City of Henderson
Henderson Fire Department
Audit Report

June 2021

Internal Audit Department

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AUDIT REPORT SUMMARY

OBJECTIVES

- Review the Henderson Fire Department's (HFD) deployment model to determine how apparatus and staff are assigned to calls and to compare to professional standards and best practices.
- Analyze the relationship between the HFD's deployment model and the survivability rate and the results thereof.

WHAT WE FOUND

- The current deployment model provides necessary resources to provide a safe, efficient, and effective response for emergencies.
- The current deployment model did not negatively impact the sudden out-of-hospital cardiac arrest (OHCA) rates.
- Public service announcements should be used to educate the public on cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training, the Henderson PulsePoint Application, and the importance of yielding to emergency vehicles.
- Response times are regularly monitored and evaluated to ensure appropriate and consistent service delivery.
- Response times have improved but there are opportunities for further improvement.
- HFD generates and analyzes data constantly to assist in meeting service delivery goals.

RECOMMENDATIONS

- Public service announcements should be amplified to educate and remind the public to yield to emergency vehicles through social media and other available avenues.
- Continue to review the reporting process of OHCA survivability rates to ensure reports are consistent year over year.
- Develop a strategy to promote the First Six Community Lifesaver Training and PulsePoint Application to encourage more citizens to take an active role in saving lives.
- Continue to analyze data, identify opportunities for improvement, and develop plans to achieve response time performance goals.
- Hold trainings and discussions with crews regarding turn out times and how the performance goal can be achieved.
- Conduct an analysis of the Henderson Police Department Communications Center to ensure staffing levels are appropriate to handle call volume.

COMMENDATIONS

We commend the HFD for their:

- continuous compilation and review of data to assist in meeting service delivery goals,
- adoption and installation of the Opticom Global Positioning Satellite (GPS) technology to improve travel times, and
- innovation in handling all emergency calls from start to finish in one location.

BACKGROUND

The HFD was established in June 1953. The HFD operates under the authority of the City of Henderson (City) Charter Section 2.160. The City is divided into 11 fire districts, each with one fire station, that are grouped by battalion for operational control. Battalion eight is comprised of six fire stations and covers the north/northeastern part of the City. Battalion nine has five fire stations and covers the south/southwest part of the City.

Station #	Square Footage	Year Built	District Square Miles	District Population	Address
81	4,430	1988	12.2	32,241	600 College Drive
82	15,240	1997	10.5	27,308	401 Parkson Road
83	4,168	1988	11.7	34,686	100 Burkholder Boulevard
84	4,430	1986	6.8	46,385	400 North Valle Verde Drive
85	11,500	2020	6.6	29,626	285 West Horizon Drive
86	17,391	2000	9.8	10,148	1996 East Galleria Drive
91	11,000	2017	15.8	18,814	2901 Democracy Drive
95	6,800	1992	6.1	36,940	2300 Pebble Road
97	8,196	2000	9.4	30,788	1550 Amador Lane
98	8,196	2001	11.0	40,681	891 Coronado Center Drive
99	8,196	2001	7.6	24,641	2401 Atchley Drive

Henderson Fire Station 98

Two additional fire stations are planned: station number 87 with a proposed location in the Cadence area in the northeast and station number 92 with a proposed location near the Henderson Executive Airport in the southwest part of the City. The strategic location of fire stations is critical in the deployment of resources and response times. The 11 fire stations are operational and staffed 24 hours a day, seven days a week. The number of personnel and apparatus within a station varies based upon specialty assignments or service demand. All apparatus have at least one firefighter paramedic to provide advanced life support (ALS) first response.

The HFD is a full-service department providing fire and rescue operations (fire suppression, technical rescue, hazardous materials response, emergency medical services (EMS), fire investigations, and community risk reduction programs). EMS includes the treatment and transportation of sick and injured patients. All these services are primarily funded by a General Fund expenditure budget of $63.5 million. Operations are conducted from fire stations strategically located throughout the City's 106 square miles to provide rapid and effective response. Fire and rescue services are assigned to the City's fire stations noted above and delivered using 11 engines, 10 twenty-four-hour rescues and two daytime peak load rescues, two ladder trucks, one heavy rescue and one hazardous materials response apparatus. Rescues are staffed with two employees (firefighter paramedic and a firefighter). Engines and trucks are staffed with a team of four comprised of a captain, engineer, firefighter paramedic, and firefighter. Additionally, there are several apparatus available for training and back up when the primary apparatus is out of service for periodic maintenance or repairs.

HFD employs 297 full and part-time employees who provide fire and emergency services to the residents of the City.

Active Fire in Progress

HFD is a double accredited ISO Class One fire department. Accreditation has been received from the Commission on Fire Accreditation International (CFAI) and the Commission on Accreditation of Ambulance Services (CAAS). The Insurance Services Office has issued a Public Protection Classification rating of one (the highest classification) to the HFD for its exemplary fire suppression delivery system.

