CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

FIRE & EMS SERVICES ANALYSIS REPORT

National City, California

Final Report-August 2022

CPSM®

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ICMA

Exclusive Provider of Public Safety Technical Services for
International City/County Management Association

THE ASSOCIATION & THE COMPANY

The International City/County Management Association is a 103-year old, nonprofit professional association of local government administrators and managers, with approximately 13,000 members located in 32 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments and their managers in providing services to its citizens in an efficient and effective manner. ICMA advances the knowledge of local government best practices with its website (www.icma.org), publications, research, professional development, and membership. The ICMA Center for Public Safety Management (ICMA/CPSM) was launched by ICMA to provide support to local governments in the areas of police, fire, and emergency medical services.

ICMA also represents local governments at the federal level and has been involved in numerous projects with the Department of Justice and the Department of Homeland Security.

In 2014, as part of a restructuring at ICMA, the Center for Public Safety Management (CPSM) was spun out as a separate company. It is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA, PERF, IACP, IFCA, IPMA-HR, DOJ, BJA, COPS, NFPA, and others.

The Center for Public Safety Management, LLC, maintains the same team of individuals performing the same level of service as when it was a component of ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and align department operations with industry best practices. We have conducted 341 such studies in 42 states and provinces and 246 communities ranging in population from 8,000 (Boone, Iowa) to 800,000 (Indianapolis, Ind.).

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SECTION 1. EXECUTIVE SUMMARY

The Center for Public Safety Management LLC (CPSM) was contracted by the City of National City, CA to complete an analysis of the city's Fire Department, EMS ground transport service, and fire dispatch services.

The National City Fire Department (NCFD) is responsible for providing services from two primary divisions that include Operations (fire suppression, first response emergency medical services, emergency management, training and education, EMS oversight and logistics, fleet and facility oversight, emergency communications liaison, and technical rescue), and Community Risk Reduction (fire code enforcement, fire investigation, weed abatement, new business license inspections, public education to the extent possible, and juvenile fire setter intervention). The NCFD carries out these and other logistical and administrative functions through the Fire Chief's office and operational fire suppression officers and staff.

The service demands on the department from the community are numerous and include EMS first response; fire suppression; wild land-urban interface; technical rescue; hazardous materials; and transportation emergencies to include extensive rail and vehicle traffic, a mass transit system utilizing bus and light rail transportation, the Port of San Diego property to include marine vessels, buildings, and occupancies located within the city's municipal boundaries; and other non-emergency responses typical of urban fire departments. A significant component of this report is the completion of an All-Hazard Risk Assessment of the Community. The All-Hazard Risk Assessment of the Community contemplates many factors that cause, create, facilitate, extend, and enhance risk in and to a community. The risk assessment includes Port property and proposed new industrial businesses/processes that are contemplating build-out in National City.

The response time and staffing components discussion of this report are designed to examine the current level of service provided by the NCFD compared to national best practices. As well, these components of the report provide incident data and relevant information that can be utilized for future planning and self-review of service levels for continued improvement designed to meet community expectations and mitigate emergencies effectively and efficiently. Included also is an analysis of fire and EMS responses the NCFD provides through a regional automatic aid agreement to Paradise Hills, an area of San Diego City contiguous to National City.

Other significant components of this report are an analysis of the current deployment of resources and the performance of these resources in terms of response times and the three NCFD fire stations; current staffing levels and patterns; department resiliency (ability to handle more than one incident at a time); critical tasking elements for specific incident responses and assembling an effective response force; the private EMS ground transport system with an analysis that depicts the start-up and annualized cost of a city EMS service; and an analysis to include start-up and annualized costs of a city fire dispatch section in the National City Police 911 Center. CPSM analyzed these items and provides recommendations where applicable to improve service delivery and for future planning purposes.

A comprehensive risk assessment and review of deployable assets are critical aspects of a fire department's operation. First, these reviews will assist the NCFD in quantifying the risks that it faces. Second, the NCFD will be better equipped to determine if its current response resources are sufficiently staffed, equipped, trained, and positioned. The factors that drive the service needs are examined and then link directly to discussions regarding the assembling of an effective response force; these factors also must be considered when contemplating the response capabilities needed to adequately address the existing and future risks, and which

encompass the component of critical tasking. CPSM does recommend additional staffing on both Engines 31 and 34 over a five-year period. This recommendation is based on current and projected building, transportation, and other risks inherent to the city, and as comprehensively discussed herein.

This report also contains a series of observations and planning objectives and recommendations provided by CPSM which are intended to help the NCFD deliver services more efficiently and effectively. This includes succession planning for near-term retirements, administrative capacity needed to manage day-to-day programs and processes such as workforce training and education, EMS (the greatest response workload of the department), and fleet and facilities (the infrastructure backbone of the department), and as well additional capacity in the Fire Marshal's Office, based on current and projected fire code inspection workload.

Recommendations and considerations for continuous improvement of services are presented here. CPSM recognizes there may be recommendations and considerations offered that first must be budgeted and/or bargained, or for which processes must be developed prior to implementation.

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RECOMMENDATIONS

Department Structure

1. CPSM recommends the NCFD work with the city's Human Resources Department and develop and implement a succession planning process that identifies and develops future organizational leadership and includes key components that focuses on the retention of current talent. Included in this planning should be consideration for a 40-hour Deputy Fire Chief position that will work with the Fire Chief managing the day-to-day activities and programs of the department. This position would be the likely successor to the Fire Chief on his retirement and would ensure succession of current department direction. This position can be implemented and filled through promotion (retention opportunity), which will create a vacancy to be filled at the lesser expensive Firefighter level. (See pp. 5-8.)
2. CPSM also recommends the city consider adding an administrative Battalion Chief position to assist with the day-to-day management of the department and to assume key program assignments currently assigned to shift Battalion Chiefs such as training, EMS, fleet and facilities, and health and safety. This position can be implemented through promotion (retention opportunity), which will create a vacancy to be filled at the lesser expensive Firefighter level. (See pp. 5-8.)

   Estimated cost alternatives to support these recommendations are: Deputy Chief position internal promotion, $108,000 (salary and benefits for one firefighter/EMT and $20,000 for promotions for Engineer, Captain, and Battalion Chief); Battalion Chief position through internal promotion, $103,000 (salary and benefits for one firefighter/EMT and $15,000 for promotions of Engineer and Captain).

Fleet and Facilities

3. CPSM recommends the NCFD, due to the current and expected future workload on apparatus, follow to the extent possible the current apparatus in-service and replacement schedule. (See pp. 11-16.)
4. CPSM further recommends the city continue with its planning to construct a permanent brick and mortar station in the northeast portion of the city utilizing national industry standards for fire facilities as outlined herein and designed to accommodate current and future response apparatus and personnel. (See pp. 11-16.)

