1st Edition
July 2019

RINCON VALLEY FIRE DISTRICT Community Risk Assessment - Standards of Cover

RINCON VALLEY FIRE DISTRICT

Our Mission

Prepare, Prevent and Protect our Community from Harm

Acknowledgments

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Captain Scott Haller
Paramedic Chris Jaegers
Fire Chief Jayme Kahle
Steward Travis Mooney, VFFA
Captain Asa Pallette
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Message from the Chief

Fire Chief Jayme Kahle

When I thought about writing this introductory letter about RVFD's 1st Community Risk Assessment - Standards of Cover Document (CRA-SOC), all my thoughts are summarized by the word - WOW!

I found myself continuously saying Wow! during this process. My first wow moment came when we asked for help from our firefighters during the community risk assessment phase. We quickly were able to fill all our work committees of fire, EMS, and special operations with a diverse mix of our ranks. I was also wowed with the level of knowledge our firefighters have of the District's buildings and risk levels. We were able to identify not only the risk to our public, but the risks to our firefighters. Our groups quickly were able to draw upon their experiences and to analyze data to prepare a true risk assessment.

My second wow moment was when we dove a bit deeper into the data. Rincon has seen tremendous growth in terms of properties and lives requiring our protection. We've doubled our call volume in just six years. In the last three years alone, our call volume has increased by 23%. Despite the Great Recession of 2008, our number of residences have increased by 33%. Although our community is small, at 14,372 residents, Pima County expects our population to increase by 9% over the next five years. However, with the recently approved master planned community, Rocking K South, I believe our growth will be much higher. Rocking K is planning to build 3,680 homes. Phase 1 that is slated to start in 2019 will be approximately 1,500 homes.

My third wow moment was confirmation that we have an awesome community. We have an educated and supportive community. Over the two community input sessions, we had a great representation from our residents, and we gained valuable insight. After explaining some of the complexities of providing emergency services, our community was able to suggest solutions and challenge us to do better. However, our community also was willing to help us become better. Vail really is the jewel of Pima County.

My fourth wow was the large-scale risks that we could face. Without deeply and systematically analyzing the risk, it's easy to create a deployment plan that covers our typical incident. However, our public is paying us to shape our organization in a way that also can handle the large-scale incidents. We identified that we have a high hazardous materials risk given our railways, interstate highway, petroleum lines, and natural gas lines. We also identified the potential for swift water rescue. However, our staff determined that our largest scale incident would be that of a major wildfire incident and we need to further develop our resources to plan for that possibility.

My fifth wow was how important data is to our safety for both residents and firefighters. With data, we can tailor our response to ensure that we are providing the proper amount of resources to address the risk. With data, we can know what our risks are and better train our firefighters to improve their safety. With data, we discovered that our total response times were not meeting the community's expectations and that we need to improve. With data, we discovered that many of our calls are outside of our district (34%) and we need to change that.

My next wow moment came when Division Chief Gary West (retired) of Ironwood Strategic Solutions, agreed to help us with this process pro bono. Chief West has extensive experience with the CRA-SOC process since he led his former fire agency through this process three times and serves as an accreditation team leader/peer reviewer.

My last wow moment was when I witnessed all the hard work that our firefighters, staff and community did to make this a solid document. Our first CRA-SOC has allowed us to really look at the level of performance that our community needs and how our organization will have to prepare for expected growth.

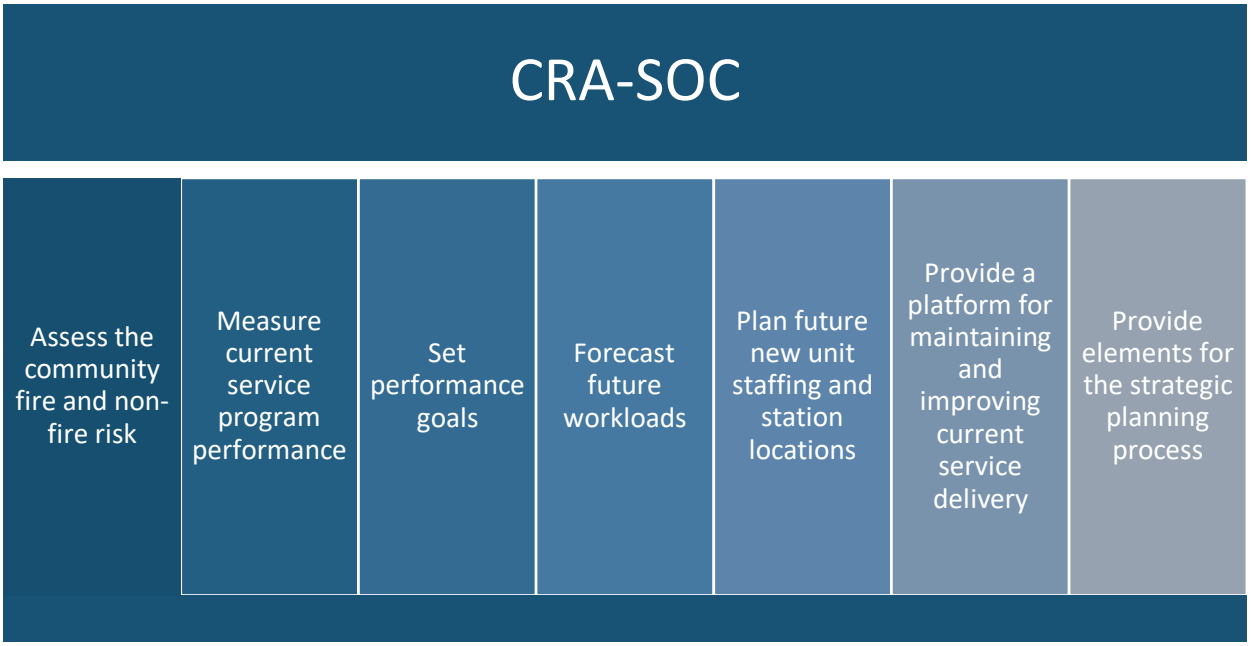
Wow, what an informative adventure it has been! We have a bright future. Our growth will enable us to add resources to improve firefighter and community safety. This process has already changed the way Rincon Valley deploys its resources and I know it will have an even bigger impact over the years. I can't wait to see how our organization will be transformed in 2024.

In Safety,

Jayme Kahle
Fire Chief

Introduction

This is the first edition of the Rincon Valley Fire District Community Risk Assessment and Standards of Cover (CRA-SOC). The purpose of the CRA-SOC is; 1) identify and assess risks specific to the citizens, visitors, and businesses of RVFD and 2) to allocate an effective and efficient distribution and concentration of resources to appropriately respond to and mitigate the identified risks. The following graphic describes in greater detail what the CRA-SOC allows the District to do.



The two core elements of this document can be defined in the following ways:[1]

- **Community Risk Assessment** is the evaluation of fire and non-fire hazards and risk, taking in to account all pertinent facts that increase or decrease risk in order to define standards of cover.
- **Standards of Cover** are those written policies and procedures that establish the distribution and concentration of fixed and mobile resources of an organization.

The development of this CRA-SOC generally followed the process as recommended by the Commission on Fire Accreditation International and the International Association of Fire Chiefs. *NFPA 1210, Standard for Providing Fire and Emergency Services to the Public* was referenced as a check and balance to compare RVFD's current service delivery organization structure against a consensus national standard. The development of a CRA-SOC by an

[1] Source: Fire and Emergency Service Self-Assessment Manual, 9th Edition. Commission on Fire Accreditation International.

organization often represents a paradigm shift from an intuitive based, reactionary decision-making process to a more methodical, data-based approach to providing services to the community.

The District utilized the resources of a CRA-SOC consultant to facilitate the process. The District also utilized in-district resources for various functions of the document. District and dispatch center databases were used to analyze response time data and a GIS consultant was retained for GIS information and relevant maps. In addition, local and federal databases were consulted for demographic and other relevant information.

As part of the CRA-SOC development process, community and internal stakeholder input was a priority. Two external stakeholder sessions were held and four internal teams were formed. They met several times to give input into the process.

Section 1 provides an overview of how RVFD is managed and funded as well as community characteristics such as population density and geographical features. Section 2 is a brief discussion of the different service programs currently delivered. Section 3 represents the community risk assessment portion of the document and includes assessment of large-scale risks such a major hazmat event. It also details the five emergency service programs that RVFD is responsible for delivering. Resulting from the risk assessment of these programs is the development of critical tasks and the associated effective response forces designed to mitigate the identified risks.

Section 4 describes the current deployment of fixed and mobile resources and performance of emergency services provided, with an emphasis on response time elements. Section 5 provides an evaluation of the current deployment and performance, based on internal and community expectations. Section 6 presents the District's six step plan for improving and maintaining response capabilities. The last section, Section 7, lists key findings resulting from the development of the CRA-SOC and associated recommendations.

> *I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.*
>
> - Lord Kelvin, famous physicist
> 1824-1907

Section 1

District Area Characteristics

Legal Basis for Existence and Description of Governance Model

Rincon Valley Fire District (RVFD) was formed in 1984 by residents living in the southeast unincorporated Tucson area. The Pima County Board of Supervisors officially approved the formation of RVFD on October 31, 1984 under resolution 1984-274. The District operates under the requirements of Arizona Revised Statutes (ARS) §48-803, §48-804, and §48-805.[2] RVFD is administrated and directed by five elected board members who serve staggered four-year terms. The Governing Board approves an annual budget, reviews and approves policies, and reviews and approves services provided by the District. ARS §48-804 requires that the Governing Board meet monthly. The Governing Board meets the third Thursday of each month. Meetings are open to the public. Rincon Valley Fire District operates under the guidance of mission, vision, and values statements (Appendix A). These statements provide the foundation for the development of the District's Strategic Plan as well as for daily operations.

District History

The Rincon Valley Fire District serves the area commonly known as Vail, Arizona. Locals often use the name "Vail" to refer to a loosely organized bedroom community nestled between the Rincon Mountains to the north, the Santa Rita mountains to the south, and the City of Tucson to the west. The District covers most of the Vail and Rincon Valley census designated areas. It is named for the Rincon Valley, an area centered on the Rincon Creek located at the northern end of the District's service area.

The Vail area was home to the Hohokam, and later the Tohono O'odham, Sobaipuri O'odham, and Apache. Many of their trails evolved into early transportation routes established by the Mormon Battalion, Butterfield Overland Mail Route, and Southern Pacific Railroad.

The town is named for Walter and Edward Vail — late 20th Century ranchers. Walter Vail owned the Empire Ranch, a vast cattle operation that stretched from the Rincon Mountains to nearly the Mexican border. Edward Vail operated the Vail Ranch in the Santa Rita Mountains

[2] These Arizona Revised Statutes may be viewed at https://www.azleg.gov/arsDetail/?title=48

west of the Empire Ranch. Cattle ranching and mining dominated the late 19th and early 20th century economy.

Vail began in 1880 as a Southern Pacific Railroad (SPRR) siding, a location with a spur track so that east and westbound trains could pass. As the SPRR (now Union Pacific Railroad) built the main rail line across Arizona, easements were negotiated with property owners including Walter Vail. The Vail community was an SPRR service point populated by railroad employees and their families. It was a gathering and business hub for ranchers and homesteaders in the area. Despite several incorporation efforts, Vail has never incorporated.

In 1898, the Helvetia Mining Company built a road to Vail to transport copper ore for shipment on the railroad, ushering in Vail's "boom time." The SPRR built a passenger depot. U.S. Postal Service was established and Vail became a hub for local stage companies shuttling people to and from mining camps. Copper ore arrived daily on lumbering freight wagons to be loaded onto the train at Vail.

Vail took on the nickname "The Town Between the Tracks" when the El Paso & Southwestern Railroad built a second rail line through the area, about 500 feet to the south.

The population of Vail has expanded and decreased throughout its history. Currently Vail is in a period of substantial growth. The expansion of nearby business activity in Pima, Santa Cruz, and Cochise counties has created demand for housing.

Ranching no longer drives the region's economy; however transportation and mining remain vital. And while the train no longer stops in Vail, both Union Pacific lines carry millions of dollars in goods through the area daily. The old coach routes were replaced by U.S. Route 80, which has in turn been replaced by Interstate 10. Vail attracts retirees, families drawn by the Vail Unified School District, and employees of nearby industry, including Raytheon, IBM, the University of Arizona Tech Park, the Port of Tucson, and mining operations. Vail's proximity to major employee centers creates a need for conveniently located housing.

The Vail area has struggled to develop enough services to meet the demands of the growing population. The Vail School District has expanded from a small two-room schoolhouse to a twenty-school district with thousands of students. Churches have expanded and proliferated. Retail and medical services have moved into the area.

The Rincon Valley Fire District was created by a local election in November 1984. After several tragic incidents, residents identified the need for fire and medical services. Prior to the creation of the District, Kord's Ambulance Company provided ambulance coverage and patients would need to wait for an ambulance to arrive from Tucson.

Provision of service started on January 1, 1985. The District deployed 12 volunteer responders, and apparatus were parked on the property of residents. No taxes were initially levied, and Pima County partially subsidized the effort. Ambulance service has always figured prominently in the District's service delivery plan. The District obtained a Certificate of Necessity from the State of Arizona Department of Health Services during its first year of operation. The District began providing advanced life support services in 1986.

As the community grew, so did demand for service and in 1986 the District hired its first two career firefighters. It also established its first facility, located in the Rocking K Ranch area. Keeping pace with growth, the District moved to a new facility in 1988 and again in 2001.

As the community swelled, the nature of the population and building types changed. Ranches and custom homes on large lots gave way to higher density suburban style housing. Antler Crest, built around 1999, was the first neighborhood with fire hydrants. It was the first example of the new tract home style of building in the area.

Rincon Valley Fire District adapted and expanded along with the community. It developed services in additional disciplines. Due to the semirural nature of the community, the District began providing wildland firefighting in the 1990s. Education and prevention services, including CPR/first aid training and fire/injury prevention education, took on a more prominent role. As resources became available, the District also began providing hazardous material and technical rescue response in the 2000s.

The community's population continued to grow and relying on a largely volunteer workforce became impractical. The District transitioned to a career only workforce in the early 2000s. In 2005, the District expanded to the south necessitating a second station. The new station housed additional companies that required additional firefighters. This led to the District's single largest hiring to date.

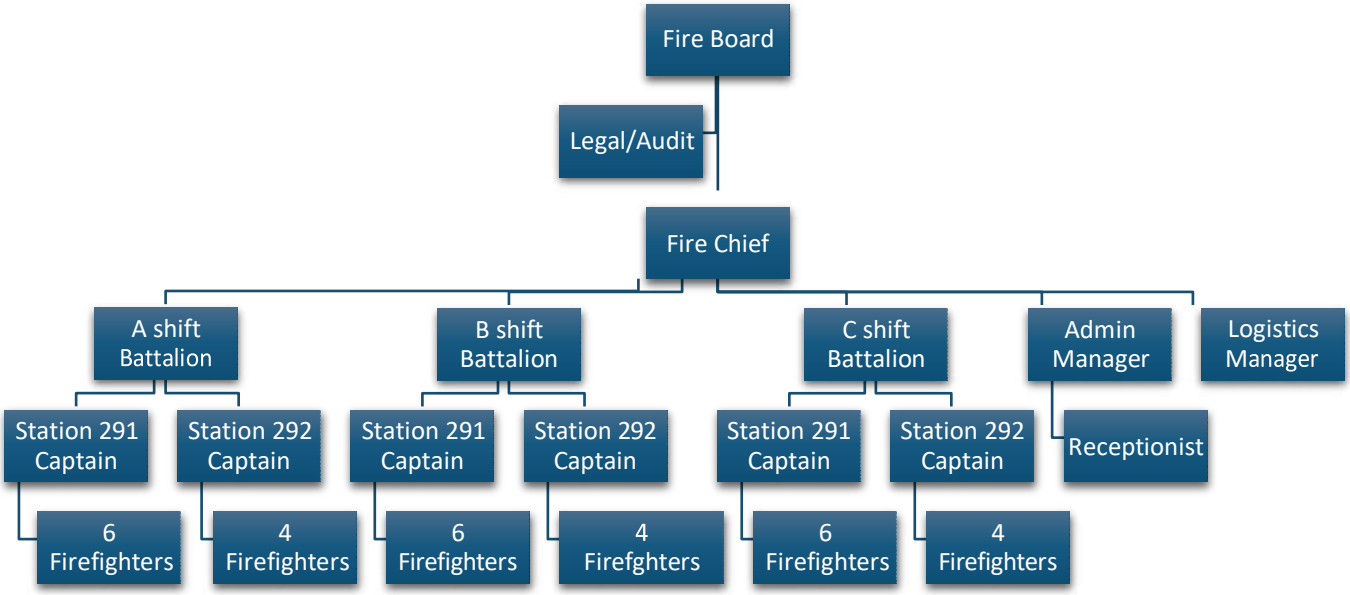
The District now has over 14,000 residents served by two stations with 40 uniformed and three staff personnel. The population and associated community activity continue to grow at an

increasingly rapid pace and the District continues to grow and adapt to provide the best service possible.

ORGANIZATIONAL OVERVIEW

Rincon Valley Fire District has a chief administrative officer (Fire Chief) who serves the Governing Board on a contractual basis. The overall organization of the District is illustrated in Figure 1.1

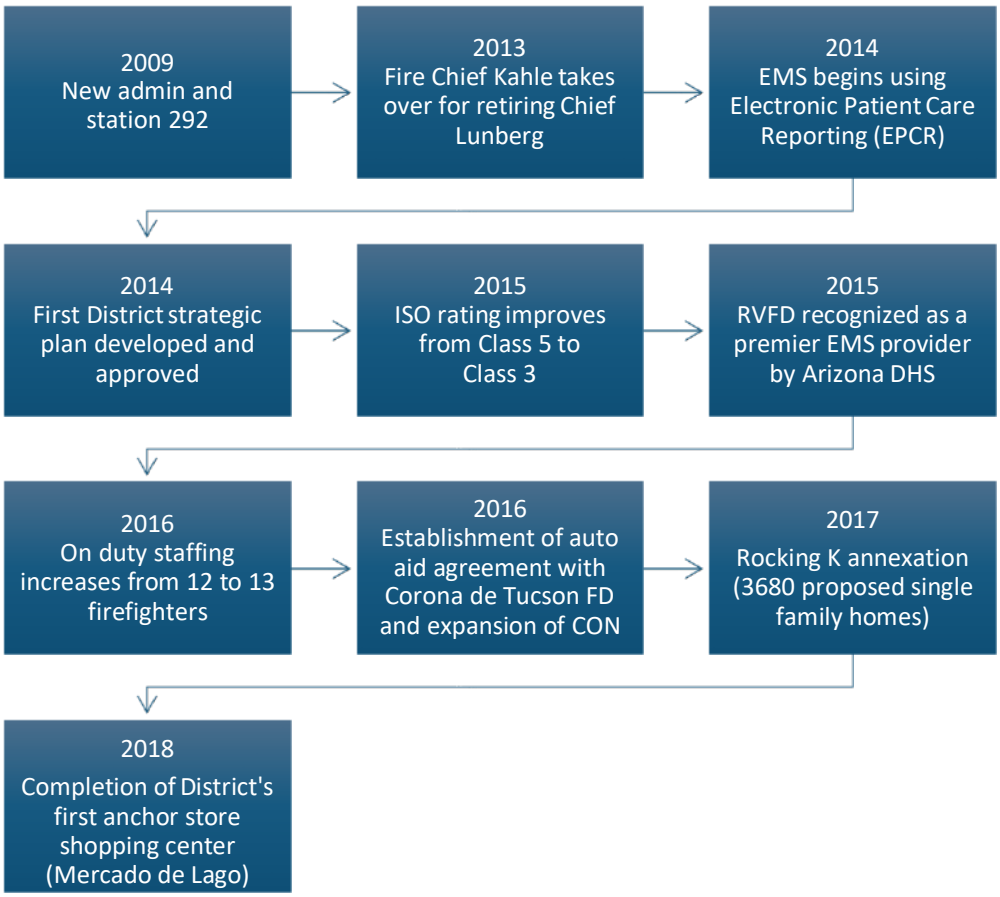
Figure 1.1



MAJOR MILESTONES

Figure 1.2 illustrates RVFD's major milestones the past ten years.

Figure 1.2



Groundbreaking ceremony – Admin/Station 292, February 24, 2008

FUNDING SOURCES

Nearly two-thirds of RVFD's funding is sourced from property taxes. There are several other sources of funding as illustrated in Figure 1.3. Expenditures are represented in Figure 1.4.

Figure 1.3

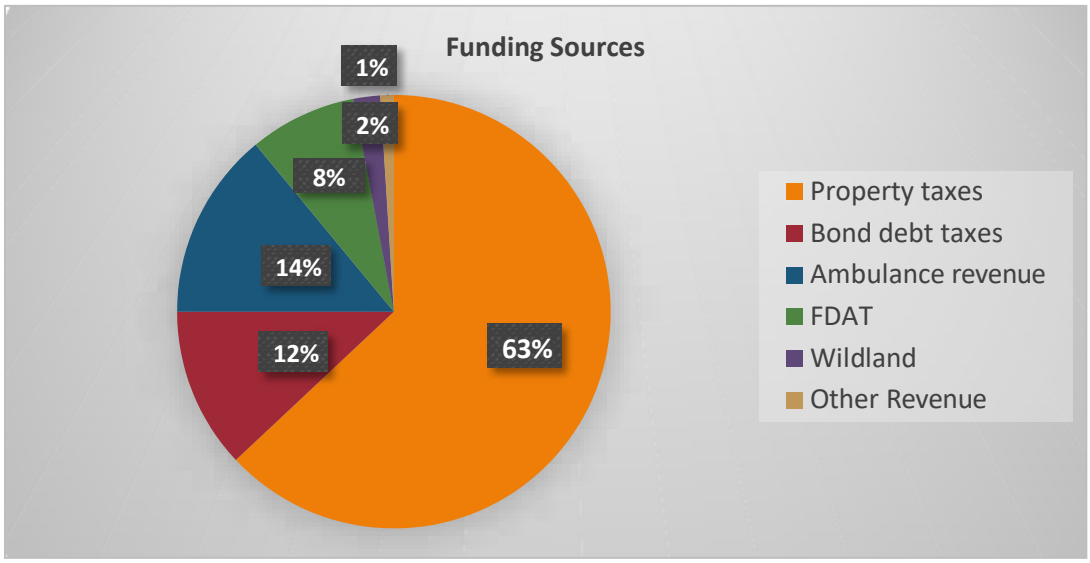
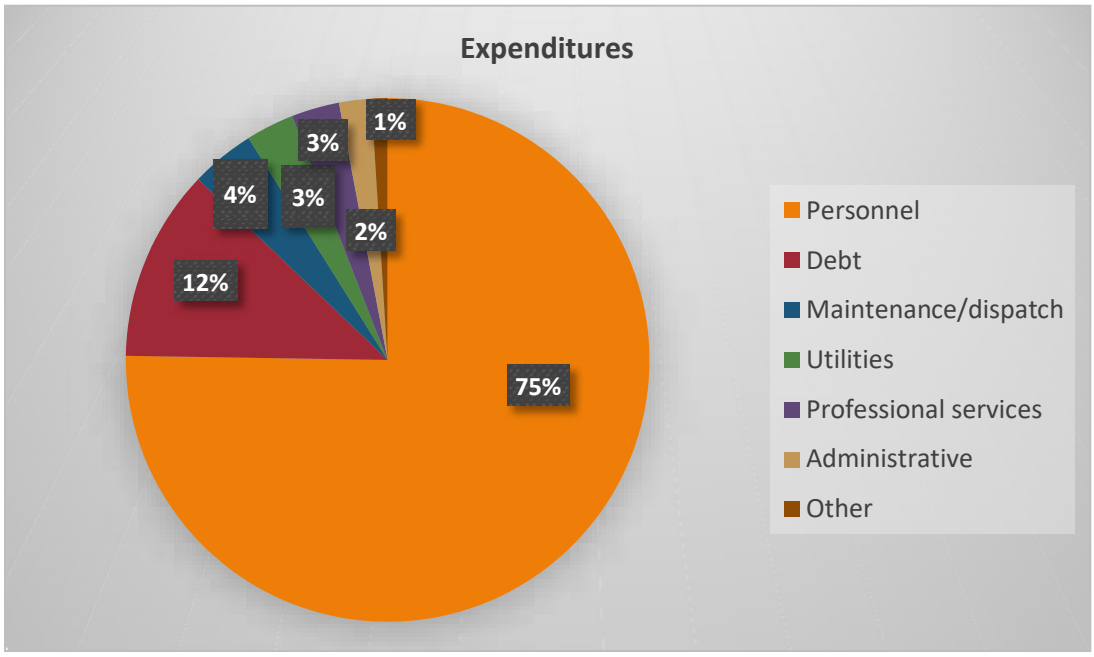


Figure 1.4



CLIMATE

According to the Köppen climate classification system, the Tucson regional area in which RVFD is located is classified as semiarid.[3] Average annual rainfall is approximately 13 inches,[4] with approximately 50% of the precipitation occurring during the summer "monsoon" months of July, August, and September with approximately 30% occurring during the winter months of December, January, February, and March. The relative humidity is generally low compared to many other areas of the country, with single digit humidity not uncommon in late spring and early summer months.

The dominant weather event in the District consists of severe thunderstorms that are triggered by a monsoonal moisture pattern from the Gulf of Mexico, generally occurring in July, August, and early September. These storms often produce heavy rain, severe lightning and high winds. As a result, they can trigger flash flooding and strong microburst events, which can produce winds of 60-70 mph. Tropical moisture surges from the Gulf of California and hurricane remnants can also be sources of significant rainfall that can cause moderate to severe flooding conditions in the region. These events, however, are rare.

Winters are generally mild; however there can be numerous nights with temperatures well below freezing. Snowfall, although rare, occurs on average every few years and accumulations can range from a light dusting, up to six inches. Daytime highs during winter months are generally 60-75 degrees. Daytime highs during the summer months generally range from 90-105 degrees. The Vail area is typically three to five degrees cooler than the developed City of Tucson area and is subject to frequent moderate to high winds (10-30+ mph from the west to east (discussed further in Section 3). The area is susceptible to prolonged periods of drought.

GEOGRAPHICAL/TOPOGRAPHICAL DESCRIPTION AND FEATURES

The Rincon Valley Fire District is located within the Sonoran Desert in Southeastern Arizona. Elevations within the District range from approximately 3000 feet above sea level along and near the Pantano Wash to approximately 3700 feet near Colossal Cave Mountain Park. Elevation generally increases from the west-southwest, to the east-northeast across the District.

The topography within RVFD varies from nearly flat, potentially flood-prone areas along the Pantano Wash and Rincon Creek to relatively low angle hillsides that eventually transition to the steeper slopes of the Rincon Mountains in the northeastern quadrant of the District.

[3] Arid climates are characterized when precipitation is less than evapotranspiration rate.
[4] Western Regional Climate Center, wrcc@dri.edu

Pantano Wash is the major drainage feature. It runs in a west to northwest-west direction through the District. The wash typically has very low flow volumes within the District boundaries, averaging less than 4 cubic feet per second (cfs), but is capable of exceeding 20,000 cfs during extreme flood conditions. Records show that all of the significant floods along the Pantano Wash have occurred in August, September, or early October.[5] This suggests that exceptional summer monsoon storms and occasional dissipating tropical storms generate the floods. There are no significant surface water bodies within the District.