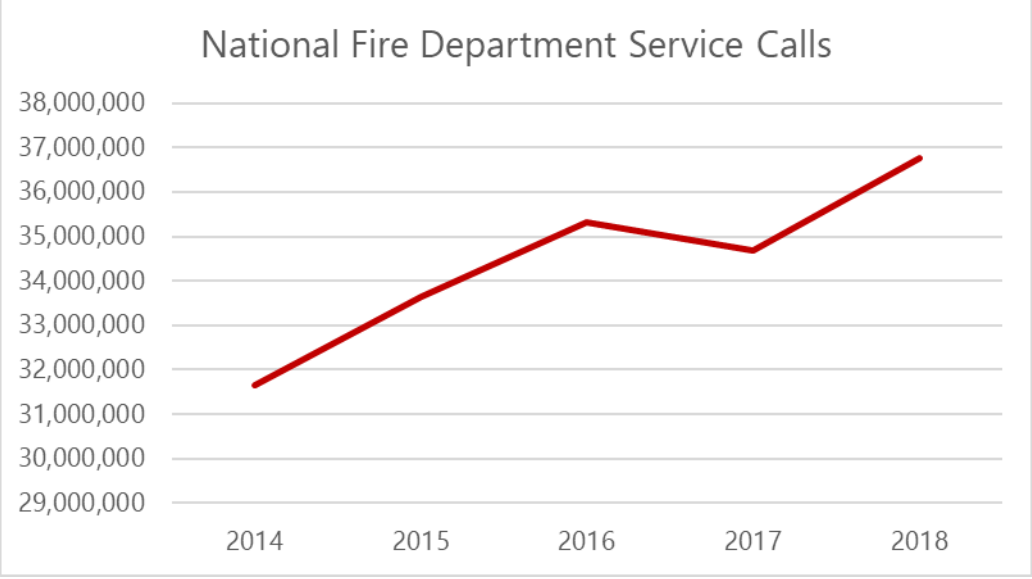
The National Fire Protection Association (NFPA) provides minimum standards that define levels of service, deployment capabilities, and staffing levels for fire departments. These standards provide criteria addressing the effectiveness and efficiency of fire suppression operations, EMS, and special operations delivery in protecting city residents and visitors, and the occupational safety and health of fire department employees.

RESULTS

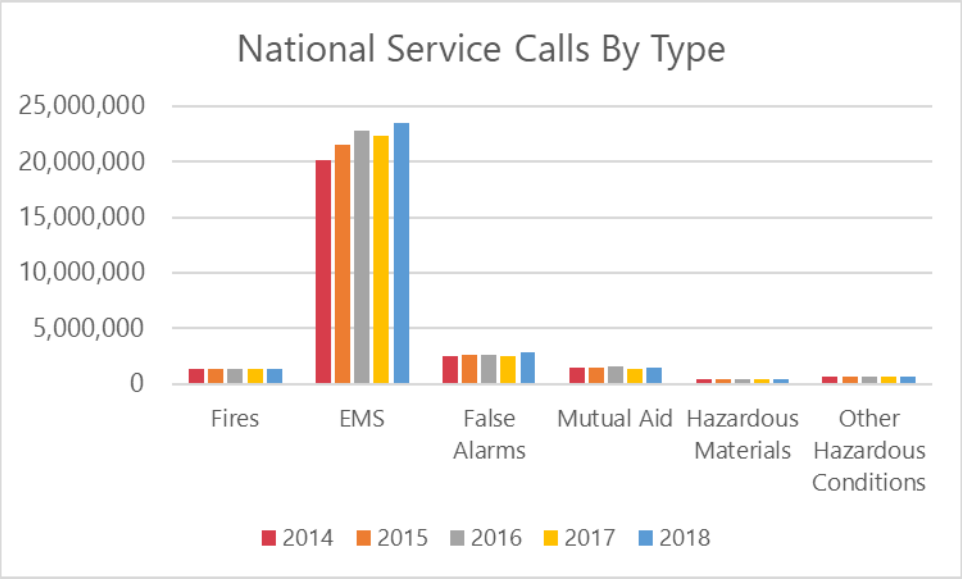
National, State, and Local Fire Department Trends

National Fire Department Calls

Per the NFPA, fire department service calls have increased by 16 percent over the Calendar Years (CY) of 2014 - 2018. Data was only available through CY 2018 for national trends. This trend is expected to continue largely due to growth.

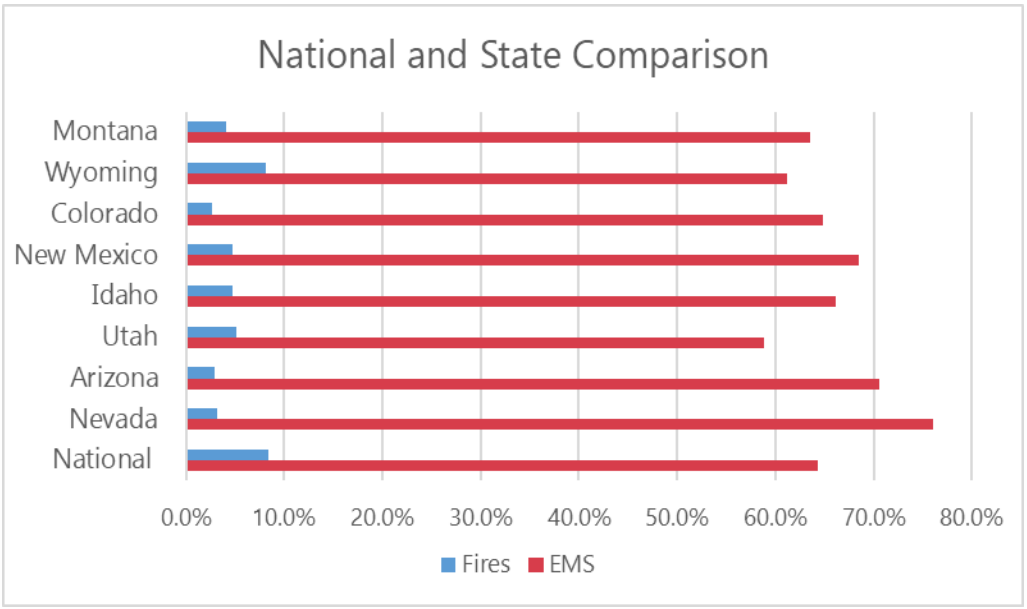


NFPA reports service calls in seven different classifications as noted in the following chart. Over the 5-year period noted above, call volume by type has remained constant for fires and increased for EMS calls.



