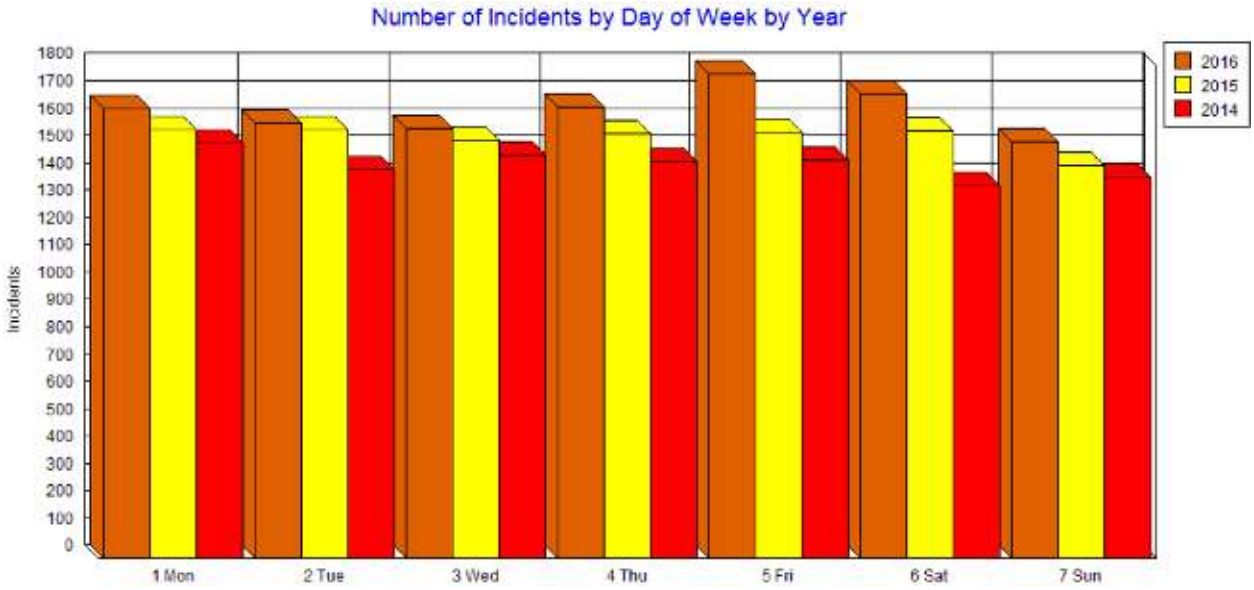
Service demand tends to be generally flat throughout the year.

Figure 14—Number of Incidents by Month by Year



Incident activity peaks on Friday, where the greatest increase in activity is visible from 2015 to 2016. There an obvious trend for increased activity from 2015 to 2016 every day of the week.

Figure 15—Number of Incidents by Day of Week by Year

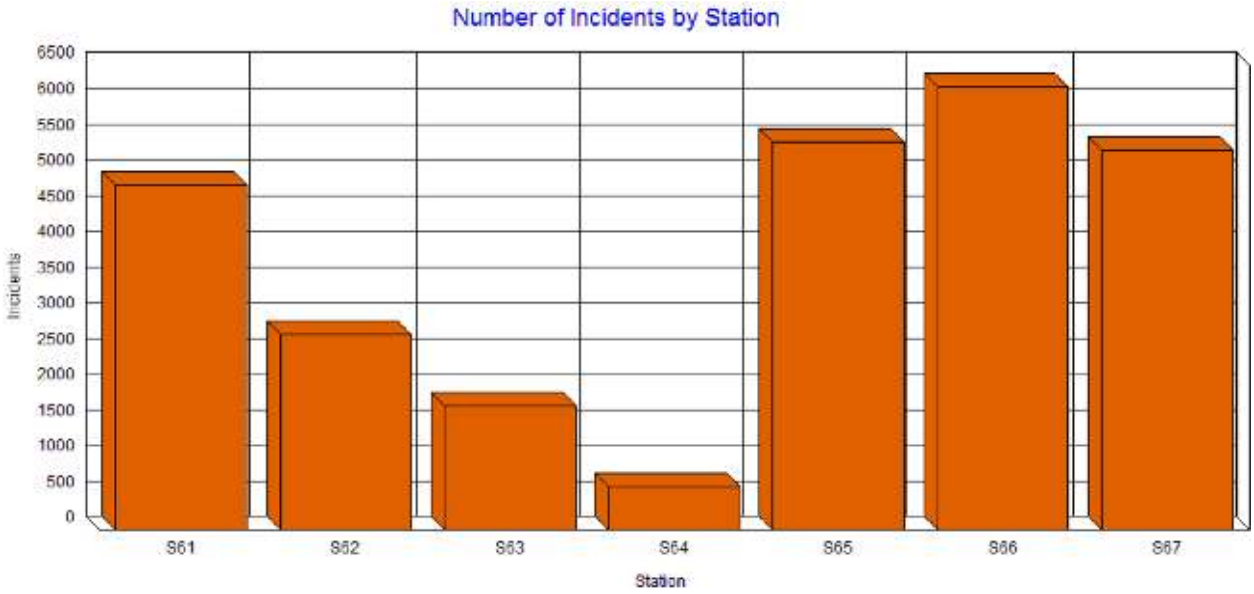


The following graph illustrates the breakdown of incidents by hour of the day by year. There is a substantial increase in the number of incidents in 2016 from 11:00 am into the early afternoon.

Figure 16—Number of Incidents by Hour of Day by Year

The following graph illustrates the number of incidents by station. Station 66 had the highest volume of activity. Station 64 had the lowest volume. Nearly 16 percent of all incidents did not include a station identifier.

Figure 17—Number of Incidents by Station



The following graph shows a breakdown of the number of incidents by station area by year. In 2016, incident activity increased dramatically in Station 65 and less dramatically in Stations 61, 62, and 67.

Figure 18—Number of Incidents by Station by Year

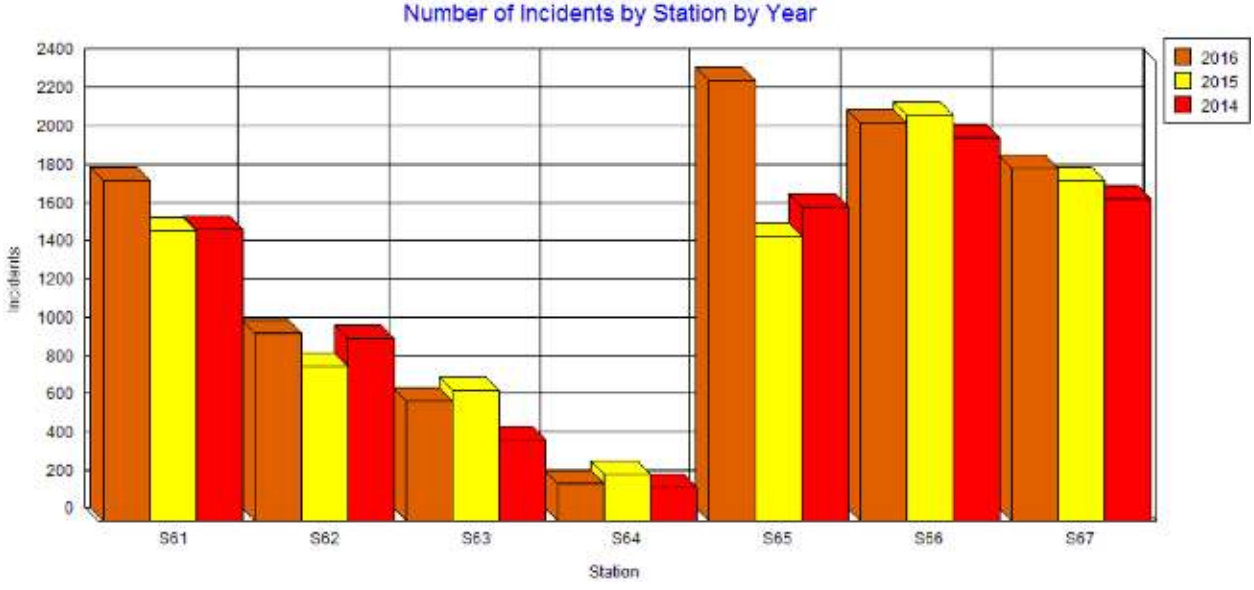


Table 40 shows hourly incident quantity by day of week for 2016. Green areas have the least activity. Red areas have the heaviest activity. The greatest incident activity is visible in the late morning through evening hours.

Table 40—Incidents: Quantity – Hour of Day and Day of Week – 2016

Hour	1 Mon	2 Tue	3 Wed	4 Thu	5 Fri	6 Sat	7 Sun	Total
00	31	38	36	40	39	43	45	**272**
01	29	30	26	32	32	55	52	**256**
02	26	23	27	33	43	42	40	**234**
03	36	26	27	27	33	31	28	**208**
04	29	23	22	26	30	30	36	**196**
05	41	37	39	36	30	33	33	**249**
06	43	43	35	49	42	55	29	**296**
07	64	60	68	71	55	46	49	**413**
08	77	76	75	102	71	55	55	**511**
09	99	98	74	84	96	76	77	**604**
10	103	87	90	84	78	64	73	**579**
11	87	107	89	115	111	110	86	**705**
12	76	93	93	114	103	89	102	**670**
13	95	91	91	99	111	99	85	**671**
14	103	99	98	80	105	95	70	**650**
15	89	83	85	81	101	74	86	**599**
16	94	90	83	95	95	89	85	**631**
17	98	83	106	100	102	97	80	**666**
18	92	101	88	82	107	97	74	**641**
19	79	85	73	90	87	99	81	**594**
20	82	71	76	69	85	100	95	**578**
21	72	60	59	57	71	90	68	**477**
22	54	41	59	45	82	58	55	**394**
23	46	50	54	42	64	73	42	**371**
Total	**1,645**	**1,595**	**1,573**	**1,653**	**1,773**	**1,700**	**1,526**	**11,465**

B.2.1 Incident Quantities by Incident Types

Table 41 lists the activity rankings of incidents by incident quantities. Notice the strong ranking for EMS incidents. Incidents cancelled en route also rank high on the list. Building fires rank in 21st place by volume.