ISO Rating

5. CPSM recommends the NCFD review and address, to the extent possible, deficiencies in the current ISO Public Protection Classification report (Fire Department Section) as outlined in this analysis. This includes, and given the identified building risks in the city, ensuring company personnel conduct (and document for future ISO reviews) some level of commercial, industrial, institutional, and other similar type buildings (all buildings except one- to four-family dwellings) familiarization and pre-plan information gathering; work with Sweetwater Authority to ensure the fire hydrants are inspected and flow-tested on a more regular basis; address Community Risk Reduction staffing and make adjustments to staffing to ensure current (and future) inspectable properties (2,700 total current) are receiving annualized (where required) inspections, and those not requiring annualized inspections receive timely inspections in accordance with applicable laws and standards, and as established by the Fire Marshal. Addressing the Community Risk Reduction deficiency will require additional staffing, to the extent possible with available funding, which has an estimated cost of $87,500 to $117,000 per Community Risk Reduction inspector, dependent on placement in the pay range. (See pp. 39-41.)

Risk Assessment / Resiliency

6. CPSM recommends the NCFD continue with the Squad program as designed, due to the efficiencies and effectiveness this unit has produced for the city. CPSM further recommends the NCFD monitor dual responses (Squad/Engine) and make necessary adjustments to maintain a 10-percent ratio. (See pp. 47-50.)

NCFD Staffing Model

7. CPSM recommends the NCFD, to the extent possible and if practical depending on available automatic and mutual aid resources, work with regional Fire Chiefs to increase response resources to commercial, apartment, and high-rise fire responses that align more closely with the NFPA 1710 standard. (See pp. 63-69.)

8. CPSM further recommends due to the following factors: demand for service on the NCFD; population density that includes substantial current and projected vertical density structures, many involving assisted and/or senior living; building and other risks identified in this report such as the San Diego Port property; industrial and commercial properties that include heavy rail and tractor-trailer transportation; proposed industrial and commercial properties; the resiliency issues the department faces due to demand for service; and to increase NCFD resources regarding assembling an Effective Response Force, that the city develop a one- to three-year funding plan to increase staffing on Engine 31 to four per shift (three total personnel with estimated costs of $263,000) as this is a single station response unit in a high-demand fire management zone, and in the subsequent three- to five-year period develop a funding plan to increase staffing on Engine 34 to four per shift (three total personnel with estimated costs of $263,000 to $300,000, depending on implementation year). (See pp. 63-69.)

Ambulance Service

9. The current method of ambulance service provision of using an outside contractor should be retained, and the NCFD should not assume responsibility for providing ambulance services to the city. (See pp. 83-91.)

10. The city should negotiate with AMR for significant contracting updates or consider undergoing an RFP process to seek enhanced service delivery models, either from the current, or prospective ambulance service providers. (See pp. 83-91.)

Mobile Integrated Healthcare

11. NCFD should engage in discussions with local and regional stakeholders to determine the potential benefits and impact of initiating a Mobile Integrated Healthcare / Community Paramedicine program. (See p. 91.)

Fire Emergency Communications

12. Based on the initial start-up and annualized costs CPSM estimates Fire Dispatch in-house totals, and that the annualized costs almost double the current San Diego Metro Fire Dispatch costs, CPSM strongly recommends National City continue with the current agreement with San Diego City for fire dispatch services. CPSM does recommend, however, that National City work with San Diego City to reduce the current fire dispatch agreement costs to offset the costs the NCFD incurs as the de facto fire department for Paradise Hills, which was demonstrated in the analysis. (See pp. 92-93.)

SECTION 2. AGENCY REVIEW AND CHARACTERISTICS

DEPARTMENT OVERVIEW AND ORGANIZATIONAL STRUCTURE

The National City Fire Department (NCFD) is responsible for providing emergency services from two primary divisions that include Operations (primarily fire suppression, first response emergency medical services) and Community Risk Reduction (fire code enforcement, fire prevention and plans review, new business license inspection program, weed abatement). Other programs administered through these primary divisions include the City's emergency management function, a department health and safety program, professional development programs, community education to include juvenile fire setter intervention program and CPR classes, hazardous materials and technical rescue response, and Community Emergency Response Team or CERT program. ***These represent best practices/best program practices for fire service agencies.***

The NCFD is led by a Chief of Emergency Services/Fire Chief. This position (department head level) serves as a member of the City Manager's cabinet. The organizational structure includes senior and middle manager level positions (Fire Marshal, Deputy Fire Marshal, Battalion Chiefs), first-line supervisors (Captain level), engineers (apparatus driver-operator), firefighters, and civilian support staff. The largest contingent of personnel in the organization are company-level officers, engineers, and firefighters.

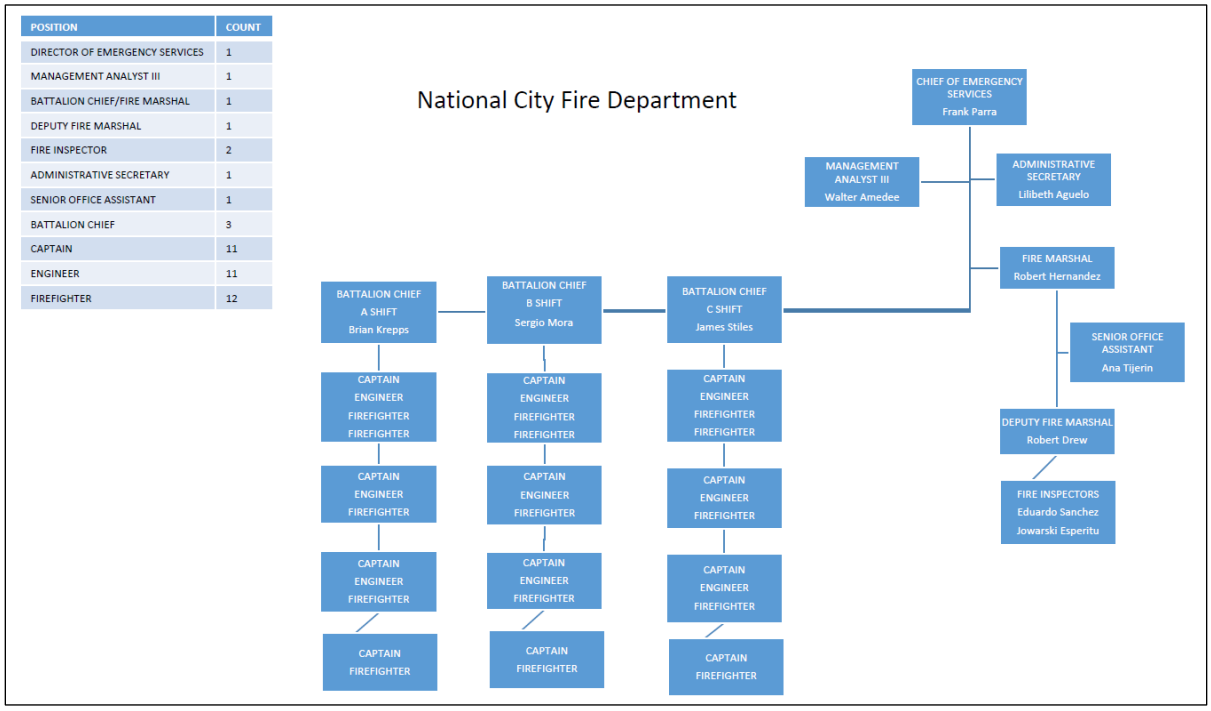
Field operations provide services from three operational shifts and work a 24-hour schedule. The operational shift schedule consists of a 24-hour shift every other day for 7 total days (4 x 24-hour shifts, with a day off in between each), followed by 4 days off and then 6 days in the next cycle. This schedule ensures compliance with 29 U.S.C 207(k) wherein firefighters working in excess of 53-hours/week must be compensated for the three additional hours worked each week or scheduled off. ***This is a national best practice.***