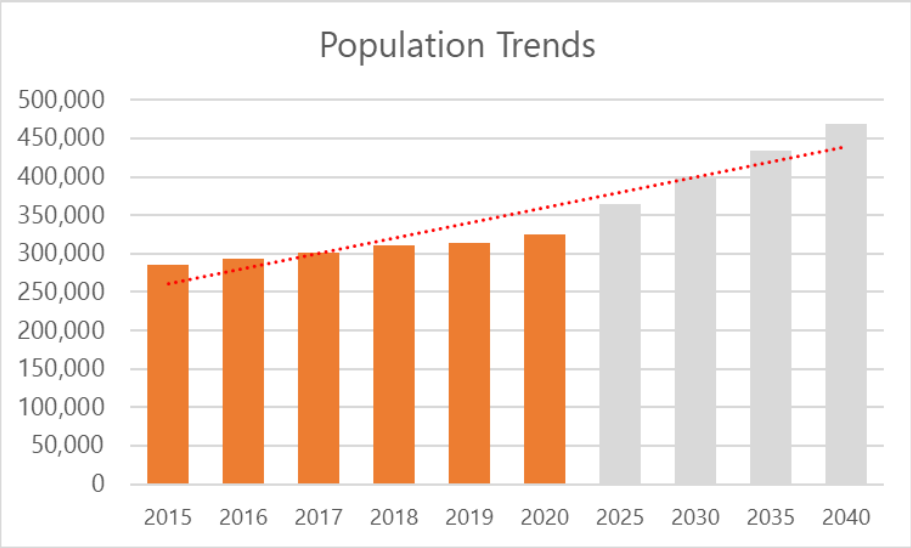
National and Mountain West State Comparison of Incident Types

Per the U.S. Fire Administration (USFA) website (www.usfa.fema.gov/data/statistics/states), Nevada has the highest percentage of EMS incidents (76 percent) and one of the lowest percentages for fire incidents (three percent) when compared to other Mountain West States and the national level overall.

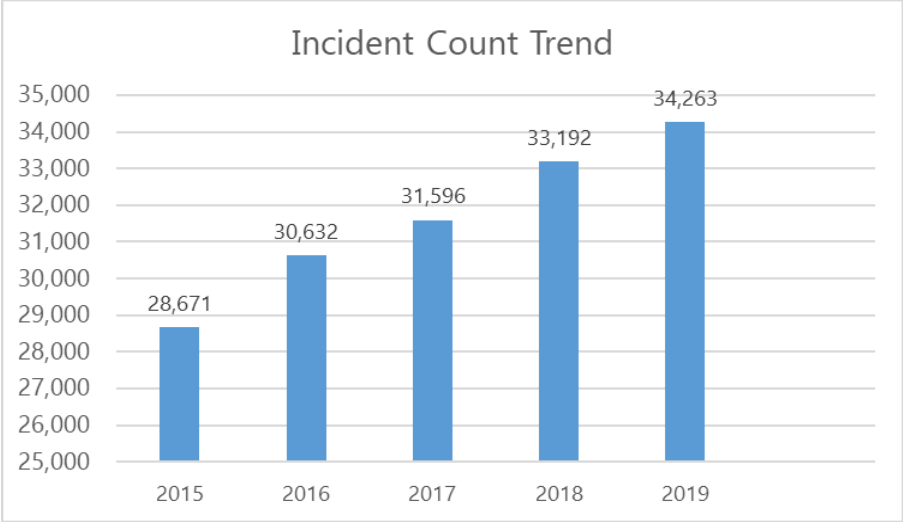


HFD Local Trends

HFD complies and reviews a great deal of data. This data is analyzed for performance trends and reviewed with management on a regular basis. The Planning and Analysis division of HFD has the primary responsibility to report on the data. This data is communicated through various documents such as the annual Response Report, annual Trends Report, annual Community Risk Assessment of Standards of Cover, Response Time Performance Improvement Plan and District Analysis. The following graphs provide information compiled by HFD for CYs 2015 - 2019. Incident data for CY 2020 is not currently available.

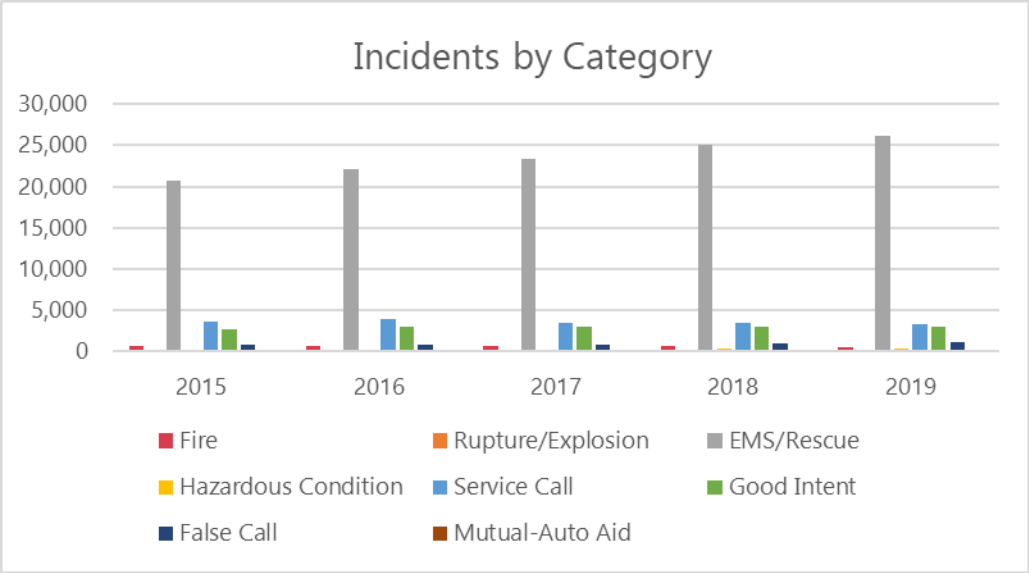


For CY 2020, 332,258 residents call Henderson home. Since last CY 2019, population has increased by 10,728 or approximately three percent. Population totals for the City are expected to increase over the next 20 years. As the population increases, the need for HFD resources and staffing are likely to increase.