Table 41—Incidents: Quantity – Year by Incident Type

Incident Type	2014	2015	2016	Total
321 EMS call, excluding vehicle accident with injury	6,391	6,976	7,483	**20,850**
611 Dispatched & canceled en route	571	637	695	**1,903**
322 Vehicle accident with injuries	425	538	594	**1,557**
622 No incident found on arrival of incident address	399	325	411	**1,135**
554 Assist invalid	166	228	335	**729**
324 Motor vehicle accident no injuries	172	221	213	**606**
553 Public service	181	193	178	**552**
311 Medical assist, assist EMS crew	229	164	72	**465**
735 Alarm system sounded due to malfunction	128	136	141	**405**
745 Alarm system sounded, no fire – unintentional	116	109	102	**327**
700 False alarm or false call, other	95	105	121	**321**
651 Smoke scare, odor of smoke	102	116	86	**304**
743 Smoke detector activation, no fire – unintentional	87	86	78	**251**
733 Smoke detector activation due to malfunction	73	49	56	**178**
151 Outside rubbish, trash or waste fire	63	56	42	**161**
552 Police matter	56	45	58	**159**
131 Passenger vehicle fire	53	43	42	**138**
444 Power line down	52	40	34	**126**
381 Rescue or EMS standby	15	50	48	**113**
118 Trash or rubbish fire, contained	33	33	41	**107**
111 Building fire	38	25	39	**102**
744 Detector activation, no fire – unintentional	32	31	38	**101**
511 Lock-out	34	29	29	**92**
412 Gas leak (natural gas or LPG)	28	35	29	**92**
113 Cooking fire, confined to container	28	30	30	**88**
323 Motor vehicle/pedestrian accident (MV Ped)	28	39	16	**83**
445 Arcing, shorted electrical equipment	35	18	26	**79**

Incident Type	2014	2015	2016	Total
143 Grass fire	16	21	33	**70**
741 Sprinkler activation, no fire – unintentional	28	18	21	**67**
551 Assist police or other governmental agency	20	25	17	**62**
142 Brush, or brush and grass mixture fire	17	20	18	**55**
522 Water or steam leak	15	21	18	**54**
561 Unauthorized burning	25	16	11	**52**
736 CO detector activation due to malfunction	17	18	14	**49**
531 Smoke or odor removal	16	15	14	**45**
671 Hazmat release investigation w/ no hazmat	16	15	6	**37**
411 Gasoline or other flammable liquid spill	11	13	11	**35**
463 Vehicle accident, general cleanup	19	9	6	**34**
714 Central station, malicious false alarm	2	19	12	**33**
521 Water evacuation	11	10	12	**33**
652 Steam, vapor, fog or dust thought to be smoke	11	12	9	**32**
571 Cover assignment, standby, moveup	9	7	12	**28**
424 Carbon monoxide incident	10	9	6	**25**
331 Lock-in (if lock-out, use 511)	9	7	9	**25**
653 Barbecue, tar kettle	12	7	5	**24**
32 Emergency medical service (EMS)	2	8	14	**24**
162 Outside equipment fire	7	8	9	**24**
731 Sprinkler activation due to malfunction	6	4	12	**22**
715 Local alarm system, malicious false alarm	10	4	6	**20**
711 Municipal alarm system, malicious false alarm	5	8	7	**20**
112 Fires in structures other than in a building	6	4	10	**20**
154 Dumpster or other outside trash receptacle fire	8	6	5	**19**
251 Excessive heat, scorch burns with no ignition	6	7	5	**18**
422 Chemical spill or leak	7	6	4	**17**
621 Wrong location	5	2	9	**16**
540 Animal problem, other	7	3	6	**16**
441 Heat from short circuit (wiring), defective/worn	9	1	6	**16**
161 Outside storage fire	5	5	6	**16**
746 Carbon monoxide detector activation, no CO	8	4	3	**15**
421 Chemical hazard (no spill or leak)	6	2	7	**15**

Incident Type	2014	2015	2016	Total
542 Animal rescue	7	4	3	**14**
541 Animal problem	10	4		**14**
132 Road freight or transport vehicle fire	5	4	4	**13**
413 Oil or other combustible liquid spill	6		6	**12**
721 Bomb scare – no bomb	2	7	2	**11**
661 EMS call, party transported by non-fire agency	5	4	2	**11**
442 Overheated motor	1	4	6	**11**
141 Forest, woods or wildland fire	1	4	6	**11**
471 Explosive, bomb removal (for bomb scare, use 721)	5	2	3	**10**
173 Cultivated trees or nursery stock fire	4	4	2	**10**
46 Accident, potential accident	2	3	4	**9**
712 Direct tie to FD, malicious/false alarm	3	5		**8**
911 Citizen complaint	3	2	2	**7**
742 Extinguishing system activation	5	2		**7**
734 Heat detector activation due to malfunction		3	4	**7**
732 Extinguishing system activation due to malfunction	2	2	3	**7**
481 Attempt to burn	2	3	2	**7**
11 Structure Fire			7	**7**
243 Fireworks explosion (no fire)	2	2	2	**6**
812 Flood assessment	2	2	1	**5**
641 Vicinity alarm (incident in other location)		4	1	**5**
171 Cultivated grain or crop fire	4	1		**5**
114 Chimney or flue fire, confined to chimney or flue	2	2	1	**5**
462 Aircraft standby		4		**4**
443 Light ballast breakdown	2		2	**4**
357 Extrication of victim(s) from machinery		1	3	**4**
123 Fire in portable building, fixed location	1	2	1	**4**
122 Fire in motor home, camper, recreational vehicle	1		3	**4**
713 Telephone, malicious false alarm	1	2		**3**
631 Authorized controlled burning	2	1		**3**
423 Refrigeration leak		1	2	**3**
353 Removal of victim(s) from stalled elevator		1	2	**3**
138 Off-road vehicle or heavy equipment fire	2	1		**3**

Incident Type	2014	2015	2016	Total
52 Water problem			2	**2**
512 Ring or jewelry removal		1	1	**2**
482 Threat to burn	1		1	**2**
461 Building or structure weakened or collapsed	1	1		**2**
231 Chemical reaction rupture of process vessel	2			**2**
223 Air or gas rupture of pressure or process vessel	1		1	**2**
163 Outside gas or vapor combustion explosion			2	**2**
152 Garbage dump or sanitary landfill fire	1	1		**2**
137 Camper or recreational vehicle (RV) fire	1		1	**2**
121 Fire in mobile home used as fixed residence	1	1		**2**
116 Fuel burner/boiler malfunction, fire confined	1		1	**2**
814 Lightning strike (no fire)		1		**1**
751 Biological hazard, malicious false report			1	**1**
355 Confined space rescue	1			**1**
354 Trench/below grade rescue	1			**1**
352 Extrication of victim(s) from vehicle	1			**1**
351 Extrication of victim(s) from building/structure		1		**1**
342 Search for person in water		1		**1**
341 Search for person on land		1		**1**
241 Munitions or bomb explosion (no fire)	1			**1**
222 Overpressure rupture of boiler from air or gas		1		**1**
211 Overpressure rupture of steam pipe or pipeline		1		**1**
153 Construction or demolition landfill fire			1	**1**
133 Rail vehicle fire	1			**1**
115 Incinerator overload or malfunction, fire confined		1		**1**
Total	**10,087**	**10,783**	**11,465**	**32,335**

B.2.2 Incident Quantities by Property Use

Table 42 illustrates the ranking of incidents by property use. The highest rankings for incidents by property use are residential dwellings.

Table 42—Incidents: Quantity – Year by Property Use

Property Use	2014	2015	2016	Total
419 1 or 2 family dwelling	4,079	4,125	4,451	**12,655**
429 Multifamily dwellings	709	755	822	**2,286**
960 Street, other	616	793	787	**2,196**
-Blank[1]-	507	572	589	**1,668**
439 Boarding/rooming house, residential hotels	356	523	505	**1,384**
961 Highway or divided highway	366	372	421	**1,159**
965 Vehicle parking area	291	335	326	**952**
361 Jail, prison (not juvenile)	234	276	356	**866**
962 Residential street, road or residential driveway	234	237	300	**771**
400 Residential, other	217	290	210	**717**
215 High school/junior high school/middle school	164	153	156	**473**
500 Mercantile, business, other	116	156	197	**469**
900 Outside or special property, other	98	175	173	**446**
963 Street or road in commercial area	137	146	138	**421**
331 Hospital – medical or psychiatric	129	122	141	**392**
161 Restaurant or cafeteria	112	98	145	**355**
891 Warehouse	107	86	112	**305**
311 24-hour care nursing homes, 4 or more persons	122	77	104	**303**
519 Food and beverage sales, grocery store	94	93	100	**287**
342 Doctor, dentist or oral surgeon's office	74	94	101	**269**
340 Clinics, doctors offices, hemodialysis centers	80	98	87	**265**
213 Elementary school, including kindergarten	94	75	77	**246**
131 Church, mosque, synagogue, temple, chapel	94	66	69	**229**
341 Clinic, clinic-type infirmary	65	90	50	**205**
449 Hotel/motel, commercial	61	45	79	**185**
700 Manufacturing, processing	50	62	56	**168**
571 Service station, gas station	44	43	67	**154**
599 Business office	44	58	39	**141**
110 Fixed use recreation places, other	59	38	44	**141**
931 Open land or field	48	39	53	**140**

Property Use	2014	2015	2016	Total
124 Playground	47	40	34	**121**
141 Athletic/health club	28	28	38	**94**
PROPERTY USE	35	39	20	**94**
539 Household goods, sales, repairs	25	27	37	**89**
882 Parking garage, general vehicle	23	22	34	**79**
888 Fire station	31	16	26	**73**
580 General retail, other	31	17	21	**69**
459 Residential board and care	20	19	24	**63**
581 Department or discount store	24	22	15	**61**
150 Public or government, other	22	14	24	**60**
549 Specialty shop	20	17	21	**58**
120 Variable use amusement, recreation places	10	23	23	**56**
321 Mental retardation/development disability facility	15	28	10	**53**
115 Roller rink: indoor or outdoor	9	20	24	**53**
160 Eating, drinking places	21	12	19	**52**
936 Vacant lot	16	20	11	**47**
323 Asylum, mental institution	11	3	30	**44**
162 Bar or nightclub	10	11	23	**44**
511 Convenience store	20	11	9	**40**
365 Police station	12	10	14	**36**
529 Textile, wearing apparel sales	13	11	11	**35**
100 Assembly, other	8	13	14	**35**
241 Adult education center, college classroom	9	14	11	**34**
592 Bank	12	11	9	**32**
183 Movie theater	7	13	10	**30**
343 Hemodialysis unit	12	8	9	**29**
121 Ballroom, gymnasium	8	15	5	**28**
300 Health care, detention, & correction, other	7	14	6	**27**
210 Schools, non-adult	7	10	9	**26**
211 Preschool	6	10	8	**24**
123 Stadium, arena	8	6	10	**24**
807 Outside material storage area	7	8	8	**23**
200 Educational, other	10	6	6	**22**
579 Motor vehicle or boat sales, services, repair	10	6	5	**21**
557 Personal service, including barber & beauty shops	6	9	5	**20**

Property Use	2014	2015	2016	Total
UUU Undetermined	3	10	6	**19**
142 Clubhouse	8	4	7	**19**
981 Construction site	6	10	2	**18**
140 Clubs, other	6	7	4	**17**
919 Dump, sanitary landfill	1	8	7	**16**
151 Library	4	7	5	**16**
819 Livestock, poultry storage	3	6	4	**13**
564 Laundry, dry cleaning	7	5	1	**13**
973 Aircraft taxi-way	4	5	3	**12**
938 Graded and cared-for plots of land	5	3	4	**12**
129 Amusement center: indoor/outdoor	2	4	6	**12**
669 Forest, timberland, woodland	3	5	2	**10**
974 Aircraft loading area	2	3	4	**9**
935 Campsite with utilities	3	4	2	**9**
800 Storage, other	2	2	5	**9**
655 Crops or orchard	5	3	1	**9**
363 Reformatory, juvenile detention center	5	2	2	**9**
116 Swimming facility: indoor or outdoor	4	3	2	**9**
984 Industrial plant yard – area	3	3	2	**8**
972 Aircraft runway	4	2	2	**8**
569 Professional supplies, services	2	3	3	**8**
559 Recreational, hobby, home repair sales, pet store	2	2	3	**7**
254 Day care, in commercial property	1	2	4	**7**
111 Bowling alley	2	3	2	**7**
647 Water utility	2	2	2	**6**
460 Dormitory type residence, other	6			**6**
173 Bus station	2	2	2	**6**
171 Airport passenger terminal	2	1	3	**6**
880 Vehicle storage, other	1		4	**5**
640 Utility or Distribution system, other		1	4	**5**
593 Office: veterinary or research	3	2		**5**
322 Alcohol or substance abuse recovery center	1	1	3	**5**
180 Studio/theater, other	2	2	1	**5**
NNN None		2	2	**4**
951 Railroad right of way	1	2	1	**4**

Property Use	2014	2015	2016	Total
940 Water area, other	1	1	2	**4**
642 Electrical distribution	2		2	**4**
596 Post office or mailing firms	1	1	2	**4**
152 Museum		3	1	**4**
122 Convention center, exhibition hall	2	2		**4**
926 Outbuilding, protective shelter	1		2	**3**
881 Parking garage, (detached residential garage)		2	1	**3**
648 Sanitation utility		2	1	**3**
130 Places of worship, funeral parlors		2	1	**3**
808 Outbuilding or shed			2	**2**
659 Livestock production	1		1	**2**
635 Computer center		1	1	**2**
610 Energy production plant, other	1		1	**2**
464 Barracks, dormitory	2			**2**
182 Auditorium or concert hall	1	1		**2**
114 Ice rink: indoor, outdoor	1		1	**2**
983 Pipeline, power line or other utility right of way			1	**1**
941 Open ocean, sea or tidal waters			1	**1**
922 Tunnel		1		**1**
849 Outside storage tank			1	**1**
644 Gas distribution, pipeline, gas distribution	1			**1**
639 Communications center			1	**1**
629 Laboratory or science laboratory		1		**1**
615 Electric generating plant	1			**1**
600 Utility, defense, agriculture, mining, other	1			**1**
181 Live performance theater	1			**1**
134 Funeral parlor	1			**1**
113 Electronic amusement center	1			**1**
Total	**10,087**	**10,783**	**11,465**	**32,335**

[1] No entry in report field

B.2.3 Dollar Loss Incidents

Table 43 breaks down the number of dollar loss incidents by year from 2014 through 2016. Station 66 has the greatest number of dollar loss fires, followed by Station 67. The second ranking for total dollar loss incidents occurred where the station of the incident was not recorded.