GEOLOGY

The geology within RVFD is diverse, ranging from fine grained flood event deposited soils adjacent to the major drainage features to large outcrops of bedrock in the northeastern part of the District. There are no active volcanic or fault features in the area. The closest fault that has potential to be active is the Santa Rita Fault located along the southern edge of the Santa Rita Mountains. The earthquake potential is discussed in Section 3.

In areas with low slope angles, the dominant geology types are quaternary deposits of axial stream deposits and alluvium. As elevations transition to steeper slopes to the east and northeast, dominant geology types include limestone and sandstone in various weathered stages that give way to a more dominant metamorphic granite and granodiorite as slope and elevation to continue to increase.[6]

WATER RESOURCES

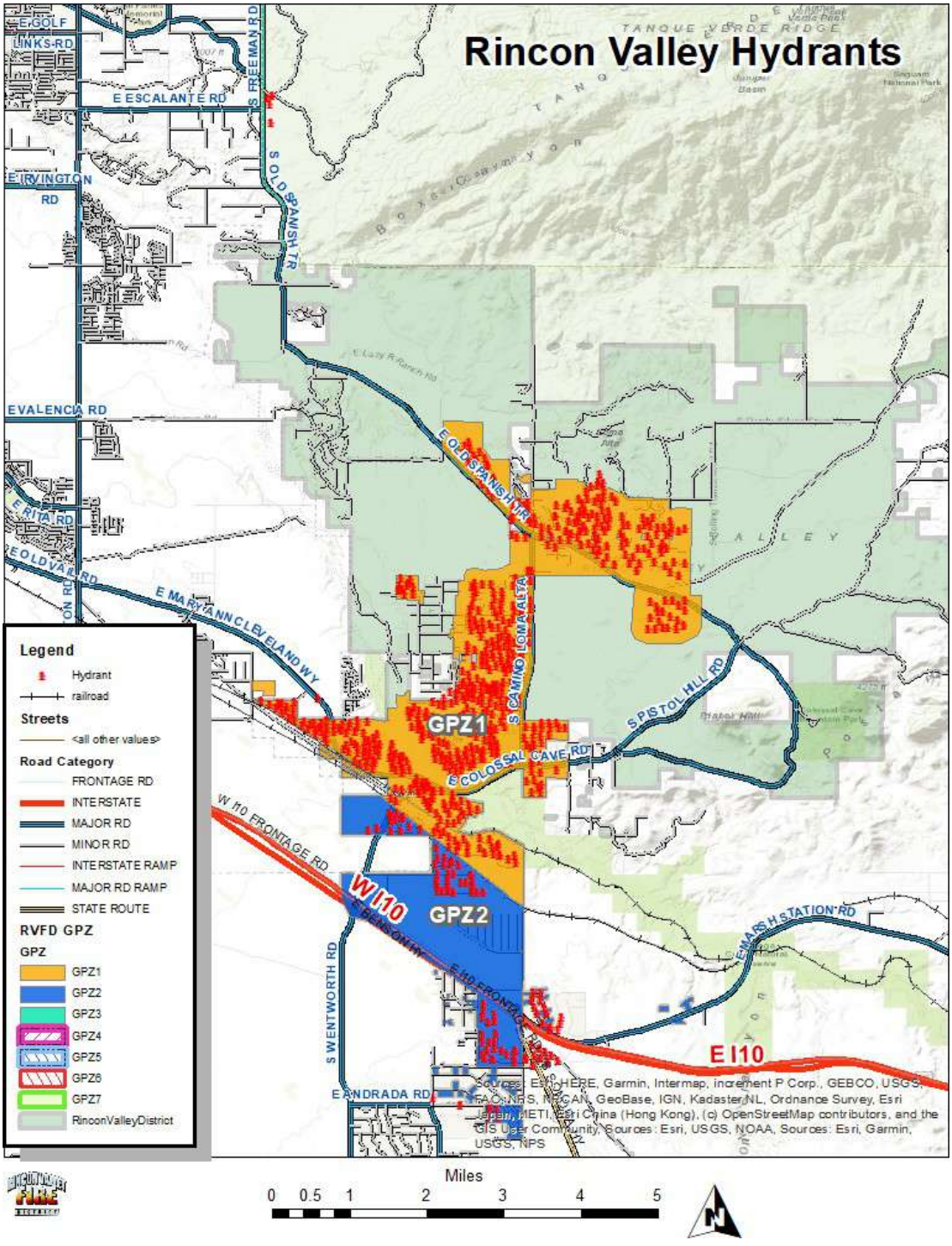
Three water companies serve RVFD; Vail Water Company, Saguaro Water Company, and Spanish Trail Water Company. Saguaro Water and Spanish Trail Water Companies are currently managed by Southwest Utility Management. Vail Water Company is by far the largest provider in the District and has an interconnected system with Tucson Water. All of Vail Water Company's water is sourced from the Central Arizona Project. Saguaro and Spanish Trail Water rely solely on groundwater wells for their water supply. There are 740 hydrants in RVFD. Figure 1.5 is a map of all hydrant locations in the District.

Older developments in the District that were constructed prior to the adoption of a fire code do not have hydrant coverage. All future developments will have hydrant coverage. RVFD performs annual inspection and basic maintenance functions on all hydrants within the District.

[5] Report - Geologic map report of the southern part of the Vail 7.5' Quadrangle, eastern Pima County, Arizona. Arizona Geological Survey. July 2002. http://repository.azgs.az.gov/sites/default/files/dlio/files/2010/u15/DGM12textBW.pdf

[6] Ibid.

Figure 1.5


Rincon Valley Hydrants
E GOLF LINKS RD
E ESCALANTE RD
S FREEMAN RD
S OLD SPANISH TR
E IRVINGTON RD
EVALENCIA RD
E RITA RD
E OLD VAIL RD
E MARYANN CLEVELAND WY
E OLD SPANISH TR
S CAMINO LOMA ALTA
S PISTOL HILL RD
S COLOSSAL CAVE RD
W I10 FRONTAGE RD
E I10 FRONTAGE RD
W I10
E I10
GPZ1
GPZ2
S WENTWORTH RD
E ANDRADA RD
E MARSH STATION RD
Legend
Hydrant
railroad
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
RVFD GPZ
GPZ
GPZ1
GPZ2
GPZ3
GPZ4
GPZ5
GPZ6
GPZ7
RinconValleyDistrict
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS
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POPULATION AND DEMOGRAPHICS

Based on data provided by the Pima County GIS Department, RVFD's 2019 population is approximately 14,372. This equates to an overall population density of 342 residents per square mile and represents a 33% *increase* in population since 2013. An overview of some of the key demographics is shown in Figure 1.6.

Figure 1.6

Demographic Element	Percent of Total District Population[7]
Children under the age of 5	7%
Children K-12	15%
Residents over the age of 65	20%
Residents with disabilities[8]	12%*
Residents below the poverty line	9%
Urban	>2500

*No District specific statistic was available for this demographic element. The State of Arizona statistical average was used. Six classes of disabilities were included in this statistic; vision, hearing, cognitive, ambulatory, self-care and independent living.

RVFD has chosen to divide the District's population density into five different classifications, as listed in Figure 1.7.

Figure 1.7

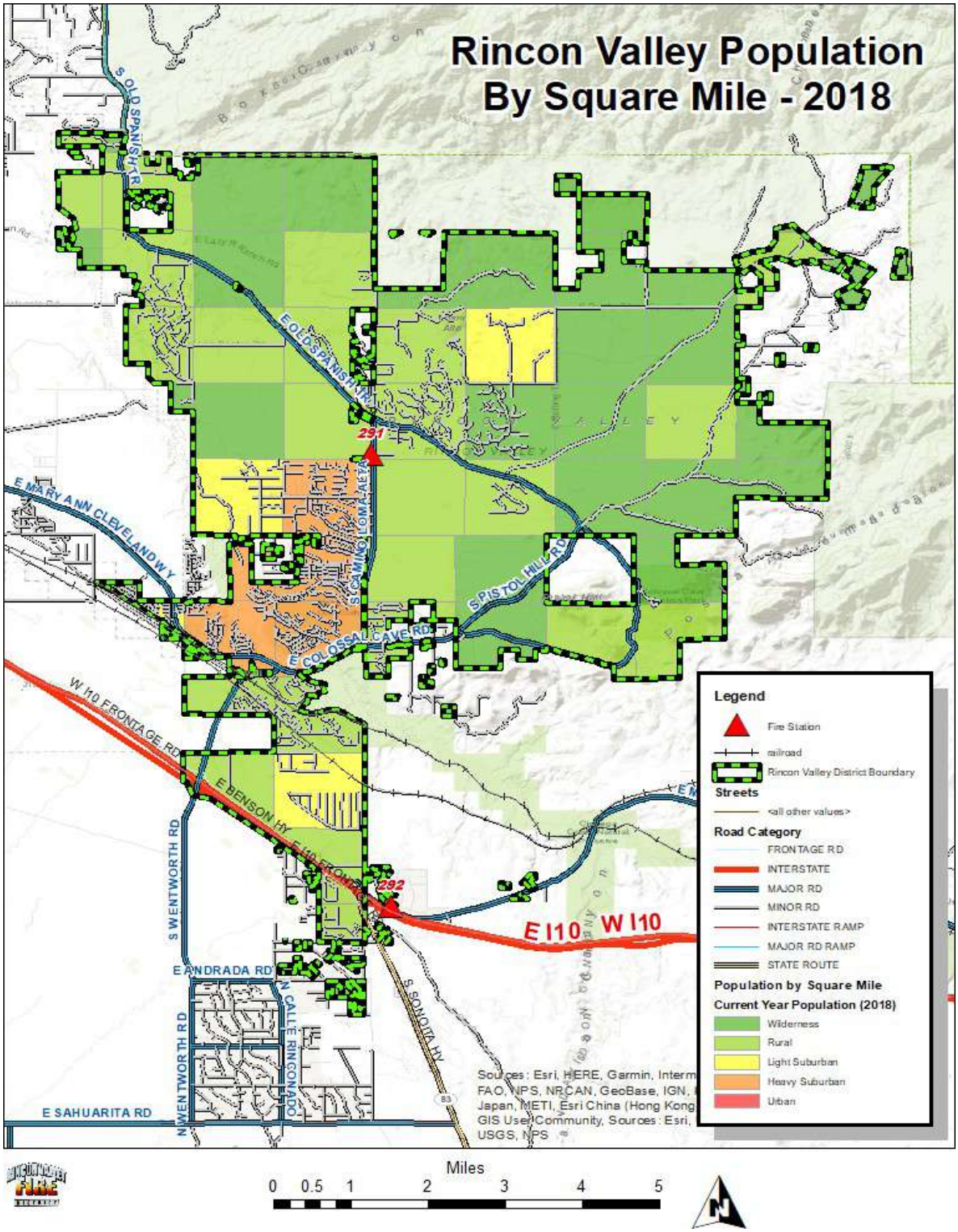
Description	Classification Parameters
Wilderness/undeveloped	No permanent population
Rural	1-499 population
Light suburban	500-999
Heavy suburban	1000-2499
Urban	>2500

Using a per-square mile as the minimum sample size, Figure 1.8 illustrates the distribution of these population density classifications in RVFD.

[7] Source: Pima Association of Governments

[8] 2017 Disability Statistics Annual Report. A Publication of the *Rehabilitation Research and Training Center on Disability Statistics and Demographics* Institute. https://disabilitycompendium.org/sites/default/files/user-uploads/2017_AnnualReport_2017_FINAL.pdf

Figure 1.8

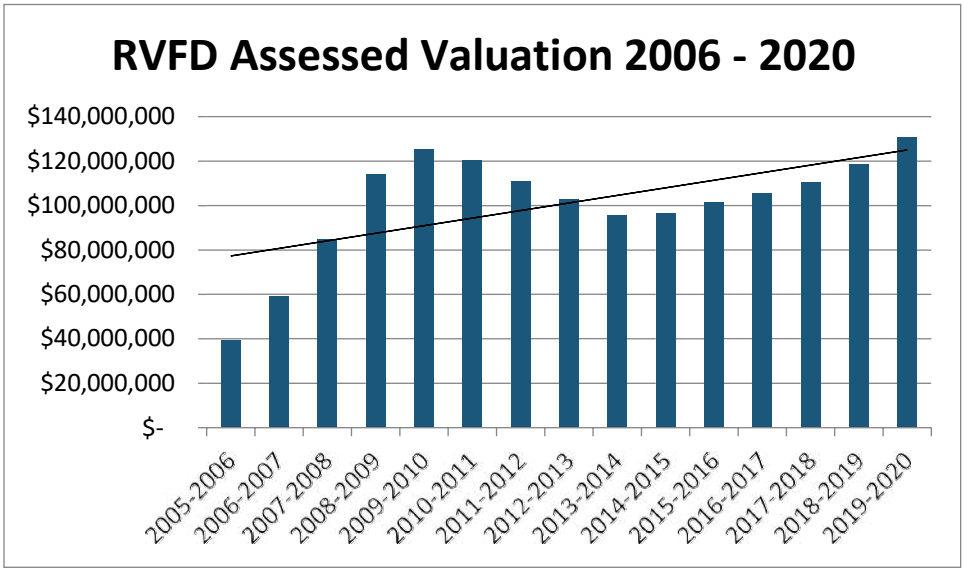

Rincon Valley Population
By Square Mile - 2018
S OLD SPANISH TR
E OLD SPANISH TR
291
E MARY ANN CLEVELAND WY
S LOMA ALTA
S PISTOL HILL DR
E COLOSSAL CAVE RD
W I10 FRONTAGE RD
E BENSON HY
E I10 FRONTAGE RD
292
E I10 W I10
S WENTWORTH RD
E ANDRADA RD
N CALLE RINCONADO
S SONORITA HY
NWENTWORTH RD
E SAHUARITA RD
Legend
Fire Station
railroad
Rincon Valley District Boundary
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
Population by Square Mile
Current Year Population (2018)
Wilderness
Rural
Light Suburban
Heavy Suburban
Urban
Sources: Esri, HERE, Garmin, Interm
FAO, NPS, NRCAN, GeoBase, IGN,
Japan, METI, Esri China (Hong Kong
GIS User Community, Sources: Esri,
USGS, NPS
Miles
0 0.5 1 2 3 4 5

AREA ECONOMICS

RVFD serves primarily a bedroom community. Retail businesses are increasing, highlighted by the opening of the Mercado del Lago Plaza in 2018 that includes an anchor food store and eight retail businesses. Tourism and recreation play a significant role in the area's economics. Colossal Cave, Cienega Creek Natural Preserve, The Arizona Trail, the nearby Saguaro National Park and numerous hiking and mountain bike trails attract tens of thousands of visitors each year to the area. Davis-Monthan Air Force Base and the Tech Park, managed by the University of Arizona, have a large influence on the District economy. There are many RVFD residents who work at these employers.

The area economics is in the midst of a multi-year upswing. RVFD's assessed property value is reflective of this trend, as indicated in Figure 1.9. The current rolling five-year assessed valuation growth is 5.29%. RVFD had an assessed valuation growth of 10.3% in 2019. The 10% growth is attributable to both residential infill construction and annexation of existing adjacent properties that are not within a fire district.

Figure 1.9



CURRENT AND FUTURE DEVELOPMENT

Rincon Valley Fire District benefits from a strong regional economy. There is a substantial amount of single-family residential housing under construction and although at a slower pace, there is an upswing in commercial development as well. There are a number of new developments that are scheduled to break ground in the near future. Figure 1.10 lists larger

projects likely to impact service delivery volume within the District. Figure 1.11 lists development likely to impact the District despite not being within District boundaries.

Figure 1.10

Future developments within RVFD

Description	Estimated Build-out Period	First Due Station
Coyote Creek Phase II	2019-2025	291
Development formerly known as The Passages	2021-2025	292
Future freestanding occupancies at Mercado del Lago	2019-2021	291
Mountain View Ranch	2019-2021	292
Palo Verde Ridge Phase III and IV	2019-2022	291
Ranch del Lago Reserve	2019-2022	291
Rancho del Lago Block 2 & 3	2019-2021	291
Rocking K Master Planned Community (3600 single family residences)	Phased, 2020-2030	291
Sonoita Hills Phase II	2019-2022	292

Figure 1.11

Upcoming developments near RVFD expected to have impact in some capacity

Description	Estimated completion	Projected District impact
Rosemont Mine	Construction 2019-2021, estimated operational in 2022	Increase demand for housing, mutual aid call volume increase
Valencia Bridge at Pantano Wash	Dependent on progress of Rocking K development, completion likely within five years	Enhanced secondary ingress/egress and all-weather access to area
Northwest Health Care Hospital, Old Spanish Trail & Houghton Road	2021-2022	Decreased ambulance turn-around times
Carondelet Hospital, Wilmot & I-10	2021-2022	Decreased ambulance turn-around times

General Description of Occupancies

Typical single family residence subdivision

Most occupancies in RVFD consist of single-family residences. Most of these single-family residence (SFR) occupancies range in size from 1300 to 3000 square feet and are in conventional style subdivisions. There are, however, a number of larger homes in the District on multi-acre lots with extended driveways. Additionally, there are two mobile home developments in the District, consisting of both single wide and double wide mobile homes.

There is a relatively small amount of commercial occupancies in RVFD. As discussed earlier, within the past year RVFD received its first anchor store retail center, Mercado del Lago. These commercial developments, along with Old Vail Village, represent the two largest commercial occupancies in the District. There also exist in small numbers other free-standing commercial occupancies. There are several churches and an elementary, middle, and high school within the District. There are no industrial facilities within the District.

Mercado del Lago

Service Type Infrastructure

There are two 345kv Tucson Electric Power transmission lines that cross through the District. A large diameter, high pressure natural gas line bisects the District in an east to west direction. Two large diameter petroleum supply lines run parallel to the UPRR railroad tracks. There is a Century Link switching station within the District as well as several cell phone and other communication towers.

TRANSPORTATION INFRASTRUCTURE

The major transportation infrastructure feature in RVFD is Interstate 10 (I-10). I-10 is an east/ west interstate that runs near the District's southern boundary for a total of approximately 2½ miles. RVFD also responds to additional 10 miles of I-10 to the east of the District boundary; an area with no defined fire coverage. The speed limit for all the I-10 RVFD service area is 75 mph, the maximum . There is also a very short section of State Highway 83 that is within RVFD but much like I-10, RVFD serves approximately 10 miles of State Highway 83 that is not within the District.

Interstate 10

The remainder of the vehicle transportation infrastructure consists of a few major arterial type roadways, with associated residential streets and rural roads. The rural roads are a combination of improved and unimproved. The residential subdivision streets as well as the rural type roadways in RVFD are not laid out in a typical grid pattern as in larger municipalities. Many of the residential subdivisions have curvilinear and conventional cul-de-sac street patterns.

There is a dual track transcontinental railroad owned and operated by Union Pacific that roughly parallels Interstate 10. Train traffic averages approximately 60 to 70 trains per day. Amtrak also operates two passenger trains that pass through the District three days a week. There are two major arterial road at-grade railroad crossings that can cause response delays. This issue is further discussed in Section 3. There are no airports within the District.

Section 2

Description of RVFD Programs and Services

Community Risk Reduction Services

RVFD provides basic community risk reduction services that meet the intent of the code enforcement and public education sections in *NFPA 1201, Standard for Providing Fire and Emergency Services to the Public*. Plan review and code enforcement functions are currently contracted to an accredited regional fire agency. Public education functions are being accomplished internally with shift personnel.

Public education programs being delivered include CPR instruction, fire extinguisher training, infant and child car seat installation, and elementary school classroom fire safety education.

Non-Emergency Services Provided by Shift Personnel

RVFD provides non-emergency services that include:

- Snake removal
- Smoke and carbon monoxide detector battery replacement
- Invalid assists
- In-service stand-bys at community events
- Engine company fire code inspections
- Courtesy home fire inspections

Fire Suppression

RVFD provides emergency response to a wide range of fire suppression-related incidents from small scale fires such as vehicle and dumpster fires to structure fires. The fire chief manages fire suppression operations and has three shift battalion chiefs under his direction. The District maintains a constant staffing of 11 firefighters who staff two engine companies, two paramedic rescue units, and a battalion chief command vehicle. A 3000 gallon tender is available to be cross-staffed as needed for fires in areas without hydrants.

All fire apparatus are *NFPA 1901, Standard for Fire Apparatus* compliant and engines meet the Insurance Services Organization's (ISO) fire equipment inventory requirements. The District utilizes *NFPA 1710, Organization and Deployment of Fire Suppression Operations by Career Departments, Chapter 5* as a guiding document and benchmark for the development of the fire suppression program.

EMERGENCY MEDICAL SERVICES (EMS)

RVFD provides a high level of emergency medical services to the community and has been recognized as a Premier Provider by the Arizona Department of Health Services. Formal medical direction and oversight is provided by St. Joseph's Hospital. The "A" shift battalion chief is responsible for the overall supervision, operational readiness, and effectiveness of medical operations/administration of the program. The battalion chief also has regional responsibilities that include participation in pre-hospital care committees and liaison duties with the District's medical director at St. Joseph's Hospital.

Engine companies are staffed at the minimum EMT level;[9] approximately 80% of the time one of the engine crew is a paramedic, however there is no paramedic constant staffing requirement on engines. Engine companies are equipped with basic life support (BLS) and advanced life support (ALS) gear. Two ambulances are constant-staffed with one EMT and one paramedic. RVFD maintains an Arizona Department of Health Services Certificate of Necessity that permits transportation and cost recovery for both BLS and ALS patients (see Appendix B). Ambulances meet requirements of the *Commission on Accreditation of Ambulance* Services (*CAAS)* specifications. RVFD provides in-service stand by services at community events such as high school football games.

[9] EMT's and paramedics meet the requirements of State of Arizona Administrative Code, Title 9, Health Services, Article 5, Medical Direction Protocols for Emergency Medical Care Technicians

Special Operations - Hazardous Materials and Technical Rescue

RVFD provides emergency services for hazardous materials and technical rescue at the first responder level and operations level, respectively.[10] There are seven hazmat technician level firefighters and seven technical rescue technician level firefighters, however there is no constant staffing requirement for a specified number of technician level firefighters. The District maintains a heavy rescue (squad) apparatus that can be cross staffed as needed. The squad carries specialized equipment for heavy extrication, low and high-angle rescue, cave rescue, and swift water rescue.

Wildland Fire

As described in the upcoming Section 3, there is a substantial wildland fire risk in RVFD. All personnel are red card certified as per the National Wildfire Coordinating Group. Additionally, the District supports 10 wildland specialists who maintain additional qualifications such as engine boss, Type 4 incident commander, communication leader specialist, etc. The District maintains a Type 3 wildland engine that is equipped in accordance with the National Fire Interagency Center Redbook requirements. In addition, each Type 1 (structure) engine has an appropriate complement of wildland firefighting equipment. RVFD participates in the Arizona Department of Forestry and Fire Management Cooperators Program on a contractual basis. This enables RVFD to dispatch personnel and apparatus (on a cost recovery basis) to in-state and out-of-state wildfire resource requests.

[10] Hazmat First Responder capabilities are outlined in NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, 2018 Edition. Technical Rescue Operations capabilities are outlined in NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents, 2017 Edition.

Section 3

All-Hazard Community Risk Assessment

Hazards, in the context of this document, are any dangerous conditions with the potential to cause harm to people and loss to property, including fires, medical emergencies, the release of hazardous materials, entrapments, and other hazards. Risk can be defined as an estimate of the probability of a hazard related incident occurring and the severity or harm or damage that could result.[11] Probability is the likelihood of an event occurring, often described within a defined time period. Consequences are generally thought of in terms life, property, or environmental losses.

The purpose of a Community Risk Assessment (CRA)

The purpose of the CRA is to evaluate a community's risks prior to the development and implementation of a community risk reduction plan *(NFPA 1300, Standard on Community Risk Assessment and Community Reduction Plan Development-Draft).*

Comprehensively identifying the community risk is a prerequisite to developing an effective standards of cover that provides for a consistent and capable deployment of District resources.

RVFD has the responsibility of responding to emergencies associated with these hazards, and the associated risk that comes with them. RVFD exists not only to respond to emergency incidents, but also to proactively prevent or mitigate the impact of such incidents within the community.

A comprehensive community risk assessment provides a focused and systematic approach for the District to develop risk management/reduction strategies and tactics. The Vision 20/20 project, in its *Community Risk Assessment: A Guide for Conducting Community Risk Assessment* document, defines community risk assessment as: "Risk assessment is basically the identification of potential and likely risks within a particular community, and the process of prioritizing those risks. It is the critical initial step in emergency preparedness, which enables organizations to eventually mitigate (if possible), plan, prepare and deploy appropriate resources to attain a desired outcome."[12]

Risk management can be defined as the identification and evaluation of risks, and the development, selection, and implementation of control measures up front to lessen the probability of a harmful consequence.[13]

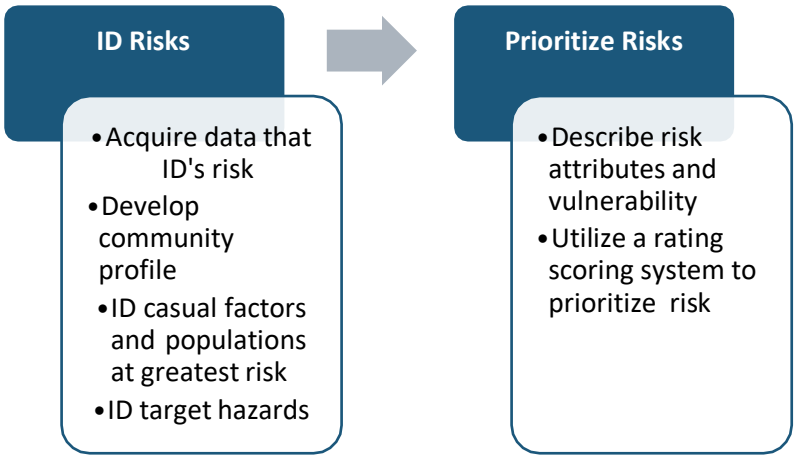
[11] Manuele, Fred A. (2008). Advanced Safety Management, Hoboken NJ: John Wiley & Sons, p. 113.
[12] Stouffer, John A. - Vision 20/20. Community Risk Reduction: A Guide for Conducting a Community Risk Assessment. Version 1.5 Rev. 02/16
[13] Graham, Gordon. www.firenuggets.com.

Quoting again from the Vision 20/20 document, community risk reduction (CRR) is a "desired outcome of a community risk assessment (CRA), and can be defined as a process to identify and prioritize local risks, followed by the integrated and strategic investment of resources (emergency response and prevention) to reduce their occurrence and impact."[14] It is important to note that there is always "residual risk;" it is not possible to eliminate all risk. The public's tolerance of risk, as well as the elected Governing Board members and fire chief's perspective of risk, determine the allocation of risk and the acceptable level of residual risk to the community. This is frequently accomplished through a risk-based, benefit/cost analysis and is directly tied to the District resources that are available to reduce risk.

While the risk to the community and its residents is fundamental to the community risk assessment effort, it should not be performed without consideration of the associated risk to firefighters. There is inherent risk for firefighters for managing any emergency. Performance objectives for each of the service classification programs (fire, EMS, hazmat, TRT, wildland) and the associated levels of risk categories must be developed with the guidance of the District's risk management policy.[15] While there was significant consideration of firefighter safety when assessing risk and developing response models, it was not designed to be a comprehensive review of *all* firefighter risks associated with the critical tasks identified in this section and should be further addressed as part of a separate process.