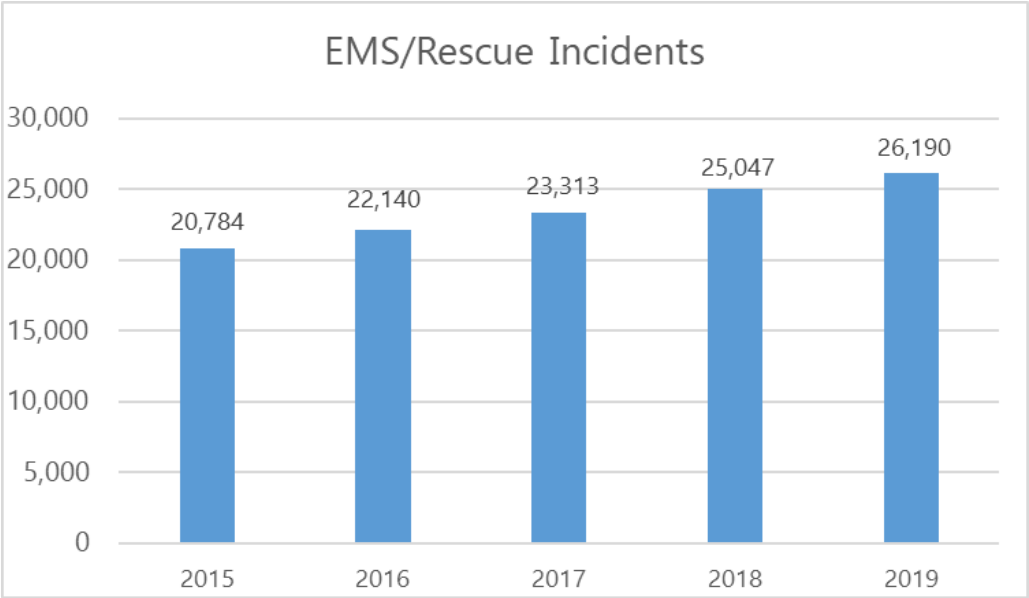


An incident count represents a single call for service which requires one or more apparatus to respond. HFD responded to 34,263 incidents in CY 2019, which is an increase of 1,071 incidents over the previous year or about three percent. Over the period of CYs 2015 - 2019, the number of incidents increased by 5,592 or about 20 percent.

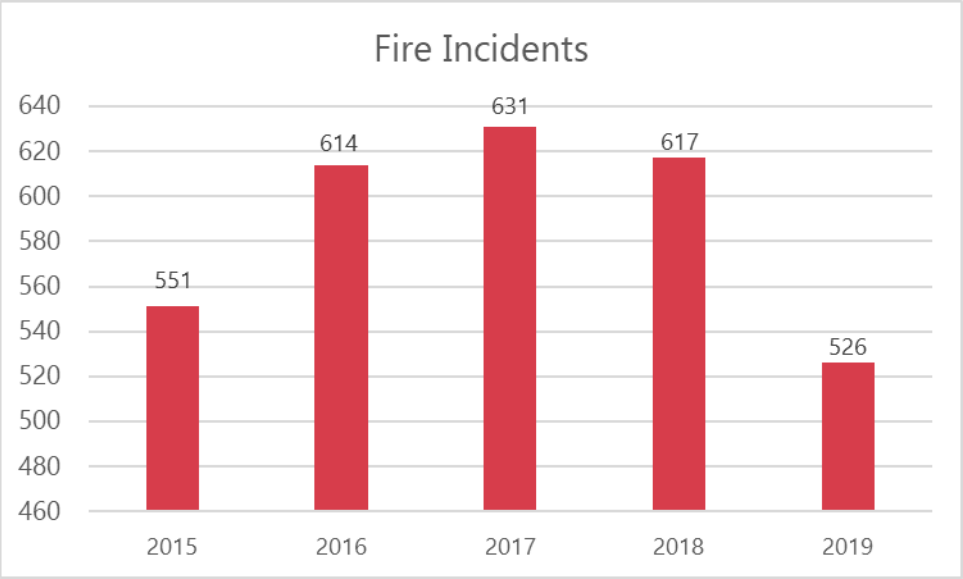
The incidents over this five-year period are classified into eight categories. As noted, most of the incidents that HFD responds to are EMS/rescue.