Table 43—Incidents: Quantity – Dollar Loss Incidents by Year by Station

Station	2014	2015	2016	Total
-Blank[1]-	21	22	14	**57**
S61	24	10	14	**48**
S62	15	10	13	**38**
S63	7	6	8	**21**
S64	1	1	1	**3**
S65	16	15	22	**53**
S66	25	23	30	**78**
S67	14	22	20	**56**
Total	**123**	**109**	**122**	**354**

[1] No entry in report field

Table 44 totals dollar loss by station area. It shows that Station 64 has consistently low dollar loss while Station 67 and Station 66 have generally consistent high dollar loss by year.

Table 44—Incidents: Total Dollar Loss by Year by Station

Station	2014	2015	2016	Total
-Blank[1]-	$1,091,100	$198,100	$64,600	**$1,353,800**
S61	$127,475	$342,150	$257,495	**$727,120**
S62	$208,030	$205,550	$36,900	**$450,480**
S63	$124,000	$411,600	$300,600	**$836,200**
S64	$1,200	$3,500	$2,100	**$6,800**
S65	$127,005	$129,100	$822,650	**$1,078,755**
S66	$137,115	$483,760	$984,280	**$1,605,155**
S67	$340,555	$1,086,300	$298,100	**$1,724,955**
Total	**$2,156,480**	**$2,860,060**	**$2,766,725**	**$7,783,265**

[1] No entry in report field

B.2.4 Simultaneous Analysis

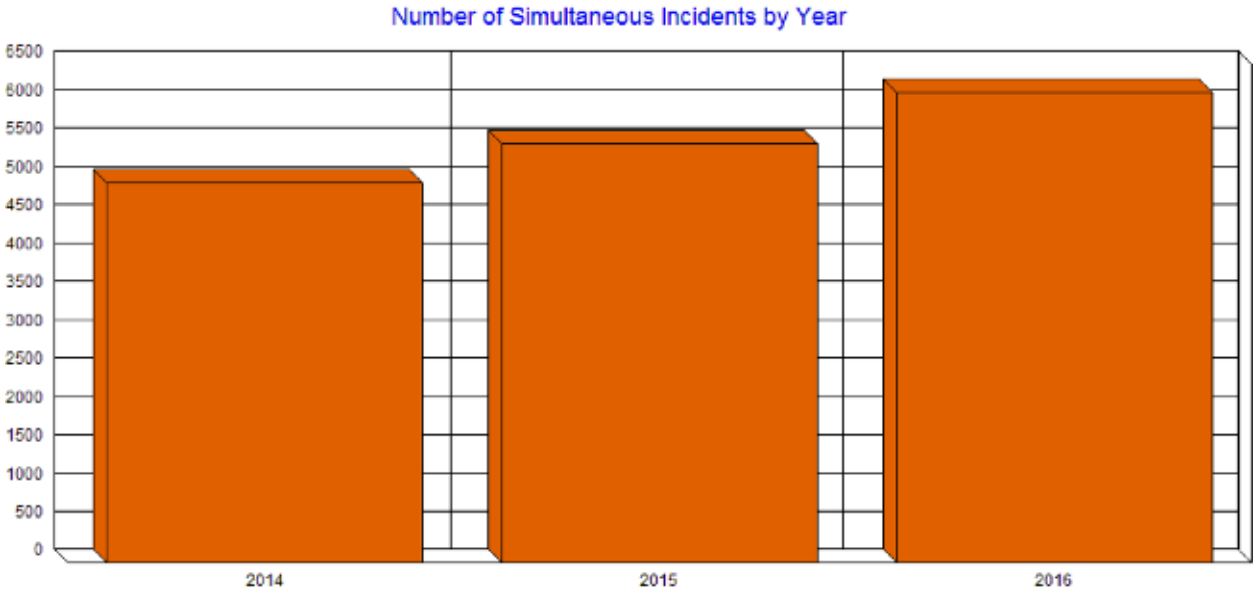
Simultaneous incidents occur when incidents are underway at the time a new incident begins. In the District during 2016, 53.49 percent of incidents occurred while one or more other incidents were underway.

The percentage of simultaneous incidents broken down by the number of simultaneous incidents is as follows:

- 1 or more simultaneous incidents: 53.49 percent
- 2 or more simultaneous incidents: 18.96 percent
- 3 or more simultaneous incidents: 05.21 percent
- 4 or more simultaneous incidents: 01.11 percent
- 5 or more simultaneous incidents: 00.22 percent

Figure 19 shows the number of simultaneous incidents is increasing steadily year to year.

Figure 19—Number of Simultaneous Incidents by Year



In a larger district, simultaneous incidents in different station areas have very little operational consequence. However, when simultaneous incidents occur within a single station area, there can be significant delays in response times.

Figure 20 illustrates the number of single-station simultaneous incidents by station area by year. There is a sharp increase in simultaneous incidents in 2016 in Stations 61, 65, and 66.

Figure 20—Number of Simultaneous Incidents by Station by Year

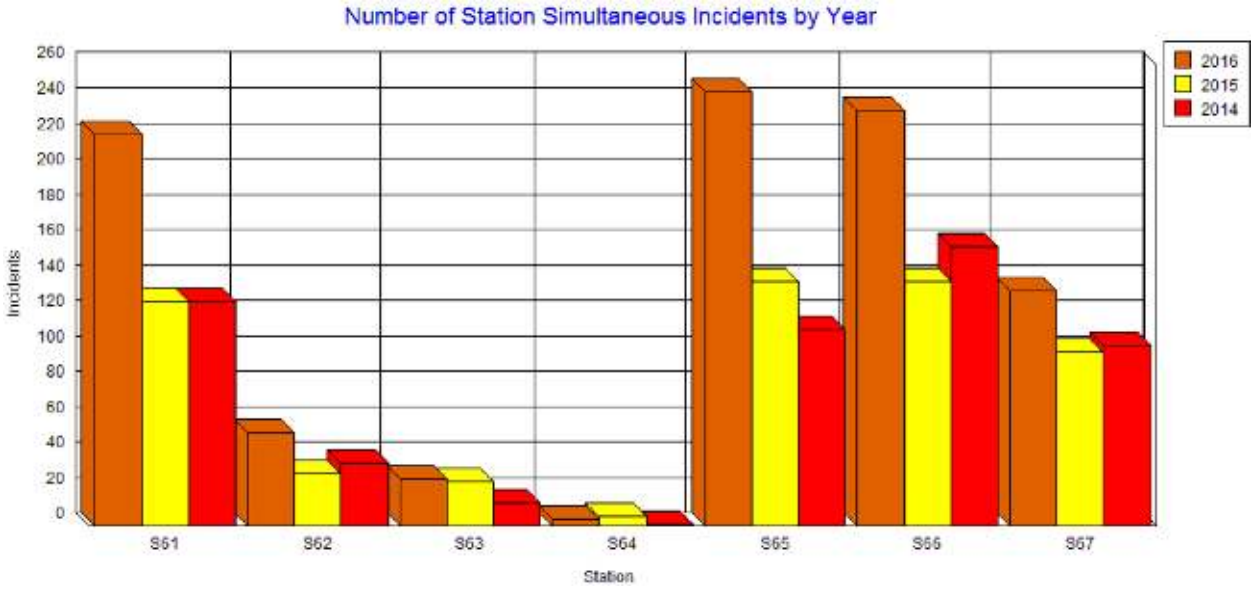


Table 45 illustrates 2016 station simultaneous activity by hour of day and day of week. The redder the cell the more likely there will be multiple simultaneous incidents within a single station area.

Table 45—Single-Station Simultanious Incidents by Hour of Day and Day of Week

Hour	1 Mon	2 Tue	3 Wed	4 Thu	5 Fri	6 Sat	7 Sun	Total
00	4	3	3	3	2	6	4	**25**
01	2	2	1	0	3	2	4	**14**
02	1	2	2	1	6	2	2	**16**
03	3	2	0	2	3	1	2	**13**
04	0	1	0	1	2	4	2	**10**
05	2	0	2	2	0	1	2	**9**
06	7	3	1	4	1	5	1	**22**
07	11	10	4	9	3	4	5	**46**
08	9	16	22	6	7	9	7	**76**
09	20	14	21	27	16	12	9	**119**
10	31	21	24	19	20	12	10	**137**
11	24	27	18	32	23	19	16	**159**
12	15	15	24	23	23	15	18	**133**
13	17	12	16	34	21	11	20	**131**
14	19	25	27	19	26	19	16	**151**
15	20	29	26	17	25	12	11	**140**
16	20	20	15	22	21	17	24	**139**
17	21	15	30	24	18	17	22	**147**
18	19	21	18	19	18	23	14	**132**
19	17	14	16	11	18	23	17	**116**
20	16	16	13	11	20	17	14	**107**
21	16	7	15	8	11	17	15	**89**
22	6	9	6	5	13	3	9	**51**
23	7	5	5	2	8	11	8	**46**
Total	**307**	**289**	**309**	**301**	**308**	**262**	**252**	**2,028**

B.2.5 Station Demand Percentage

Table 46 summaries overall activity percentages for 2016 by station. The percentage listed is the percentage likelihood a particular station is involved in an incident at any given hour. This number considers not only the number of incidents, but also the duration of incidents. The busiest stations are listed first.

No calculations could be made for 2016 incidents that were not assigned a station area.