Methodology Approach

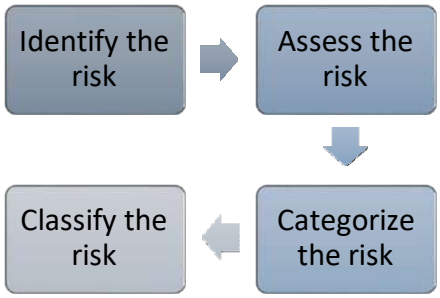
The methodology for performing the community risk assessment originated from three sources. The first source utilized was an approach as outlined in the *Vision 20/20* document previously referenced.



[14] Stouffer, John A. - Vision 20/20. Community Risk Reduction: A Guide for Conducting a Community Risk Assessment. Version 1.5 Rev. 02/16

[15] RVFD Procedure 03-001, Risk Management Plan

The second resource utilized for the community risk assessment process was the Commission on Fire Accreditation International's *Community Risk Assessment: Standards of Cover 6th Edition* that outlines a four-step process regarding risk assessment methodology:



The third source utilized to develop a methodical and systematic approach to community risk assessment was *National Fire Protection Association (NFPA) 1300, Standard on Community Risk Assessment and Community Risk Reduction Plan Development, Proposed Edition*.[16] This proposed standard includes six steps in the development of a community risk assessment.

Step 1	Recognize the need to conduct a CRA and develop a community risk reduction plan based on the CRA.
Step 2	Define the problem by identifying the potential risks and their root causes, and develop programs that are appropriate to mitigate the identified risks that exist within the available categories.
Step 3	Collect empirical data (verifiable and validated) regarding the community's demographics, building stock profile, geography, past loss history, and potential likelihood or anticipated future events.
Step 4	Analyze the data.
Step 5	Identify gaps, areas where actual conditions vary from desired outcomes.
Step 6	Validate the CRA by comparing the findings of the CRA with the available data, to ensure they are consistent with the community's level of acceptable risk, capabilities and resources. All risks considered in the CRA might not be addressed in the CRR plan.

[16] This standard is still in draft form, scheduled to be adopted as a formal standard in January, 2020.

A review of these three sources led to developing a systematic approach for performing a comprehensive community risk assessment for RVFD. The CRA process was conducted November 2018 through March 2019. The process included the participation of six different internal teams that had specific association and responsibility with each of the major service delivery areas (fire, EMS, hazmat, technical rescue, wildland) and also included an assessment of large scale, potentially districtwide risks that was conducted by the fire chief and the battalion chiefs. Results of the various internal teams' work are included later in this section.

GEOGRAPHICAL PLANNING ZONES (GPZ'S)

As part of the risk assessment process, seven geographical planning zones were established. These zones were created based on consideration of population density, response times, risks, occupancies, as well as other considerations. The development of these GPZ's allow the District to analyze in a more detailed and precise manner demographic information, risk potentials, and emergency response data to enhance and establish operational direction, policies, goals and objectives. Moving forward, additional information regarding the planning zones' characteristics and response times will be analyzed to help develop community risk reduction programs and enhance the emergency response model. Figure 3.1 illustrates the seven GPZ's, followed by a more detailed description of each of the individual GPZ's. (Figures 3.2-3.7).

Figure 3.1

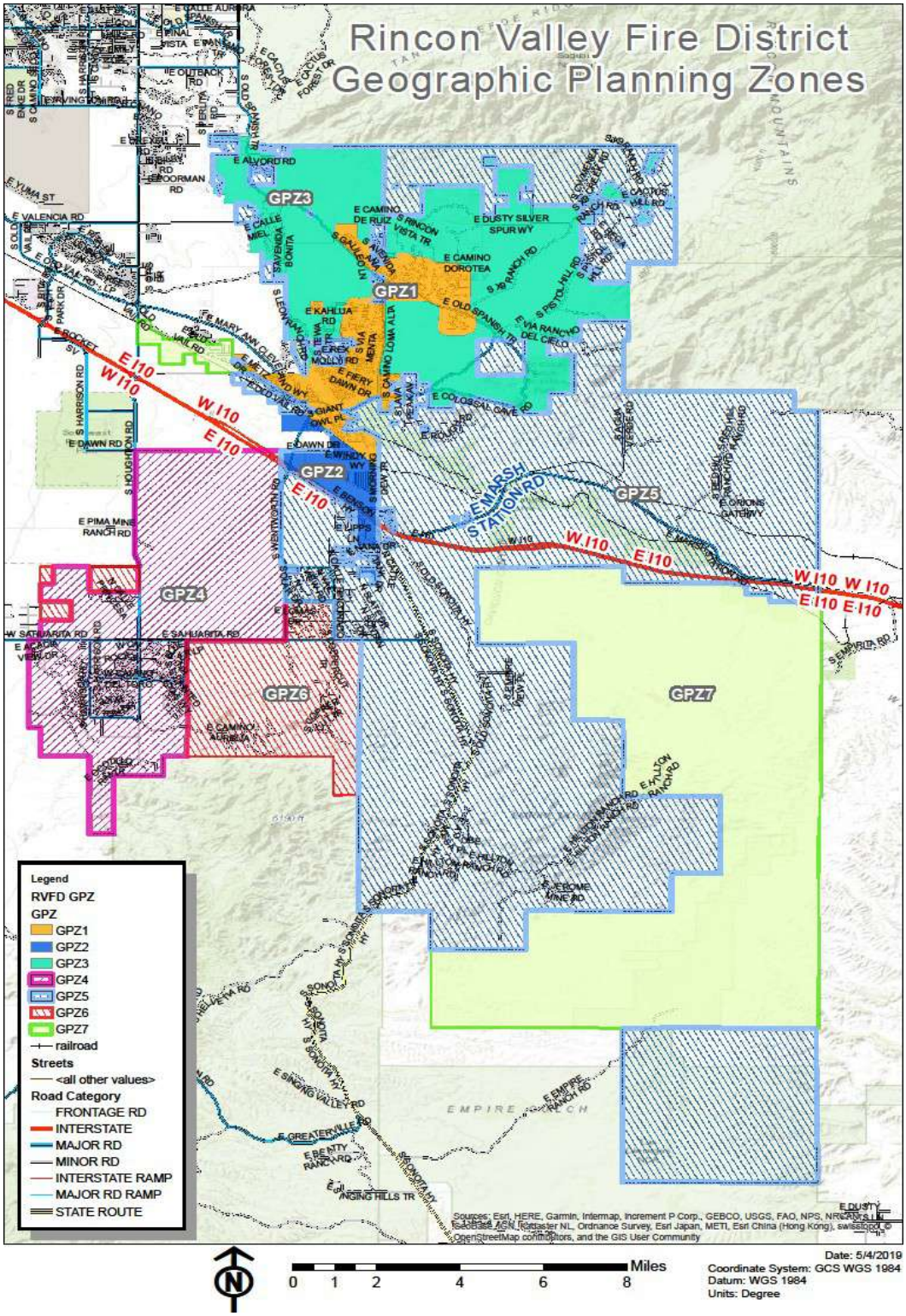

Rincon Valley Fire District
Geographic Planning Zones
GPZ1
GPZ2
GPZ3
GPZ4
GPZ5
GPZ6
GPZ7
E I10
W I10
railroad
Legend
RVFD GPZ
GPZ
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
Miles
0 1 2 4 6 8
Date: 5/4/2019
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Figure 3.2

Geographical Planning Zone 1

General description		Station 291 covers this area north of the railroad tracks. It includes the more developed area of the District, with several medium density single family residence subdivisions and several significant commercial and cultural occupancies. The area covered is less than 5 miles from Station 291 and has hydrants generally within 1000' of all occupancies.				
Critical infrastructure and significant features		Union Pacific Railroad, two Kinder Morgan large diameter petroleum lines, Qwest switching station, one elementary school, one middle school, one high school, St. Rita in the Desert Catholic Church (Register of Historic Places). Also includes the upcoming 2,000-acre master planned community, Rocking K Loop.				
Square miles	% of total district area	8		18%		
Percentage of total call volume*		50%				
Population density		Mostly light and heavy suburban				
2018 population	2023 est. population	9,759		10,589		
Service program Risk category		Fire	EMS	Hazmat	TRT	Wildland
		low	high	high	low	low

*Total call volume within and outside the District

Rancho del Lago subdivision located in GPZ #1

Figure 3.3

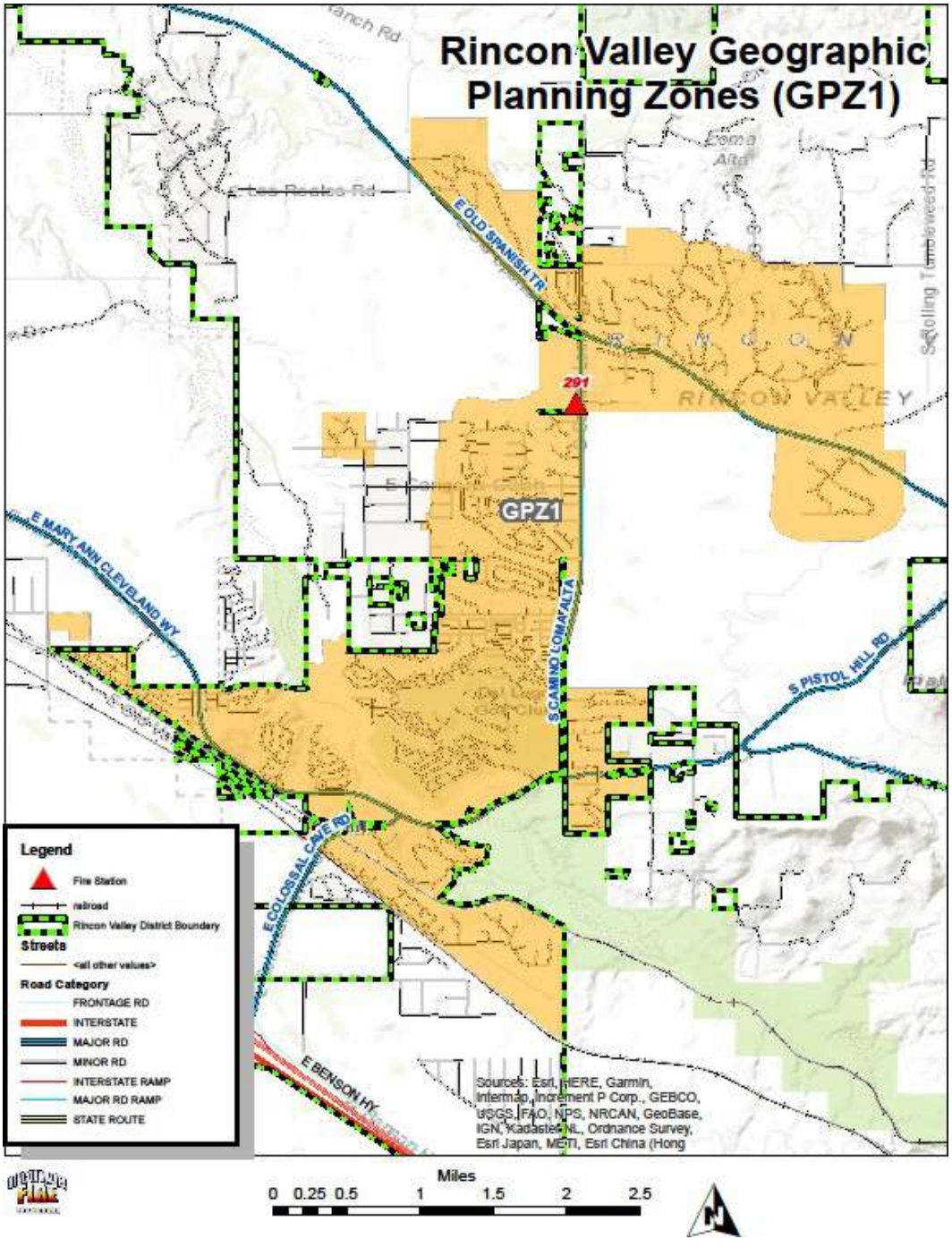

Rincon Valley Geographic Planning Zones (GPZ1)
GPZ1
291
E OLD SPANISH TR
E MARY ANN CLEVELAND WY
SCAMINO LOMA ALTA
S PISTOL HILL RD
E COLOSSAL CAVE RD
E BENSON HY
Legend
Fire Station
railroad
Rincon Valley District Boundary
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong
Miles
0 0.25 0.5 1 1.5 2 2.5

Figure 3.4

Geographical Planning Zone 2

General description		Station 292 covers this area south of the railroad tracks. It includes several low to moderate density subdivisions as well as approximately two miles of Interstate 10.				
Critical infrastructure and significant features		Interstate 10, Union Pacific Railroad, Kinder Morgan petroleum gas lines, El Paso large diameter/high pressure natural gas lines, parallel Tucson Electric 138 KV high voltage transmission lines, electric substation, Vail School District Administrative Offices.				
Square miles	% of total district area	3.4			8%	
Percentage of total call volume*		9%				
Population density		Mostly light suburban and rural				
2018 population	2023 est. population	1,525			1,665	
Service program		Fire	EMS	Hazmat	TRT	Wildland
Risk category		moderate	high	high	moderate	moderate

*Total call volume within and outside the District

Vail School District Administration Offices in GPZ #2

Figure 3.5

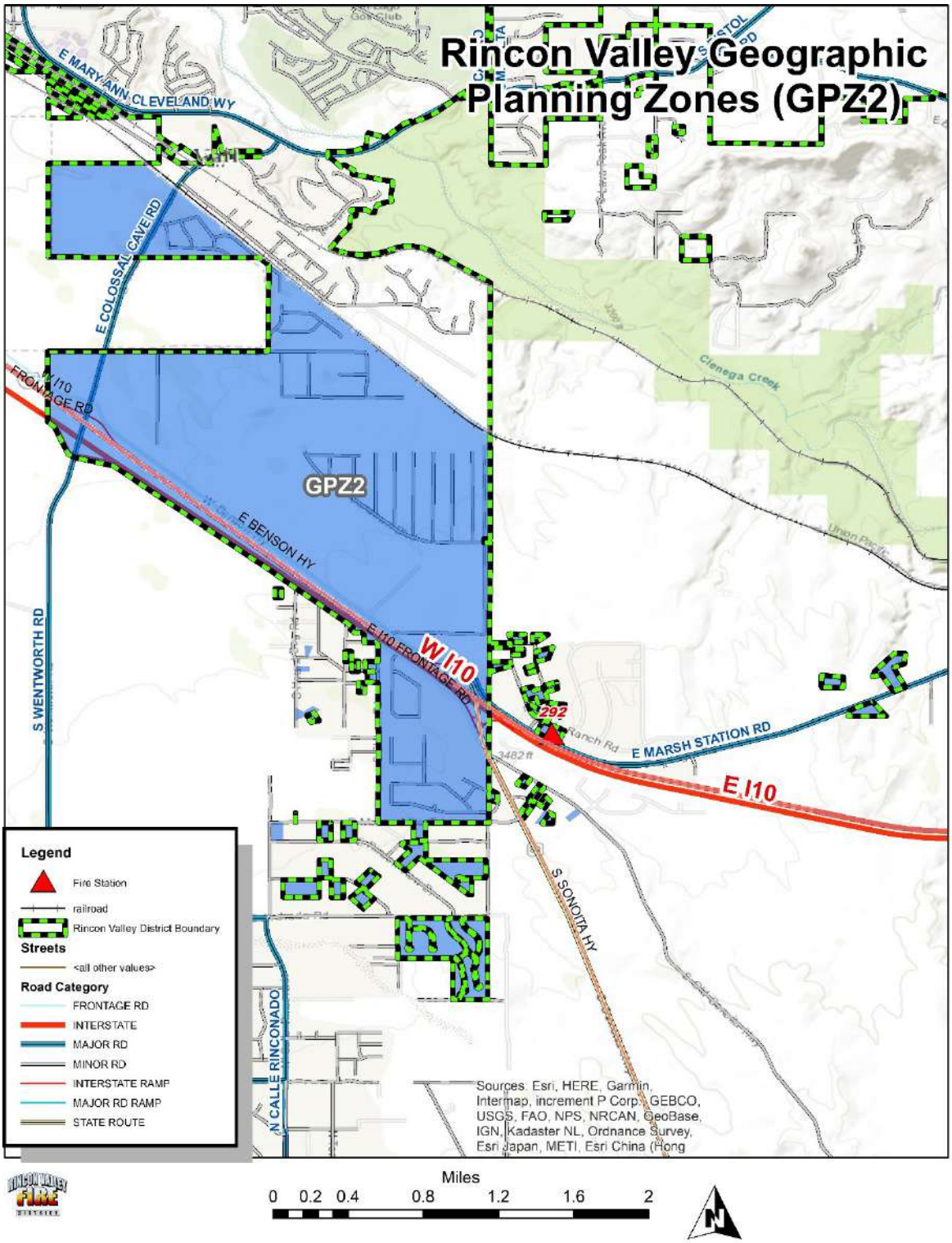

Rincon Valley Geographic Planning Zones (GPZ2)
E MARY ANN CLEVELAND WY
E COLOSSAL CAVE RD
W I10 FRONTAGE RD
GPZ2
E BENSON HY
S WENTWORTH RD
E I10 FRONTAGE RD
W I10
292
E MARSH STATION RD
E I10
S SONOITA HY
N CALLE RINCONADO
Cienega Creek
Union Pacific
Legend
Fire Station
railroad
Rincon Valley District Boundary
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong
Miles
0 0.2 0.4 0.8 1.2 1.6 2
N

Figure 3.6

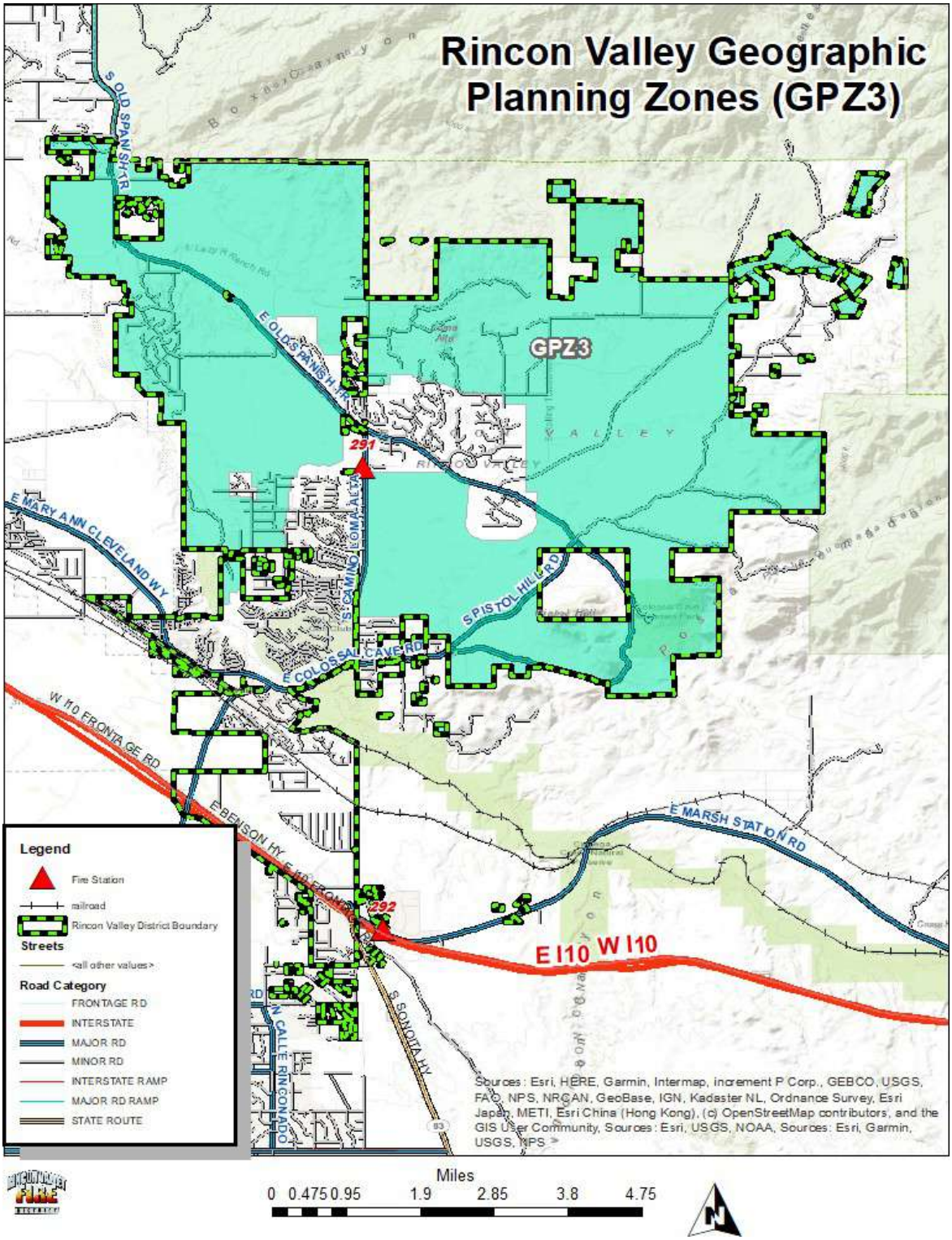
Geographical Planning Zone 3

General description		Station 291 covers this rural and undeveloped area of the District. Residences are generally on larger lots not located in developed subdivisions. Some of the residences in this area are very large. This area is not covered by hydrants and in general is more than five miles from an RVFD station. The area is characterized by a poor road network and has the most diverse topography in the District. Access to many areas of this GPZ can be challenging during periods of intense and/or extended periods of wet weather. It represents the lowest population density in the District.				
Critical infrastructure and significant features		Colossal Cave Mountain Park, Cienega Creek Natural Preserve, Pantano Wash, Arizona Trail.				
Square miles	% of total district area	30		71%		
Percentage of total call volume*		9%				
Population density		Mostly rural and undeveloped				
2018 population	2023 est. population	3,088		3,362		
Service program		Fire	EMS	Hazmat	TRT	Wildland
Risk categories		low	low	low	moderate	high

*Total call volume within and outside the District

Larger lot single family residences with unpaved access in GPZ #3

Figure 3.7


Rincon Valley Geographic Planning Zones (GPZ3)
GPZ3
291
292
S OLD SPANISH TR
E OLDS FARMS HTS
E MARY ANN CLEVELAND WY
S CAMINO LOMA ALTA
S PISTOL HILL RD
E COLOSSAL CAVE RD
W I10 FRONTAGE RD
E BENSON HY
E MARSH STATION RD
E I10 W I10
S SONOITA HY
N CALLE RINCONADO
Legend
Fire Station
railroad
Rincon Valley District Boundary
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, Sources: Esri, USGS, NOAA, Sources: Esri, Garmin, USGS, NPS
Miles
0 0.475 0.95 1.9 2.85 3.8 4.75

Geographical Planning Zone 4 (outside of RVFD)

GPZ #4 represents an area of Corona Fire District that is covered by RVFD. It includes 28 square miles and represents 15% of RVFD's total call volume. GPZ #4 population is 7,616.

Geographical Planning Zone 5 (outside of RVFD)

GPZ #5 represents an area of RVFD's Arizona Department of Health Certificate of Necessity for ambulance transportation services as well as an area that RVFD responds to for other emergencies due to the fact there is no other agency that will respond to this area. It consists of 128 square miles and represents 15% of RVFD's total call volume. GPZ #5 population is 3,598.

Geographical Planning Zone 6 (outside of RVFD)

GPZ #6 represents an area of RVFD's CON as well as an area RVFD responds to in Corona de Tucson Fire District's area as first due and as part of the automatic aid agreement. It consists of 13 square miles and represents 2% of RVFD's total call volume. GPZ #6 population is 821.

Geographical Planning Zone 7 (outside of RVFD)

GPZ #7 represents an area that is not in a fire district, but RVFD responds to for emergencies since there is no other agency in the area to respond. It consists of 59 square miles and represents less than 1% of RVFD's total call volume. It has a very low population density and is dominantly uninhabited native area with no vehicle access. GPZ #7 population is 376.

UNIQUE RISK FACTORS ASSOCIATED WITH RVFD

At-Risk Population

The two most at-risk demographic groups for fire deaths are persons with disabilities and persons over the age of 65. From statistics in Section 2, the total percentage of these two at-risk populations in RVFD is 32%. Of these two at-risk groups, the over 65 sector is by far the most significant, accounting for nearly 60% of the total fire deaths in 2016.[17] This percentage is likely to grow as the over-65 demographic metric is expected to increase in coming years. According to Jonathan Vespa, a demographer with the U.S. Census Bureau, "The

[17] *Fire Risk in 2016*. Topical Fire Report Series. United States Fire Administration. September 2018. https://www.usfa.fema.gov/downloads/pdf/statistics/v19i6.pdf

aging of baby boomers means that within just a couple decades, older people are projected to outnumber children for the first time in U.S. history."[18]

Out-of-District Responses

Analysis of call volume during the development of the CRA-SOC revealed that 34% of the total call volume was outside of RVFD boundaries. Further breakdown of the percentages in each GPZ was provided in the previous subsection. The fact that over one-third of RVFD's call volume are calls outside the District contributes to increased risk within the District in the form of longer response times, resulting from another station having to respond to a call for the first due station unit that is on an out-of- district call. It can also contribute to fewer personnel being available for larger, resource intensive incidents within the District.

Large Certificate of Necessity (CON) Service Area

RVFD's Certificate of Necessity for ambulance transportation, as granted by the Arizona Department of Health, encompasses an area of 267 square miles; approximately six times the size of the District. A ground ambulance service that is awarded a CON must comply with the certificate's criteria and operate in accordance to the statutes[19] and rules by which it is governed. A copy of RVFD's CON is in Appendix B. The CON area outside RVFD's borders accounts for 43% of the total ambulance transports.

As indicated in Section 1, the ambulance transport revenue is a significant portion of RVFD's overall budget revenue. However, the CON ambulance transports outside the District contribute to longer ambulance response times within the District when one or more ambulances are committed to calls outside the District.

Water Resources

As discussed in Section 1, RVFD is served by three water companies. Nearly three-quarters of RVFD's geospatial area is not covered by hydrants.[20] While the majority of the residential subdivisions and major businesses have adequate hydrant coverage, there remains significant area and occupancies without hydrant coverage. With limited mobile water supply capabilities

[18] *Older People Projected to Outnumber Children for First Time in U.S. History.* March 2018. https://www.census.gov/newsroom/press-releases/2018/cb18-41-population-projections.html

[19] https://apps.azsos.gov/public_services/Title_09/9-25.pdf.

[20] Defined as a hydrant within 1000' of an occupancy.

within the District, areas without hydrant coverage pose a significant increase in fire risk. It is also noteworthy that none of the water companies has auxiliary power available in the event of a power failure. The following chart shows hydrants by geographical planning zone (GPZ, further discussed in this section.

GPZ	Square Miles	Percentage of total hydrants
1	8	85
2	3.4	10
3	30	5

Earthquakes

RVFD is located in a seismic design category B, category A being the lowest risk ranking and category E being the highest risk ranking.[21] A high seismic design category area zone is nearest a seismic zone where there are more earthquakes, and a lower seismic design category is farther away from a seismic zone. The United States Geological Survey estimates that the chance for damage resulting from an earthquake in the Tucson regional area in a 100-year period is 4 to 19 percent.[22] Damaging earthquakes in the area have occurred, the latest being the 1887 Sonora Earthquake south of Douglas that had a magnitude of 7.6 on the Pitaycachi fault near the Arizona-Mexico border. It killed nearly 60 people and was widely felt throughout the Southwest, including Tucson, Bisbee, Yuma, Phoenix, Prescott, Albuquerque, El Paso, and Sonora, Mexico.