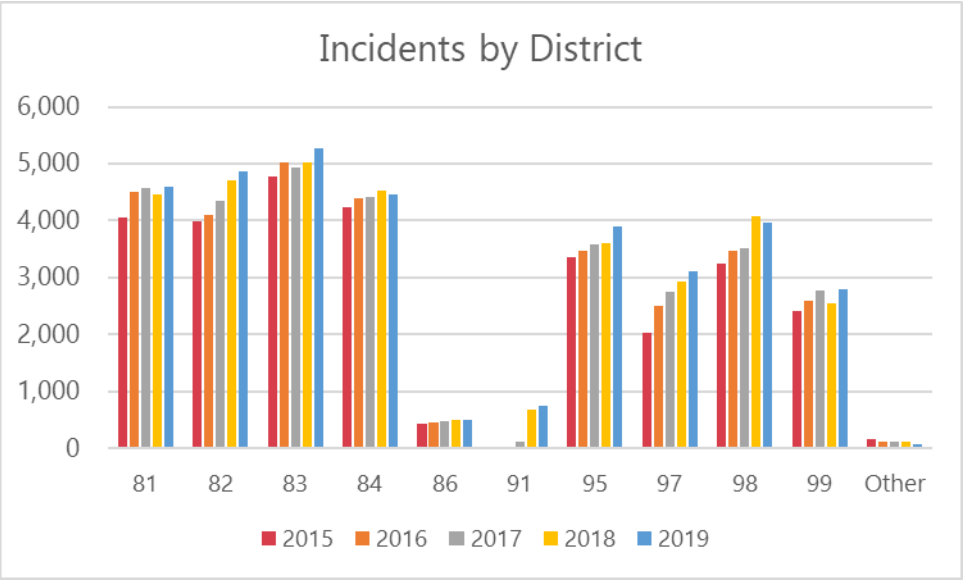
In CY 2019, HFD responded to 26,190 EMS incidents which account for 76 percent of all incidents. Over the period of CYs 2015 – 2019, EMS incidents increased by 5,406 or 26 percent.



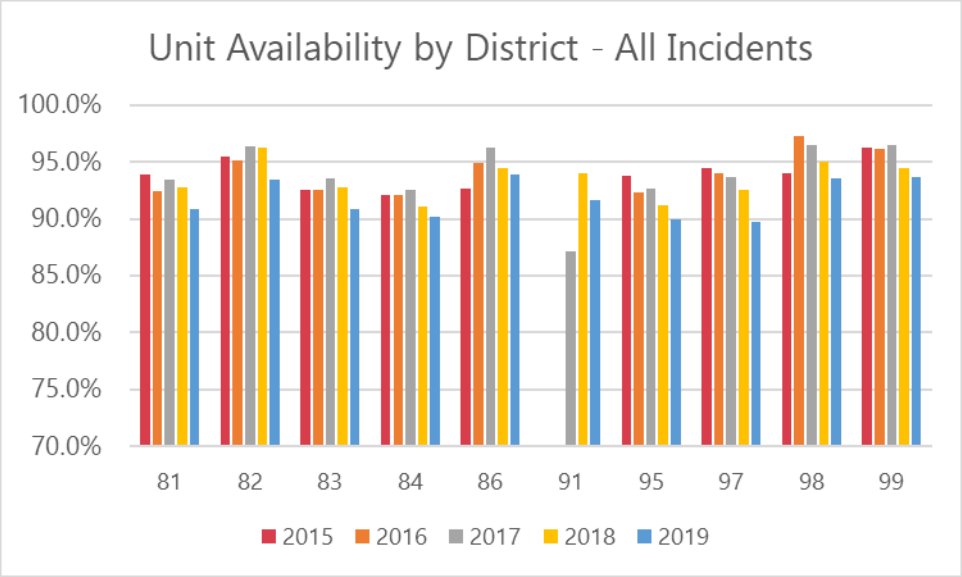
By comparison, fire incidents represented less than two percent of total incidents in CY 2019 and decreased by almost five percent during this period of CYs 2015 - 2019.



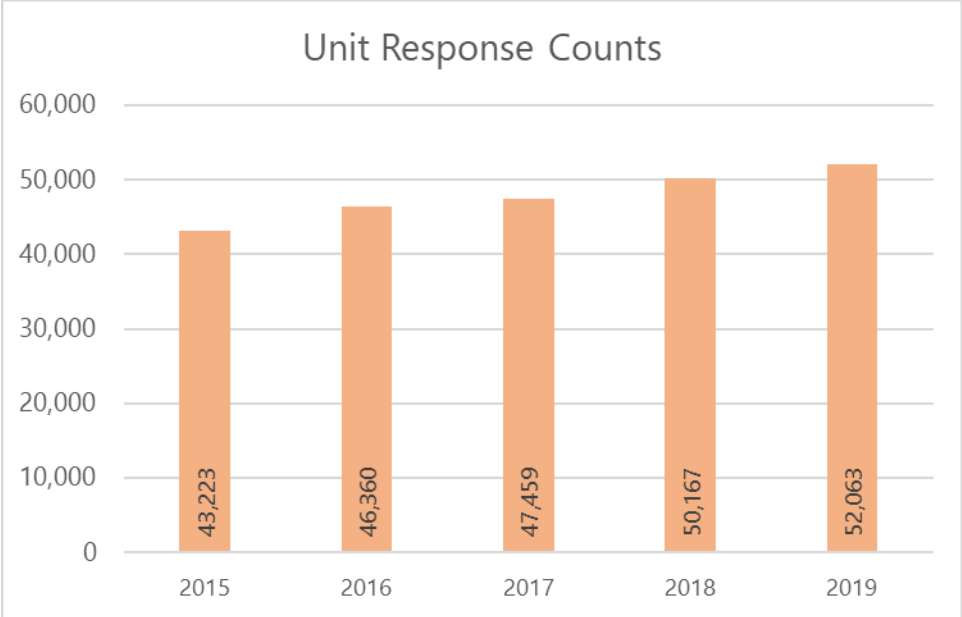
At the end of CY 2019, the City was divided geographically into ten districts (district 85 was added during CY 2020). The districts (i.e., fire stations) are determined using information such as response times, population totals, square miles, number of service calls, etc. During CY 2019, district 83 handled the highest number of incidents at 5,264 followed by district 82 at 4,858. District 95 had the highest increase in the number of calls (281) from CYs 2018 - 2019. The daily average number of incidents increased from 79 in CY 2015 to 94 in CY 2019. The "Other" category in the graph below represents HFD responding to neighboring jurisdictions through mutual aid agreements.