Table 46—Station-Hour Demand

Hour	S66	S65	S61	S67	S62	S63	S64
00	7.67%	6.60%	5.39%	5.57%	3.74%	2.15%	0.99%
01	7.43%	7.97%	2.71%	6.08%	2.69%	2.30%	1.12%
02	6.03%	6.34%	3.92%	7.08%	2.42%	3.10%	1.11%
03	6.08%	7.95%	5.28%	6.48%	1.38%	1.89%	0.11%
04	5.86%	6.06%	3.36%	5.39%	2.93%	2.61%	0.31%
05	8.32%	5.84%	3.50%	5.41%	3.70%	4.72%	1.72%
06	8.19%	8.21%	5.85%	5.42%	3.07%	2.44%	1.43%
07	9.81%	10.20%	6.30%	8.41%	7.55%	6.49%	0.98%
08	14.43%	16.66%	10.69%	9.04%	8.77%	4.10%	0.60%
09	17.02%	14.81%	18.89%	11.94%	11.20%	3.36%	1.86%
10	17.14%	14.21%	14.34%	12.11%	7.55%	7.99%	1.86%
11	17.61%	18.34%	18.82%	13.62%	14.26%	6.30%	1.76%
12	24.17%	17.25%	14.28%	15.56%	9.41%	3.31%	2.57%
13	20.46%	18.71%	17.03%	18.63%	11.63%	4.77%	1.23%
14	21.71%	13.47%	15.42%	12.28%	6.81%	5.72%	0.57%
15	18.18%	19.61%	14.27%	9.66%	6.64%	5.03%	2.57%
16	20.38%	17.28%	11.76%	12.10%	6.88%	6.68%	1.56%
17	21.03%	16.48%	11.59%	13.12%	9.27%	6.43%	2.45%
18	15.19%	19.09%	14.46%	13.37%	10.29%	5.05%	1.55%
19	15.12%	17.76%	11.90%	13.19%	8.73%	4.67%	1.41%
20	16.66%	15.05%	13.51%	10.86%	14.03%	3.95%	2.59%
21	12.30%	13.39%	9.68%	11.20%	6.88%	3.38%	0.65%
22	12.08%	9.54%	6.96%	8.00%	5.08%	3.05%	0.61%
23	9.26%	11.02%	6.64%	8.92%	5.72%	2.30%	0.34%
Overall	**13.84%**	**12.99%**	**10.27%**	**10.14%**	**7.11%**	**4.24%**	**1.33%**
Runs	**2,081**	**2,305**	**1,781**	**1,849**	**981**	**633**	**197**

B.2.6 Apparatus Deployment

Table 47 illustrates primary apparatus responses for 2016. The far-left column shows the home station for primary apparatus resources. The top row identifies the station area where incidents have occurred. Multi-company stations will have multiple apparatus assigned under that Station ID.

Table 47 displays the number of station-assigned resources that responded to incidents in each station area. Highlighted cells indicate apparatus operating in their home station area. Notice that Station 61 apparatus operate in Station 67's area frequently, 639 times in 2016.

Table 47—Apparatus: Quantity – Assigned Station by Incident in Station

Station Area	S61	S62	S63	S64	S65	S66	S67	Total
S61	1,952	336	25	11	318	402	639	**3,683**
S62	154	1,646	42	12	32	153	46	**2,085**
S63	162	334	608	10	26	80	153	**1,373**
S64	34	40	4	190	18	110	13	**409**
S65	265	51	16	6	3,890	138	414	**4,780**
S66	264	237	20	79	214	3,383	69	**4,266**
S67	235	52	22	7	299	96	3,097	**3,808**
Total	**3,066**	**2,696**	**737**	**315**	**4,797**	**4,362**	**4,431**	**20,404**

Table 48 shows 90 percent travel time performance. When Station 61 resources respond into Station 67's territory, the 90 percent travel time is under 6:00 minutes. Home station responses (also highlighted) vary by 3:00 minutes from 5:22 minutes to 8:22 minutes.

Table 48—Apparatus: 90 Percent Performance Minutes – Assigned Station per Incident in Station

Station Area	S61	S62	S63	S64	S65	S66	S67
S61	06:04 (1,278)	09:22 (181)	12:28 (6)		07:24 (176)	07:22 (254)	05:59 (442)
S62	11:19 (50)	07:09 (1,286)	09:31 (12)	06:53 (1)	12:30 (14)	10:28 (74)	12:11 (24)
S63	13:06 (37)	11:25 (191)	07:07 (413)	05:52 (2)	19:10 (8)	15:13 (25)	11:31 (85)
S64	18:00 (6)	11:58 (19)	05:08 (1)	08:22 (114)	12:52 (8)	10:51 (63)	11:53 (6)
S65	10:43 (41)	08:46 (15)	03:09 (1)		05:42 (2,875)	08:38 (40)	07:29 (135)
S66	10:38 (58)	10:58 (108)	10:02 (3)	09:22 (4)	11:36 (88)	06:58 (2,485)	12:11 (24)
S67	10:00 (50)	11:33 (15)	08:44 (3)	06:18 (1)	07:39 (119)	08:45 (29)	05:22 (2,341)

B.2.7 Unit-Hour Utilization

The utilization percentage for apparatus is calculated by two primary factors: the number of responses and the duration of responses. Table 49 is a unit-hour utilization summary for District engine companies. The busiest engines are listed first.

Table 49—Unit-Hour Utilization – Engine Companies

Hour	ME65	ME66	ME61	ME67	ME62	ME63	ME64
00	6.42%	6.59%	4.95%	4.72%	3.73%	2.14%	0.99%
01	7.42%	6.41%	3.14%	5.59%	2.77%	2.41%	1.13%
02	5.87%	5.39%	3.80%	5.78%	2.37%	3.16%	0.28%
03	7.62%	5.95%	4.78%	5.71%	2.05%	2.03%	0.11%
04	5.70%	4.68%	3.11%	4.85%	3.12%	2.80%	0.41%
05	5.25%	7.23%	3.25%	4.53%	4.05%	4.26%	2.12%
06	7.28%	7.68%	5.40%	4.84%	3.35%	2.55%	2.16%
07	9.74%	9.15%	6.64%	7.49%	6.90%	7.08%	1.14%
08	16.63%	10.55%	12.31%	8.67%	8.46%	3.82%	0.97%
09	13.17%	12.71%	13.82%	9.99%	9.92%	3.45%	2.00%
10	12.33%	14.27%	14.20%	11.82%	7.81%	12.19%	2.65%
11	15.68%	14.94%	15.76%	11.53%	12.85%	7.11%	1.87%
12	14.43%	19.67%	13.09%	14.82%	9.09%	4.10%	2.07%
13	17.85%	16.40%	17.45%	23.99%	9.70%	6.17%	2.11%
14	13.26%	18.97%	16.11%	11.49%	6.83%	6.63%	1.58%
15	17.47%	13.58%	13.00%	10.84%	7.19%	5.85%	3.27%
16	15.48%	15.69%	10.33%	10.80%	7.64%	6.46%	1.82%
17	15.07%	17.35%	12.14%	12.79%	8.90%	7.62%	2.51%
18	19.45%	13.42%	14.14%	13.70%	7.26%	5.20%	1.66%
19	17.15%	12.73%	12.56%	10.90%	8.35%	4.91%	1.52%
20	12.55%	13.61%	12.04%	10.07%	7.67%	4.33%	2.46%
21	12.86%	10.40%	8.79%	9.37%	6.80%	3.65%	0.85%
22	8.95%	9.34%	6.44%	6.98%	4.64%	3.21%	0.50%
23	10.72%	8.42%	5.97%	6.72%	4.93%	2.17%	0.33%
Overall	**12.01%**	**11.46%**	**9.72%**	**9.50%**	**6.52%**	**4.72%**	**1.52%**
Runs	**2,499**	**2,256**	**1,930**	**2,116**	**1,138**	**737**	**315**

Table 50 illustrates a unit-hour utilization summary for the District's ladder company.

Table 50—Unit-Hour Utilization – Ladder Company

Hour	MT61
00	1.36%
01	0.83%
02	1.39%
03	2.07%
04	1.71%
05	2.23%
06	2.17%
07	3.24%
08	5.36%
09	3.65%
10	4.02%
11	6.26%
12	4.89%
13	6.44%
14	6.13%
15	4.88%
16	5.56%
17	6.25%
18	4.40%
19	5.00%
20	5.30%
21	2.96%
22	1.16%
23	2.25%
Overall	**3.73%**
Runs	**719**

Table 51 illustrates a unit-hour utilization summary for the District's medic squads.

Table 51—Unit-Hour Utilization – Medic Squads

Hour	MS66	MS65	MS67	MS62
00	11.55%	6.14%	9.17%	6.18%
01	9.54%	7.98%	8.55%	4.22%
02	10.07%	6.70%	9.58%	6.62%
03	5.56%	9.68%	8.84%	3.48%
04	8.55%	7.92%	7.75%	5.36%
05	9.83%	7.29%	7.20%	7.57%
06	12.31%	10.30%	8.37%	6.43%
07	16.75%	14.79%	11.38%	10.25%
08	19.51%	20.73%	14.48%	15.89%
09	25.08%	20.21%	19.78%	18.94%
10	22.23%	18.88%	17.09%	14.82%
11	23.29%	21.06%	24.52%	21.60%
12	30.31%	24.77%	21.51%	17.66%
13	22.34%	27.52%	20.32%	20.03%
14	25.71%	20.04%	19.59%	16.85%
15	22.67%	22.53%	18.77%	15.19%
16	24.30%	20.87%	20.81%	12.23%
17	29.40%	20.82%	20.33%	15.53%
18	19.35%	25.54%	20.12%	13.63%
19	21.17%	20.03%	19.66%	14.17%
20	20.65%	19.74%	17.88%	17.92%
21	18.80%	17.94%	14.86%	10.29%
22	15.39%	12.09%	11.87%	9.86%
23	10.25%	12.51%	14.57%	8.01%
Overall	**18.11%**	**16.50%**	**15.29%**	**12.20%**
Runs	**2,106**	**2,298**	**2,315**	**1,558**

B.2.8 Aid Activity with Other Jurisdictions

Table 52 shows aid activity for the three reporting years broken down by aid type. These numbers report data collected in the Aid section of NFIRS 5 data.

Table 52—Incidents: Quantity – Year by Aid Type

Aid Type	2014	2015	2016	Total
1 Received	11	9	17	37
2 Automatic Aid Received	34	18	23	75
3 Given	38	49	51	138
4 Automatic Aid Given	51	68	51	170
5 Other Aid Given	5	5	4	14
N None	9,948	10,634	11,319	31,901
Total	**10,087**	**10,783**	**11,465**	**32,335**

These figures show a fire department with very little aid activity.

B.2.9 Impact of Ambulance Apparatus

The operational description in previous sections has included ambulances. However, ambulance responses will be eliminated from the data set in sections to follow.

Of all incidents, 76.11 percent were to fire and EMS calls. Of those fire and EMS incidents, 3.5 percent had the ambulance arriving before any fire apparatus. This means, as far as distribution performance is concerned, ambulances have a minimal impact on performance.

Ambulances accounted for 35 percent of all apparatus responses during the three years of this analysis.

B.3 DISTRIBUTION PERFORMANCE

This section reports performance for the first apparatus to arrive on the scene of emergency incidents. Measurements are the number of minutes and seconds necessary for 90 percent completion of:

- Call Processing
- Turnout
- Travel
- Dispatch to Arrival
- Call to Arrival.

Each one of these components starts with a year-to-year comparison followed by a table displaying performance over incremental time segments. Finally, each section includes a graph breaking down the percentage of compliance with a stated goal by hour of day.

B.3.1 Call Processing

Call processing measures the time from the first incident timestamp until apparatus are notified of the request for assistance.

Table 53 shows call processing is just over 1:20 minutes for 90 percent compliance.

Table 53—Call Processing Analysis

Station	Overall	2014	2015	2016
Department-Wide	01:21 (20,213)	01:18 (6,223)	01:21 (6,564)	01:23 (7,426)
Station S61	01:24 (3,610)	01:20 (1,077)	01:24 (1,187)	01:28 (1,346)
Station S62	01:22 (2,072)	01:13 (703)	01:24 (600)	01:24 (769)
Station S63	01:26 (1,248)	01:28 (286)	01:24 (496)	01:23 (466)
Station S64	01:27 (429)	01:27 (131)	01:18 (168)	01:47 (130)
Station S65	01:21 (4,126)	01:17 (1,220)	01:23 (1,154)	01:24 (1,752)
Station S66	01:19 (4,706)	01:18 (1,556)	01:17 (1,624)	01:20 (1,526)
Station S67	01:17 (4,022)	01:14 (1,250)	01:17 (1,335)	01:19 (1,437)

Table 54 shows call processing performance in 15-second increments.