Union Pacific Railroad (UPRR)

A dual UPRR transcontinental line traverses the entire District, dividing it north and south. Approximately 60-70 freight trains pass through the District daily. This can result in crossing delays of two to four minutes for responding units that need to cross the at-grade crossing. In addition to response delays, the railroad also represents a significant hazmat risk. According to the Bureau of Transportation,[23] approximately one-third of all hazardous materials is transported

Traffic waiting at Colossal Cave Road RR crossing

[21] https://www.fema.gov/earthquake-hazard-maps
[22] https://earthquake.usgs.gov/hazards/hazmaps/2018_NSHM_Overview_Figures_public_v1_opt.pdf
[23] https://www.bts.gov/bts-publications/freight-facts-and-figures/freight-facts-figures-2017-chapter-2-freight-moved

by rail. Hazardous materials transported by rail have a wide range of severity, from hydrocyanic acid, a deadly poison, to crude oil. Additionally, six Amtrak passenger trains (three eastbound, three westbound), utilize the same tracks three times a week. These passenger trains pose a multi-casualty risk and would require complex technical rescue tasks in the event of a crash or derailment.

Interstate 10

RVFD covers approximately 14 miles of Interstate 10 (two miles within District, 12 miles outside of the District). It is the 8th busiest interstate in the country. Over 90% of the motor vehicle accidents RVFD responds to are on the Interstate. According to the Arizona Department of Transportation (ADOT), traffic counts within RVFD coverage area of I-10 range from 29,000 to 32,000 vehicles per day, of which a significant percentage are multi-axle, over the road semi-trucks.

The Interstate also represents a substantial hazmat risk as over the road trucking accounts for two-thirds of all transportation of hazardous materials in the U.S. As the District's population grows near the freeway, the associated hazmat exposure risk also will grow.

Interstate 10 poses a very high risk to firefighters as they perform their various job functions on the freeway. Nearly 20% of the District's EMS calls occur on I-10. Firefighters are frequently working in close proximity to passing traffic that is often traveling at high speeds. In recent years there have been concerted efforts at the state and national levels to reduce the risk to firefighters on highways, utilizing engineering/equipment, administrative and training aspects.

While some risks can be reduced with programs such as ADOT's *Traffic Incident Management for Responders* course, there still exists a very high risk to firefighters operating on I-10. It is estimated about 8% of all drivers are driving with some level of alcohol in their system.[24] Approximately 23% have some level of drugs that could potentially contribute to impairment.[25] Twenty to 30% are driving distracted due to cell phone use and texting. Interstate driving also can lead to a higher incidence of sleep-impaired drivers due to the longer distances

[24] 2013-2014 National Roadside Study of Alcohol Use by Drivers. National Highway Safety Traffic Administration. 2016. https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/812362_2013-2014_nrs_alcoholresults.pdf
[25] 2013-2014 National Roadside Study of Drug Use by Drivers. National Highway Safety Traffic Administration. 2016. https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13013-nrs_drug-053117-v3-tag_0.pdf

generally traveled on interstate highways. In the 2017 AAA Traffic Safety Culture Index Report, 31% of drivers surveyed admitted to driving when they were so tired they had difficulty keeping their eyes open at some point in the last month. Combined with high speeds, and high traffic volume, these factors make the Interstate a very high-risk operating environment for firefighters.

Vail Gale

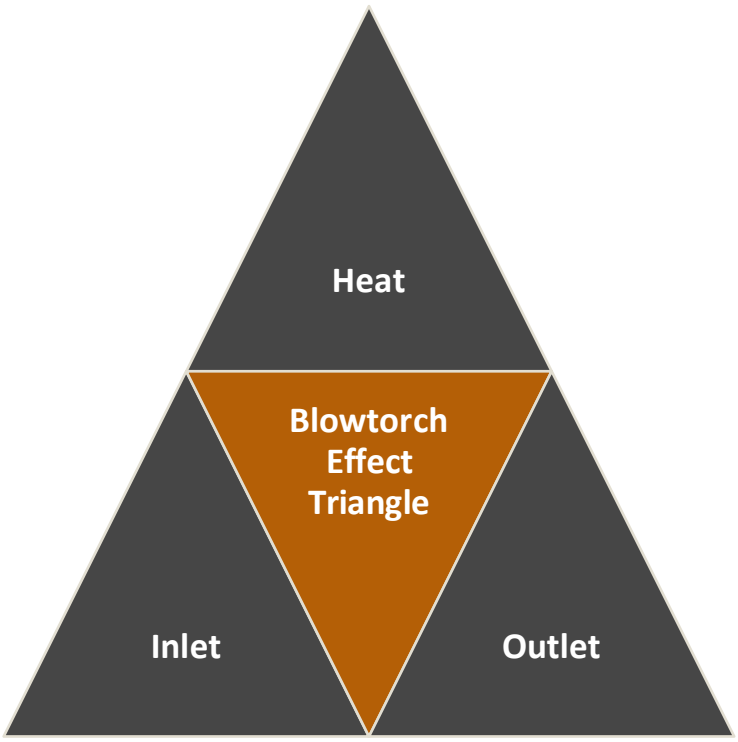
The *Vail Gale*, a term coined by Vail community members, represents the sustained wind that is often present in RVFD and the surrounding area. This wind typically occurs out of the west-southwest and can often reach 20-30 mph for an extended period of time, sometimes peaking at 40-50 mph. These winds are most prevalent during the late winter and spring months and typically recede during the monsoon, but are replaced with shorter duration, more intense winds and downdrafts associated with the seasonal monsoonal thunderstorms. The Vail Gale has two significant impacts on fire risk in RVFD, at a structural fire and wildland fire level.

Flag at Station 292 on a "Vail Gale" day.

At a structure fire, wind has an effect known as a wind driven effect. According to the National Institute of Standards and Technology, wind speeds as little as 10 miles per hour can cause rapid fire progression in a structure regardless of the structure.[26] Prevailing winds that enter a fire-vented location of the structure can create a flow path of blowtorch-effect flames and untenable temperatures when a secondary opening is created. The components of the blowtorch effect are illustrated in Figure 3.8.[27]

[26] Wind Driven Fires. https://www.nist.gov/el/fire-research-division-73300/firegov-fire-service/wind-driven-fires
[27] Source: Modern Fire Behavior: An informational Clearinghouse of Modern Fire Behavior Research Coupled with Modern Day Tactics. https://modernfirebehavior.com/understanding-wind-driven-fires/

Figure 3.8



It is estimated that approximately 20 firefighters in the U.S. have lost their lives in the past 20 years fighting wind driven structure fires. Clearly, wind driven fires substantially increase the risk to both occupants and firefighters.

The three major factors affecting wildland fire behavior are topography, fuel, and weather. Regarding relevant weather factors (temperature, humidity and wind), wind can often be the biggest influence on wildland fire behavior. Wind has a strong effect on the fire behavior due to the fanning effect on the fire. Wind increases the supply of oxygen, which results in the fire burning more rapidly, and causes an exponential increase in the spread of fire. It also removes the surface fuel moisture, which increases the drying of the fuel. Air pressure will push flames, sparks and firebrands into new fuels. By pushing the flames close to the fuel in front of the fire, the fuel is preheated more quickly because of the increased radiant heat. More of the fuel becomes available for combustion since it is drier and can reach ignition temperature quickly. RVFD has a significant wildland urban interface (WUI) risk as discussed later in this section. The Vail Gale factor patently increases the WUI risk.

Roadway Network

As indicated in Section 2, RVFD does not have a centralized, gridded roadway system as is common in larger municipalities such as the City of Tucson. The non-gridded road system in RVFD contributes significantly to response times. An increased response time often translates to an increase in the scale of an emergency. Many roadways in RVFD lack drainage management systems and have washes that cross roadways at grade, as opposed to diverting stormwater flows to engineered drainage systems.

Lack of Nearby Additional Fire Agency Resources

RVFD serves an area that is distant to any additional fire agency resources. The closest additional resources come from Corona de Tucson Fire District, which also has limited resources and variable staffing on a given day. Travel times for an engine company from CTFD range from 15 to 20 minutes, depending on the location of an incident in RVFD. Resources for larger incidents are available from Tucson Fire Department through a county mutual aid agreement, but the agreement is not as efficient and effective as an automatic aid agreement. TFD units also have an extended response time. The closest engine company has an estimated travel time of 14 to 16 minutes, again dependent on the location of an incident in RVFD. The extended response times for additional resources, along with RVFD's limited resources contribute to the community risk as well as firefighter risk.

A typical subdivision street pattern in RVFD

Major Upcoming Construction Projects

The Arizona Department of Transportation will begin a bridge deck replacement project in the summer of 2019. The two bridges are located at the Colossal Cave/Wentworth Road and State Route 83 interchanges. Crews will construct one bridge at a time. Each bridge deck will be replaced half at a time to maintain traffic flow while work is underway. Each bridge will take several months to replace. These two bridges frequently are used by RVFD units responding to calls. The construction projects are expected to impact response times to some degree when RVFD must use the bridges to access incident locations.

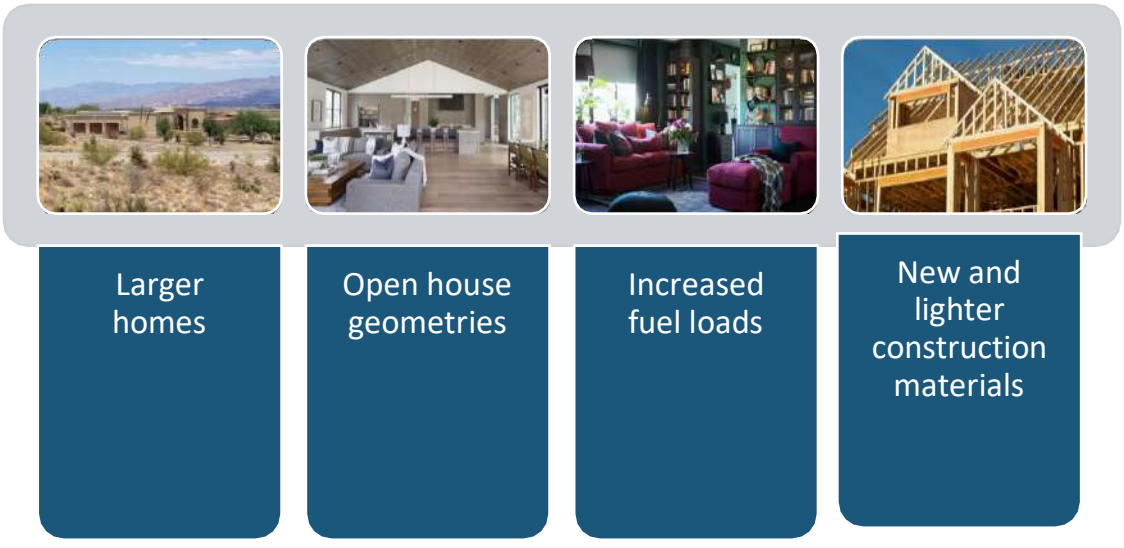
Service Delivery Program Risk Assessments

RVFD has completed risk assessments for the following service programs:

- Fire
- EMS
- Hazmat
- Technical Rescue
- Wildland

Fire Risk Assessment

While RVFD mirrors a nationwide trend in a decrease in fire events, it remains a substantial risk to the RVFD community, and as a result remains a primary focus of the District. Offsetting the decrease in frequency are several factors that increase the potential of severity of structure fires. Over 90% of the residential structures in RVFD are of relatively new construction built in the past 10-20 years, a time period that can be described as part of the "lightweight" construction era. The lightweight construction as well as several other current trends in residential structures has increased the risk for a severe outcome of a structure fire. Underwriters Laboratory has considered four specific factors that collectively are called the UL Modern Fire Formula.[28]



[28] Analysis of Changing Residential Fire Dynamics and Its Implications on Firefighter Operational Time Frames. Underwriters Laboratories, https://newscience.ul.com.

These factors result in the following negative impacts:

- Faster fire spread
- Shorter time to flashover[29]
- Rapid changes in fire behavior
- Shorter escape times
- Shorter time to structural collapse

Flashover conditions under the UL Modern Fire Formula occur much sooner than in the past. In fact, flashover today occurs eight times faster than 50 years ago[30] and can take place in under five minutes.[31] This is largely due to residential furnishings and finishes that have a high content of hydrocarbons that in turn produce much more intense heat under fire conditions than conventional class A combustibles (wood-based). It is evident from the UL Modern Fire Formula that the fire life safety risk for newer residential and commercial structures has increased in the past 20 years.

There is overwhelming evidence that a fire agency's ability to keep a fire to room of origin is a critical element in preventing fire deaths. Figure 3.9 statistics show that when a fire is confined to the room of origin versus extending beyond the room of origin, the rate of deaths and property loss is *nine times less.*[32] The National Fire Protection Association (NFPA) also reports that three-quarters of residential fire deaths occur when the fire extends beyond the three most common rooms of origin – living room, bedroom and kitchen.[33]

Flame Spread (Fig. 3.9)	Rate per 1000 Fires		
	Civilian deaths	Civilian injuries	Avg. dollar loss/fire
Confined fires or contained fire identified by incident type	0	8.7	$200
Confined fire or fire spread confined to object of origin	0.4	11.1	$1,200
Confined to room of origin, including confined fires and confined to object	1.8	23.8	$4,000
Spread beyond the room of origin but confined to floor of origin	16.2	76.3	$35,000
Spread beyond floor of origin	24.6	55.0	$65,900

[29] Flashover occurs all surfaces and contents of a space (room) reach their ignition temperature nearly simultaneously resulting in full room fire involvement. Flashover is generally not a life survivable event for either occupants or firefighters.

[30] UL. *Modern Residential Fires.* http://newscience.ul.com/articles/modern-residential-fires

[31] Analysis of Changing Residential Fire Dynamics and Its Implications on Firefighter Operational Timeframes. Underwriters Laboratories, https://newscience.ul.com.

[32] Source: NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2020 Edition, Annex A.

[33] NFPA. Home Structure Fires. December 2017. https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and- reports/Building-and-life-safety/oshomes.pdf

Sprinkler discussion

The National Fire Protection Association reports that the civilian death rate in homes protected with fire sprinklers is 81% less than those homes not having sprinkler systems.[34] The United States Fire Administration reports that fire associated property damage in homes with fire sprinklers is 71% less than those without.[35] These same organizations report that in fire sprinklered *commercial* occupancies:

- There is an 89% lower death rate.
- There is a 71% decrease in property damage.
- There were 67% fewer firefighter injuries.
- 97% of the fires were confined to the room of origin.

From evidenced-based research, as part of its community risk reduction program, RVFD should continue its aggressive approach of advocating the use of fire sprinklers in the community to reduce property damage and prevent both civilian and firefighter injuries and deaths. This is in line with the National Fallen Firefighters Foundation's Firefighter Safety Initiatives - *Advocacy must be strengthened for the enforcement of codes and the installation of home fire sprinklers*.[36]

Hoarding Discussion

Contributing to a higher risk to occupants and firefighters from fire is the increase in hoarding in recent years. Hoarding generally is defined as when the excessive accumulation of items, regardless of actual value, occurs. According to the NFPA,[37] hoarding puts firefighters in harm's way in several different aspects:

- Firefighters cannot move swiftly through a home filled with clutter.
- Responders can be trapped in a home when exits are blocked.
- They can be injured by objects falling from piles.
- The weight of the stored items, especially if water is added to put out a fire, can lead to building collapse.
- Fighting fires is very risky in a hoarding home. It is hard to enter the home to provide medical care. The clutter impedes the search and rescue of people and pets.

[34] NFPA. *U.S. Experience with Sprinklers*. July 2017. https://www.nfpa.org/News-and-Research/Data-research-and-tools/Suppression/US-Experience-with-Sprinklers

[35] United States Fire Administration. https://www.usfa.fema.gov/prevention/outreach/sprinklers.html

[36] Everyone Goes Home 16 Firefighter Safety Initiatives. https://www.everyonegoeshome.com/16-initiatives/

[37] NFPA, Hoarding and Fire Risk. https://www.nfpa.org/~/media/files/public-education/resources/safety-tip-sheets/hoardingtipsheet.pdf?la=en.

Fire Risk Assessment Methodology

RVFD fire risk assessment included a methodical approach risk scoring system that included 17 variables that as part of a weighted percentage system collectively contribute to an overall fire risk score. An internal fire risk assessment team was formed to determine the variables included in the scoring and complete the scoring process for all commercial occupancies and categories of residential occupancies. The team consisted of the fire chief, a captain, an acting captain, a firefighter/paramedic and a firefighter. The process was facilitated by the District's CRA-SOC consultant. The risk assessment tool, titled Occupancy Risk Assessment Profile (ORAP) utilized for District occupancies is included in Appendix C.

As part of the assessment, if a commercial occupancy was sprinklered, the overall OVAP score was reduced by 50% and 25% for residential occupancies. The lessor credit score for residential occupancies was based on the assumption that residential sprinkler systems receive less inspection and maintenance than commercial occupancies. Nearly 100 commercial occupancies were assessed and scored. The scoring for commercial occupancies and categories of residential occupancies are also included in Appendix C. General descriptions of fire categories are listed in Figure 3.10 below.

Figure 3.10

Fire Risk Level Categories	
Low	Dumpster fires, car/small truck fires, nuisance fires, small shed fires, automatic alarms.
Moderate	Mobile homes, typical single-family residences, sprinklered small to medium size retail and office occupancies.
High	Very large residential structures, non-sprinklered retail and office occupancies, large sprinklered occupancies.
Maximum	Identified target hazard occupancies characterized by unique factors contributing significantly to fire risk and the risk to occupants and firefighters.

Critical Task and Effective Response Force Determination

A critical task is a time-sensitive work function that is essential, along with other work functions to ensure a positive outcome for keeping a fire to the area of origin. A critical task analysis was conducted for each risk classification (fire, EMS, hazmat, technical rescue, wildland) and category level. This allows the District to determine the capabilities needed to resolve an emergency. Capabilities include staffing organization, coordination, training, standard operating procedures, apparatus and equipment. An Effective Response Force (ERF) determination is part of the capability determination and is defined as the number of staff and apparatus type

necessary to complete all of the identified critical tasks necessary to mitigate an incident. The following tables show critical tasks and ERF for each risk level category.

Low Risk - Fire, Non-structural	
Critical Task	Personnel required
Fire attack	2
Pump operation	1
Total Personnel = 3	
ERF = Single engine company	

Moderate Risk - Structure Fire	
Critical Task	Personnel required
Incident command/Safety	1
Pump operation	1
Fire attack + search/Rescue	4
RIC	2
Vent	3
Exposure	3
Total Personnel= 14	
ERF = 3 engine companies, 2 ambulances, 1 BC	

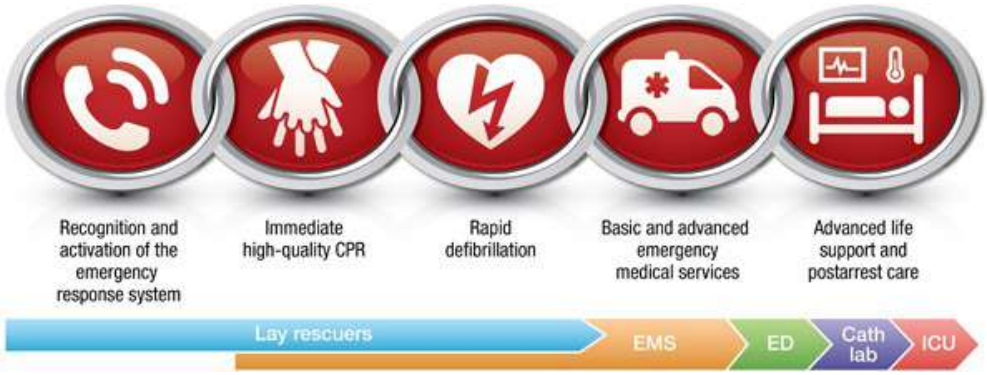
High Risk - Structure Fire	
Critical Task	Personnel required
Incident command/Safety	1
Pump operation	1
Fire attack + search/Rescue	6
Second attack or back up line	3
RIC	2
Vent	3
Exposure	3
Total personnel = 19	
ERF = 4 engine companies, 2 ambulances, 1 BC	

Maximum Risk - Structure Fire	
Critical Task	Personnel required
Incident command/Safety	2
Pump operation	1
Fire attack	3
Search/Rescue	3
Second attack line	3
RIC	3
Vent	3
Exposure	3
Total personnel = 21	
ERF = 4 engine companies, 1 ladder company, 2 ambulances, 1 BC, one additional fire officer	

EMS Risk Assessment

The EMS risk assessment team considered the frequency of an occurrence based on historical response data, the severity/consequences such emergencies could have on the community, firefighter safety, and the impact the commitment of resources would have on the District. Each EMS call classification was scored. The summary of the scoring is in Appendix D. This rating differs from the rating assessment used for patient risk categorization in that it considers other factors besides the call type.

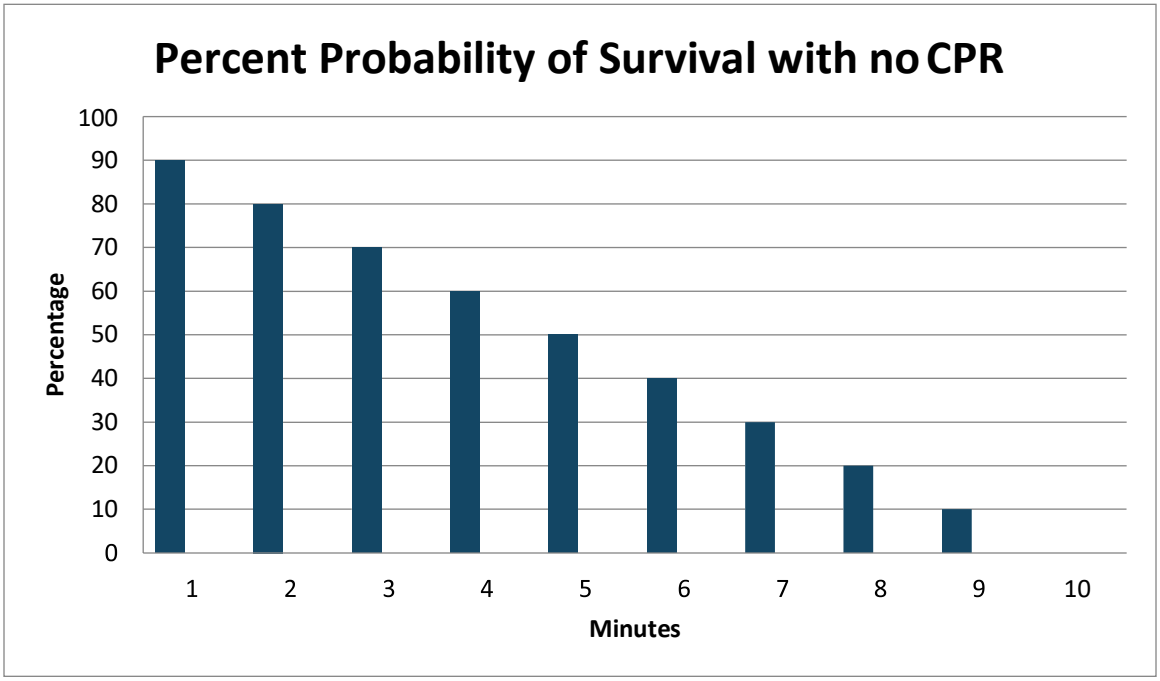
Information was also utilized from sources such as the American Heart Association (AHA) and the National Institutes of Health to help assess the EMS risk. Both serious medical and trauma conditions are very time sensitive. The AHA Cardiac Chain of Survival is shown below.



A strong chain of survival can improve chances of survival and recovery for victims of heart attack, stroke, and other medical emergencies. The first three links are predicated on actions prior to the arrival of RVFD resources. Educating the public about the importance of activating the 911 system as soon as a serious medical emergency is discovered is key, along with expeditious call processing (alarm handling) at the dispatch center.

Figure 3.11 illustrates the importance of the initiation of CPR by bystanders.

Figure 3.11



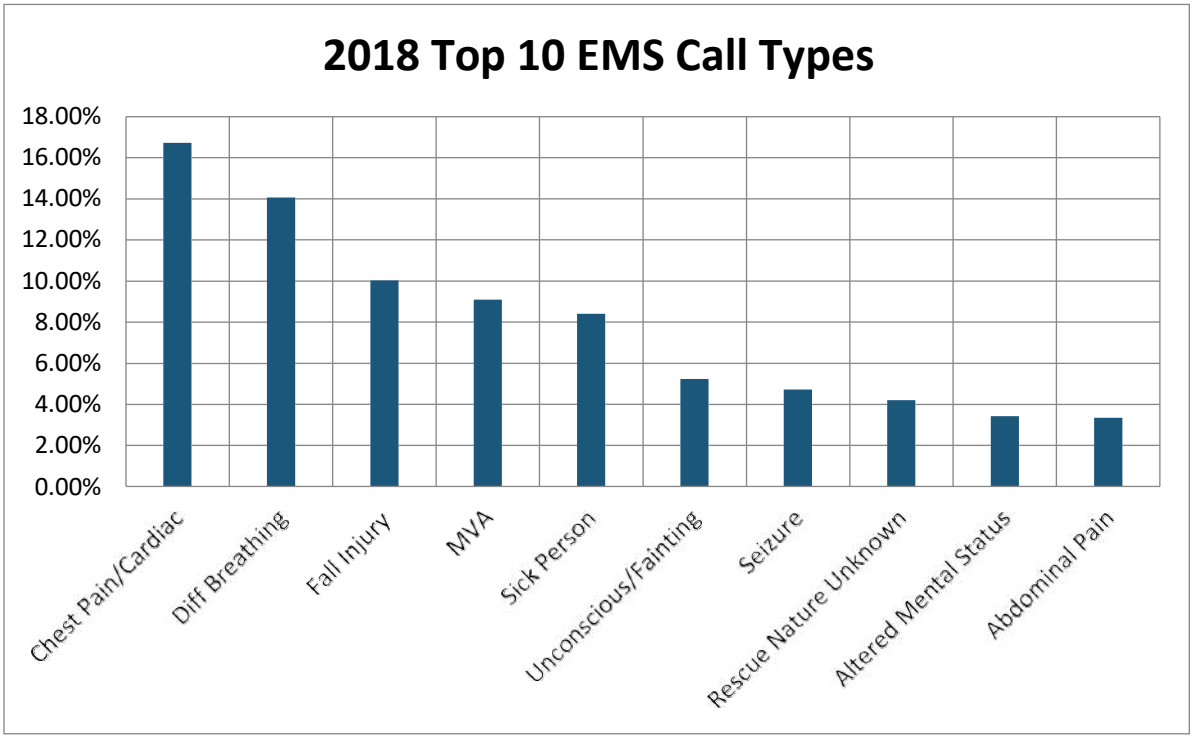
"Cardiac arrest survival rates are unacceptably low," said Robert Graham, chair of the study committee and director of the national program office for Aligning Forces for Quality at George Washington University in Washington, D.C. "Although breakthroughs in understanding and treating cardiac arrest are promising, the ability to deliver timely interventions and high-quality care is inconsistent. Cardiac arrest treatment is a community issue, requiring a wide range of people to be prepared to act, including bystanders, family members, first responders, emergency medical personnel, and health care providers." According the American Heart Association,[38] when bystander CPR was administered 45% of out-of-hospital cardiac arrest victims survived, compared to 10% survival without bystander CPR.