Emergency Medical Services (EMS) ground transportation is provided in National City by a single private ambulance service, American Medical Response (AMR). The NCFD responds to EMS incidents as a first responder agency. NCFD engine, ladder, and squad companies have appropriately trained staff (including Paramedic level) on duty on each apparatus to render pre-transport emergency care to those requiring that care.

The following figure illustrates the NCFD's chart of the organization.

FIGURE 2-1: NCFD Organizational Chart

POSITION	COUNT
DIRECTOR OF EMERGENCY SERVICES	1
MANAGEMENT ANALYST III	1
BATTALION CHIEF/FIRE MARSHAL	1
DEPUTY FIRE MARSHAL	1
FIRE INSPECTOR	2
ADMINISTRATIVE SECRETARY	1
SENIOR OFFICE ASSISTANT	1
BATTALION CHIEF	3
CAPTAIN	11
ENGINEER	11
FIREFIGHTER	12



Note: On July 25, 2022, Fire Chief Parra became the Interim Assistant City Manager. BC Sergio Mora became the Interim Fire Chief. These assignments are for the near term (three-month period) but could be longer.

In addition to normal work assignments—and due to the limited capacity of NCFD administrative positions—operational shift Battalion Chiefs perform and oversee many ancillary duties and programs necessary to maintain administrative and operational systems and components of the organization. These are illustrated in the next three figures.