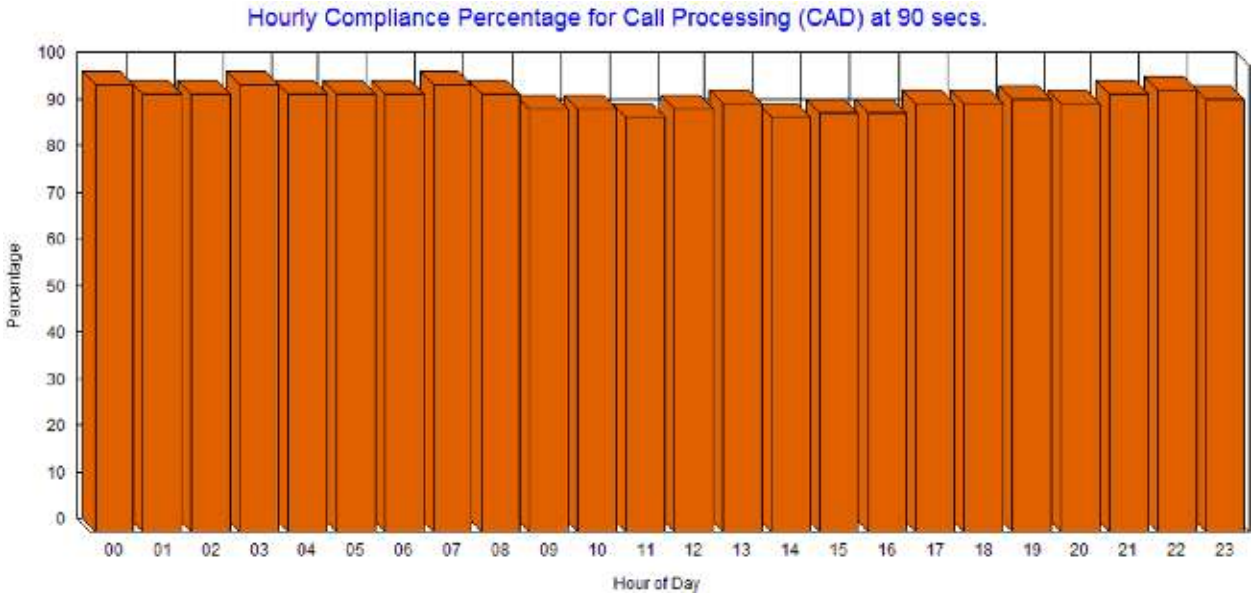
Table 54—Incidents: Call Processing (CAD) Analysis

Call Processing Time	Percentage
Call Processing (CAD) at 0000 Seconds	0.0% (0)
Call Processing (CAD) at 0015 Seconds	5.5% (1,111)
Call Processing (CAD) at 0030 Seconds	29.3% (5,928)
Call Processing (CAD) at 0045 Seconds	59.8% (12,095)
Call Processing (CAD) at ** 1 Minute **	79.5% (16,074)
Call Processing (CAD) at 0075 Seconds	88.2% (17,820)
Call Processing (CAD) at 0090 Seconds	92.2% (18,638)
Call Processing (CAD) at 0105 Seconds	94.5% (19,100)
Call Processing (CAD) at ** 2 Minutes **	96.0% (19,402)
Call Processing (CAD) at 0135 Seconds	97.1% (19,621)
Call Processing (CAD) at 0150 Seconds	97.7% (19,746)
Call Processing (CAD) at 0165 Seconds	98.2% (19,848)
Call Processing (CAD) at ** 3 Minutes **	98.6% (19,927)
Call Processing (CAD) at 0195 Seconds	98.9% (19,989)
Call Processing (CAD) at 0210 Seconds	99.2% (20,047)
Call Processing (CAD) at 0225 Seconds	99.4% (20,090)
Call Processing (CAD) at ** 4 Minutes **	99.5% (20,117)
Call Processing (CAD) at 0255 Seconds	99.6% (20,143)
Call Processing (CAD) at 0270 Seconds	99.8% (20,171)
Call Processing (CAD) at 0285 Seconds	99.9% (20,196)
Call Processing (CAD) at ** 5 Minutes **	100.0% (20,214)

* 212 records were ignored because of a zero time value.
* 161 records were ignored because they were more than the limit of 300 seconds.

Figure 21 is an hourly compliance graph revealing generally flat performance. A 90-second goal is used for call processing performance.

Figure 21—Hourly Compliance Percentage for Call Processing (CAD) at 90 Seconds



B.3.2 Turnout Time

Turnout time measures the time from apparatus notification until apparatus start traveling to the scene. A 2:00-minute goal is used for this measurement. Station 63 has consistently high turnout time while other stations come closer to meeting or performing better than the 2:00-minute goal. Station 61 is below 2:00 minutes for turnout.

Table 55—Turnout Time Analysis

Station	Overall	2014	2015	2016
Department-Wide	02:03 (19,890)	02:06 (6,119)	02:00 (6,446)	02:02 (7,325)
S61	01:59 (3,461)	02:03 (1,037)	01:53 (1,111)	02:00 (1,313)
S62	02:06 (2,057)	02:14 (701)	02:00 (596)	02:02 (760)
S63	02:17 (1,232)	02:15 (283)	02:16 (487)	02:19 (462)
S64	02:03 (425)	02:16 (134)	01:59 (163)	01:58 (128)
S65	02:05 (4,088)	01:59 (1,208)	02:03 (1,147)	02:11 (1,733)
S66	02:00 (4,630)	02:02 (1,511)	02:03 (1,613)	01:54 (1,506)
S67	02:00 (3,997)	02:08 (1,245)	01:54 (1,329)	01:56 (1,423)

The following table shows turnout time performance in 15-second increments.

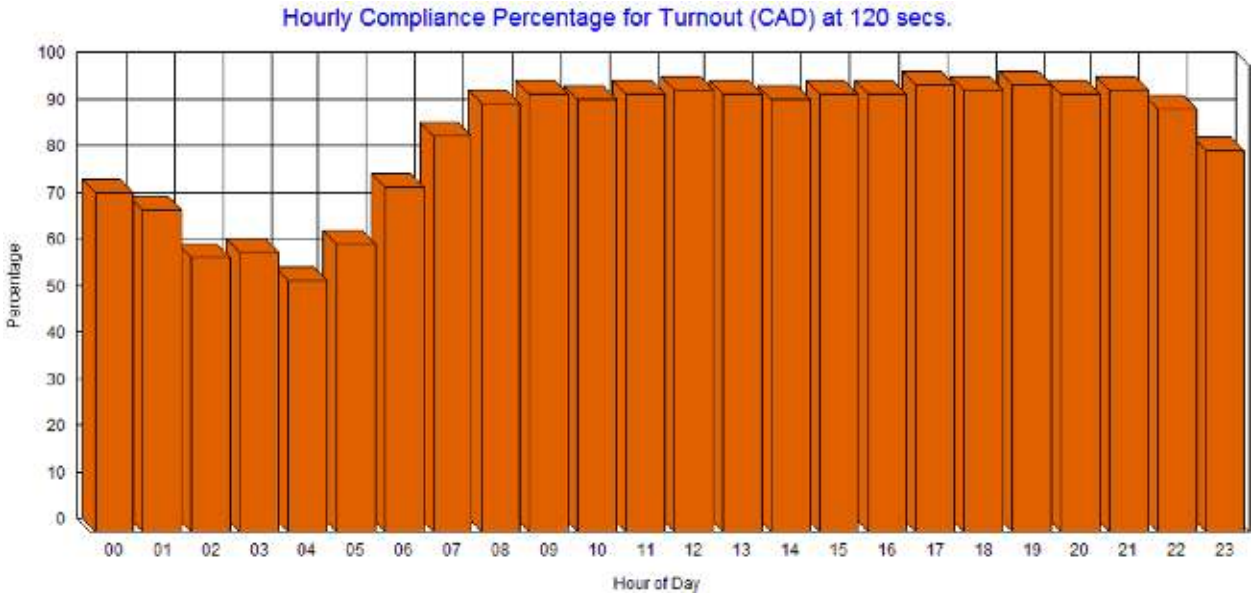
Table 56—Incidents: Turnout (CAD) Analysis

Turnout Time	Percentage
Turnout (CAD) at 0000 Seconds	0.0% (0)
Turnout (CAD) at 0015 Seconds	4.3% (858)
Turnout (CAD) at 0030 Seconds	9.6% (1,900)
Turnout (CAD) at 0045 Seconds	16.8% (3,334)
Turnout (CAD) at ** 1 Minute **	30.4% (6,046)
Turnout (CAD) at 0075 Seconds	48.2% (9,596)
Turnout (CAD) at 0090 Seconds	66.2% (13,160)
Turnout (CAD) at 0105 Seconds	80.5% (16,002)
Turnout (CAD) at ** 2 Minutes **	89.1% (17,725)
Turnout (CAD) at 0135 Seconds	94.0% (18,705)
Turnout (CAD) at 0150 Seconds	96.9% (19,272)
Turnout (CAD) at 0165 Seconds	98.2% (19,525)
Turnout (CAD) at ** 3 Minutes **	98.9% (19,663)
Turnout (CAD) at 0195 Seconds	99.3% (19,749)
Turnout (CAD) at 0210 Seconds	99.6% (19,801)
Turnout (CAD) at 0225 Seconds	99.7% (19,831)
Turnout (CAD) at ** 4 Minutes **	99.8% (19,849)
Turnout (CAD) at 0255 Seconds	99.9% (19,864)
Turnout (CAD) at 0270 Seconds	99.9% (19,878)
Turnout (CAD) at 0285 Seconds	100.0% (19,885)
Turnout (CAD) at ** 5 Minutes **	100.0% (19,890)

* 674 records were ignored because of a zero time value.
* 23 records were ignored because they were more than the limit of 300 seconds.

Figure 22 illustrates turnout time compliance with the 2:00-minute turnout time goal. There is a decrease in performance during early morning hours. This contrasts with performance well over 90 percent from 9:00 am through 10:00 pm.

Figure 22—Hourly Compliance Percentage for Turnout (CAD) at 120 Seconds



B.3.3 Travel Time

Travel time measures the time for an apparatus to travel to the scene of the emergency. In most urban and suburban fire departments, a 4:00-minute travel time 90 percent of the time would be considered highly desirable. Table 57 shows that no stations achieve that standard. Stations 65 and 67 have the best performance. Stations 63 and 64 have the greatest travel time challenge.

Table 57—Travel Time Analysis

Station	Overall	2014	2015	2016
Department-Wide	06:22 (19,749)	06:32 (6,091)	06:32 (6,415)	06:03 (7,243)
S61	06:14 (3,452)	06:35 (1,034)	06:30 (1,113)	05:43 (1,305)
S62	06:48 (2,048)	06:55 (694)	07:00 (600)	06:41 (754)
S63	07:32 (1,216)	07:42 (278)	07:25 (482)	07:32 (456)
S64	08:30 (422)	08:45 (132)	08:23 (164)	08:22 (126)
S65	05:31 (4,048)	05:59 (1,205)	05:33 (1,134)	05:08 (1,709)
S66	06:39 (4,607)	06:45 (1,505)	06:38 (1,602)	06:31 (1,500)
S67	05:17 (3,956)	05:27 (1,243)	05:37 (1,320)	04:46 (1,393)

Table 58 illustrates travel time performance in 15-second increments.