[38] https://cpr.heart.org/AHAECC/CPRAndECC/AboutCPRECC/CPRFactsAndStats/UCM_475748_CPR-Facts-and-Stats.jsp

The well-known Golden Hour, the hour immediately following traumatic injury to the time of the patient reaching surgery at an appropriate definitive trauma care facility, is a key factor when assessing serious trauma risk. This type of injury is very time critical and given a high level of consideration when reviewing current, and planning for concentration and distribution of response resources.

Figure 3.12 illustrates the top 10 EMS call types distribution in 2018

Figure 3.12



The top ten EMS calls accounted for 78% of all EMS call types. RVFD had 952 transports in 2018; 57% were ALS transports, 43% BLS.

EMS Risk Level Categories	
Low	BLS level calls such as sick person, back pain, minor cuts/burns. This risk level is without airway, breathing or circulation problems. Transport needs determined on scene.
Moderate	Probable ALS level calls such as STEMI patients, difficulty breathing, major musculoskeletal injury, stroke, and other ALS level calls. Also includes code arrest calls.
High	High mechanism of injury calls that could involve several patients including multiple vehicle/occupant MVA's, motorcycle/pedestrian calls. Also includes drownings.
Maximum	Multi-patient incidents, generally greater than three patients.

Low Risk - EMS	
Critical Task	Personnel Required
Command/Safety	1
Patient assessment/Treatment	2
Total Personnel = 3	
ERF = Single engine company	

Moderate Risk - EMS	
Critical Task	Personnel Required
Command/Safety	1
Assessment/Treatment/Documentation	4*
Transportation	2
Total Personnel = 5	
ERF = 1 engine company, 1 ambulance**	

*ambulance crew part of patient assessment/treatment
**If code arrest, adds battalion chief

High Risk - EMS	
Critical Task	Personnel Required
Command/Safety	1
Assessment/Treatment/Documentation/Additional tasks as needed	8*
Transportation	2
Total Personnel = 9	
ERF = 2 engine companies, 1 ambulance,** 1 BC	

* Includes ambulance crew
** If air medical is used for transport, adds engine company for LZ management

Maximum Risk – EMS (generally > 3 patients)	
Critical Task	Personnel Required
Command/Safety	1
Medical group supervisor	1
Triage/Treatment	12*
Transport	6**
Total Personnel = 14	
ERF = 2 engine companies, 3 ambulances,** 1 BC, one additional fire officer	

*Includes ambulance crews
** Additional transport units as needed. If air medical is used for transport, additional engine company is added for LZ management

Hazmat Risk Assessment

As described earlier in this section, RVFD has substantial exposures to hazardous materials, mostly occurring on and along the I-10 corridor. This is combined with the routine hazmat risks expected with light to medium commercial development and residential subdivisions. The majority of calls to these occupancies consist of small diameter gas line breaks and carbon monoxide issues.

The Special Operations Risk Assessment Team, consisting of the fire chief, three captains, a firefighter/paramedic, and two firefighters completed the hazmat risk assessment. The risk assessment process included identifying key hazmat risks in the District, categorizing and classifying them and developing critical tasks and effective response forces to mitigate the different levels of hazmat incidents that may occur in RVFD. The identified hazmat risks were ranked using probability and severity multipliers. The scoring of various identified hazmat risks is in Appendix E. Figure 3.13 lists the various hazmat risk categories and their general descriptions.

Figure 3.13

Hazmat Risk Level Categories	
Risk category and associated score range	General Description
Low ≤ 4	CO alarms, small flammable liquid spills, small pressurized flammable or nonflammable gas container leak. Incident can be stabilized at the hazmat operations training level.
Moderate 5-8	Small volume chemical spills, low pressure, small diameter gas line breaks, meth lab response. Generally can be managed at the hazmat operations training level. Incident may require direction from hazmat technician.
High 9-15	Large volume flammable liquid spills, large pressurized flammable or nonflammable gas container leak, high pressure, large diameter natural gas line break.
Maximum ≥ 16	El Paso or Kinder Morgan high pressure/large diameter natural gas or petroleum line breaks, large pressurized toxic gas vessel leak, train derailment with hazmat.

Low Risk - Hazmat	
Critical Task	Personnel Required
Command/Safety	1
ID/Establish zones/Evacuate/Mitigation/Patient assessment if needed, control and contain leak.	2
Total personnel = 3	
ERF = Single engine company*	

*Ambulance added if carbon monoxide detector call

Moderate Risk - Hazmat	
Critical Task	Personnel Required
Command	1
Safety	1
ID/Establish zones/Evacuate/Mitigation/Patient assessment if needed, control and contain leak if possible within parameters of hazmat operations level	2
Air monitoring	3
Charged and manned protection line	2
Water pump operation	1
Medical	2
Total personnel = 12	
ERF = 2 engine companies, 2 ambulances, 1 BC, 1 additional fire officer	

High Risk - Hazmat	
Critical Task	Personnel Required
Command	1
Safety	1
Hazmat asst. safety officer	1*
ID/Establish zones/Evacuate*/Patient assessment if needed	3
Exposure line	2
Water supply	1
Air monitoring/recon	2*
Research	2*
Entry team	2*
Back up team	2*
Decon (minimum one tech level)	3
Medical	2
Total personnel = 22	
ERF = 2 engine companies, 2 ambulances, 1 BC, 2 additional fire officers, Pima Regional Hazmat Team	

*Indicates technician level critical tasks

Maximum Risk – Hazmat	
Critical Task	Personnel Required
Command	1
Division supervisors	2 minimum
Safety	1
Hazmat asst. safety officer (tech level)	1*
ID/establish zones/Evacuate*/Patient assessment if needed	3
Exposure line	2
Water supply	1
Air monitoring/recon	4*
Research	2*
Entry team	4*
Back up team	4*
Decon (minimum one tech level)	6
Medical	4
Total personnel = 35	
ERF = 4 engine companies, 4 ambulances, 1 BC, 4 additional fire officers, Pima Regional Hazmat Team	

*Indicates technician level critical tasks

Technical Rescue Risk Assessment

The special operations conducted the technical rescue assessment. Based on the team's identification of potential technical rescues in the District, the following technical rescue disciplines were included in the team's risk assessment. They include:

- Extrication
- Cave rescue
- Confined space rescue
- Structural collapse rescue
- Water rescue
- Trench collapse rescue
- Low and high angle rescue

The team identified the following technical rescue target hazards and the associated potential technical rescue risks:

District Target Hazard	Technical Rescue Risk
Interstate 10	Extrication
At-grade drainage crossings	Water rescue
Mountain bike/hiking trails	Low/high angle rescue
Colossal Cave	Cave rescue
Vulcan Plant	Confined space, machinery extrication
Retaining wall at rear of Walgreens	High angle rescue
UPRR railroad trestle bridges	High angle rescue

Extrication

The Special Operations Risk Assessment Team identified two levels of vehicle extrication that occur in the District; those that occur on arterial roadways such as Old Spanish Trail and Colossal Cave Road (generally at intersections) and those that occur on Interstate 10. The risk for extrications located on arterial roadways was categorized as *moderate risk.* Those on Interstate 10 were categorized as *high risk* due to the increased level of risk to firefighters. "Heavy" extrications on the Interstate; those involving the use of advanced rescue tools and techniques such as airbags, were categorized as a maximum risk.

Moderate Risk - Extrication	
Critical Task	Personnel Required
Command/Safety	1
Vehicle stabilization/Patient extrication	4*
Patient treatment/Transportation	4
Total Personnel = 9	
ERF = 2 engine companies, 1 ambulance, 1 BC	

*Includes placement of precautionary attack line

High Risk - Extrication	
Critical Task	Personnel Required
Command	1
Safety	1
Vehicle stabilization/Patient extrication	4*
Patient treatment/Transportation	4
Total Personnel = 10	
ERF = 2 engine companies, 1 ambulance, 1 BC, 1 additional fire officer	

*Includes placement of precautionary attack line

Maximum Risk - Extrication	
Critical Task	Personnel Required
Command	1
Safety	1
Vehicle stabilization/Patient extrication	6*
Patient treatment/Transportation	4
Total Personnel = 12	
ERF = 2 engine companies, 2 ambulances, 1 BC, 1 additional fire officer	

*Includes placement of precautionary protection line

Trench Collapse

In the current period of strong economic growth in RVFD, there are a substantial number of construction projects that involve utility, water, or sewer line trench construction. Trench collapse risk was identified by the Special Operations Risk Assessment Team and classified as a high risk. RVFD does not have trench collapse rescue capability and on scene actions would only consist of establishing a safe zone at the scene until qualified technical rescue personnel arrive

through mutual aid. The Special Ops Risk Assessment Team classified trench collapse as a single category “high risk” event.

High Risk - Trench Collapse	
Critical Task	Personnel Required
Command	1
Safety	1
Tech rescue asst. safety officer	1*
Tech rescue supervisor	1*
Securement of scene	3
Shoring team	8*
Patient treatment/Transportation	2
Total Personnel = 17	
ERF = 1 engine company, 1 ambulance, 1 BC, additional technical rescue level resources from mutual aid agencies	

*Indicates technician level critical tasks

Structural Collapse

The Special Operations Risk Assessment Team determined the primary risk in RVFD for structural collapse is limited to a vehicle into a building, since the risk for structural collapse of other types is very limited, such as that from an earthquake or deliberate event. The team determined that there was only a single category of risk for structural collapse, “moderate.”

Moderate Risk - Structural Collapse	
Critical Task	Personnel Required
Command/Safety	1
Structural stabilization	2
Vehicle stabilization/Patient extrication	2
Fire protection attack line	2
Patient treatment/Transportation	2
Total Personnel = 9	
ERF = 2 engine companies, 1 ambulance, 1 BC	

Confined Space

The Special Operations Risk Assessment Team determined there are confined spaces within RVFD that could present confined space technical rescue challenges. Confined spaces include large utility vaults, storage tanks, manholes, wells, and other similar structures. The team determined that there was only a single category of risk for structural collapse, "high."

High Risk - Confined Space	
Critical Task	Personnel Required
Command	1
Safety	1
Technician level asst. safety officer	1*
Tech rescue supervisor	1*
Entry team	3*
Entry team back up	3*
Support functions/Hauling system	3**
Patient treatment/Transportation	2
Total Personnel = 15	
ERF = 1 engine company, 1 ambulance, 1 BC, additional technical rescue level resources from mutual aid agencies	

*Indicates technician level critical tasks **minimum one tech level

Low and High Angle Rescue

RVFD has numerous mountain biking and hiking trails. These can be categorized as low angle and high angle, each having their own unique technical rescue challenges, high angle predictably being the more resource intensive of the two. While either low angle or high angle can require rope systems for rescue, generally low angle events do not. Based on these types of rescue scenarios, two associated risk categories were identified.

Moderate Risk - Low Angle	
Critical Task	Personnel Required
Command/Safety	1
On-trail patient locating/Treatment/Transport to ambulance location	6
Patient transportation	2
Total Personnel = 9	
ERF = 2 engine companies, 1 ambulance, 1 BC	

High Risk - High Angle	
Critical Task	Personnel Required
Command	1
Technician level safety officer	1
Technical rescue supervisor	1*
Rescue team, initial patient care	2*
Haul team	3
Rigger/Work line/Belay line	4 **
Patient transportation	2
Total Personnel = 14	
ERF = 2 engine companies, 2 ambulances, 1 BC, additional technical rescue level resources from mutual aid agencies	

*Indicates technician level critical tasks **minimum one tech level

Cave Rescue

Colossal Cave is located within RVFD. It receives over 60,000 visitors per year. RVFD has a history of rescues in the cave. The Special Operations Risk Assessment Team categorized cave rescue as a "moderate risk."

Moderate Risk – Cave Rescue	
Critical Task	Personnel Required
Command	1
Safety	1
Entry/Search/Patient treatment	2
Support tasks, including transport of patient out of cave	3
Patient transportation	2
Total Personnel = 9	
ERF = 2 engine companies, 1 ambulance, 1 BC	

Water Rescue

The Special Operations Risk Assessment Team identified water rescue is a significant risk in RVFD. There is substantial history of water rescues in the District, contributing to what is one of the most common technical rescue calls for RVFD. The Pantano Wash and Rincon Creek contribute heavily to this risk, but there are many other smaller washes that can create a water rescue scenario. The assessment team determined the water rescue risk to be categorized as a "moderate or high risk," depending on a number of rescue factors. The ERF was determined to be the same for both levels of risk. It is recognized that critical tasks will vary with each water rescue.

Moderate to High Risk – Water Rescue	
Critical Task	Personnel Required
Command	1
Safety (technician level)	1
Spotters	2
Throw bag team	2
"Go" team	2
Decon	1
Patient treatment/Transport	2
Total Personnel = 11	
ERF = 2 engine companies, 2 ambulances, 1 BC	

Wildland Risk Assessment

The Special Operations Risk Assessment Team performed the wildland risk assessment. As noted later in the Large Risk – Potentially Districtwide Risk Assessment, a severe wildland-urban interface event was the top-ranked risk in that assessment. This type of an event was categorized in the wildland risk assessment as a maximum risk. Three other categories of risk; low, moderate and high were also identified and assessed.

Figure 3.14 represents the three major vegetation associations and their fire related characteristics associated with wildland risk in RVFD.[39] These factors were also considered when developing criteria for categorizing the wildland fire risk in RVFD.

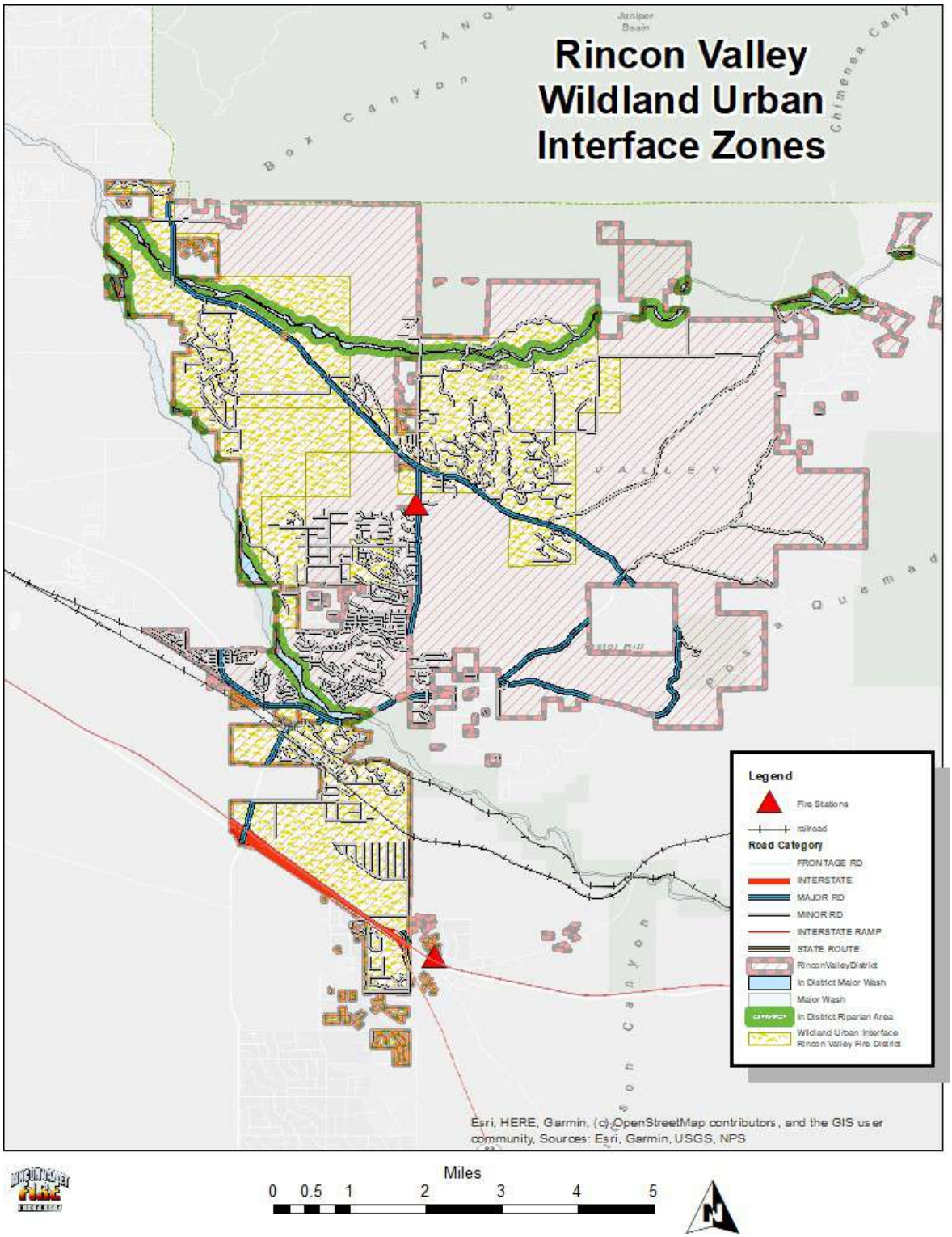
[39] Source: Pima County Community Wildfire Protection Plan, July 2013. I https://webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/OEMHS/Pima%20County%20Community%20Wildfire%20Protection%20Plan/130724%20Community%20Wildfire%20Protection%20Plan.pdf

Figure 3.14

Vegetation Association	Fuel Type	Risk Rating	Flame Length, Feet	Rate of spread per hour, feet
Semi-desert Grassland and Steppe	Grasslands	Low	4-6	2310-5150
Sonoran Palo Verde – Mixed Cacti	Desert shrub - scrub	Moderate	4-6	2310-5150
Mesquite Upland Scrub	Shrublands	Moderate	4-12	5180-6860
Invasive Southwest Riparian Woodland and Shrub	Not formally defined, but primarily consists of salt cedar in RVFD	High	19	4950

The areas of wildland urban interface risk in RVFD have been identified and are represented in Figure 3.15.

Figure 3.15


Rincon Valley
Wildland Urban
Interface Zones
Box Canyon
Chimenea Canyon
Juniper Basin
Legend
Fire Stations
railroad
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
STATE ROUTE
RinconValleyDistrict
In District Major Wash
Major Wash
In District Riparian Area
Wildland Urban Interface
Rincon Valley Fire District
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Sources: Esri, Garmin, USGS, NPS
Miles
0 0.5 1 2 3 4 5

Wildland Fire Risk Level Categories	
Low	Small wildland fires, generally less than half-acre but also dependent on fuel type/density, continuity, and rate of spread. Includes small fires adjacent to RR tracks and the interstate.
Moderate	Wildland fires generally from half-acre to five acres in size, but also dependent on fuel density, continuity, and rate of spread. These fires are not imminently endangering any structures.
High	Wildland fires generally greater than five acres, but also dependent on fuel density, continuity, and rate of spread. These fires have the possibility of eventually reaching structures.
Maximum	Larger wildland fires that have the immediate possibility of reaching multiple structures and have the possibility of substantial loss of life and property.

Low Risk – Wildland Fire	
Critical Task	Personnel Required
Command/Safety	1
Fire attack including handline and hand tool tasks as necessary	2*
Total Personnel = 3	
ERF = 1 engine company	

*Command assists as appropriate

Moderate Risk – Wildland Fire	
Critical Task	Personnel Required
Command/Safety	1
Recon/Lookout	1
Pump operator	1
Water supply	1
Two or more attack lines/Progressive lay	6
Total Personnel = 10	
ERF = 2 engine companies*, 1 tender, 1 ambulance, 1 BC, one additional fire officer	

*May also include cross staffing of wildland engine

High Risk – Wildland Fire	
Critical Task	Personnel Required
Command	1
Safety	1
Operations supervisor	1
Recon/Look out	1
Pump operator	1
Water supply	2
Two or more attack lines/Progressive lay/Hand line construction	6
Total Personnel = 13*	
ERF = 3 engine companies,* ** 2 tenders, 1 ambulance, 1 BC, one additional fire officer	

* Balance of ERF to be provided by mutual aid

** May also include cross staffing of wildland engine

Maximum Risk – Wildland Fire	
Critical Task	Personnel Required
Command	1
Safety	1
Operations supervisor	1
Aerial recon	1
Recon/Lookout	1
Structure protection	11*
Water supply	5
Firing operations	3
Medical	2
Fire attack operations and other support operations	15*
Total Personnel = 41**	
ERF = 3 engine companies*, 5 tenders, 1 strike team of Type 3 engines*** 2 ambulances, 1 BC, 4 additional fire officers.	

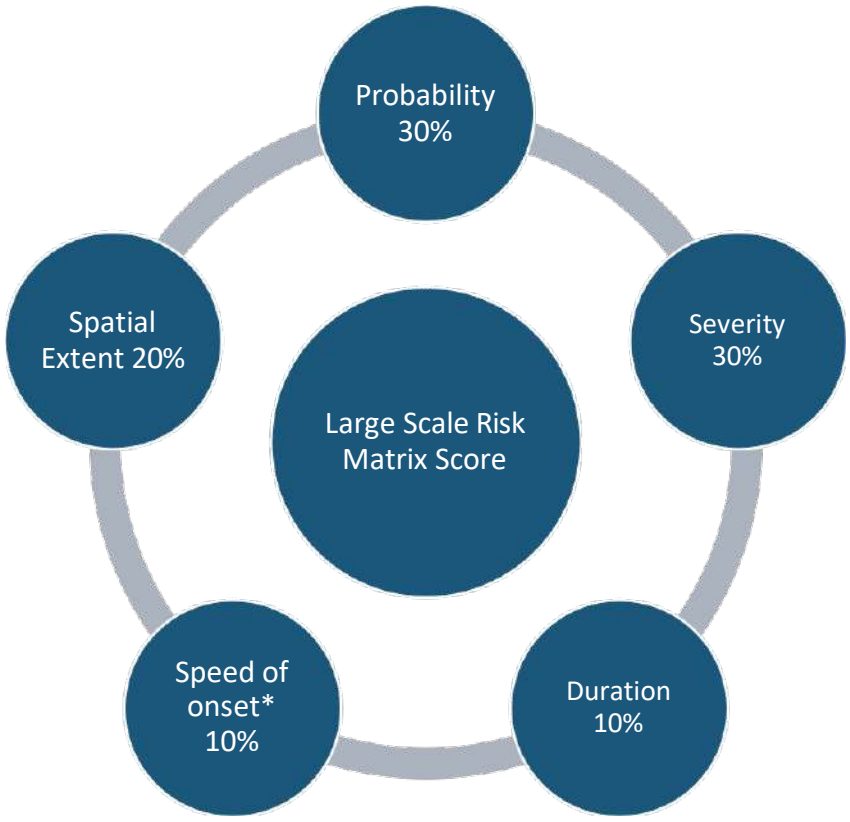
* Balance of ERF to be provided by mutual aid

** May also include cross staffing of wildland engine

*** Strike team consists of five Type 3 engines

LARGE SCALE – POTENTIALLY DISTRICTWIDE EVENT RISK ASSESSMENT

In addition to the five classifications of risk previously discussed, RVFD has also assessed large scale, potentially districtwide risks. These risks would likely require additional resources beyond RVFD's capability and have extended incident time periods. A multi-dimensional profile risk index (PRI) was utilized by RVFD's officer staff resulting in the identification and ranking of six large scale risks. The PRI process consisted of rating five elements with an associated weighted value.[40] The elements and their associated weighted values are illustrated by the following graphic.



* refers to advance warning time of event

[40] Source: Beyond the Basics, Best Practices in Local Mitigation Planning, www.mitigationguide.org, and National Fire Academy On-campus Executive Fire Officer Community Risk Reduction course curriculum.

The completed PRI scoring matrix can be located in Appendix G. Risks scoring greater 3.5 were classified as high risk. Lower than 3.5 classified as moderate risk. Discussion of each large-scale risk and the associated category rating/PRI score follows, listed in order of the highest associated PRI score.

1) **Wildland/Urban Interface (WUI) Fire –** *PRI score 4.0, High Risk*

As part of the risk assessment process, RVFD personnel with expertise in wildland fire identified areas of wildland/urban interface within the District. *NFPA 1710, Organization and Deployment of Fire Suppression Operations by Career Departments* defines wildland/urban interface as:

> The line or zone where structures and other development meet or intermingle with undeveloped wildland or vegetative fuels and the area within or adjacent to private and public property where mitigation actions can prevent damage or loss from wildfire.

The identified areas were previously noted in Figure 3.15. These findings were considered during the profile index scoring process and resulted in this risk having the highest ranking.

2) **Large Scale I-10, Railroad, or Large Diameter Gas Line Hazmat Incident –** *PRI score 3.8, High Risk*

Much like the WUI risk, this incident would require numerous additional regional as well as potentially state level resources and could pose a serious risk to nearby residential populations. Effects from such an incident could pose both acute and long-term effects for the public as well as the environment. Identifying the scope of a large-scale hazmat incident early in its inception by qualified personnel is critical to initiating the response of appropriate resources to help ensure stabilization in an expeditious manner.

3) **Extended Power Failure –** *PRI score 3.3, Moderate Risk*

While RVFD experiences relatively short duration, isolated power failures several times a year, an extended districtwide power failure (roughly defined as an outage that goes beyond eight hours and possibly lasts for days) has far greater implications to its citizens as well as the District's response capabilities. Threats from a large regional severe weather event, an aging energy infrastructure system, and the potential for an intentional large-scale interruption of power or intranet all contributed to a rating of moderate for this risk.

4) **Active Shooter –** *PRI score 3.0, Moderate Risk*

This risk is an example of the ever-changing, all-hazard nature of the fire service. Active shooter events have increased in frequency across the country in recent years, and the regional experience of the January 8, 2011 Safeway shooting resulted in this risk to be included as part of the large scale risk assessment. While the impact of such an event on the community and the responding fire agency can be large, RVFD is fortunate to not have a large number of venues that such an event is likely to occur. RVFD participates in a regional team of law enforcement and fire agencies to develop response strategies and tactics to help ensure the best outcome possible for both the public and first responders.

5) **Flood Event–** *PRI score = 2.9, Moderate Risk*

This risk is primarily based on flooding adjacent to the Pantano Wash that traverses the northern portion of the District in a general southeast to northwest direction. Rincon Creek also poses a significant flood risk as described in FEMA's Flood Insurance Study, Volume 1 of 5, Pima County Arizona (quote):[41]

> *There is a constructed earthen channel surrounded by cultivated farmland from approximately 1,000 feet upstream of Old Spanish Trail to approximately 1,800 feet downstream of Camino Loma Alta Road. Except for an area along the northern bank of the stream, from approximately 3,640 feet upstream of Old Spanish Trail, a one-percent-annual-chance flood will inundate the entire floodplain throughout the study reach. There is high ground on the northern bank just upstream of the area approximately 3,640 feet upstream of Old Spanish Trail. If the levee in the northern bank downstream of this area failed during a 1-percent-annual-chance flood, this protected reach would be flooded.*

[41] https://webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/Flood%20Control/Reports/Agua%20Caliente%20Wash %20Floodplain%20Study/revised-fis-volume1-20120928.pdf

Major flood conditions would have a severe effect on accessing a substantial area of RVFD's coverage area. A flood plain map is included in Appendix H. Increased development along these potential flood zones contributed to this risk being categorized at the moderate level.