FIGURE 2-2: Operations Ancillary Duties, Battalion Chief Mora

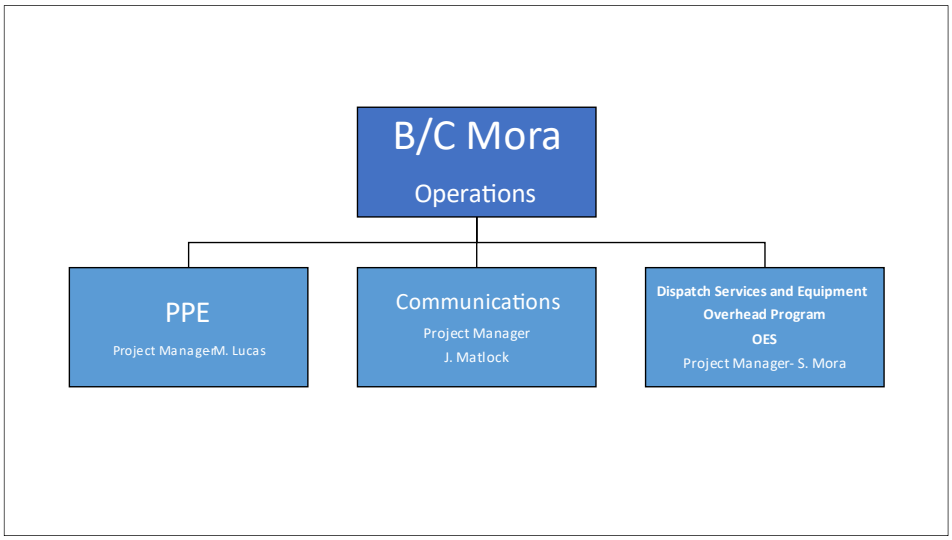


FIGURE 2-3: Training/EMS Ancillary Duties, Battalion Chief Stiles

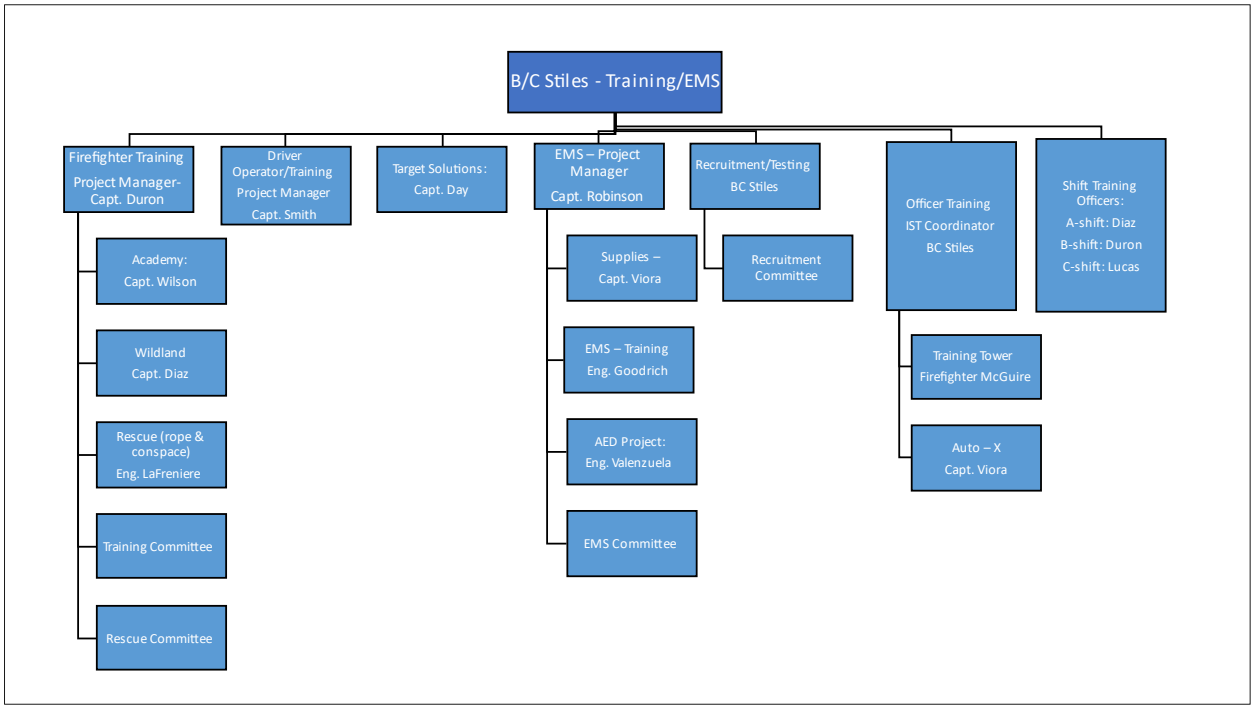
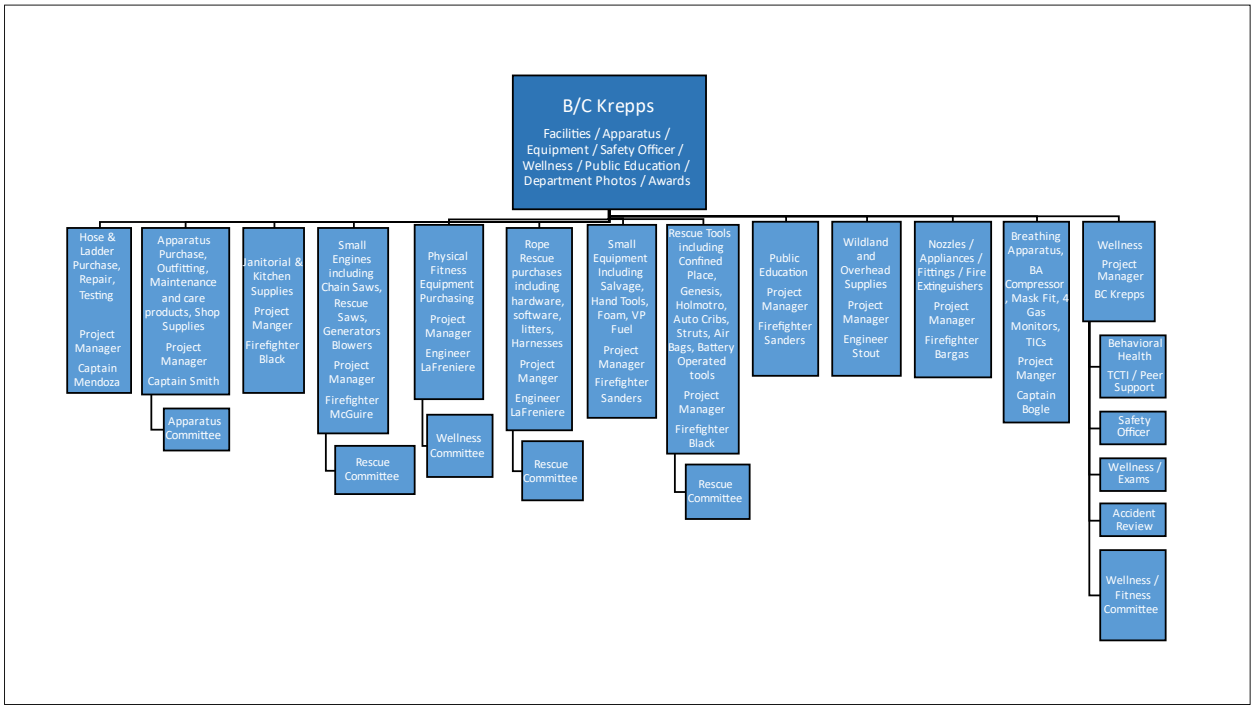


FIGURE 2-4: Support Programs Ancillary Duties, Battalion Chief Krepps



The programs, processes, and inter-workings of a fire department are many as can be seen in the above three figures. A drawback to assigning almost all of these components to shift personnel is that during their absence (either off-duty on shift rotation or out on leave) is the potential something is not getting done or will be missed. This is a real occurrence in any fire

department. Traditional administrative support positions in a fire department include those assigned the training, EMS and logistics (radio and comms, supply chain management, fleet, and facility) functions. Most smaller fire departments combine one or more of these main functions together and also include the health and safety oversight function as well.

CPSM learned while on-site in March 2022, that the Fire Chief may retire in 24 to 30 months, and one Battalion Chief and the Fire Marshal (Battalion Chief Position) are also approaching retirement in the near term (18 to 36 months). This will create a gap at the senior management level as 60 percent of the top leadership may depart over a three-year period. While there likely is an informal succession plan in the department, a more formal plan should be developed to address these and other near-term retirements. Our analysis of the NCFD did not identify a clear organizational succession plan.

Succession planning in the NCFD should include a systematic approach to developing potential successors to ensure organizational leadership stability is maintained. A plan should be in place to identify, develop, and nurture potential future leaders. CPSM sees this as critical for the long-term success of the NCFD. This plan should also include a focus on current talent and the retention of this valuable staff. CPSM was told by senior management that other area fire departments pursue the hiring of NCFD staff because of the urban response and firefighting capabilities in which staff is trained in National City. This raiding of seasoned staff creates knowledge and experience gaps in an already small agency and leads to continual hiring and onboarding expenses. Together (succession planning and retention of talent) is a systems approach that should not be overlooked.

Recommendations:

- CPSM recommends the NCFD work with the city's Human Resources Department and develop and implement a succession planning process that identifies and develops future organizational leadership and includes key components that focuses on the retention of current talent. Included in this planning should be consideration for a 40-hour Deputy Fire Chief position that will work with the Fire Chief managing the day-to-day activities and programs of the department. This position would be the likely successor to the Fire Chief on his retirement and would ensure succession of current department direction. This position can be implemented and filled through promotion (retention opportunity), which will create a vacancy to be filled at the lesser expensive Firefighter level. (Recommendation No. 1.)
- CPSM also recommends the city consider adding an administrative Battalion Chief position to assist with the day-to-day management of the department and to assume key program assignments currently assigned to shift Battalion Chiefs such as training, EMS, fleet and facilities, and health and safety. This position can be implemented through promotion (retention opportunity), which will create a vacancy to be filled at the lesser expensive Firefighter level. (Recommendation No. 2.)