Two other important trends are availability and response counts. Unit availability represents the percentage of time a unit is available to respond to an emergency within its own service area. The graph below illustrates that units are available to respond more than 90 percent of the time within their own district.



Response counts capture the total number of apparatus responding to an incident. In CY 2019, responses reached 52,063, an increase of 1,896 or four percent compared to CY 2018. Over the five-year period shown below, responses increased by 8,840 or 20 percent.



Deployment

HFD has the autonomy to establish objectives and deployment strategies to provide emergency services to City residents and businesses. The deployment strategy uses a risk assessment to determine the assignment of apparatus and firefighters. The risk assessment includes a review of community risk factors such as topography, transportation network, climate, disaster exposure, critical infrastructure, population growth and density, at-risk populations, service demand, incident types, location and frequency of incidents, and distribution of resources. For each possible injury, symptom, or condition (i.e., abdominal pain, breathing problems, stab/gunshot, fire, chemical spill, etc.) a priority level (low, moderate, high, and maximum), response package, and one of 542 codes is assigned. The response may include one or more of the following: rescue, engine, truck, and/or a battalion chief. Additionally, the City has a contract with a local ambulance company that can transport patients to area hospitals, as needed.

These codes are pre-programmed into the computer aided dispatch (CAD) system used in the HPD Communications Center. Based on the caller's description of the event or injury, the communications operator will select a code and the response package will be listed. The assigned apparatus is/are then dispatched to the incident location.

The concept of deploying resources based on risk is not new; most fire departments intuitively understand that greater risks should correlate to greater resources and capabilities deployed. The deployment methodology assists the HFD to provide a safe, efficient, and effective response for emergencies. Using a risk assessment to develop a deployment model is in line with professional standards and best practices.

Licenses and Certifications

The medical field is constantly changing due to new procedures and technology. It is imperative that medical field personnel are current with new information and medical advances that may assist in providing critical care to the community.

HFD personnel are mandated to maintain licenses and certifications. This includes a state issued driver's license with endorsement (fire engineers), Nevada firefighter I and II certificates, Nevada hazard materials certificate and an emergency medical technician (EMT) or paramedic certificate. We selected 47 (approximately 17 percent) employee files to review and noted that 44 employees have the necessary current and state issued licenses and certifications. The remaining three employees are part of the ongoing fire academy and will receive certifications upon graduation. Certifications for EMT's and paramedics are required to renew every two years. Our review disclosed no exceptions with EMT/paramedics renewals.

Survivability Rate

Per the American Heart Association, survivability rate is the percentage of people in a study or treatment group who are still alive for a certain period after they were diagnosed with or started treatment for a disease, such as cancer, stroke, or OHCA. Survivability rate is measured based on three factors: medical science, efficient education of patient caregivers, and local implementation.

Heart attack and stroke patients require rapid intervention, care, and transport to a medical facility. The longer the time without care, the less likely the patient will fully recover. Numerous studies by the American Heart Association disclosed that irreversible brain damage can occur if the brain is deprived of oxygen for more than four minutes.

Survival rates can be improved by the following actions: early recognition and call for help, bystander CPR, defibrillation, ALS, and post-resuscitation care. The patient's overall health such as smoker vs non-smoker, sedentary lifestyle, high blood pressure, obesity, family history of heart disease, age, gender, and substance abuse can impact the survivability rate of OHCA.

Finding #1

According to the American Heart Association, nearly 45 percent of OHCA victims survived when CPR is administered within four minutes. However, apparatus with emergency personnel may take longer to arrive due to traffic issues (i.e., failing to yield to emergency vehicles, drivers unsure how to yield in a construction zone or traffic congestion, etc.)

Recommendation #1

We recommend that the HFD increase public service announcements to educate and remind the public to yield to emergency vehicles through social media and other available avenues.

Measuring survivability from OHCA is often used as a benchmark for EMS performance. The national average survivability rate per the Cardiac Arrest Registry to Enhance Survival (CARES) is 10 percent. HFD's survivability rate has been above national average for the past three CYs: 2017 (13.6 percent), 2018 (13.3 percent) and 2019 (16.9 percent).

The number of cardiac arrest incidents handled by HFD is less than one percent of total EMS incidents over the audit period.

Finding #2

Survivability rate reporting over the last several years has not been formatted consistently and does not provide the same information from year to year. We also found that personnel who consolidate the reports have changed. This may contribute to small variations in reporting.

Recommendation #2 We recommend that HFD continue to review the reporting process for OHCA survivability rates to ensure reports are consistent year over year.

NFPA recommends a response time for first EMS arrival within six minutes, 30 seconds or less, 90 percent of the time (i.e., 90th percentile). According to the Center for Public Safety, after 6 minutes with no defibrillation, a person only has a 40 percent chance of survival. HFD's total response time is 8 minutes, 36 seconds, 90 percent of the time. After 8 minutes the probability for survival drops to 20 percent. The first six minutes are crucial in a cardiac arrest. Public knowledge of CPR and access to AED's is also critical to survivability. OHCA survivability is dependent on the focus and resources applied to it by the community and the medical personnel.

The American Heart Association recommends hands-only CPR using chest compressions for adults experiencing cardiac arrest rather than a combination of chest compressions and rescue breathing. Shocking the heart with an AED can save a person's life during cardiac arrest. As public access AEDs become more available in the community, it is important to become familiar with how and when to use an AED.