Table 58—Incidents: Travel (CAD) Analysis

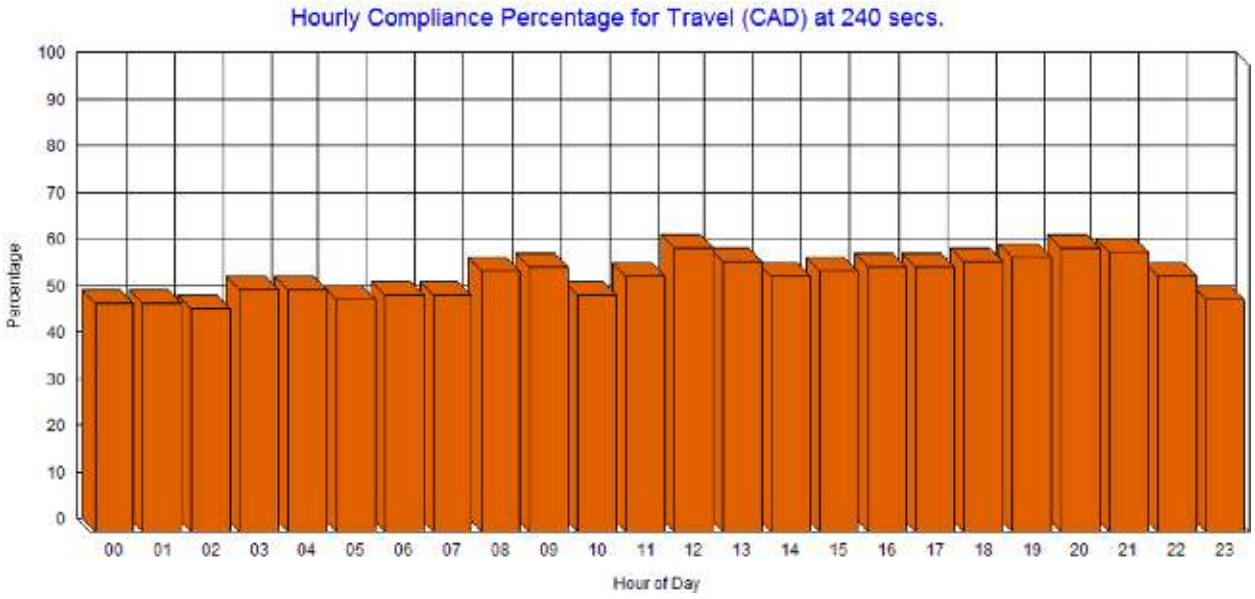
Travel Time	Percentage
Travel (CAD) at 0000 Seconds	0.0% (0)
Travel (CAD) at 0015 Seconds	.3% (52)
Travel (CAD) at 0030 Seconds	.5% (97)
Travel (CAD) at 0045 Seconds	.8% (157)
Travel (CAD) at ** 1 Minute **	1.3% (259)
Travel (CAD) at 0075 Seconds	2.2% (431)
Travel (CAD) at 0090 Seconds	3.7% (728)
Travel (CAD) at 0105 Seconds	5.5% (1,092)
Travel (CAD) at ** 2 Minutes **	8.3% (1,640)
Travel (CAD) at 0135 Seconds	11.6% (2,299)
Travel (CAD) at 0150 Seconds	16.2% (3,201)
Travel (CAD) at 0165 Seconds	21.8% (4,301)
Travel (CAD) at ** 3 Minutes **	28.2% (5,565)
Travel (CAD) at 0195 Seconds	35.1% (6,926)
Travel (CAD) at 0210 Seconds	42.2% (8,343)
Travel (CAD) at 0225 Seconds	48.9% (9,649)
Travel (CAD) at ** 4 Minutes **	55.6% (10,978)
Travel (CAD) at 0255 Seconds	61.7% (12,183)
Travel (CAD) at 0270 Seconds	67.1% (13,252)
Travel (CAD) at 0285 Seconds	71.6% (14,134)
Travel (CAD) at ** 5 Minutes **	75.5% (14,914)
Travel (CAD) at 0315 Seconds	79.1% (15,619)
Travel (CAD) at 0330 Seconds	82.1% (16,220)
Travel (CAD) at 0345 Seconds	84.8% (16,751)
Travel (CAD) at ** 6 Minutes **	87.2% (17,228)
Travel (CAD) at 0375 Seconds	89.2% (17,613)
Travel (CAD) at 0390 Seconds	90.9% (17,957)
Travel (CAD) at 0405 Seconds	92.4% (18,256)
Travel (CAD) at ** 7 Minutes **	93.7% (18,497)
Travel (CAD) at 0435 Seconds	94.6% (18,680)
Travel (CAD) at 0450 Seconds	95.4% (18,847)
Travel (CAD) at 0465 Seconds	96.1% (18,978)
Travel (CAD) at ** 8 Minutes **	96.7% (19,089)

Travel Time	Percentage
Travel (CAD) at 0495 Seconds	97.1% (19,178)
Travel (CAD) at 0510 Seconds	97.5% (19,256)
Travel (CAD) at 0525 Seconds	97.8% (19,323)
Travel (CAD) at ** 9 Minutes **	98.1% (19,373)
Travel (CAD) at 0555 Seconds	98.4% (19,426)
Travel (CAD) at 0570 Seconds	98.6% (19,465)
Travel (CAD) at 0585 Seconds	98.7% (19,493)
Travel (CAD) at ** 10 Minutes **	98.9% (19,525)
Travel (CAD) at 0615 Seconds	99.0% (19,550)
Travel (CAD) at 0630 Seconds	99.1% (19,566)
Travel (CAD) at 0645 Seconds	99.1% (19,582)
Travel (CAD) at ** 11 Minutes **	99.3% (19,605)
Travel (CAD) at 0675 Seconds	99.3% (19,621)
Travel (CAD) at 0690 Seconds	99.4% (19,640)
Travel (CAD) at 0705 Seconds	99.5% (19,654)
Travel (CAD) at ** 12 Minutes **	99.6% (19,663)
Travel (CAD) at 0735 Seconds	99.6% (19,669)
Travel (CAD) at 0750 Seconds	99.7% (19,684)
Travel (CAD) at 0765 Seconds	99.7% (19,694)
Travel (CAD) at ** 13 Minutes **	99.8% (19,704)
Travel (CAD) at 0795 Seconds	99.8% (19,710)
Travel (CAD) at 0810 Seconds	99.8% (19,718)
Travel (CAD) at 0825 Seconds	99.9% (19,726)
Travel (CAD) at ** 14 Minutes **	99.9% (19,733)
Travel (CAD) at 0855 Seconds	99.9% (19,738)
Travel (CAD) at 0870 Seconds	100.0% (19,742)
Travel (CAD) at 0885 Seconds	100.0% (19,743)
Travel (CAD) at ** 15 Minutes **	100.0% (19,750)

* 751 records were ignored because of a zero time value.
* 86 records were ignored because they were more than the limit of 900 seconds.

Figure 23 shows generally flat travel time performance during the day. The graph shows that morning rush hour traffic has a small influence and evening rush hour traffic has an undetectable influence on travel time performance.

Figure 23—Hourly Compliance Percentage for Travel (CAD) at 240 Seconds



B.3.4 Dispatch to Arrival

Dispatch to arrival measures time from apparatus dispatch until the apparatus arrives on the scene. A standard dispatch to arrival goal is 6:00 minutes or less (2:00-minute turnout + 4:00-minute travel). Table 59 shows that Department-wide performance fails to meet this goal.

Table 59—Dispatch to Arrival Time

Station	Overall	2014	2015	2016
Department-Wide	07:44 (20,097)	07:57 (6,182)	07:52 (6,529)	07:21 (7,386)
S61	07:33 (3,515)	07:47 (1,051)	07:47 (1,137)	07:00 (1,327)
S62	08:22 (2,074)	08:33 (705)	08:15 (605)	08:11 (764)
S63	09:10 (1,245)	09:21 (285)	09:06 (491)	09:09 (469)
S64	09:50 (429)	10:09 (133)	09:40 (166)	09:41 (130)
S65	06:53 (4,121)	07:17 (1,218)	07:02 (1,157)	06:28 (1,746)
S66	07:57 (4,675)	08:08 (1,526)	08:02 (1,627)	07:44 (1,522)
S67	06:37 (4,038)	06:49 (1,264)	06:52 (1,346)	06:10 (1,428)

The following table shows dispatch to arrival performance in 15-second increments.

Table 60—Incidents: Dispatch to Arrival (CAD) Analysis

Dispatch to Arrival Time	Percentage
Dispatch to Arrival (CAD) at 0000 Seconds	0.0% (0)
Dispatch to Arrival (CAD) at 0015 Seconds	0.3% (66)
Dispatch to Arrival (CAD) at 0030 Seconds	0.6% (112)
Dispatch to Arrival (CAD) at 0045 Seconds	0.8% (155)
Dispatch to Arrival (CAD) at ** 1 Minute **	1.0% (205)
Dispatch to Arrival (CAD) at 0075 Seconds	1.3% (255)
Dispatch to Arrival (CAD) at 0090 Seconds	1.6% (322)
Dispatch to Arrival (CAD) at 0105 Seconds	2.0% (404)
Dispatch to Arrival (CAD) at ** 2 Minutes **	2.5% (511)
Dispatch to Arrival (CAD) at 0135 Seconds	3.2% (637)
Dispatch to Arrival (CAD) at 0150 Seconds	4.2% (843)
Dispatch to Arrival (CAD) at 0165 Seconds	5.5% (1,111)
Dispatch to Arrival (CAD) at ** 3 Minutes **	7.3% (1,467)
Dispatch to Arrival (CAD) at 0195 Seconds	9.8% (1,971)
Dispatch to Arrival (CAD) at 0210 Seconds	13.0% (2,621)
Dispatch to Arrival (CAD) at 0225 Seconds	17.3% (3,476)
Dispatch to Arrival (CAD) at ** 4 Minutes **	22.5% (4,514)
Dispatch to Arrival (CAD) at 0255 Seconds	28.0% (5,633)
Dispatch to Arrival (CAD) at 0270 Seconds	34.4% (6,906)
Dispatch to Arrival (CAD) at 0285 Seconds	40.6% (8,169)
Dispatch to Arrival (CAD) at ** 5 Minutes **	47.2% (9,484)
Dispatch to Arrival (CAD) at 0315 Seconds	53.7% (10,788)
Dispatch to Arrival (CAD) at 0330 Seconds	59.8% (12,015)
Dispatch to Arrival (CAD) at 0345 Seconds	65.2% (13,096)
Dispatch to Arrival (CAD) at ** 6 Minutes **	69.9% (14,054)
Dispatch to Arrival (CAD) at 0375 Seconds	74.1% (14,882)
Dispatch to Arrival (CAD) at 0390 Seconds	77.7% (15,615)
Dispatch to Arrival (CAD) at 0405 Seconds	80.7% (16,222)
Dispatch to Arrival (CAD) at ** 7 Minutes **	83.6% (16,799)
Dispatch to Arrival (CAD) at 0435 Seconds	86.2% (17,318)