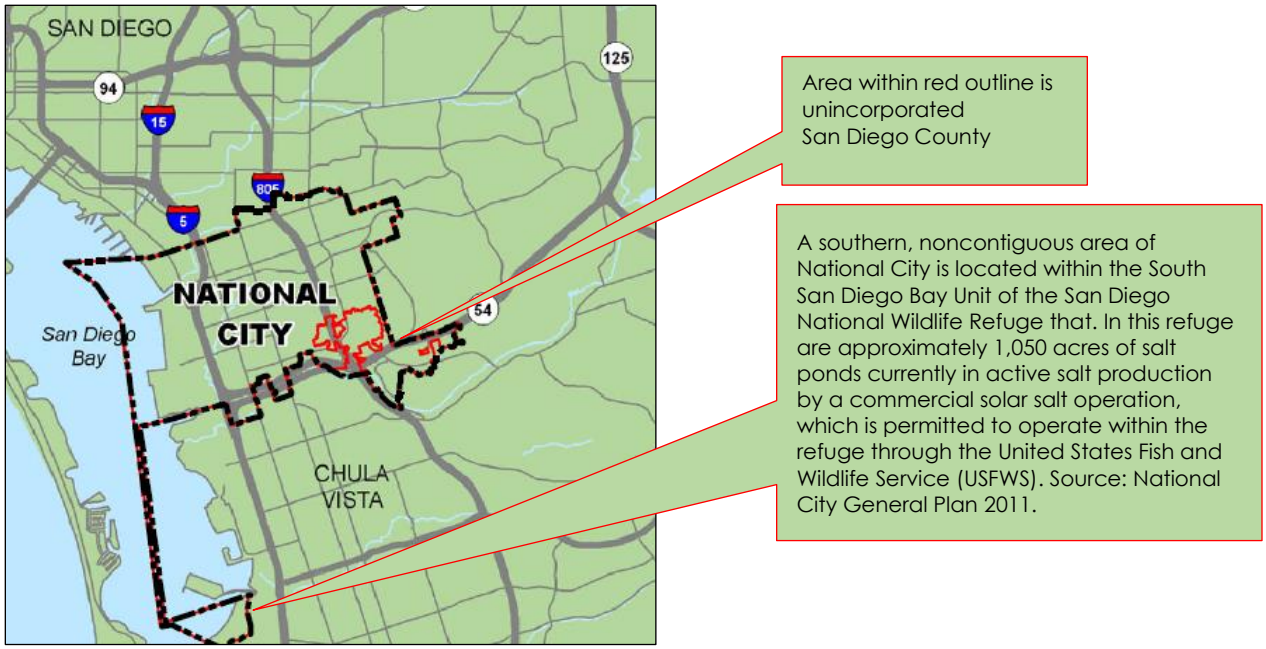
Estimated cost alternatives to support these recommendations are: Deputy Chief position internal promotion, $108,000 (salary and benefits for one firefighter/EMT and $20,000 for promotions for Engineer, Captain, and Battalion Chief); Battalion Chief position through internal promotion, $103,000 (salary and benefits for one firefighter/EMT and $15,000 for promotions of Engineer and Captain).

SERVICE AREA

National City is in the south bay area of San Diego County. The city boundaries encompass 9.1 total square miles of which 7.8 square miles are land area and the remainder water area. Contiguous jurisdictions include the City of San Diego city to the north and northeast, Bonita to the southeast (unincorporated San Diego County), and Chula Vista to the south (National City and Chula Vista are separated by the Sweetwater River).

The next figure illustrates the municipal boundaries of the city in which the NCFD responds. The NCFD also provides automatic/mutual aid to San Diego city and county, Bonita, and Chula Vista.

FIGURE 2-5: National City Jurisdictional Boundaries



The NCFD provides emergency services from three stations located in the city. Response is primarily made through two engine companies, one ladder/truck company, one quick response squad unit, one shift command vehicle, and various other operational support vehicles to include a state Office of Emergency Services Type 1 engine apparatus for wildland firefighting and deployment. In addition to in-city mitigation of fire and emergency service incidents, the NCFD provides and receives mutual/automatic aid from neighboring/contiguous jurisdictions (***a national best practice***).

Engine and ladder company response is provided through traditional fire apparatus. The squad apparatus is a Type 6 engine (heavy-duty pick-up truck chassis with equipment body) unit that has a 120 gpm pump and 250-gallon water tank and carries a crew of two (Captain and FF). This unit also has hose for initial attack on small outside fires, fire-related hand tools, self-contained breathing apparatus for the two-person crew, and basic and advanced medical equipment for first response EMS calls for service. This unit also carries crew member structural and wildland firefighting protective clothing and other crew-related equipment.

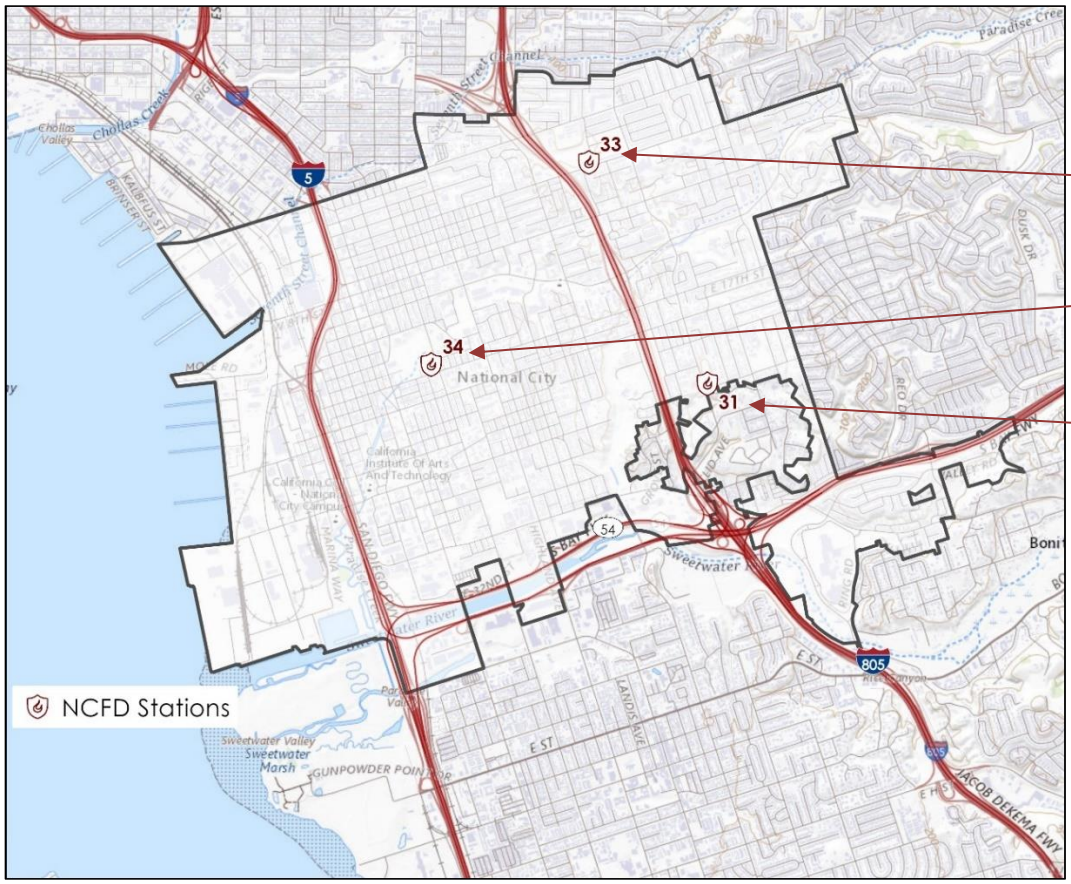
The squad unit was placed in service as the result of a 2009 fire service consultant report that identified gaps in response service in the northeast area of the city. This busy area of the city was

receiving emergency response from NCFD stations 31 and 34, as well as from mutual aid partner the City of San Diego. Several benefits have been realized by placing this unit in service:

- Quicker first due response to fire and EMS calls in the busy northeast portion of the city.
- Since this unit is not a resource type that is included in the mutual/auto aid agreements in the region, it does not leave the city, increasing its readiness to respond at all times.
- This unit provides an additional two firefighters (Captain, Firefighter) to respond to multi-unit responses such as structure fires in the city, increasing the ability for the NCFD to quickly assemble an Effective Response Force.