6) **Mass Casualty Event –** *Moderate Risk, PRI score 2.7*

This risk includes all other aspects of a mass casualty event besides an active shooter incident, including incidents such as bus accidents, passenger train accidents, etc. This event will require resources beyond RVFD's capability including engine companies, ambulances, air medical units and chief officers.

Section 4

Current Deployment and Performance

DEPLOYMENT

Deployment of resources consists of two components, concentration and distribution. Concentration of resources is defined as the spacing of multiple resources arranged so that an initial effective response force can arrive on scene within the time frames outlined by the response time and on-scene performance objectives. Distribution of resources is the geographic location of all first due resources for initial intervention.[42] RVFD serves the community with a higher level of concentration and distribution of response resources in the suburban/urban developed areas of the District than the rural/undeveloped areas. This is in direct response to the higher risk and call volume associated with the suburban/urban areas.

RVFD maintains a diverse fleet of apparatus appropriately equipped to respond to the risks identifed in Section 3. The various types of apparatus RVFD deploys to incidents are described below.

Mobile Resources

Engine – Primary response unit from each station for most types of service requests. Each engine is equipped with a 1500 gallons per minute pump. Engine 291 has a 1000 gallon water tank. Engine 292 has a 750 gallon water tank. Each engine has a set of hydraulic power rescue tools and an equipment complement in accordance with *NFPA 1901, Standard for Automotive Fire Apparatus.* RVFD engines meet the requirements for FEMA Type 1 engine classification.

[42] Fire and Emergency Service Self-Assessment Manual, 9th Edition. Commission on Fire Accreditation International.

Ambulance – These vehicles provide emergency medical services on incidents and patient transport. RVFD rescues/ambulances meet the requirements for GSA Type 1 ambulance classification.

Tender – Vehicle designed to carry a large quantity of water to deliver water for firefighting efforts in areas that are not serviced by fire hydrants. RVFD's tender capacity is 3000 gallons and meets the requirements for FEMA 508-4 Type 1 and NWCG S2 tender classification.

Brush engine – Small or medium sized apparatus specifically designed for wildland firefighting. They are all-wheel drive and carry from 300 to 500 gallons of water. RVFD's engine is a Type III engine, carries 500 gallons of water, is in compliance with applicable sections of *NFPA 1906, Wildland Fire Apparatus* and equipped in accordance with National Wildland Coordinating Group requirements.

Squad – Specialized apparatus that carries both a large inventory of technical rescue and hazardous materials equipment. It also serves as the District's air supply truck. In essence, it is a rolling toolbox. For hazardous materials, it carries all the required equipment to support RVFD hazardous materials technicians. For technical rescue, it carries rope systems for high angle rescue, litters for cave and wilderness rescues, and an inflatable boat for swift water rescues. For highway responses, it is called to provide blocking as well as the use of its 50 DOT highway cones. For scene support, it has a large light for nighttime illumination, carries 24 spare SCBA bottles, and has a cascade air refill system. It also carries 250 gallons of water and a 250 GPM fire rated pump.

Fixed Resources

RVFD deploys its mobile response resources from two stations as noted in Figure 4.1. A summary of the fixed resources and the response units and staffing that are assigned to each station are included in Figures 4.2 and 4.3.

Figure 4.1

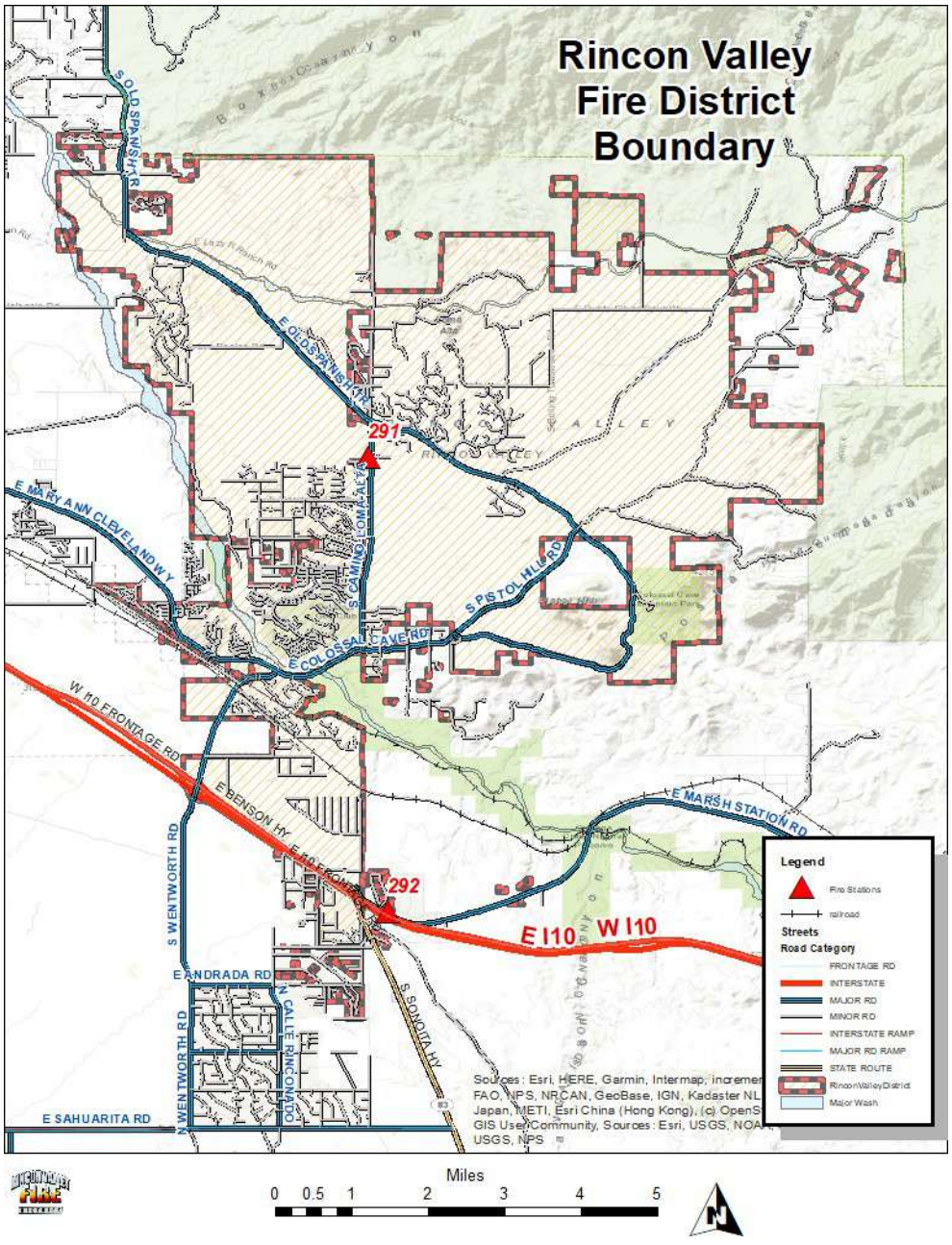


Figure 4.2

Station 291 – 8850 S. Camino Loma Alta	
Assigned apparatus and staffing	Engine 291 and Paramedic 291. Staffed with 5 FF's, 3 on the engine and 2 on the paramedic unit. Brush 291, Tender 291 and a reserve ambulance are also housed here.
Design, construction, and use	10,366 sq. ft. Built in 2003, with a 1,936 sq. ft. fitness and storage room addition in 2006. Steel frame, Type II construction. There is capacity for six shift personnel. There is a detached storage facility that houses spare equipment, and a training room that is also frequently used by the public. There is a large Pima County Wireless Integrated Network communication tower on site.
Code compliance and safety	The station met all building codes at time of construction and is fully sprinklered. The station does not have a bay exhaust system. The station has backup generator power for bay door and the communication system only.
General facility condition	Overall condition is good. The office area will need to be remodeled within five years and the public parking area pavement will need replacement within two years.

Figure 4.3

Administration/Station 292	
Assigned apparatus and staffing	Engine 292, Paramedic 292, Battalion 292. Staffed with 5 FF's and 1 chief officer, 3 on the engine and 2 on the paramedic unit, and the battalion chief. There is capacity for 8 FF's and there 8 administrative offices available, with 5 currently being utilized.
Design, construction, and use	16,813 sq. ft. Built in 2008 with 6,210 sq. ft. dedicated to admin space. Building construction consists of alternative grout-filled, reinforced styrofoam block with mostly sloped metal roof and some flat roof areas. The building is classified as Type IVB. The building is LEED Silver certified. There is a training classroom that is utilized by the public. Fleet maintenance is performed in one of the truck bays at this facility. There is a fitness course that circles the facility.
Code compliance and safety	The building met all building codes at time of construction. The backup generator is capable of supplying all necessary power needs of the building.
General facility condition	Excellent condition. There is a need for a separate BC vehicle bay; the vehicle currently shares bay space with the maintenance bay.

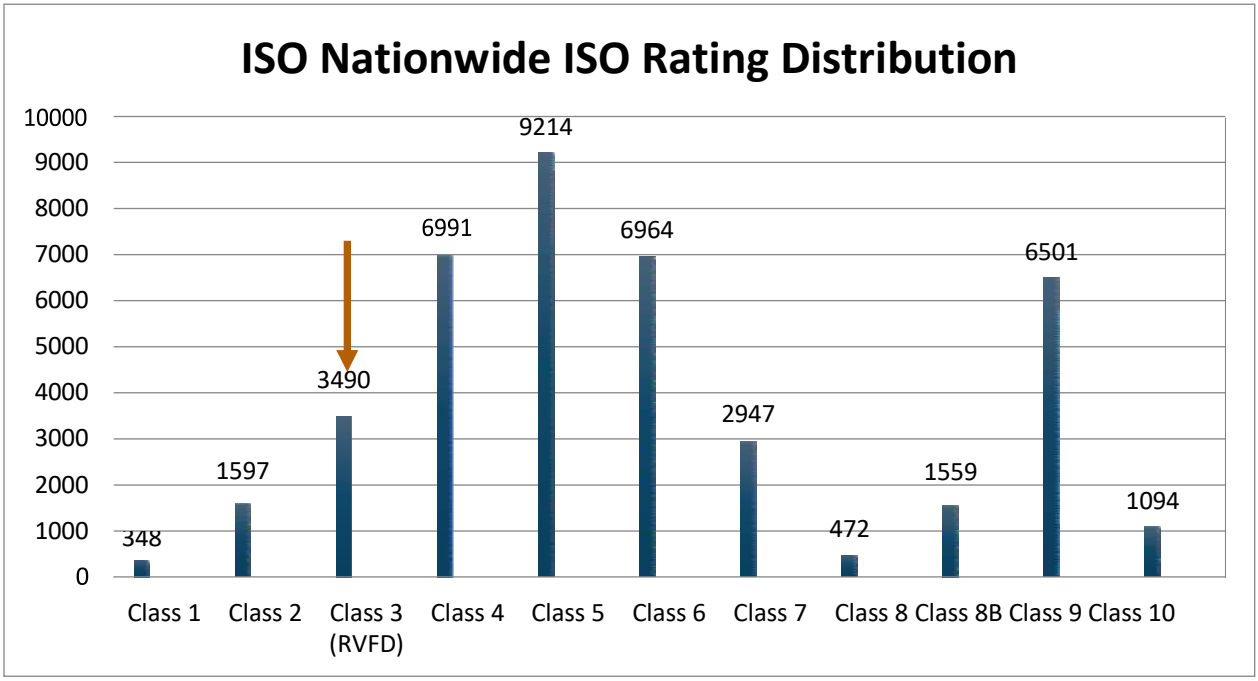
AUTOMATIC AID

RVFD currently has an automatic aid agreement with Corona de Tucson Fire District. The District has agency specific mutual aid agreements with Benson Fire Department and Sonoita-Elgin Fire District. A broad-based Pima County mutual aid agreement is also in place that includes all of the major fire/EMS providers in Pima County. Additionally, RVFD maintains a contract agreement with AMR/Rural Metro for fire and EMS services. The District currently does not have a method in place to track auto and mutual aid call data. This is a goal in the current fiscal year.

PERFORMANCE

Insurance Services Office Rating

The Insurance Service Office (ISO) was developed to collect and evaluate data from fire service communities across the United States. ISO's Fire Suppression Rating Schedule (FSRS) evaluates four primary categories of fire suppression; emergency communications, fire department, water supply, and community risk reduction.[43] The evaluation process is specific to fire prevention and fire suppression activities and produces a ranking structure that reflects the effectiveness of the fire department evaluated and its current performance. The scale range is 1-10, with 1 being the best rating, and 10 being the lowest rating. RVFD currently has an ISO rating of 3/3Y, placing it in the top 8% of all ISO rated fire agencies in the country.



[43] It should be noted that ISO only consider these primary categories, ISO does not evaluate any other service programs.

Fire Related Property Loss and Injuries/fatalities

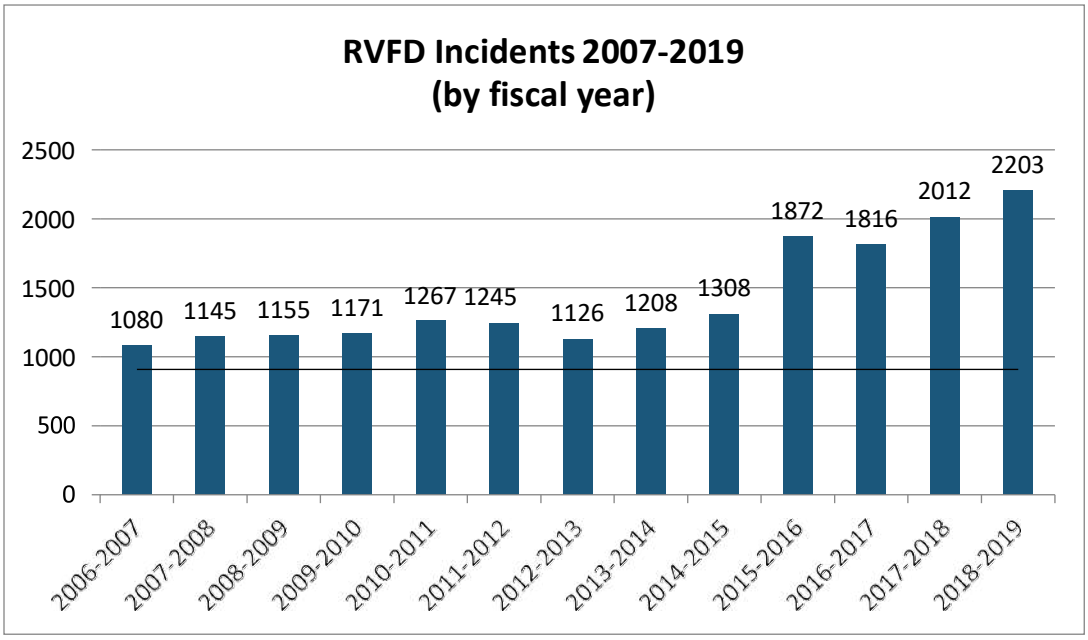
The following figure represents structural fire loss and associated civilian injuries and deaths within RVFD for the period of 2016-2018.

Year	Dollar loss	# Structure fires	Civilian injuries	Deaths
2016	8,000	1	0	1
2017	18,000	1	1	0
2018	201,000	4	0	0

Temporal Analysis

As represented in the Figure 4.4 RVFD's call volume has increased by 21% in the past three fiscal years; a sizable increase.

Figure 4.4



Reviewing the call volume of incidents by differing time periods illustrates when the greatest service demand is occurring. Figure 4.5 shows the change in call volume activity based on the day of the week for the period of 2015-2018. Figure 4.6 shows incidents by time of day.

Figure 4.5

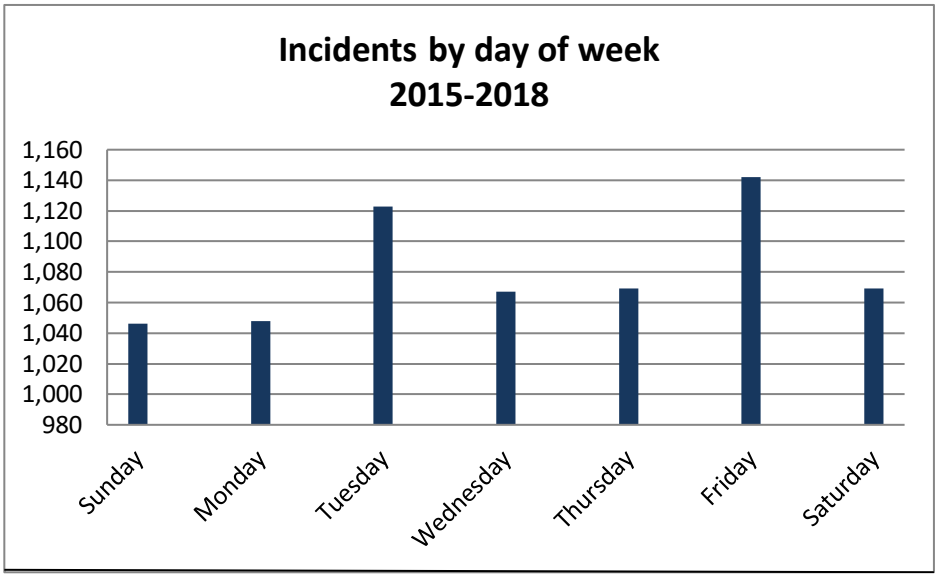
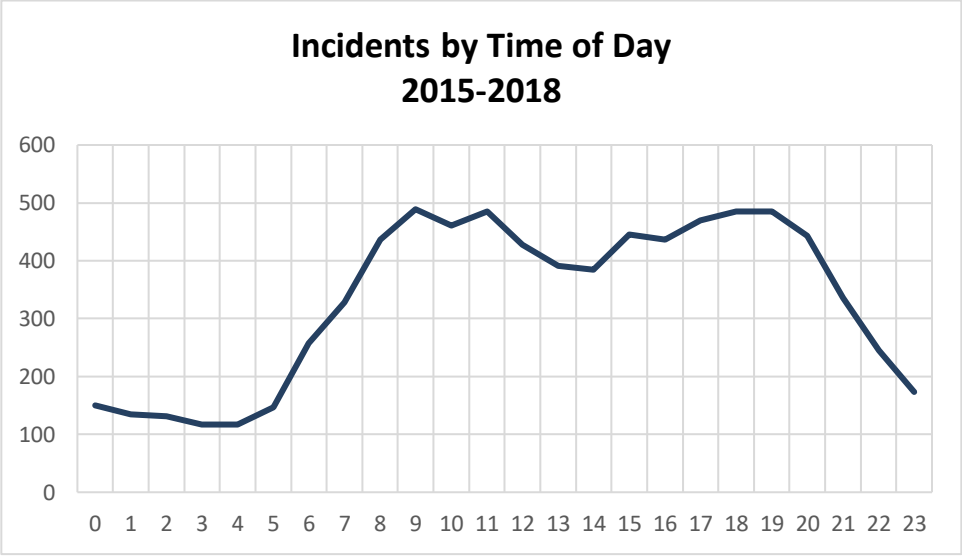
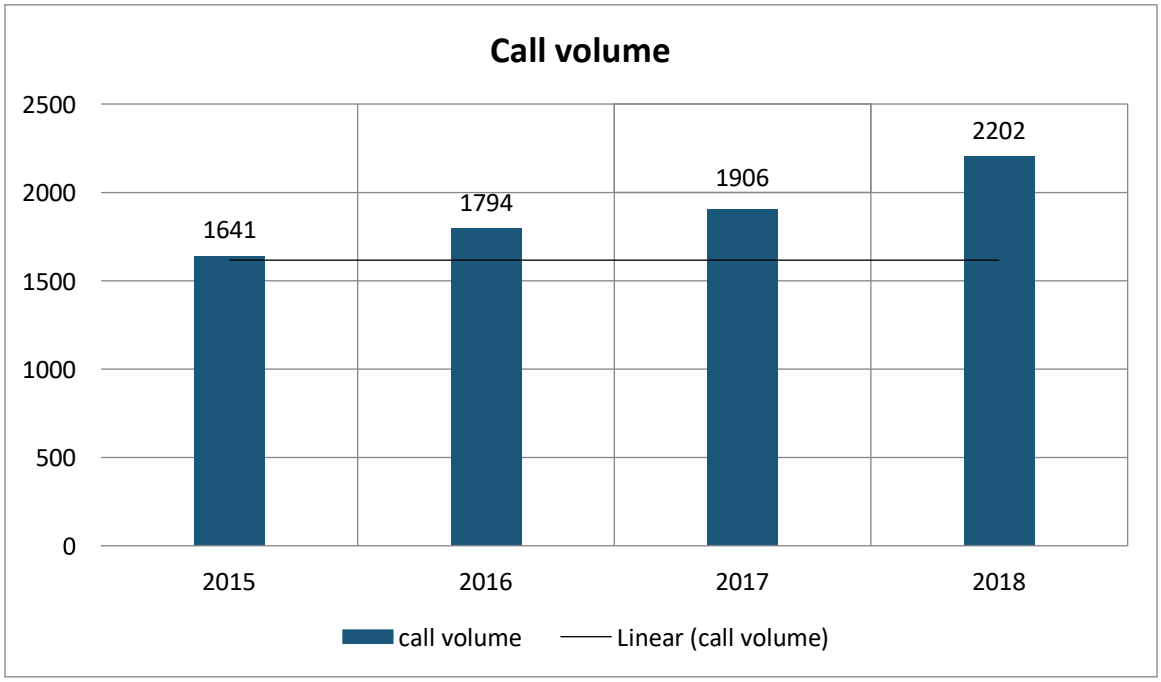


Figure 4.6



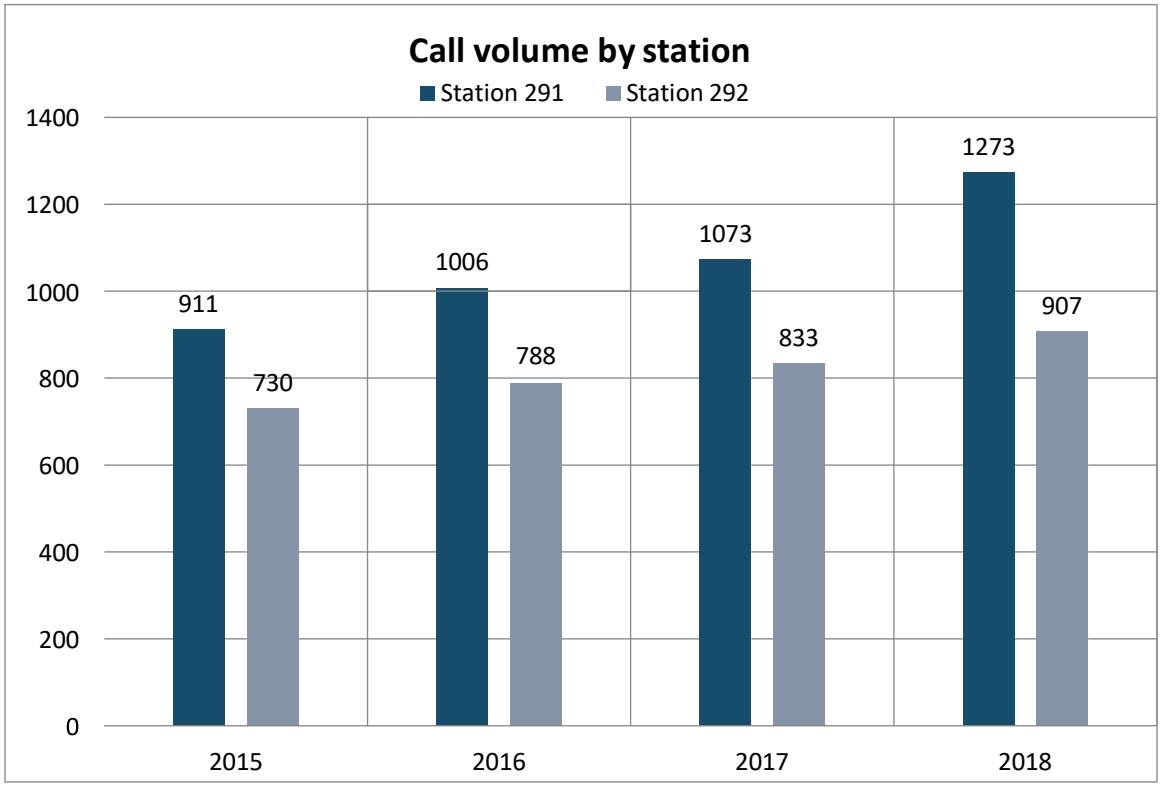
The time of day analysis shows that call volume drops significantly during the period of 2000 hours to 0600 hours. Seventy-five percent of calls occur between the hours of 0600 and 2000 hours. Figures 4.7 and 4.8 show total call volume and volume by station for the period of 2015-2018.

Figure 4.7



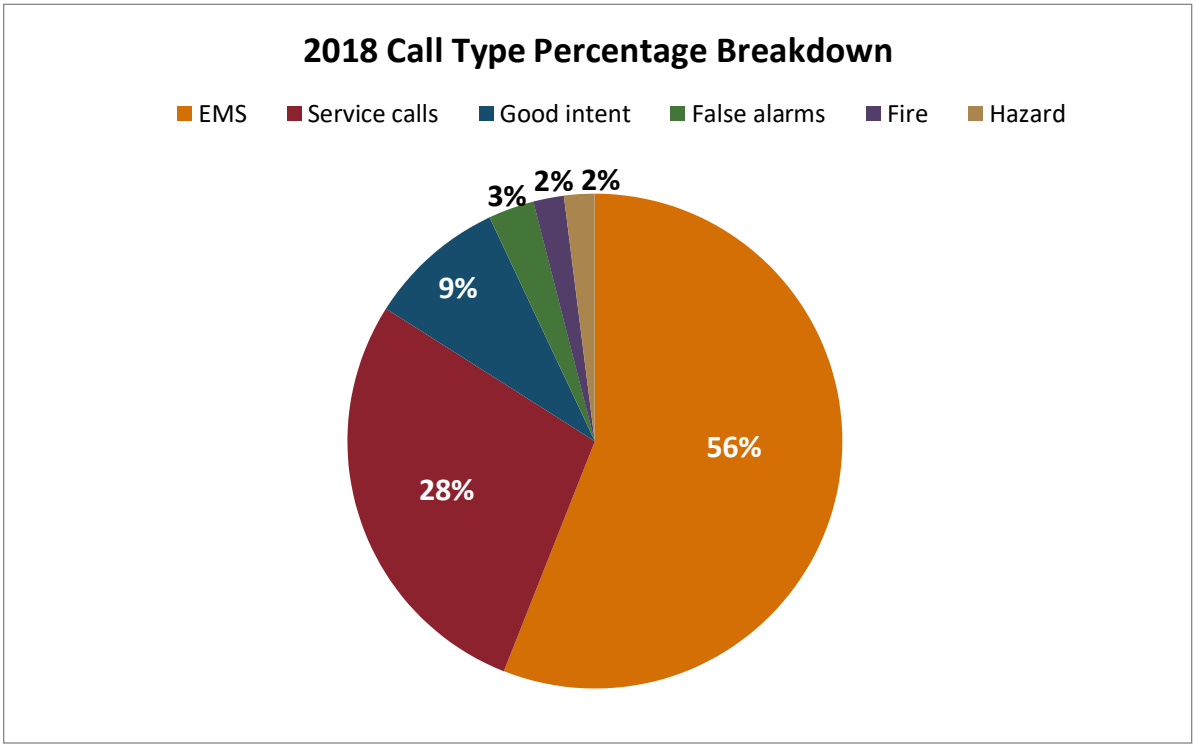
Call volume has increased substantially over the past four years, with the most annual increase from 2017 to 2018, a 15% increase. The overall increase during this four-year period was 34%.