HFD offers a free-of-charge First Six Community Lifesaver Training course that provides the skills needed for bystanders to save a life until help arrives. The training provides updated instructions on how to properly conduct CPR for adults as well as AED use, emergency bleeding control and use of the Henderson Fire PulsePoint Application (PulsePoint).

PulsePoint is a smartphone application designed to support public safety agencies working to improve cardiac arrest survival rates through improved bystander performance and active citizenship. This application empowers everyday citizens to provide lifesaving assistance to victims of sudden cardiac arrest. The application can be downloaded on a smartphone in either the Apple Store or on Google Play. It allows you to monitor calls and receive notification of the location of a patient experiencing a cardiac event. Early bystander CPR and AED utilization significantly increase the chance of patient survival.

Finding #3 The First Six Community Lifesaver Training courses are offered twice a month on Saturdays (free-of-charge) with two sessions at 10 a.m. and 1 p.m. and are open to anyone with an interest. Registration is on the City's website; however, the link is not easily accessible and requires clicking on several links to get to the information. Also, information about the PulsePoint application is also not easily found on the City's website.

Recommendation #3 We recommend that HFD work with their marketing team to develop a strategy to promote the First Six Community Lifesaver Training and PulsePoint application to encourage more citizens to

take an active role in saving lives. Also, the registration link for the training should be easy to locate on the City's website.

Response Performance

Timely response is a key component of emergency service delivery and a fire department's ability to effectively mitigate emergencies. Emergency incidents may evolve at a predictable rate (as noted in the trend analysis) and have critical points at which time intervention from emergency responders is vital to affect positive outcomes. For example, the American Heart Association recognizes that the brain begins to die in four to six minutes without oxygen. A fire that has reached flashover means it is too late to save anyone in the room of origin. Flashover normally occurs from four to ten minutes after free burning begins.

Response times in each risk classification are regularly reviewed. Actual performance data is compared to standards established by the NFPA to identify gaps. Any gaps over one minute are the primary areas of focus. The following table provides response time performance information at the 90th percentile.

Risk Classification	Response Force	Risk Category	Standard	Actual	Gap
EMS	1st Unit	Mod/High/Max	6 min 30 sec	8 min 36 sec	+2 min 6 sec
	1st Unit	Low	8 min	9 min 12 sec	+1 min 12 sec
	ERF Units	Mod/High/Max	9 min	9 min 44 sec	+ 44 sec
Fire	1st Unit	Mod/High/Max	6 min 50 sec	9 min 30 sec	+2 min 40 sec
	1st Unit	Low	8 min 20 sec	9 min 18 sec	+ 58 sec
	ERF Units	High/Max	10 min 50 sec	11 min 12 sec	+22 sec
Hazmat	1st Unit	All	8 min 50 sec	9 min 50 sec	+1 min
	ERF Units	High/Max	14 min 50 sec	16 min 3 sec	+1 min 13 sec
TRT	1st Unit	All	8 min 50 sec	10 min 1 sec	+ 1 min 11 sec
	ERF Units	Max	14 min 50 sec	14 min 14 sec	-36 sec
	ERF Units	Mod/High	14 min 50 sec	13 min 23 sec	-1 min 27 sec

As previously stated, response times are regularly monitored and evaluated to ensure appropriate and consistent service delivery. Through this evaluation, it can be determined if the current deployment model provides for the right number of resources with the right capabilities arriving

at the right time to mitigate the emergency. HFD has implemented several solutions over the previous five CYs to help reduce the gap within the response times. These solutions include:

- Modified the alarm handling process to provide for the earliest notification and response by emergency responders;
- Dispatched performance reports are provided monthly to communicate personnel performance;
- Turnout time performance reports are distributed monthly to battalion chiefs and discussed with captains;
- Upgraded to fire station alerting system includes message signs and countdown timers;
- Placement of one additional rescue at district 99;
- Replaced obsolete fire station alerting equipment with state-of-the-art equipment;
- Opened a fire station with an engine creating district 91;
- Added two rescues where needed during higher levels of demand;
- Added an additional rescue at district 82;
- Opened fire station 85 and staffed with an engine and rescue;
- Staffed an additional rescue at fire station 83 to meet growing service demand; and
- Continued to maintain performance awareness and accountability through monthly reporting.

Total response time is measured from the moment an emergency call is received at the HPD Communications Center until an apparatus arrives at the scene. The time is further broken down into smaller segments to include alarm handling, turnout, and travel time.

Alarm handling interval is measured from receipt of an alarm at the HPD Communications Center until the beginning of the transmittal of response by voice or electronic means to the primary response apparatus. The turnout time interval is measured from the point in time when emergency response information is transmitted to the primary response apparatus to the apparatus's beginning point of travel. Travel time is measured from the point of departure to arrival at the scene.

Over the period October 2013 to October 2018, total response time has gradually decreased from 9 minutes 41 seconds to 8 minutes 35 seconds resulting in over one minute reduction in time. For the same period, decreases have occurred in the following areas:

- Alarm-handling time has decreased from 3 minutes 28 seconds to 1 minute 46 seconds;
- Turnout time has decreased from 2 minutes 30 seconds to 1 minute 55 seconds; and
- Travel time has decreased from 6 minutes 29 seconds to 6 minutes 22 seconds.

Finding #4

Actual response times are continuously collected and compared to standard response times. Traffic congestion presents an impediment to emergency vehicles and can increase response times. Response times have improved but as noted previously,

there are opportunities for further improvement (particularly, turnout time) to be more in alignment with standards. Continuous review of the data helps the HFD to measure and improve results.

Recommendation #4 We recommend that HFD continue to analyze data, identify opportunities for improvement, and develop plans to achieve response time performance goals. Additionally, trainings and discussions should be held with crews regarding turnout time and how the performance goal can be achieved.