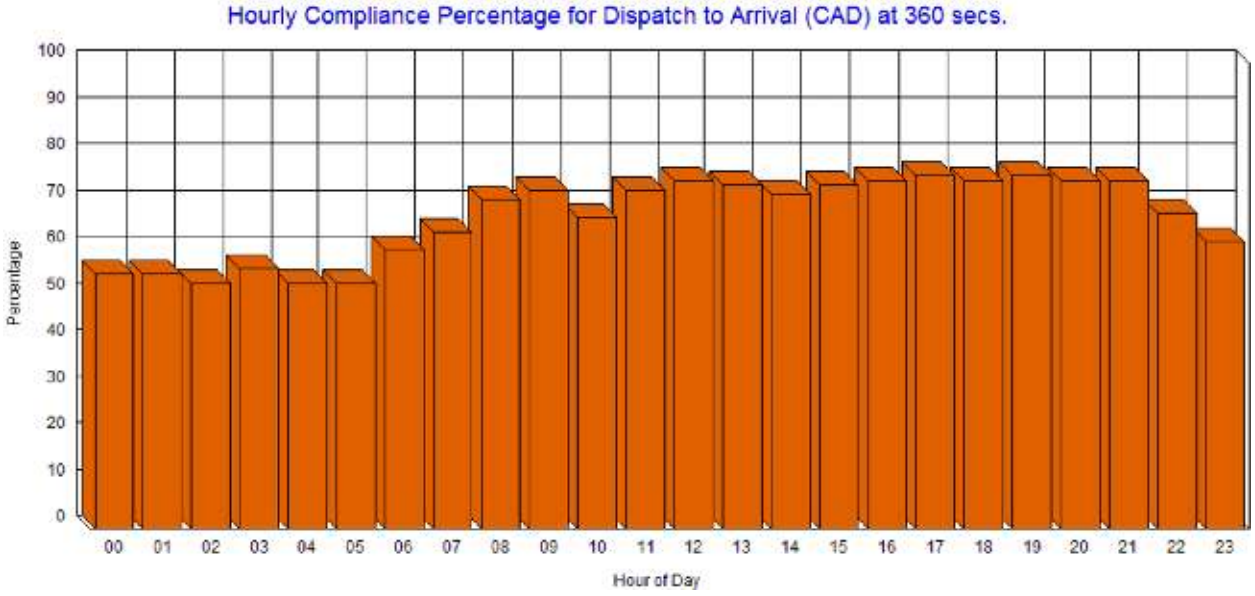
Dispatch to Arrival Time	Percentage
Dispatch to Arrival (CAD) at 0450 Seconds	88.3% (17,751)
Dispatch to Arrival (CAD) at 0465 Seconds	90.2% (18,123)
Dispatch to Arrival (CAD) at ** 8 Minutes **	91.7% (18,423)
Dispatch to Arrival (CAD) at 0495 Seconds	93.0% (18,689)
Dispatch to Arrival (CAD) at 0510 Seconds	94.0% (18,894)
Dispatch to Arrival (CAD) at 0525 Seconds	95.0% (19,090)
Dispatch to Arrival (CAD) at ** 9 Minutes **	95.7% (19,227)
Dispatch to Arrival (CAD) at 0555 Seconds	96.3% (19,349)
Dispatch to Arrival (CAD) at 0570 Seconds	96.7% (19,439)
Dispatch to Arrival (CAD) at 0585 Seconds	97.2% (19,526)
Dispatch to Arrival (CAD) at ** 10 Minutes **	97.5% (19,604)
Dispatch to Arrival (CAD) at 0615 Seconds	97.9% (19,674)
Dispatch to Arrival (CAD) at 0630 Seconds	98.1% (19,722)
Dispatch to Arrival (CAD) at 0645 Seconds	98.3% (19,764)
Dispatch to Arrival (CAD) at ** 11 Minutes **	98.5% (19,797)
Dispatch to Arrival (CAD) at 0675 Seconds	98.7% (19,832)
Dispatch to Arrival (CAD) at 0690 Seconds	98.8% (19,856)
Dispatch to Arrival (CAD) at 0705 Seconds	98.9% (19,873)
Dispatch to Arrival (CAD) at ** 12 Minutes **	99.0% (19,893)
Dispatch to Arrival (CAD) at 0735 Seconds	99.1% (19,913)
Dispatch to Arrival (CAD) at 0750 Seconds	99.2% (19,937)
Dispatch to Arrival (CAD) at 0765 Seconds	99.3% (19,956)
Dispatch to Arrival (CAD) at ** 13 Minutes **	99.4% (19,971)
Dispatch to Arrival (CAD) at 0795 Seconds	99.5% (19,987)
Dispatch to Arrival (CAD) at 0810 Seconds	99.5% (19,997)
Dispatch to Arrival (CAD) at 0825 Seconds	99.5% (20,004)
Dispatch to Arrival (CAD) at ** 14 Minutes **	99.6% (20,017)
Dispatch to Arrival (CAD) at 0855 Seconds	99.6% (20,025)
Dispatch to Arrival (CAD) at 0870 Seconds	99.7% (20,035)
Dispatch to Arrival (CAD) at 0885 Seconds	99.7% (20,038)
Dispatch to Arrival (CAD) at ** 15 Minutes **	99.7% (20,044)
Dispatch to Arrival (CAD) at 0915 Seconds	99.8% (20,048)
Dispatch to Arrival (CAD) at 0930 Seconds	99.8% (20,053)

Dispatch to Arrival Time	Percentage
Dispatch to Arrival (CAD) at 0945 Seconds	99.8% (20,058)
Dispatch to Arrival (CAD) at ** 16 Minutes **	99.8% (20,062)
Dispatch to Arrival (CAD) at 0975 Seconds	99.8% (20,065)
Dispatch to Arrival (CAD) at 0990 Seconds	99.9% (20,069)
Dispatch to Arrival (CAD) at 1005 Seconds	99.9% (20,073)
Dispatch to Arrival (CAD) at ** 17 Minutes **	99.9% (20,077)
Dispatch to Arrival (CAD) at 1035 Seconds	99.9% (20,081)
Dispatch to Arrival (CAD) at 1050 Seconds	99.9% (20,083)
Dispatch to Arrival (CAD) at 1065 Seconds	99.9% (20,083)
Dispatch to Arrival (CAD) at ** 18 Minutes **	99.9% (20,086)
Dispatch to Arrival (CAD) at 1095 Seconds	99.9% (20,086)
Dispatch to Arrival (CAD) at 1110 Seconds	100.0% (20,090)
Dispatch to Arrival (CAD) at 1125 Seconds	100.0% (20,092)
Dispatch to Arrival (CAD) at ** 19 Minutes **	100.0% (20,092)
Dispatch to Arrival (CAD) at 1155 Seconds	100.0% (20,093)
Dispatch to Arrival (CAD) at 1170 Seconds	100.0% (20,093)
Dispatch to Arrival (CAD) at 1185 Seconds	100.0% (20,095)
Dispatch to Arrival (CAD) at ** 20 Minutes **	100.0% (20,097)

* 454 records were ignored because of a zero time value.
* 36 records were ignored because they were more than the limit of 1,200 seconds.

Figure 24 illustrates an early morning decrease in dispatch to arrival compliance during the day.

Figure 24—Hourly Compliance Percentage for Dispatch to Arrival (CAD) at 360 Seconds



B.3.5 Call to Arrival

Call to arrival measures the time from the receipt of the request for assistance until the apparatus arrives on the scene. In the District, the call to arrival goal is 1:30 minutes for dispatch, plus 2:00 minutes for turnout, plus 4:00 minutes for travel, or 7:30 minutes. Station 67 just misses this goal by three seconds. Station 64 misses the goal by well over 3:00 minutes.

Table 61—Call to Arrival Time

Station	Overall	2014	2015	2016
Department-Wide	08:43 (20,403)	08:53 (6,316)	08:54 (6,620)	08:22 (7,467)
S61	08:36 (3,628)	08:53 (1,089)	08:54 (1,187)	08:03 (1,352)
S62	09:16 (2,093)	09:14 (714)	09:36 (609)	09:05 (770)
S63	10:16 (1,262)	10:26 (288)	10:04 (500)	10:22 (474)
S64	10:46 (433)	11:43 (134)	10:26 (169)	10:26 (130)
S65	07:56 (4,163)	08:19 (1,234)	08:01 (1,164)	07:35 (1,765)
S66	08:52 (4,741)	09:04 (1,572)	08:52 (1,640)	08:37 (1,529)
S67	07:33 (4,083)	07:43 (1,285)	07:52 (1,351)	07:02 (1,447)

The following table shows call to arrival processing performance in 15-second increments.

Table 62—Incidents: Call to First Arrival (CAD) Analysis

Call to First Arrival Time	Percentage
Call to 1st Arrival at 0000 Seconds	0.0% (0)
Call to 1st Arrival at 0015 Seconds	0.0% (4)
Call to 1st Arrival at 0030 Seconds	0.1% (19)
Call to 1st Arrival at 0045 Seconds	0.2% (35)
Call to 1st Arrival at ** 1 Minute **	0.2% (43)
Call to 1st Arrival at 0075 Seconds	0.3% (63)
Call to 1st Arrival at 0090 Seconds	0.4% (80)
Call to 1st Arrival at 0105 Seconds	0.5% (106)
Call to 1st Arrival at ** 2 Minutes **	0.7% (149)
Call to 1st Arrival at 0135 Seconds	1.1% (221)
Call to 1st Arrival at 0150 Seconds	1.4% (284)
Call to 1st Arrival at 0165 Seconds	1.9% (388)
Call to 1st Arrival at ** 3 Minutes **	2.6% (540)
Call to 1st Arrival at 0195 Seconds	3.7% (762)
Call to 1st Arrival at 0210 Seconds	5.2% (1,070)
Call to 1st Arrival at 0225 Seconds	7.3% (1,486)
Call to 1st Arrival at ** 4 Minutes **	10.2% (2,074)
Call to 1st Arrival at 0255 Seconds	13.8% (2,816)
Call to 1st Arrival at 0270 Seconds	18.0% (3,676)
Call to 1st Arrival at 0285 Seconds	23.3% (4,762)
Call to 1st Arrival at ** 5 Minutes **	28.8% (5,885)
Call to 1st Arrival at 0315 Seconds	34.8% (7,103)
Call to 1st Arrival at 0330 Seconds	41.0% (8,364)
Call to 1st Arrival at 0345 Seconds	47.2% (9,622)
Call to 1st Arrival at ** 6 Minutes **	52.7% (10,754)
Call to 1st Arrival at 0375 Seconds	58.4% (11,907)
Call to 1st Arrival at 0390 Seconds	63.6% (12,972)
Call to 1st Arrival at 0405 Seconds	68.4% (13,965)
Call to 1st Arrival at ** 7 Minutes **	72.5% (14,796)
Call to 1st Arrival at 0435 Seconds	76.2% (15,553)