Figure 4.8



Station 291 ran 57% of the total call volume for the period of 2015-2018. Station 292 ran 43% of the total call volume. Station 291 experienced a 40% increase in call volume from 2015 to 2018, while Station 292 experienced a 24% increase in call volume. Figure 4.9 shows call types by percentage.

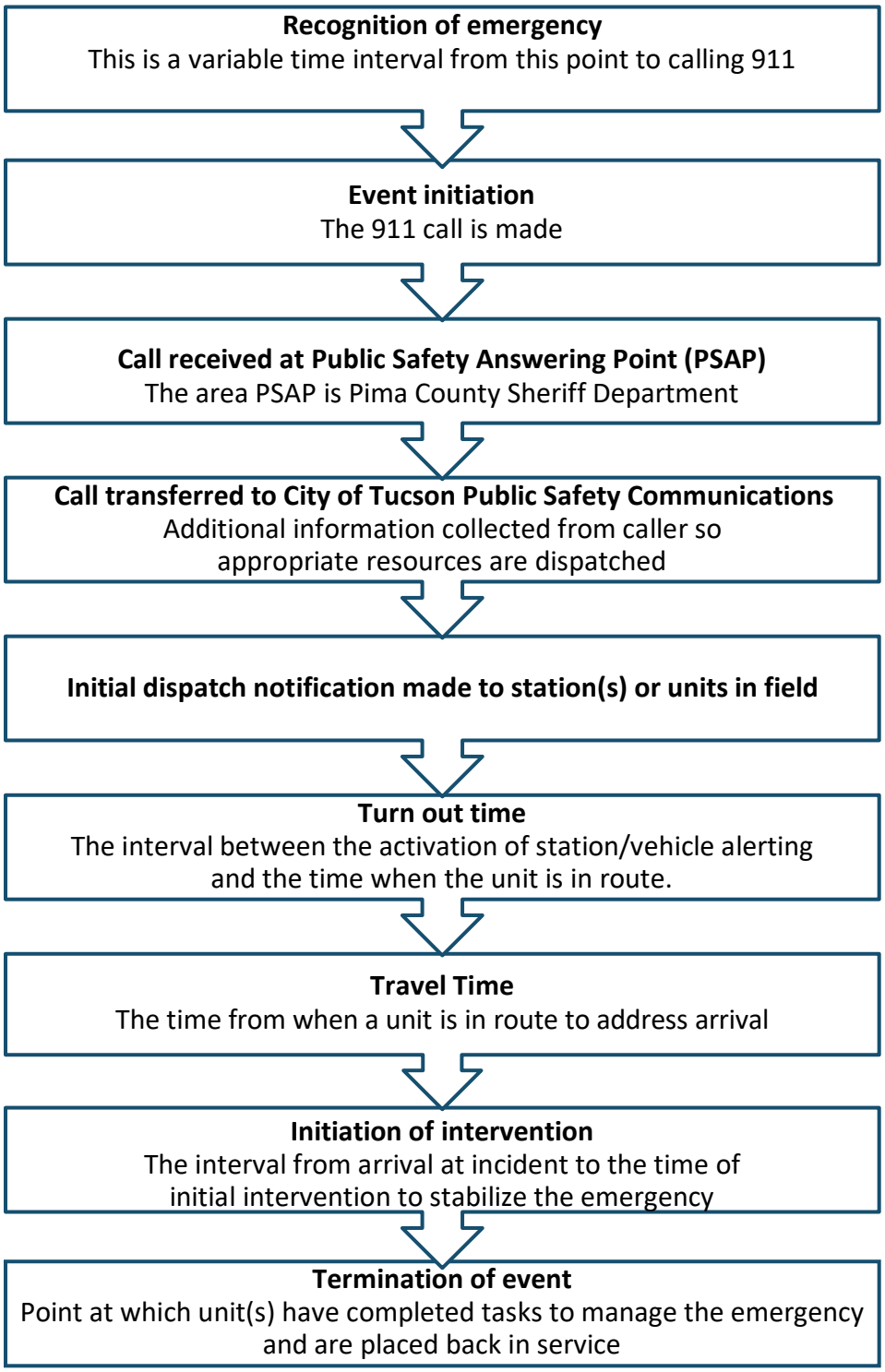
Figure 4.9



CASCADE OF EVENTS

In every emergency there is a sequence of critical events that precede the arrival of an RVFD unit. This sequence of events is known as a Cascade of Events, as illustrated in Figure 4.10.

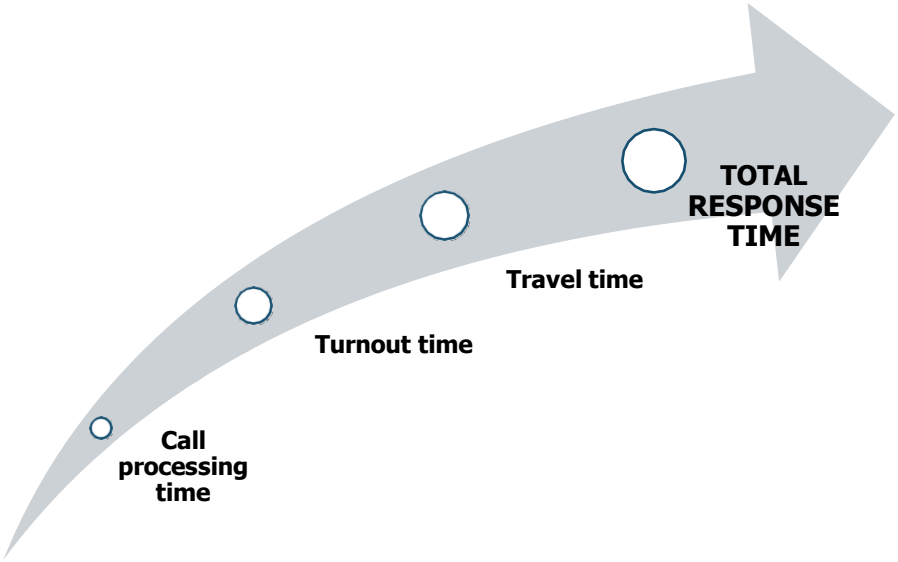
Figure 4.10


Recognition of emergency
This is a variable time interval from this point to calling 911
Event initiation
The 911 call is made
Call received at Public Safety Answering Point (PSAP)
The area PSAP is Pima County Sheriff Department
Call transferred to City of Tucson Public Safety Communications
Additional information collected from caller so appropriate resources are dispatched
Initial dispatch notification made to station(s) or units in field
Turn out time
The interval between the activation of station/vehicle alerting and the time when the unit is in route.
Travel Time
The time from when a unit is in route to address arrival
Initiation of intervention
The interval from arrival at incident to the time of initial intervention to stabilize the emergency
Termination of event
Point at which unit(s) have completed tasks to manage the emergency and are placed back in service

COMPONENTS AND STATISTICAL METHODS USED FOR REPORTING RESPONSE TIMES

RVFD has chosen to report response time data in a 90th percentile format versus the conventional "average" reporting format that most fire organizations use. Percentile differs greatly from average. Averaging calculates response times by adding all response times together and then dividing the total number of minutes by the total number of responses (mean average). The 90th percentile includes the vast majority of responses—not just half of the responses.

RVFD uses three variables to measure total response time:



Call processing time is defined as the time interval from when the alarm is acknowledged at the communication center until response information begins to be transmitted via voice or electronic means to the station(s) and/or units in the field. As of July 1, 2019, RVFD contracts with the City of Tucson Public Safety Communication Division for dispatch services.

Turnout time is defined as the time interval that begins when the station(s) and/or units in the field notification process begin by either an audible alarm or visual annunciation or both and end at the beginning point of travel time (wheels turning).

Travel time is defined as the time interval that begins when a unit is in route to the emergency incident and ends when the unit arrives at the scene (wheels stop).

Total response time is the sum of all three of these measurable variables. Total response time performance for 2018 districtwide and for GPZ's are listed in the following tables:

2018 Total Response Time baseline performance – first due unit

All Emergency Calls Districtwide 90th percentile	2018 n=3364*
Call Processing	1 min: 57 sec
Turnout Time	2 min: 03 sec
Travel Time	9 min: 06 sec
Total Response Time	10 min: 26 sec

***** total number of calls

All Emergency Calls GPZ 1 90th percentile	2018 n=1288
Call Processing	1 min: 57 sec
Turnout Time	1 min: 58 sec
Travel Time	7 min: 59 sec
Total Response Time	11 min: 54 sec

All Emergency Calls GPZ 2 90th percentile	2018 n=299
Call Processing	1 min: 57 sec
Turnout Time	2 min: 25 sec
Travel Time	9 min: 03 sec
Total Response Time	13 min: 25 sec

All Emergency Calls GPZ 3 90th percentile	2018 n=329
Call Processing	1 min: 57 sec
Turnout Time	1 min: 55 sec
Travel Time	10 min: 53 sec
Total Response Time	14 min: 45 sec

During the response time data gathering process, it was discovered that the call processing time data at the former dispatch center was not being recorded in a manner consistent with the requirements of the CRA-SOC format model. It was determined to use as an assumed value for this time element, the current 90th percentile statistic (1 min: 57 sec) from the City of Tucson Public Safety Communications Division, which RVFD now contracts with for dispatch services. There is a reasonable amount of confidence from the review of the previous dispatch center's data that this is a realistic time to use as an assumed value.

Section 5

Evaluation of Current Deployment and Performance

Section 4 presented baseline deployment and performance data. This section evaluates deployment and performance incorporating community expectations and District performance objectives.

COMMUNITY EXPECTATIONS

Prior to assessing deployment and performance, it is important to have a clear understanding of the community's expectations. As part of the current strategic planning process, two external shareholder workshops were held in May 2019 to gain community input about service delivery programs and service delivery expectations. Attendees represented a wide range of positions, occupations, and associations within the District. The workshops included a review of current performance objectives and elements of total response time. From these two workshops two main conclusions were evident:

- The external stakeholder workshop attendees felt that RVFD should continue the current service delivery programs.
- While desiring to see better response times, the stakeholders understood some of the major barriers associated with making substantial improvements but indicated that the District should press forward with efforts to reduce the total response times to be better aligned with a suburban-urban type fire organization. They expressed that this should be accomplished utilizing both short-term and long-term goals and objectives.

INTERNAL EXPECTATIONS

A Standards of Cover team was formed to review current performance and set goals for future performance. The team consists of the fire chief, all three of the battalion chiefs, three captains, and an IAFF Local #5100 representative. Taking input from the external stakeholder process and reviewing national standards and other regional fire agency performance, the team set 2020 and 2024 goals for performance. These are included in figure 5.1 followed by a more detailed performance-based discussion for each service program.

RESPONSE TIME PERFORMANCE OBJECTIVES

Figure 5.1

All Emergency Calls Districtwide 90th percentile	Baseline 2018 n=3364	2020 Objective	Benchmark (2024)
Call Processing	1 min: 57 sec	1 min: 47 sec	1 min: 30 sec
Turnout Time	2 min: 03 sec	1 min:43 sec	1 min: 30 sec
Travel Time	9 min: 6 sec	9 min: 0 sec	8 min: 0 sec
Total Response Time	13 min: 06 sec	12 min: 30 sec	11 min: 0 sec

All Emergency Calls GPZ 1 90th percentile	2018 n=3364	2020 Goal	Benchmark
Call Processing	1 min: 57 sec	1 min: 47 sec	1 min: 30 sec
Turnout Time	1 min: 58 sec	1 min: 38 sec	1 min: 30 sec
Travel Time	7 min: 59 sec	8 min: 0 sec	6 min: 0 sec
Total Response Time	11 min: 54 sec	11 min: 25 sec	9 min: 0 sec

All Emergency Calls GPZ 2 90th percentile	2018 n=3364	2020 Goal	Benchmark
Call Processing	1 min: 57 sec	1 min: 47 sec	1 min: 30 sec
Turnout Time	2 min: 25 sec	2 min: 5 sec	1 min: 30 sec
Travel Time	9 min: 3 sec	9 min: 0 sec	8 min: 0 sec
Total Response Time	13 min: 25 sec	12 min: 52 sec	11 min: 0 sec

All Emergency Calls GPZ 3 90th percentile	2018 n=3364	2020 Goal	Benchmark
Call Processing	1 min: 57 sec	1 min: 47 sec	1 min: 30 sec
Turnout Time	1 min: 55 sec	1 min: 35 sec	1 min: 30 sec
Travel Time	10 min: 53 sec	10 min: 53 sec	10 min: 53 sec
Total Response Time	14 min: 45 sec	14 min: 15 sec	13 min: 53 sec

2020 Service Level Performance Goals and Objectives for Emergency Service Programs

Fire

> The performance goal is to contain the fire to area of origin 90% of the time in GPZ's 1 and 2, and 50% of the time in GPZ 3.

To accomplish this goal the following 2020 performance objectives have been established:

- For 90% of all fire risks, the first arriving engine company shall arrive in:
  - 11 minutes and 55 seconds for GPZ 1
  - 13 minutes and 22 seconds for GPZ 2
  - 14 minutes and 45 seconds for GPZ 3

  The first arriving engine company shall arrive with a minimum of three firefighters capable of size-up, establishing command and safety, evaluating the need for additional resources beyond the initial alarm, performing basic forcible entry, advancing an 1¾" attack line capable of flowing 125 gpm to initiate fire attack and search and rescue efforts.

- For 90% of all *moderate* risk fire suppression incidents, the balance of the first alarm assignment consisting of an effective response force of 14 personnel shall arrive within 20 minutes total response time. The ERF assignment shall be capable of assuming command initiating an uninterrupted water supply, victim search & rescue, advancing of a second fire attack line, establishing a two person RIC, performing ventilation, forcible entry, control of utilities, and exposure control.

- For 90% of all *high risk* fire suppression incidents, the balance of the first alarm assignment consisting of an effective response force of 17 personnel who shall arrive within 25 minutes total response time. The ERF assignment shall be capable of assuming command initiating an uninterrupted water supply, victim search & rescue, advancing of a second fire attack line, establishing a two person RIC, performing ventilation, forcible entry, control of utilities, and exposure control.

- For 90% of all *maximum* risk fire suppression incidents, the balance of the first alarm assignment consisting of an effective response force of 21 personnel who shall arrive within 25 minutes total response time. The ERF assignment shall be capable of assuming command initiating an uninterrupted water supply, victim search & rescue, advancing of a second fire attack line, establishing a two person RIC, performing ventilation, forcible entry, control of utilities, and exposure control.

EMS

The performance goal is to provide appropriate BLS or ALS care to stabilize the patient(s) and provide transport if appropriate to a definitive care facility.

To accomplish this goal the following 2020 performance objectives have been established:

- For 90 percent of all EMS risks, the total response time for the arrival of the first arriving engine company shall arrive in:
  - 11 minutes and 25 seconds for GPZ 1
  - 9 minutes and 30 seconds for GPZ 2
  - 14 minutes and 15 seconds for GPZ 3

The first arriving engine company shall arrive with a minimum of three firefighters and shall be capable of establishing command and safety, providing appropriate BLS patient care, determining the need for transport, and documenting scene actions.

,

- For 90% of all *moderate* risk EMS incidents, the effective response force shall consist of an engine company and ambulance company for a total of five personnel who shall arrive within 11 minutes, 30 seconds, total response time. The ERF shall be capable of assessing the patient, initiating appropriate ALS skills, recording appropriate patient documentation, and providing ALS transportation to an appropriate definitive care facility.

- For 90% of all *high* risk EMS incidents, the effective response force shall consist of a total of nine personnel who shall arrive within 15 minutes, 0 seconds, total response time. The ERF shall be capable of assessing the patient, initiating appropriate ALS skills, recording appropriate patient documentation, and providing ALS transportation to an appropriate definitive care facility.

- For 90% of all *maximum* risk EMS incidents, the effective response force shall consist of an engine company and ambulance company for a total of 14 personnel who shall arrive within 20 minutes total response time. The ERF shall be capable of assessing the patient, initiating appropriate ALS skills, recording appropriate patient documentation, and providing ALS transportation to an appropriate definitive care facility.

Hazmat

> At the Operations qualification level, the performance goal is to protect nearby persons, the environment, and property from the effects of a hazardous release.

To accomplish this goal the following 2020 performance objectives have been established:

- For 90 percent of all hazmat risks, the total response time for the first arriving engine company shall be:
  - 11 minutes and 55 seconds for GPZ 1
  - 13 minutes and 22 seconds for GPZ 2
  - 14 minutes and 45 seconds for GPZ 3

The first arriving engine company shall be capable of establishing command andsafety, isolate/ identify the hazardous material and evacuate as appropriate. A limited offensive strategy may be utilized within the capabilities/competencies of Operations level personnel.

- For 90% of all *moderate* risk hazmat incidents, the effective response force shall consist of a total of 12 personnel who shall arrive within 20 minutes total response time. The ERF shall be capable of establishing command and safety, isolate/ identify the material and evacuate as appropriate. Additionally, the ERF shall be capable of patient triage, treatment and transport as needed, air monitoring, sampling, testing, containing, extinguishing, and/or abating the hazard(s). This includes the use of any kind of technician level hazmat specific equipment.

- For 90% of all *high* risk hazmat incidents, the effective response force shall consist of a total of 22 personnel who shall arrive within 35 minutes total response time. The ERF shall be capable of establishing command and safety, isolate/ identify the hazardous material and evacuate as appropriate. Additionally, the ERF shall be capable of sampling, testing, containing, extinguishing, and/or abating the hazard(s). This includes

utilizing any kind of specialized gear, tools, equipment at a technician and specialist level.

- For 90% of all *maximum* risk hazmat incidents, the effective response force shall consist of an engine company and ambulance company for a total of 35 personnel who shall arrive within 55 minutes total response time. The ERF shall be capable of establishing command and safety, isolate/ identify the hazardous material and evacuate as appropriate. Additionally, the ERF shall be capable of sampling, testing, containing, extinguishing, and/or abating the hazard(s). The ERF shall be capable of multiple division level operations. This includes utilizing any kind of specialized gear, tools, equipment at a technician and specialist level. The ERF shall be capable of multiple ICS division operations.

Technical Rescue

At the Operations technical rescue qualification level, the performance goal is identify hazards, use basic rescue equipment, and apply limited techniques to locate, rescue, stabilize the patient(s) and transport if necessary.

To accomplish this goal the following 2020 performance objectives have been established:

- For 90 percent of all technical rescue risks, the total response time for the first-arriving engine company shall be:
  - 11 minutes and 55 seconds for GPZ 1
  - 13 minutes and 22 seconds for GPZ 2
  - 14 minutes and 45 seconds for GPZ 3

The first arriving engine company shall be capable of establishing command and safety, initiating actions within the capabilities at the technical rescue operations level, and providing patient treatment and transport as appropriate.

- For 90% of all *moderate* risk technical rescue incidents, the effective response force shall consist of a total of nine personnel who shall arrive within 18 minutes, 0 seconds, total response time. The ERF shall be capable of establishing command and safety, initiating operations level rescue skills, and patient treatment/transport as appropriate.

- For 90% of all *high* risk technical rescue incidents, the effective response force shall consist of a total of 15 personnel who shall arrive within 35 minutes total response time. The ERF shall be capable of establishing command and safety, initiating operations and technician level rescue skills, and patient treatment/transport as appropriate.

Wildland Fire

> The performance goal is to contain wildfires to an area that minimizes risk to structures and sensitive environmental areas.

To accomplish this goal the following 2020 performance objectives have been established:

- For 90% of all wildland risks, the first due engine company shall arrive in:
  - 11 minutes and 55 seconds for GPZ 1
  - 13 minutes and 22 seconds for GPZ 2
  - 14 minutes and 45 seconds for GPZ 3

- The first arriving engine company shall arrive with a minimum of three firefighters capable of size-up, establishing command and safety, evaluating the need for additional resources beyond the initial alarm, utilizing wildland strategy and tactics from the National Wildfire Coordinating Group *Wildland Incident Field Guide* including basic scratch line construction, direct fire suppression, and mop up operations to complete extinguishment.

- For 90% of all *moderate* risk wildland fire incidents, the effective response force shall consist of a total of ten personnel who shall arrive within 18 minutes, 0 seconds, total response time. The ERF shall be capable of establishing command and safety, evaluating the need for additional resources beyond the initial alarm, utilizing wildland strategy and tactics from the National Wildfire Coordinating Group *Wildland Incident Field Guide* including basic scratch line construction, direct fire suppression, and mop up operations to complete extinguishment.

- For 90% of all *high risk* wildland fire incidents, the effective response force shall consist of a total of ten personnel who shall arrive within 25 minutes total response time. The ERF shall be capable of establishing command and safety, evaluating the need for additional resources beyond the initial alarm, utilizing wildland strategy and tactics from

the National Wildfire Coordinating *Group Wildland Incident Field Guide* including basic scratch line construction, direct fire suppression, and mop up operations to complete extinguishment.

Maximum risk wildland fire - It is difficult to determine with any degree of precision the 90th percentile total response time for the wildland fire maximum risk ERF. This is due to responding mutual aid units are coming from a number of different organizations. It will also depend heavily on the availability of the closest units, a variable of the severity of the wildland season activity at the time of the incident.

PERFORMANCE GAP DISCUSSION

As described earlier in this section, neither external stakeholders nor internal stakeholders are satisfied with the current (baseline) performance. The following is a summary of the performance gap in each of three components of total response time:

Call Processing Time

As discussed in Section 4, effective July 1, 2019, RVFD contracted to the City of Tucson Public Safety Communication Department (PSCD) for dispatch services. The switch was made for an improvement in services and cost effectiveness. Currently PSCD processes calls at the 90th percentile at 1 minute, 57 seconds.

PSCD management has set a benchmark goal for call processing of 1 minute, 30 seconds 90% of the time PSCD also is striving to meet call answering times as described in *NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 2015 Edition.* The short-term 2020 goal is to reduce 90th percentile call processing times by ten seconds. The SOC Team concurred with the short-term goal as well as the benchmark goal, with understanding that the longer term goal is to meet the call processing times as listed in the referenced NFPA standard.

Turnout Time

The SOC Team has set a District standard at one minute, 30 seconds at the 90th percentile. Based on this standard, there is currently an approximate 30 second performance gap. The 2020 goal will be to improve response times by 20 seconds. The 2024 benchmark goal will be to meet the District turnout standard.

Travel Time

2018 travel time at the 90th percentile was 9 minutes, 6 seconds. Travel time is a direct function of concentration and distribution of resources, as well as the road network. The result is there is little that can be done to improve travel time in the short term. Any significant improvement in travel time in any of the GPZ's would require staffing an additional unit and/or building an additional station. Driving faster is not and should not be part of a plan to improve travel times.

Section 6
Plan for Improving and Maintaining Response Capabilities

The CRA-SOC document Rincon Valley Fire District has completed demonstrates RVFD's high level of commitment to the community it serves. A key element of that commitment is ensuring there is a plan moving forward that addresses improving and maintaining response capabilities. Components of such a plan are illustrated in the graphic below followed by a more detailed discussion.

Step 1 - Establish and Review Performance Objectives
To establish performance objectives, RVFD has completed the following:

- Identified services provided
- Completed a risk assessment
- Defined the levels of service
- Identified and categorized levels of risk
- Developed performance distribution/concentration measures and associated objectives

Updating and establishing any new performance measures should occur when:

- There is a change in the type(s) of services delivered by RVFD
- New laws or regulations require a change in the method of service delivery by RVFD
- There is a significant change in RVFD boundaries[44] (growth or contraction)
- The Governing Board or the Fire Chief feel there is a need to adjust performance service delivery and associated performance objectives

Step 2 – Evaluate Performance (CRA-SOC Section 5)
RVFD evaluates performance at several levels:

- Performance at a Districtwide level
- Performance at the geographical planning zone level
- Unit level (first due)
- Effective response force level

Step 3 – Develop Compliance Strategies
The SOC Team will develop compliance strategies that will include, but not limited to:

- Ensure maximization of existing resources including recommendations for new response models as needed
- Evaluation of partnering opportunities (additional or enhanced mutual or auto aid agreements)
- Consideration of alternate means of service delivery
- Recommendations for additional mobile and fixed resources as needed to improve or maintain service delivery
- Individual or group actions that can improve service delivery
- Recommend response performance reporting system(s)

Step 4 – Communicate Expectations
The CRA-SOC clearly outlines service level response performance objectives. These performance objectives need to be clearly communicated to the RVFD personnel responsible for service delivery, as well as support service personnel. The methods for communicating performance objective expectations may include, but are not limited to:

- Direct communication with crews by the battalion chiefs
- Review of expectations and performance objective statistics at fire officer staff meetings
- Posting of the CRA-SOC on the District's internet and intranet

[44] Service delivery impact analysis is part of RVFD's standardized evaluation process anytime there is a proposed annexation.

Using these and potentially other methods of communication, the SOC team will develop a plan to communicate expectations by October, 2019. The plan will include an element by which members can give feedback regarding the expectations.

Step 5 - Validate Compliance
Validating compliance will include the following mechanisms:

- Monthly performance reports that include performance data by unit, station, and shift battalion will be developed and distributed to all fire officers.
- Quarterly performance reports will be developed, delivered, and reviewed at the SOC team quarterly meetings.
- A comprehensive annual performance report will be developed by the SOC team. The annual report will include all aspects of:
    - Performance compliance for the previous calendar year
    - Any significant trends that were identified as a result of analyzing performance
    - Any new external influences or altered conditions, new growth and development trends, and new or changing risks

The annual report shall be submitted to the Governing Board for their review and acceptance.

Step 6 – Make Necessary Adjustments
By reviewing the information developed for the validation of compliance, any performance gaps can be identified and a plan formulated for improvement developed by the SOC Team.

In addition to developing an annual performance report as outlined in Step 5, the SOC Team will review on an annual basis the entire CRA-SOC to make any necessary adjustments. Following the SOC team annual review, the CRA-SOC will be reviewed and adopted by the Governing Board on an annual basis.

Continuous improvement requires systematic evaluation. Continuous improvement requires unfiltered evaluation.

- Anonymous

Section 7
Key Findings and Recommendations

One of the major benefits of developing a CRA-SOC is the identification of key findings and the development of associated recommendations. The SOC Team identified 11 key findings and as a result, recommendations were developed.

KEY FINDING #1

Out-of-district calls represent 34% of RVFD's call volume.

Recommendation #1

Analyze in a more detailed manner the out-of-district call volume to better define how these calls impact services within the District.

Recommendation #2

Further analyze the call types in the four out-of-district GPZ's to determine if there are opportunities to reduce the associated call volume.

The greatest value of a picture is when it forces us to notice what we never expected to see.

John Tukey,
American
Mathematician

KEY FINDING #2

Total response times exceed the community's and internal stakeholder's expectations.

Recommendation #1

Meet regularly with the City of Tucson Public Safety Communications Department (PSCD) to ensure there is incremental, statistically significant progress toward improving call processing times over the next 24 months.

Recommendation #2

Develop a turnout time improvement plan that will enable the District to meet their 2020 performance goal for turnout time as listed in Section 5.

KEY FINDING #3

Forty percent of RVFD ambulance transports meet the basic life support classification.