The following figure shows the municipal boundaries with NCFD fire station locations.

FIGURE 2-6: NCFD Fire Station Locations



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NCFD BUDGET AND CAPITAL ASSETS

An overview of the annual NCFD appropriations from the general fund is provided in the following table; it includes the general fund budget allocations for fiscal years 2020, 2021, and 2022.

TABLE 2-1: NCFD General Fund Appropriations, Fiscal Years 2020–2022

FY 2020 Adopted (General Fund)	FY 2021 Adjusted Appropriations (General Fund)	FY 2022 Adjusted Appropriations (General Fund)
$11,424,457	$11,369,542	$11,106,737

Traditionally, and like every other career fire department in the nation, the NCFD's budget is primarily consumed by personnel costs. This includes salary, benefit and retirement costs, overtime, and worker's compensation, which are the larger line items in this budget area. The NCFD personnel services budget area consistently represents approximately 80 percent of the total budget. The next largest budget area is internal service charges (12 percent in FY 2022), which are for the operation and repair of facilities and equipment, automotive operational/repair costs and replacement, and maintenance and operations of equipment.

The NCFD does have certain revenues line items in the budget to offset overall expenditures. These include (FY 2022 proposed budget):

- Charges for community risk reduction services (plans review, fire permit fees, license and permit fees, weed abatement): $71,879.
- False alarm fines: $55,000.
- AMR (EMS ground transport provider) station rental fees: $94,200
- Charges for fire services (misc. fire services, fire protection services for certain unincorporated San Diego County areas, fire services for the Port of San Diego, fire/life safety annual fire inspection fees): $1,317,620.
- AMR Franchise Fee (EMT-D Revolving Fund): $334,124 (used for certain personnel services costs in fire operations).
- Development impact fees: $10,000.

The NCFD received a grant from the Staffing for Adequate Fire and Emergency Response (SAFER) program and has a FY 2022 expenditure of $590,185 from this grant. Lastly, the city and department are utilizing Community Development Block Grant (CDBG) funds for bond principal and interest redemption in fire operations.

Capital Assets

Facilities

Fire facilities must be designed and constructed to accommodate both current and forecast trends in fire service vehicle type and manufactured dimensions. A facility must have sufficiently-sized bay doors, circulation space between garaged vehicles, departure and return aprons of adequate length and turn geometry to ensure safe response, and floor drains and oil separators to satisfy environmental concerns. Station vehicle bay areas should also consider future tactical vehicles that may need to be added to the fleet to address forecast response challenges, even

if this consideration merely incorporates civil design that ensures adequate parcel space for additional bays to be constructed in the future.

Personnel-oriented needs in fire facilities must enable performance of daily duties in support of response operations. For personnel, fire facilities must have provisions for vehicle maintenance and repair; storage areas for essential equipment and supplies; space and amenities for administrative work, training, physical fitness, laundering, meal preparation, and personal hygiene/comfort; and—where a fire department is committed to minimize "turnout time"—bunking facilities.

A fire department facility may serve as a de facto "safe haven" during local community emergencies and also serve as likely command center for large-scale, protracted, campaign emergency incidents. Therefore, design details and construction materials and methods should embrace a goal of having a facility that can perform in an uninterrupted manner despite prevailing climatic conditions and/or disruption of utilities. Programmatic details, such as the provision of an emergency generator connected to automatic transfer switching—even going as far as to provide tertiary redundancy of power supply via a "piggyback" roll-up generator with manual transfer (should the primary generator fail)—provide effective safeguards that permit the fire department to function fully during local emergencies when response activity predictably peaks.

Personnel/occupant safety is a key element of effective station design. This begins with small details such as the quality of finish on bay floors and nonslip treads on stairwell steps to decrease tripping/fall hazards, or use of hands-free plumbing fixtures and easily disinfected surfaces/countertops to promote infection control. It continues with installation of specialized equipment such as an exhaust recovery system to capture and remove cancer-causing by-products of diesel fuel exhaust emissions. A design should thoughtfully incorporate best practices for achieving a safe and hygienic work environment.

An ergonomic layout and corresponding space adjacencies in a fire station should seek to limit the travel distances between occupied crew areas to the apparatus bays. Likewise, facility design should carefully consider complementary adjacencies, such as lavatories/showers in proximity of bunk rooms, desired segregations, and break rooms or fitness areas that are remote from sleeping quarters. Furnishings, fixtures, and equipment selections should provide thoughtful consideration of the around-the-clock occupancy inherent to fire facilities. Durability is essential, given the accelerated wear and life cycle of systems and goods in facilities that are constantly occupied and operational.

Sound community fire-rescue protection requires the strategic distribution of fire station facilities to ensure that effective service area coverage is achieved, that predicted response travel times satisfy prevailing community goals and national best practices, and that the facilities are capable of supporting mission-critical personnel and vehicle-oriented requirements and needs. Additionally, depending on a fire-rescue department's scope of services, size, and complexity, other facilities may be necessary to support emergency communications, personnel training, fleet and essential equipment maintenance and repair, and supply storage and distribution.

National standards such as NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, outlines standards that transfer to facilities such as infection control, personnel and equipment decontamination, cancer prevention, storage of protective clothing, and employee fitness. NFPA 1851, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Firefighting and Proximity Fire Fighting*, further delineates laundering standards for protective clothing and station wear. Laundry areas in fire facilities

continue to evolve and are being separated from living areas to reduce contamination. Factors such as wastewater removal and air flow need to be considered in a facility design.

The NCFD operates out of three operational facilities strategically located throughout the city. Each station houses around-the-clock crews, 365 days a year. Two stations house one crew and one piece of first response apparatus (an engine at Station 31 and a squad at Station 33), while one station houses more than one crew and two primary first response apparatus (engine and truck companies-Station 34).

Apparatus and staffing assignments are outlined in the following table.

TABLE 2-2: NCFD Facilities, with Apparatus and Staffing

Station Number	Resource Assignment	Year Constructed	# Apparatus Bays
31	Engine: 3 staff 24/7/365	1984	2
33	Squad: 2 staff 24/7/365	2019	2
34	Engine: 3 staff Truck: 4 staff Battalion Chief: 1 staff 24/7/365	2004	4

Station 33 is not a permanent brick and mortar facility. The implementation of the Squad Company, as discussed above, originated from a previous consulting study the city commissioned for the specific purpose of examining ways to service the increased demand (particularly regularly dispatched EMS and lower acuity fire responses) in the northeast area of the city and NCFD response area. Station 33 is a modular type building with an open awning that provides cover to response apparatus. The awning and building are not connected.