HFD continues to evaluate response performance through the gap analysis. Also, trend analysis is a frequent on-going tool for the HFD. The two analyses require a diligent and constant data review. Management reviews data trends and performance gaps throughout the calendar year which helps to maximize limited resources to the fullest benefit to the City. This review will help to identify areas for improvement and ensure demand levels are met. Additionally, deployment strategies can be modified or improved to close any gaps, reduce overall response times to emergencies and ensure the necessary aid and coverage is available in an emergency.

Commendation #1 We commend the HFD for the compilation and review of data to assist in meeting service delivery goals.

Every second counts when an emergency occurs. Delays in arriving on scene can put lives and property at risk. Emergency crews follow strict procedures and undergo extensive training to respond as quickly as possible, however, they cannot control the path to the scene, other vehicles, red lights, or distracted drivers. First responders need every advantage they can get to help save lives. HFD installed the Opticom GPS technology in 2014 that assists emergency vehicles by providing temporary right-of-way through equipped intersections. This technology helps to reduce delays for first responders.

Commendation #2 We commend the HFD for adopting and installing the GPS technology which helps to reduce delays for first responders.

Communications Center

The Communications Center is under the direction of the HPD. It is the direct link between citizens and the City's emergency response services. The communications operators handle all calls (311 and 911) for service and dispatches resources for police, fire, and medical emergencies. The Communications Center is the only operations center within Clark County that handles calls from start to finish. Other agencies have a centralized center that receives all 311 and 911 calls. Emergency calls are transferred to the appropriate agency (police, fire, or emergency medical) and they will dispatch appropriate resources.

Finding #5

Handling all calls from start to finish may help expedite emergency personnel and reduce response times. However, it does require the operators to complete multiple tasks at once and may impact their focus from calls waiting in the queue thus potentially impacting response times. It is also important to ensure that staffing levels are appropriate.

Recommendation #5

We recommend that HFD conduct an analysis of the HPD Communications Center to ensure staffing levels are appropriate to handle the call volume.

Commendation #3

We commend the HFD for its innovation in handling all emergency calls from start to finish in one location. This practice allows for getting emergency aid dispatched as soon as possible.

OBJECTIVES, SCOPE AND METHODOLOGY

This audit was completed in accordance with the Fiscal Year (FY) 2021 audit plan. Audit objectives were to:

- Review the HFD's deployment model to determine how apparatus and staff are assigned to calls and to compare to professional standards and best practices.
- Analyze the relationship between the HFD's deployment model and the survivability rate and the results thereof.

To accomplish these objectives, we conducted a preliminary survey that included a review of prior audit reports; the outside auditor's (Piercy, Bowler, Taylor & Kern) Required Communications Letter for FY 2019; the City's Internet and Intranet websites; the Comprehensive Annual Budget Report (CABR); the Comprehensive Annual Financial Report (CAFR); department organizational charts; and any applicable federal, state, City, and department policies. Additionally, we conducted interviews with department personnel and performed walkthrough observations of Fire Station 82 and the Henderson Police Department (HPD) Communications Center. We reviewed service call trends on the national, state, and local level, verified State mandated certifications, examined response times and resources assigned to service calls.

The audit encompassed the period from July 1, 2018 through January 31, 2021, and the last day of fieldwork was April 27, 2021.

We conducted this audit in accordance with generally accepted government auditing standards except for the requirement for an external peer review every three years. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The Internal Audit Department reports to the Audit Committee and is organizationally independent of all City departments.

AUDIT SERVICES

Internal Audit is an independent, objective assurance and consulting activity designed to add value and improve the City's operations. The Internal Audit Department's purpose is to help the City accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.

Performance Audits provide findings or conclusions based on an evaluation of sufficient, appropriate evidence against established criteria that will assist City Council and City management to improve program performance and operations.

Assurance services involve the objective assessment of evidence to provide an independent opinion or conclusion regarding an entity, operation, function, process, or system.

Consulting services are advisory in nature and are generally performed at the specific request of City senior or department management. The nature and scope of the consulting engagement are subject to agreement with the engagement client.

The Fraud Hotline provides City employees the ability to report any suspected activity or conduct involving fraud, waste, or abuse; and suspected violations of laws, rules, or regulations. All reports will be treated confidentially. Fraud, waste, or abuse within the City can be reported to Internal Audit.

Internal Audit Department

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APPENDIX A

Management Response Letter

Our vision is to be America's Premier Fire Department

CITY OF HENDERSON
240 S. Water Street
P.O. Box 95050
Henderson, NV 89009-5050

FIRE DEPARTMENT
Phone: 702-267-2222
FAX: 702-267-2223

Memorandum

TO: Melissa Wright, City Auditor

FROM: Shawn White, Fire Chief

DATE: June 2, 2021

SUBJECT: Henderson Fire Department Draft Audit Report Response

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We appreciate the opportunity to collaborate with the Internal Audit Department to help us evaluate our organization and find new ways to improve. It is always helpful to have fresh eyes on our processes and operations to assess our performance.

As your report stated, we have always been committed to making data driven decisions and planning. We are grateful for acknowledging the great work from our Planning and Analysis team. They play a key role in our continued success.

Your appraisal of our department was fair and accurate. Thank you for your commendations and we will prioritize your recommendations for improvement.

It was a pleasure to work with your personnel throughout this process. They were engaging, professional and encouraging. We look forward to working with you in the future.

Thank you.

SLW: kls

cc: Richard Derrick, City Manager/CEO
Bristol Ellington, Deputy City Manager/Chief Operating Officer
Scott Vivier, Deputy Fire Chief Support