Recommendation

Explore opportunities for a more efficient and effective BLS transport system in the future.

KEY FINDING #4

RVFD has experienced a 23% call volume growth in the past three years and is expected to experience a similar or greater growth pattern in the next five years. This continued growth will result in increased difficulty maintaining current performance levels and even more difficulty in efforts to improve current performance.

Recommendation #1

The SOC Team should determine a trigger point formula that consists of a set of measurable response time related factors such as response times, reliability, unit hour utilization, etc. to determine when there is a need for additional staffed units or stations.

Recommendation #2

The SOC Team should review response time performance reports on a quarterly basis to maintain an awareness of the increase in call volume and its associated impact on response times.

KEY FINDING #5

There are significant large-scale risks in RVFD.

Recommendation #1

Develop formal risk reduction and emergency response plans for each of the large-scale risks identified.

Recommendation #2

Consider the development of a more comprehensive special operations training program and the distribution of qualified personnel throughout the District.

KEY FINDING #6

The critical task analysis process identified that RVFD does not have adequate on duty staffing or additional resources within effective proximity to accomplish all of the critical tasks in the required time frame for accomplishing the District's performance objective of containing structure fires to the area of origin.

Recommendation #1

Explore options for increasing the effective response force that will arrive in an acceptable time frame to meet the District's goal of containing fire to area of origin. This includes exploring options for responding a second fire officer as a single resource for those risks where this need was identified.

Recommendation #2

Develop a training program for fire officers that focuses on the current resources available and their capability that aligns with the District's risk management policy.

Recommendation #3

Enhance and invest it a more aggressive community risk reduction program where the District is challenged to provide sufficient personnel in a sufficient time frame.

KEY FINDING #7

RVFD currently only tracks property fire loss value versus property saves.

Recommendation

Begin tracking saves as well as losses to better communicate the value of RVFD to the community.

KEY FINDING #8

Code arrest survival rates with on-scene CPR is 45% versus 10% without on-scene CPR.

Recommendation

Develop a comprehensive plan for a districtwide, hands-only CPR instruction program that includes associated performance objectives regarding the target population percentage the District would strive to reach.

KEY FINDING #9

RVFD lacks the resources needed to process data to the degree that it can be of maximum benefit to the District.

Recommendation #1

Explore and determine physical and human resources necessary to obtain and manage data to the detail RVFD needs to maintain and improve its service delivery programs.

Recommendation #2

Explore partnering opportunities with other fire and governmental entities to reach RVFD's goals of data analysis and management.

KEY FINDING #10

Engine and ambulance company functions and expectations at structure fires are in need of enhancement and formal documentation in the form of minimum company standards and SOP development.

Recommendation

Develop a plan for developing minimum company standards and SOP's and the necessary training program for these elements to be utilized effectively in the field.

KEY FINDING #11

The community risk assessment discovered many elements of community risk can be minimized through specific risk reduction efforts by the District.

Recommendation

Based on the community risk assessment, develop a formal, comprehensive community risk reduction plan.

Glossary

Adequate: Providing what is needed to meet a given objective without being in excess.

Advanced Life Support (ALS): Emergency medical treatment beyond basic life support level as defined by the medical authority having jurisdiction.

Alarm: A signal or message from a person or device indicating the existence of a fire, medical emergency, or other situation that requires fire department action.

Alarm Answering Time: The time interval that begins when the alarm is received at the communication center and ends when the alarm is acknowledged at the communication center.

Alarm Handling Time: The time interval from the receipt of the alarm at the primary PSAP until the beginning of the transmittal of the response information via voice or electronic means to emergency response facilities (ERFs) or the emergency response units (ERUs) in the field.

Alarm Processing Time: The time interval from when the alarm is acknowledged at the communication center until response information begins to be transmitted via voice or electronic means to emergency response facilities (ERFs) and emergency response units (ERUs).

Alarm Transfer Time: The time interval from the receipt of the emergency alarm at the PSAP until the alarm is first received at the communication center.

Automatic Aid: A plan developed between two or more fire departments for immediate joint response on first alarms.

Baseline Performance: Current level of performance.

Benchmark Performance: Level of performance the District is trying to achieve long term.

Community Risk Assessment (Analysis): The evaluation of a community's fire and non-fire hazards and threats, considering all pertinent facts that increase or decrease risk in order to define standards of cover.

Company: A group of RVFD members:

- Under the direct supervision of an officer
- Trained and equipped to perform assigned tasks
- Usually organized and identified as engine companies, ladder companies, rescue companies, squad companies, or multi-functional companies
- Operating with one piece of fire apparatus (engine, ladder truck, rescue, squad) except where multiple apparatus are assigned that are dispatched and arrive together, continuously operate together and are managed by a single company officer
- Arriving at the incident scene on fire apparatus

Concentration: Spacing of multiple resources arranged so that an initial effective response force can arrive on scene within the timeframes outlined in the on-scene performance objectives.

Credible: Capable of being believed; believable as verified and/or validated.

Critical Task: A time-sensitive work function that is essential along with other work functions to ensure a positive outcome for a performance objective.

Deployment: The strategic assignment and placement of fire agency resources such as fire companies, fire stations and specific staffing levels for those companies required to mitigate community emergency events.

Distribution: Geographic location of all first-due resources for initial intervention. Generally measured from fixed response points, such as fire stations, and expressed as a measure of time.

Effective Response Force (ERF): The minimum amount of staffing and equipment that must reach a specific emergency zone location within a maximum prescribed total response time and is capable of initial fire suppression, EMS and/or mitigation. The ERF is the result of the critical tasking analysis conducted as part of a community risk assessment.

Fire Protection System: The regular interaction of dependent and independent sources of fire protection services, and includes both public and private organizations, apparatus, equipment, fixed and mobile, facilities, methods, human resources, and policies by the authority having jurisdiction.

First-Due Area: The portion of a jurisdiction that each response company has been assigned to be the first unit to arrive at the scene of an emergency. Usually the first-due company is responsible for most activities in that area. See Distribution.

Frequency: The number of occurrences per unit time at which observed events occur or are predicted to occur.

Geographical Planning Zones: The establishment of organized geographical response areas by: size (e.g. square mile or kilometer), or unique occupancy, demographic type or other risk-relevant characteristics.

Hazard: A condition that presents the potential for harm or damage to people, property, or the environment.

Incident: An occurrence, either human-caused or a natural phenomenon, that requires action or support by emergency services personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Incident Commander:
The fire department member in overall command of an emergency incident.

Incident Safety Officer: An individual appointed to respond or assigned at an incident scene by the incident commander to perform the duties and responsibilities of that position as part of the command staff.

Mutual Aid: Reciprocal assistance by emergency services under a prearranged plan.

Outputs: The specifically intended types of results that can be expected form the activities and inputs that are placed into service.

Outcomes: Something that follows an applied activity as a result or consequence.

Percentile: One-hundredth parts; 90/100=90%.

PSAP: Acronym for “Public Safety Answering Point”.

Rapid Intervention Crew (RIC): A dedicated crew of firefighters who are assigned for rapid deployment to rescue lost or trapped members.

Risk: A measure of the probability and severity of adverse effects that result from an exposure to a hazard.

Standards of Cover: Those written policies and procedures that establish the distribution and concentration of fixed and mobile resources of an organization.

Total Response Time: The sum of alarm handling (call processing), turn out, and travel times.

Travel Time: The time interval that begins when a unit is in route to the emergency incident and ends when the unit arrives at the scene.

Turnout Time: The time interval that begins when the emergency response facilities and emergency response units (ERUs) notification process begins by either an audible alarm or visual annunciation, or both, and end at the beginning point of travel time.

Working Fire: Any fire within a structure or building fire causing significant damage to the building and its contents. Generally requires commitment of all initial effective response force.

Appendix

APPENDIX A

RINCON VALLEY FIRE DISTRICT

Vision

Vail will be a safe place.

Mission

Prepare, Prevent, and Protect our Community from Harm.

Values

Our values define how we interact with each other. They influence how we conduct ourselves and conduct business of the District each day. We strive to keep our values in mind with everything we do. These values shall be used to drive our policies, decisions, and actions based on what is equitable for all of our stakeholders.

Rincon Valley Fire District members are:

Responsible

We hold ourselves and each other accountable. We seek self-improvement to better serve our customers. We care for people, internally and externally, to the best of our abilities and with professionalism. We conduct ouselves ethically with honor and pride.

Versatile

We deliver the highest level of service by using our resources wisely. We adapt and overcome. We are resilient. We are dynamic to ensure we are prepared for the challenges of today and tomorrow.

Fair

Because people are our greatest resource, we create opportunities for all members to succeed. We develop healthy and productive work relationships to accomplish our mission. We respect the contributions of all members. We understand that we are better because of our diverse backgrounds.

Dedicated

We commit ourselves for the betterment of the District and our members. We will make sacrifices that provide for the health and safety of our community. We uphold our oath each day.

APPENDIX B

ARIZONA DEPARTMENT OF HEALTH SERVICES

STATE OF ARIZONA } ss
County of Maricopa

CERTIFICATE NO. - 92 -

DOCKET NO. EMS 00119

THE ARIZONA DEPARTMENT OF HEALTH SERVICES has found, under the authority of A.R.S. § 36-2232 et seq and Pursuant to Department of Health Services rules, that public necessity requires the operation of

RINCON VALLEY FIRE DISTRICT

as a ground ALS and BLS ambulance service in the State of Arizona for the transportation of individuals who are sick, injured, wounded or otherwise incapacitated or helpless within the following service area, with the following central operations station and response times:

1. **Service Area:**
   The Rincon Valley Fire District boundaries and generally starting at the area North to the Tucson City limit and Saguaro National Park boundary; East to the Saguaro National Park, Coronado National Forest, to a straight line aligned to Interstate 10, Exit 291; south to the boundaries of the Sonoita-Elgin Fire District, (CON #132) boundaries; West and North along the northern boundaries of the Sonoita-Elgin Fire District (CON #132); North and West along the Coronado National Forest; West until the general boundaries of the Corona de Tucson Fire District; Then North and West along the City of Tucson boundaries; as outlined on a map on file with Arizona Department of Health Services.

2. **Legal Address:** ***14550 E. Sands Ranch Road, Vail, AZ 85641.***

3. **Response Times:**
   a. ***Ten (10) minutes on Fifty-five (55) percent of all emergency ambulance responses.***
   b. ***Fifteen (15) minutes on Seventy-five (75) percent of all emergency ambulance responses.***
   c. ***Twenty (20) minutes on Ninety-five (95) percent of all emergency ambulance responses.***
   d. ***Thirty (30) minutes on One Hundred (100) percent of all emergency ambulance responses.***

Now, therefore, by virtue of the authority vested in the Arizona Department of Health Services, under the constitution and laws of the State of Arizona, does hereby grant this

RENEWAL

CERTIFICATE OF NECESSITY

authorizing the operation of the aforesaid ambulance service for a period ending March 31, 2022 unless for cause sooner amended, suspended, revoked or terminated subject to the decisions and orders, and rules of the Department.

PROVIDED, that this certificate shall not be assigned nor transferred unless authorized by the Arizona Department of Health Services.

BY THE ORDER OF THE ARIZONA DEPARTMENT OF HEALTH SERVICES, IN WITNESS WHEREOF, I CARA M. CHRIST, M.D. the Director of the Arizona Department of Health Services, have hereunto set my hand and caused the official seal of the Arizona Department of Health Services to be affixed at Phoenix, Arizona on 2/11/19.

DIRECTOR

APPENDIX C (4 pages)

Occupancy Risk Assessment Profile (ORAP) Form

Each factor is rated 1-5 with 5 being the highest risk

Risk factor	Water supply	Bldg. const.	Age	Exposures	Content	Occupancy number	Occupancy type	Sq.ft.	Detection system	Travel time	WUI factor	# stories	Hazmat	FF safety	Comm. impact	**Total score**
Score																

If occupancy is sprinklered, total score is reduced 50%, residential occupancies 25%

Scoring Guide for ORAP

Rating factor	Guideline
Building construction	Type I = 1, Type 2 = 2, Type 3 = 3, Type 4 = 4, Type 5 = 5.
Water supply	Hydrants with adequate flow = 0. Hydrants with less than adequate flow = 3, hydrants available beyond first due hose supply but within second due supply hose capacity = 4, no hydrants within the first two “first-due” engine supply hose capacity = 5.
Age/condition	0-10 years = 1, 11-20 = 2, 21-30 = 3, >30 = 5. Condition and renovations should also factor into this score.
Exposures	> 100’ = 1, 51-100” = 2, 31-50’ = 3, 21-30’ = 4, <20’ = 5.
Content	“Live” loads consideration, light = 1, moderate = 3, heavy = 5.
Occupancy #	0-5= 1, 6-20 = 2, 21-50 = 3, 51-200 = 4, >200 = 5
Occupancy type (mobility)	All ambulatory = 1, ambulatory with assistance = 3, mix of ambulatory and non-ambulatory = 4, non-ambulatory = 5. (no 2 rating)
Size – square footage	0-2000 = 1, 2000-5000 = 2, 5001-10000 = 3, 10001-25000 = 4, >25000 = 5.
Detection systems	detection with off-site notification = 1, detection with no notification = 3, no detection system = 5.
Travel time	0-3 minutes = 1, 3-5 minutes = 2, 5-8 minutes = 3, 8-12 minutes = 4, >12 minutes = 5.
Interface	Not applicable = 0, within 300’ = 3, adjacent = 5.
Number of stories	1 story = 0, 2 stories = 3, 3-4 stories = 4, > 4 stories = 5.
Hazmat	No NFPA diamond rating = 0, maximum number on diamond is 1, then =1, max number 2, then = 2, max number 3 then = 3, max number 4, then = 4, more than one “4” value in diamond = 5.
FF safety	Combination of many of the above factors as it relates to FF safety. Subjective rating 1-5.
Community impact	Consideration of economic, social, cultural, environmental impact. Subjective rating 1-5.

Occupancy Risk Assessment Profile Scores

= Maximum risk = High risk = Moderate Risk

Occupancy	Score
Vail School District Administration Offices	56
Colossal Cave MP Posta Quemada	47
Colossal Cave Visitor Center	44
St. Rita in the Desert office	44
Rincon Valley Farmers Market	42
Spotted Bull	41
Vail Post Office Annex	40
Vail School District Transportation Main Shop	40
Vail School District Transportation Small Shop	40
St. Rita in the Desert Verhagen Hall	39
St. Rita in the Desert classroom	39
2 story single family residence, no hydrants	39
MWA Speaker Parts	39
Rocking K Riding Stables	39
Mobile home, no hydrants	38
Acacia Elementary School Bldg J	38
Old Vail MS Library	38
1 story single family residence, no hydrants	38
Century Link station	37
Vulcan Materials Black Angus Plant Shops	37
Vulcan Materials Black Angus Plant Shops	37
Rancho del Lago GC Maintenance Shop	37
13200 Colossal Cave – self storage bldg.	37
Acacia Elementary School Bldg K	36
Acacia Elementary School preschool	36
Rocking K Market	36
Vail Depot-Vail Resources Thrift Shop	36
Mobile home with hydrants	35
Vail Depot-Vail Chamber of Commerce	35
Del Lago Golf Club cart barn	35
UCHC	35
Vail Ranch	34
Cienega High School Bldg 600	34
Coyote Creek Visitor Center	34
Cienega High School Inclusive pre-K	34

Occupancy	Score
Mountain View Animal Clinic	34
Vail Depot Vail Resources Food Bank	34
2 story single family residence with hydrants	34
Fitos	33
Vulcan Materials Black Angus Plant Offices	33
Coyote Creek Stables	33
Coyote Creek Rec Center	33
1 story single family residence with hydrants	33
Villas	33
Vail Water Company	33
Academy Village Community Center	33
Academy Village Senior Center	32
Walgreens	32
Acacia Elementary School MPR bldg	32
Cienega High School Bldg 400	32
Montgomery's	32
Saguaro Buttes	32
Christ Lutheran Vail portables	32
Cienega High School Bldg 700	32
Victory Baptist Church	32
Acacia Elementary School Administration	32
Cienega High School Bldg 100	32
Cienega High School Bldg 300	31
Cienega High School Bldg 500	31
Old Vail Middle School Admin	31
Acacia Elementary School Bldg A	31
Acacia Elementary School Bldgs B-G	30
Old Vail Middle School Bldgs 300-600	29
Old Vail Middle School Bldg 800	29
Del Lago Golf Club Hacienda del Lago	28
CHS 300	28
Christ Lutheran Vail Bldg 100	28
Cienega HS stadium locker room addition	27
St. John XXIII	26
Rincon Creek Ranch	26
13181 Colossal Cave Rd – Trail Boss	26
Ocotillo Ridge Elementary School Admin/Lib.	26
Ocotillo Ridge Elem. School Bldgs 200-400	25
Quik Mart	25
Del Webb Lodge	24

Occupancy	Score
Academy Village pool bldg	23
Del Webb Sales Office	23
Vail School District Transportation Office	22
RVFD Station 291	21
RVFD Station 292	20
Cienega HS stadium concessions bldg.	19

APPENDIX D (3 pages)

Risk rating template and guidelines

Call type	**Frequency (F1)**	**RVFD Community Impact/Consequence, 1-4 (C1)**			**Sum of C1 factors**	**TOTAL RISK SCORE (F1)(C1)**
		RVFD resources	FF safety	Community impact		

Frequency (F1) Rating Guideline Table	
Annual Call Volume	Rating
≤ 10	1
11-39	2
40-79	3
> 80	4

Category	Ranking			
	1	2	3	4
RVFD resource impact	1 unit (EN or AMB) committed for short duration	2 units (EN & AMB) committed for moderate duration (probable transport)	3 units committed (2 EN, AMB, BC) for moderate duration	All RVFD units committed for moderate to extended duration
FF safety impact	Low risk	Moderate risk	High risk	Maximum risk
Community impact	Low	Moderate	High	Maximum

EMS call type risk scores

Call Type	Score
MVA	18
MVA Rollover	16
Chest Pain/Cardiac	12
Difficulty Breathing	12
Fall Injury	12
MVA Major (3 or more)	11
MVA Entrapment	11
Rescue Nature Unknown	9
Seizure	9
Unconscious/Fainting	9
Sick Person	8
Suicide Attempt/Threat	8
Shooting/Stabbing	7
Drowning	7
Altered Mental Status (non-responsive)	6
Back Pain	6
Code Arrest	6
Diabetic Problem	6
Overdose/Poisoning	6
Stroke/TIA	6
Assault/Rape	5
Bicyclist Struck	5
Abdominal Pain	4
Bleeding Minor	4
Injured Person	4
Carbon Monoxide	4
Allergic Reaction (Severe)	3
Bleeding Major	3
Burns Major	3
Child Birth/Pregnancy	3
Person Down	3
Obstructed Airway/Choking	3
Traumatic Injury	3
Allergic Reaction (minor)	2
Animal Bite/Sting	2

Call Type	Score
Burns Minor	2
Exposure Heat/Cold	2
Headache	2
Psych Problem	2
Unknown Problem	2
Eye Injury	2

Appendix E

Hazmat Risk Assessment Rating Table			
Risk	**Probability (P)**	**Severity (S)**	**Risk Score (P x S)**
Carbon monoxide alarm	2	2	4
Small pressurized flammable or nonflammable gas vessel leak	2	2	4
Small volume flammable liquid spill	2	2	4
Small volume chemical spill	2	4	8
Meth lab	2	4	8
Small diameter (< 2") natural gas line break	2	4	8
Large diameter (>2" up to 4") natural gas line break	2	6	12
Large volume flammable liquid spill	2	6	12
Large pressurized flammable or nonflammable gas vessel leak	2	6	12
Asphalt plant class B fire	2	6	12
Small pressurized toxic gas vessel leak	2	6	12
Large pressurized toxic gas vessel leak	2	8	16
El Paso or Kinder Morgan large diameter, high pressure natural gas or petroleum line breaks	2	8	16
Hazmat train derailment	2	8	16

Risk Rating

0-4 = Low risk
5-8 = Moderate risk
9-12 = High risk
> 13 = Maximum risk

Appendix F

Technical Rescue Risk Rating Scoring Summary			
Risk	**Probability (P)**	**Severity (S)**	**Risk Score (P x S)**
Routine extrication, not on I-10	2	4	8
Low velocity/low volume water rescue	2	4	8
Confined space	2	6	12
Cave rescue	2	6	12
Low angle hiker/mountain biker rescue	2	6	12
High velocity/high volume water rescue	2	6	12
Heavy extrication/I-10 extrication	2	8	16
High angle hiker/climber rescue	2	6	16
Trench collapse	2	8	16
Vehicle into building	2	8	16

Risk Rating

8-12 = Moderate

13-16 = High

Appendix G

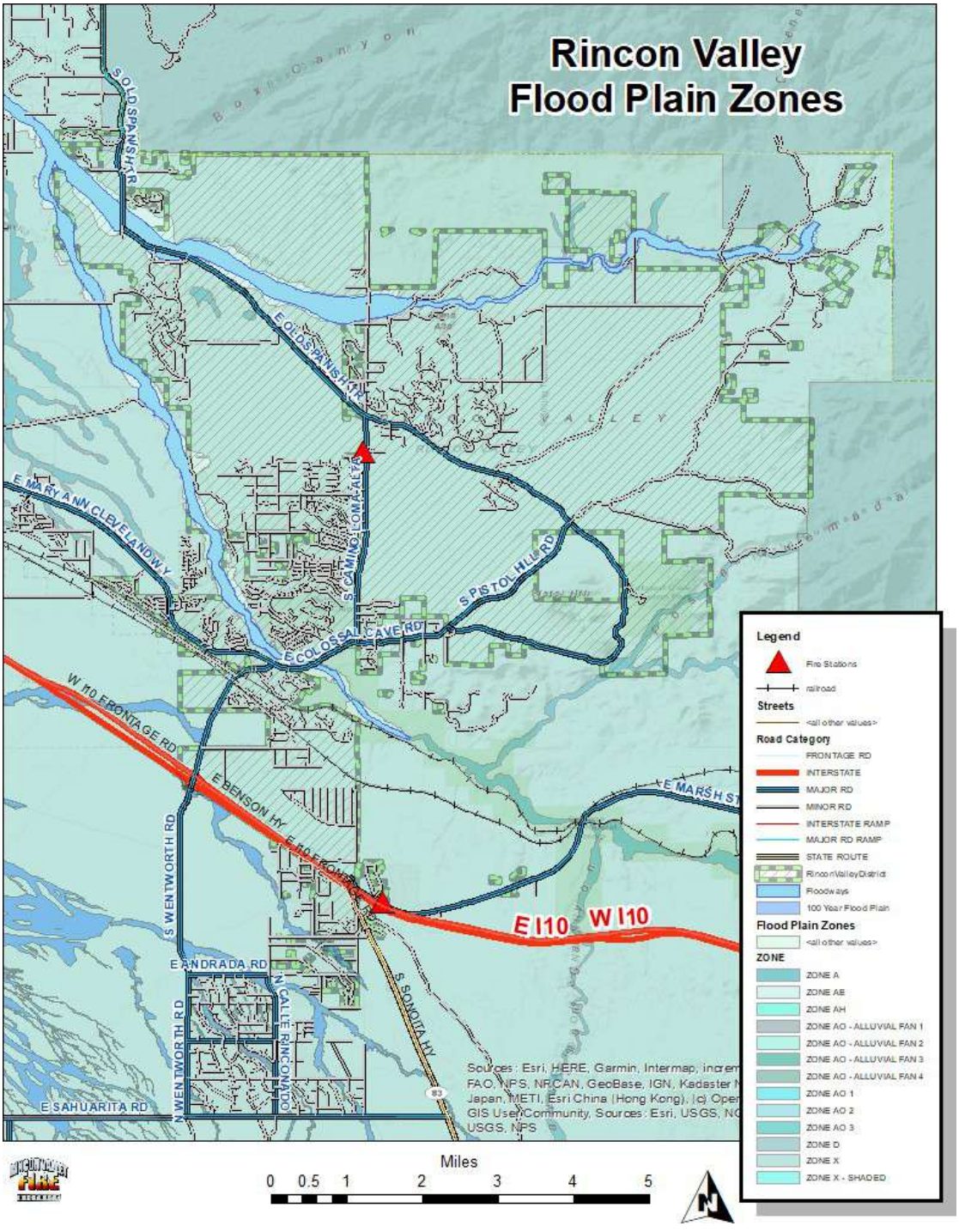
Priority Risk Index Scoring Guide

Score	Probability	Severity	Spatial Extent	Speed of Onset/Warning Time	Duration
1	Rare	Negligible	Small	Day or more	1-4 hours
2	Unlikely	Minor			Up to 12 hours
3	Occasional	Moderate	Moderate	Hours	12-24 hours
4	Likely	Serious			1-2 days
5	Almost Certain	Catastrophic	Large	None	> 2 days

Priority Index Scoring Summary

	Probability (30%)	Severity (30%)	Spatial Extent (20%)	Speed of Onset (10%)	Duration (10%)	TOTAL SCORE
Wildland/Urban Interface Fire						
Score	3	4	5	5	4	
Weighted score	0.9	1.2	1.0	0.5	0.4	4.0
Large Scale I-10, Railroad, or Large Diameter Gas Line Hazmat Incident						
Score	1	5	5	5	5	
Weighted score	0.3	1.5	1.0	0.5	0.5	3.8
Extended Power Failure (> 8 hours)						
Score	1	5	5	5	3	
Weighted score	0.3	1.5	1.0	0.5	0.3	3.3
Active Shooter						
Score	1	5	1	5	5	
Weighted score	0.3	1.5	0.2	0.5	0.5	3.0
Flood Event						
Score	1	4	3	3	5	
Weighted score	0.3	1.2	0.6	0.3	0.5	2.9
Mass Casualty Event						
Score	1	5	1	5	2	
Weighted Score	0.3	1.5	0.2	0.5	0.2	2.7

APPENDIX H


Rincon Valley
Flood Plain Zones
S OLD SPANISH TR
E OLD SPANISH TR
E MARY ANN CLEVELAND WY
S CAMINO LOMA ALTA
S PISTOL HILL RD
E COLOSSAL CAVE RD
W I10 FRONTAGE RD
E BENSON HY
E I10 FRONTAGE RD
E I10
W I10
E MARSH ST
S WENTWORTH RD
N WENTWORTH RD
E ANDRADA RD
N CALLE RINCONADO
S SONOITA HY
E SAHUARITA RD
Sources: Esri, HERE, Garmin, Intermap, increment
FAO, NPS, NRCAN, GeoBase, IGN, Kadaster N
Japan, METI, Esri China (Hong Kong), (c) Open
GIS User Community, Sources: Esri, USGS, NO
USGS, NPS
Miles
0 0.5 1 2 3 4 5
Legend
Fire Stations
railroad
Streets
<all other values>
Road Category
FRONTAGE RD
INTERSTATE
MAJOR RD
MINOR RD
INTERSTATE RAMP
MAJOR RD RAMP
STATE ROUTE
RinconValleyDistrict
Floodways
100 Year Flood Plain
Flood Plain Zones
<all other values>
ZONE
ZONE A
ZONE AE
ZONE AH
ZONE AO - ALLUVIAL FAN 1
ZONE AO - ALLUVIAL FAN 2
ZONE AO - ALLUVIAL FAN 3
ZONE AO - ALLUVIAL FAN 4
ZONE AO 1
ZONE AO 2
ZONE AO 3
ZONE D
ZONE X
ZONE X - SHADED