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FIGURE 2-7: NCFD Station 33

Fleet

The provision of an operationally ready and strategically located fleet of mission-essential fire-rescue vehicles is fundamental to the ability of a fire-rescue department to deliver reliable and efficient public safety within a community.

The NCFD currently operates a fleet of front-line fire apparatus as outlined in the following table.

TABLE 2-3: NCFD Fleet

Apparatus Type	Year In Service	Operational Assignment / Station Assigned
Type 1 Engine	2011	Front Line / 34
Type 1 Engine	2019	Front Line / 31
Type 1 Engine	2006	Reserve
Ladder-105' Quint	2015	Front Line / 34
Ladder-105' Quint	2009	Reserve
Water Tender-2000 gallons		Front Line / 34
Type 6 Squad	2017	Front Line / 33

The procurement, maintenance, and eventual replacement of response vehicles is one of the largest expenses incurred in sustaining a community's fire-rescue department. While it is the personnel of the NCFD who provide emergency services within the community, the department's fleet of response vehicles is essential to operational success. Reliable vehicles are

needed to deliver responders and the equipment/materials they employ to the scene of dispatched emergencies within the city. Regular maintenance is performed by city fleet mechanics; specialized maintenance and repair of pump, aerial, and other fire apparatus are performed by a third-party fire apparatus maintenance vendor.

Replacement of fire-rescue response vehicles is a necessary, albeit expensive, element of fire department budgeting that should reflect careful planning. A well-planned and documented emergency vehicle replacement plan ensures ongoing preservation of a safe, dependable, and operationally capable response fleet. A plan must also include a schedule for future capital outlay in a manner that is affordable to the community.

NFPA 1901, *Standard for Automotive Fire Apparatus*, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. The document is updated every five years using input from the public/stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues. A primary interest of the committee over the past years has been improving firefighter safety and reducing fire apparatus crashes.

The Annex Material in NFPA 1901 (2016) contains recommendations and work sheets to assist in decision-making in vehicle purchasing. With respect to recommended vehicle service life, the following excerpt is noteworthy:

> *"It is recommended that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status and upgraded in accordance with NFPA 1912, Standard for Fire Apparatus Refurbishing (2016), to incorporate as many features as possible of the current fire apparatus standard. This will ensure that, while the apparatus might not totally comply with the current edition of the automotive fire apparatus standards, many improvements and upgrades required by the recent versions of the standards are available to the firefighters who use the apparatus."*

The impetus for these recommended service life thresholds is continual advances in occupant safety. Despite good stewardship and maintenance of emergency vehicles in sound operating condition, there are many advances in occupant safety, such as fully enclosed cabs, enhanced rollover protection and air bags, three-point restraints, antilock brakes, higher visibility, cab noise abatement/hearing protection, and a host of other improvements as reflected in each revision of NFPA 1901. These improvements provide safer response vehicles for those providing emergency services within the community, as well those "sharing the road" with these responders.

The NCFD follows the NFPA recommendations for apparatus replacement as such: 10-years front line, 5-years reserve. At the 15-year mark, the NCFD budgets in the Capital Improvement Plan (CIP) to replace the apparatus so as not to extend the service life much beyond 15 years**.** The 2006 engine apparatus is due to be replaced in the FY 23 CIP budget. Staff vehicles are replaced based on age, mileage, and consideration of recurrent maintenance costs.

Recommendations:

- CPSM recommends the NCFD, due to the current and expected future workload on apparatus, follow to the extent possible the current apparatus in-service and replacement schedule. (Recommendation No. 3.)

- CPSM further recommends the city continue with its planning to construct a permanent brick and mortar station in the northeast portion of the city utilizing national industry standards for fire facilities as outlined herein and designed to accommodate current and future response apparatus and personnel. (Recommendation No. 4.)

TRAINING PROGRAMS

Training is, without question, one of the most essential functions that a fire department should be performing on a regular basis. One could even make a credible argument that training is, in some ways, as important as emergency responses because a department that is not well trained, prepared, and operationally ready will be unable to fulfill its emergency response obligations and mission. Education and training are vital at all levels of fire service operations to ensure that all necessary functions are completed correctly, safely, and effectively. A comprehensive, diverse, and ongoing training program is critical to the fire department's level of success.

An effective fire department training program must cover all the essential elements of that department's core missions and responsibilities. The level of training or education required given a set of tasks varies with the jobs to be performed. The program must include an appropriate combination of technical/classroom training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Much of the training, and particularly the practical, standardized, hands-on training evolutions should be developed based upon the department's own operating procedures and operations while remaining cognizant of widely accepted practices and standards that could be used as a benchmark to judge the department's operations for any number of reasons.

The NCFD has an extensive Fire Services Manual, which serves as the standard operating guidelines for the department. Chapter 600 of this manual is dedicated to training and education of the workforce and comprehensively outlines the training regimen of the department.

Chapter 600.1 outlines the purpose of training, which is:

> *It is the policy of this department to administer a training program that will provide for the professional growth and continued development of its members. By doing so, the Department will ensure its members possess the knowledge and skills necessary to provide a professional level of service that meets the needs of the community.*

Chapter 600.2 states the policy of the department with regards to training, which is:

> *The Department seeks to provide ongoing training and encourages all members to participate in advanced training and formal education on a continual basis. Training is provided within the confines of funding, the requirements of a given assignment, staffing levels and legal mandates.*
>
> *Whenever possible, the Department will use courses certified by the California Office of the State Fire Marshal (OSFM), the California Fire Service Training and Education System (CFSTES), the U.S. Department of Homeland Security or other accredited entities.*

Chapter 623.1 further states the department's policy on individual responsibility as it links to training, and is:

The department shall provide a standardized Mandated Training Program to its members.

The department shall provide standardized training references and materials made available for the use of its members in conjunction with the Mandated Training Program.

All members shall participate in the Mandated Training Program relative to their position and classification within the department.

Certain Occupational Safety and Health Administration (OSHA) regulations dictate that minimum training must be completed on an annual basis, covering assorted topics that include:

- A review of the respiratory protection standard, self-contained breathing apparatus (SCBA) refresher and user competency training, SCBA fit testing (29 CFR 1910.134).
- Blood Borne Pathogens Training (29 CFR 1910.1030).
- Hazardous Materials Training (29 CFR 1910.120).
- Confined Space Training (29 CFR 1910.146).
- Structural Firefighting Training (29 CFR 1910.156).