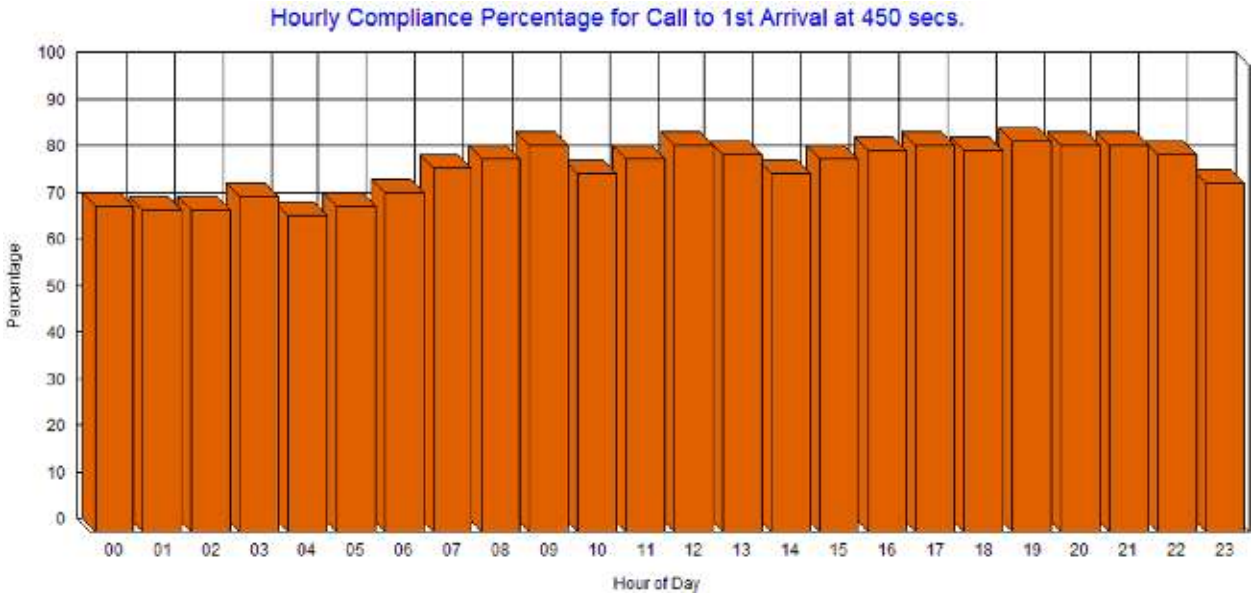
Call to First Arrival Time	Percentage
Call to 1st Arrival at 0450 Seconds	79.3% (16,183)
Call to 1st Arrival at 0465 Seconds	82.2% (16,763)
Call to 1st Arrival at ** 8 Minutes **	84.6% (17,268)
Call to 1st Arrival at 0495 Seconds	86.9% (17,731)
Call to 1st Arrival at 0510 Seconds	88.7% (18,096)
Call to 1st Arrival at 0525 Seconds	90.3% (18,421)
Call to 1st Arrival at ** 9 Minutes **	91.6% (18,697)
Call to 1st Arrival at 0555 Seconds	92.9% (18,950)
Call to 1st Arrival at 0570 Seconds	93.8% (19,132)
Call to 1st Arrival at 0585 Seconds	94.6% (19,307)
Call to 1st Arrival at ** 10 Minutes **	95.4% (19,461)
Call to 1st Arrival at 0615 Seconds	95.9% (19,564)
Call to 1st Arrival at 0630 Seconds	96.4% (19,677)
Call to 1st Arrival at 0645 Seconds	96.8% (19,760)
Call to 1st Arrival at ** 11 Minutes **	97.3% (19,848)
Call to 1st Arrival at 0675 Seconds	97.6% (19,909)
Call to 1st Arrival at 0690 Seconds	97.8% (19,956)
Call to 1st Arrival at 0705 Seconds	98.0% (20,005)
Call to 1st Arrival at ** 12 Minutes **	98.2% (20,037)
Call to 1st Arrival at 0735 Seconds	98.4% (20,071)
Call to 1st Arrival at 0750 Seconds	98.5% (20,102)
Call to 1st Arrival at 0765 Seconds	98.7% (20,132)
Call to 1st Arrival at ** 13 Minutes **	98.8% (20,159)
Call to 1st Arrival at 0795 Seconds	98.9% (20,182)
Call to 1st Arrival at 0810 Seconds	99.0% (20,191)
Call to 1st Arrival at 0825 Seconds	99.1% (20,214)
Call to 1st Arrival at ** 14 Minutes **	99.2% (20,233)
Call to 1st Arrival at 0855 Seconds	99.2% (20,248)
Call to 1st Arrival at 0870 Seconds	99.4% (20,271)
Call to 1st Arrival at 0885 Seconds	99.4% (20,282)
Call to 1st Arrival at ** 15 Minutes **	99.5% (20,292)
Call to 1st Arrival at 0915 Seconds	99.5% (20,300)
Call to 1st Arrival at 0930 Seconds	99.5% (20,311)

Call to First Arrival Time	Percentage
Call to 1st Arrival at 0945 Seconds	99.6% (20,320)
Call to 1st Arrival at ** 16 Minutes **	99.6% (20,326)
Call to 1st Arrival at 0975 Seconds	99.7% (20,335)
Call to 1st Arrival at 0990 Seconds	99.7% (20,343)
Call to 1st Arrival at 1005 Seconds	99.7% (20,349)
Call to 1st Arrival at ** 17 Minutes **	99.8% (20,356)
Call to 1st Arrival at 1035 Seconds	99.8% (20,362)
Call to 1st Arrival at 1050 Seconds	99.8% (20,372)
Call to 1st Arrival at 1065 Seconds	99.9% (20,374)
Call to 1st Arrival at ** 18 Minutes **	99.9% (20,379)
Call to 1st Arrival at 1095 Seconds	99.9% (20,379)
Call to 1st Arrival at 1110 Seconds	99.9% (20,384)
Call to 1st Arrival at 1125 Seconds	99.9% (20,385)
Call to 1st Arrival at ** 19 Minutes **	99.9% (20,390)
Call to 1st Arrival at 1155 Seconds	100.0% (20,394)
Call to 1st Arrival at 1170 Seconds	100.0% (20,396)
Call to 1st Arrival at 1185 Seconds	100.0% (20,402)
Call to 1st Arrival at ** 20 Minutes **	100.0% (20,403)

* 115 records were ignored because of a zero time value.
* 69 records were ignored because they were more than the limit of 1,200 seconds.

Figure 25 illustrates a roughly flat call to arrival performance with a slight decrease in compliance during early morning hours.

Figure 25—Hourly Compliance Percentage for Call to First Arrival (CAD) at 450 Seconds



B.3.6 Distribution Travel Time – Outside versus Home Resources by Station

StatsFD compares travel time to emergencies by home versus outside apparatus resource.

Table 63 shows that Station 61 first arrivals come from outside station areas 9.89 percent of the time. When outside resources arrive first in Station 61's territory, they arrive 13 seconds faster than home resources.

All other stations have outside resources arriving later than home resources. These arrival differences range from 52 seconds in Station 64 to almost 3:00 minutes in Station 63.

Table 63—Distribution Travel Time Analysis of Fire and EMS Responses

Station Area	1st Arrivals	Home Resources	Outside Resources	Outside Percent	Overall Travel	Home Travel	Outside Travel	Delta Home/Out
S61	4,245	3,825	420	9.89%	06:17 (4,108)	06:19 (3,711)	06:06 (397)	<0:13
S62	2,470	2,380	90	3.64%	06:55 (2,408)	06:51 (2,331)	08:30 (77)	1:39
S63	1,570	1,434	136	8.66%	07:20 (1,521)	07:03 (1,396)	09:56 (125)	2:53
S64	568	525	43	7.57%	08:27 (547)	08:22 (508)	09:14 (39)	0:52
S65	4,918	4,757	161	3.27%	05:40 (4,778)	05:34 (4,631)	07:19 (147)	1:45
S66	5,648	5,478	170	3.01%	06:49 (5,519)	06:44 (5,368)	08:07 (151)	1:23
S67	4,800	4,653	147	3.06%	05:26 (4,663)	05:23 (4,531)	06:20 (132)	0:57

B.3.7 Concentration Performance

Concentration measures the arrival of firefighting teams. Table 64 shows District fire apparatus arriving on the scene of incidents within each station area in 2016. This analysis measures the time difference between the arrivals of primary apparatus. In Station 61's territory, the second apparatus arrives within 1:36 minutes of the first apparatus arrival 90 percent of the time. Station 63 shows the greatest delta between first and second apparatus arrival at over 4:00 minutes.

Table 64—Concentration Travel Time Analysis of Fire and EMS Responses

Station Area	1st Arrivals	1st Travel	2nd Travel	3rd Travel	4th Travel	Delta 1st/2nd
S61	5,621	06:19 (4,180)	07:55 (1,135)	08:46 (89)	09:00 (45)	1:36
S62	3,452	06:58 (2,515)	09:02 (734)	10:15 (66)	11:19 (38)	2:04
S63	2,007	07:25 (1,540)	11:31 (321)	12:15 (38)	13:55 (20)	4:06
S64	695	08:28 (558)	10:53 (96)	10:55 (7)	13:27 (4)	2:25
S65	6,775	05:42 (4,869)	07:05 (1,565)	10:52 (84)	12:46 (39)	1:23
S66	7,389	06:52 (5,643)	08:53 (1,395)	10:02 (93)	10:56 (49)	2:01
S67	6,403	05:28 (4,739)	07:17 (1,288)	09:01 (107)	08:17 (67)	1:49

B.3.8 ERF Concentration Measurements

The Effective Response Force has been defined in two ways. The first is by response group. The response group measurement timestamps the arrival of four engines, one ladder, and one medic squad. During the three years of this study, there were 11 incidents that had that ERF deployment on the scene. Of those incidents, six were building fires. All six incidents were within Chino

Valley's jurisdiction. Of those in-jurisdiction building fires, five had the full assignment arrive on the scene after having been dispatched within 60 seconds. Of those five incidents, one was considered an outlier due to a 58:31 call to arrival time for the last unit.

The second measurement of ERF is by firefighters arriving on the scene. The firefighter measurement timestamps the arrival of 20 firefighters. During the three years of this study, there were 45 incidents that had 20 firefighters on the scene. Of those incidents, 26 were building fires. Of those, 25 incidents were within Chino Valley's jurisdiction. Of those 25 in-jurisdiction building fires, only seven had the full assignment arrive on the scene after having been dispatched within 60 seconds, with one incident excluded as an outlier.

The following tables show performance for this response group ERF deployment.

Table 65—Travel for ERF by Response Group

Station	Overall	2014	2015	2016
Department-Wide	10:40 (4)			10:40 (4)
S61	10:02 (2)			10:02 (2)
S62				
S63				
S64				
S65				
S66	10:40 (1)			10:40 (1)
S67	7:53 (1)			7:53 (1)

ERF incidents with travel or call to arrival times greater than 1,800 seconds have been eliminated as outliers.
ERF incidents with zero second travel or call to arrival times have been eliminated as outliers.
Example performance measurement: 02:44 (30,724)
The number in parentheses represents the number of records used for this calculation.
The higher the number used for the calculation, the more stable the calculation.
The lower the number used for the calculation, the more volatile the calculation.
Measurements based on 20 or fewer incidents can be very volatile.
Blank cells indicate no activity.
Blank cells indicate no incidents.

Table 66—Travel for ERF by Firefighter Quantity

Station	Overall	2014	2015	2016
Department-Wide	16:09 (7)	16:09 (3)	44:42 (3)	13:10 (1)
S61	07:29 (2)	07:29 (2)		
S62	09:52 (1)		09:52 (1)	
S63	16:09 (1)	16:09 (1)		
S64				
S65	07:36 (1)		07:36 (1)	
S66				
S67				

ERF incidents with travel or call to arrival times greater than 3,600 seconds have been eliminated as outliers.
ERF incidents with zero second travel or call to arrival times have been eliminated as outliers.
Example performance measurement: 02:44 (30,724)
The number in parentheses represents the number of records used for this calculation.
The higher the number used for the calculation, the more stable the calculation.
The lower the number used for the calculation, the more volatile the calculation.
Measurements based on 20 or fewer incidents can be very volatile.
Blank cells indicate no incidents.

Table 67—Call to Arrival ERF by Response Group

Station	Overall	2014	2015	2016
Department-Wide	12:05 (4)			12:05 (4)
S61	11:36 (2)			11:36 (2)
S62				
S63				
S64				
S65				
S66	12:05 (1)			12:05 (1)
S67	9:44 (1)			9:44 (1)

ERF incidents with travel or call to arrival times greater than 3,600 seconds have been eliminated as outliers.
ERF incidents with zero second travel or call to arrival times have been eliminated as outliers.
Example performance measurement: 02:44 (30,724)
The number in parentheses represents the number of records used for this calculation.
The higher the number used for the calculation, the more stable the calculation.
The lower the number used for the calculation, the more volatile the calculation.
Measurements based on 20 or fewer incidents can be very volatile.
Blank cells indicate no incidents.

Table 68—Call to Arrival ERF by Firefighter Quantity

Station	Overall	2014	2015	2016
Department-Wide	18:53 (7)	18:53 (3)	47:47 (3)	14:31 (1)
S61	08:58 (2)	08:58 (2)		
S62	12:08 (1)		12:08 (1)	
S63	18:53 (1)	18:53 (1)		
S64				
S65	09:42 (1)		09:42 (1)	
S66				
S67				

ERF incidents with travel or call to arrival times greater than 3,600 seconds have been eliminated as outliers.
ERF incidents with zero second travel or call to arrival times have been eliminated as outliers.
Example performance measurement: 02:44 (30,724)
The number in parentheses represents the number of records used for this calculation.
The higher the number used for the calculation, the more stable the calculation.
The lower the number used for the calculation, the more volatile the calculation.
Measurements based on 20 or fewer incidents can be very volatile.
Blank cells indicate no incidents.