Because so much depends upon the ability of the emergency responder to effectively deal with an emergency, education and training must have a prominent position within an emergency responder's schedule of activities when on duty. Education and training programs also help to create the character of a fire service organization. Agencies that place a real emphasis on their training tend to be more proficient in carrying out day-to-day duties. The prioritization of training also fosters an image of professionalism and instills pride in the organization. Overall, the NCFD has an excellent robust and comprehensive training program and there exists a dedicated effort focused on a wide array of training activities.

The NCFD does not have a stand-alone training unit. Incumbent training is developed and implemented by and through in-house instructors. Training and education opportunities are available through community college programs, other regional fire departments, and Vector Solutions, an on-line training platform.

The department hires only fire- and EMS-certified prospective employees. Minimum hiring requirements include (per NCFD Lateral FF job announcement):

- Possession of Calf. State Fire Marshal Firefighter I certification and one year of employment with a paid municipal fire department, California State fire department, or Federal fire department.
- High School Diploma or GED.
- Possession of a valid California Class C driver's license is required at the time of appointment.
- Possession of a valid EMT Level IA certification with the County of San Diego or the State Fire Marshal, or State of California Paramedic License, or National Registry Paramedic License.

Prospective employees are also noticed through the job announcement that the ability to obtain additional certificates as required to operate in an ever-changing fire service, Technical Rescue, Hazardous Material Awareness and Operations, etc., may be required during the term of employment.

Title 8 of the California Code of Regulations (CCR) also stipulates certain training classes that are grouped dependent on whether the staff member is initial and entry level staff; emergency response staff; firefighter level staff; and certain training dependent on response functions.

The NCFD has implemented a three-year training task book for new firefighters, ***which is a national best practice.*** This task book is assigned to the Captain level, where the accountability for completing the book rests. The task book is comprehensive, task oriented, and includes written, manipulative (hands-on), and presentation scoring at the end of years one and two. Training includes manipulative, didactic, computer-based, and self-study. The assigned Captain manages the employee's progress and is responsible for ensuring the employee is prepared to perform at the firefighter level. Shift Battalion Chiefs have oversight of the program as well.

The NCFD has also implemented a task book for engine company driver operations. This Task Book is designed to provide a training format and in-house certification of the minimum skill level needed to successfully operate engine (pumper) apparatus as the driver and pump operator. This task book is a model as well and is ***a national best practice.*** To achieve certification and subsequently be released to drive and operate the engine apparatus, the firefighter must successfully complete all task and job performance requirements outlined in the task book. Tasks include driving and safe driving checks; apparatus inspection and safety checks; understanding of manufacturers' recommendations; and pump operations.

The NCFD utilizes Vector Solutions as a didactic/virtual platform for department training. Vector Solutions has a robust course catalog system for fire and EMS training (among other disciplines in need of continuing education) that can be utilized to meet all federal, state, and local public safety training mandates. Its inventory is comprised of more than 450 hours of fire department training, as well as 250 hours of accredited EMS training.[1] Training personnel (and really any officer or member so authorized) can post training and information materials online for personnel to reference. The training schedule is posted prominently on Vector Solutions and accessible to all personnel. Vector Solutions also provides the platform for managing all training records and reports. The use of this program will help to ensure that there is a reliable and accurate data base for tracking and retrieval of all department-level training and for recording and tracking the status of certifications for all personnel. The NCFD is one of more than 7,000 public agencies that uses Vector Solutions.[2]

COMMUNITY RISK REDUCTION PROGRAMS

Community risk reduction is an important undertaking of a modern-day fire department. A comprehensive fire protection system in every jurisdiction should include, at a minimum, the key functions of fire prevention, code enforcement, inspections, and public education. Preventing fires before they occur, and limiting the impact of those that do, should be priority objectives of every fire department. Fire investigation is a mission-important function of fire departments, as this function serves to determine how a fire started and why the fire behaved the way it did, providing information that plays a significant role in fire prevention efforts. Educating the public about fire safety and teaching them appropriate behaviors on how to react should they be confronted with a fire is also an important life safety responsibility of the fire department.

Fire suppression and response, although necessary to protect property, have negligible impact on preventing fire. Rather, it is public fire education, fire prevention, and built-in fire protection systems that are essential elements in protecting citizens from death and injury due to fire, smoke

1. https://www.vectorsolutions.com
2. Ibid

inhalation, and carbon monoxide poisoning. The fire prevention mission is of utmost importance, as it is the only area of service delivery that dedicates 100 percent of its effort to the reduction of the incidence of fire.

Fire prevention is a key responsibility of every member of the fire department, and fire prevention activities should include all personnel. On-duty personnel can be assigned with the responsibility for "in-service" inspections to identify and mitigate fire hazards in buildings, to familiarize firefighters with the layout of buildings, identify risks that may be encountered during firefighting operations, and to develop pre-fire plans. On-duty personnel in many departments are also assigned responsibility for permit inspections and public fire safety education activities.

Fire prevention should be approached in a truly systematic manner, and many community stakeholders have a personal stake and/or responsibility in these endeavors. It has been estimated that a significant percentage of all the requirements found in building/construction and related codes are related in some way to fire protection and safety. Various activities such as plan reviews, permits, and inspections are often spread among different departments in the municipal government and are often not coordinated nearly as effectively as they should be. Every effort should be made to ensure these activities are managed effectively between departments.

The Fire Prevention Division in the NCFD is commanded by the Fire Marshal. In addition to the Fire Marshal, the office is staffed with a Deputy Fire Marshal and two Fire Inspectors. Together, these positions administer the fire code inspection program, fire plan reviews, weed abatement program, fire permitting, and public education mission of the department. The Fire Prevention Division works closely with the city's Community Development Department concerning matters of fire protection and relevant plan reviews, and fire code enforcement when building code issues are identified.

At the time of this analysis the City of National City and NCFD were utilizing the following fire and building codes:

- California Fire Code, 2019 edition.
- California Building Code, 2019 edition.
- California Mechanical Code.
- California Electrical Code.
- California Plumbing Code.
- Uniform Housing Code.
- California Energy Code.
- California Green Buildings Standard Code.
- California Residential Code.

In addition to state statutes and adopted fire and building codes, Chapter 400 of the NCFD Fire Services Manual outlines department policies for fire prevention, permit fees, fire investigation, public education, and associated Community Risk Reduction programs. These policies are comprehensive and are ***a best practice.***

There are 2,700 inspectable occupancies in the city. For 2019 and 2020 the fire inspection division conducted the following number of inspections:

- 2020: 599 (COVID impact affected total).
- 2019: 992.

The Fire Marshal and staff complete required annual occupancy inspections to Assembly, Institutional, and High-Hazard occupancies as required. Additionally, the Fire Marshal's Office inspects those occupancies involving a complaint, and all occupancies issued a new Business License to operate in the city. All other occupancy types are inspected once every three years to the extent possible. This type of inspection plan is typical in smaller agencies with minimal staffing. The plans review function typically conducted in-house in the Fire Marshal's Office is contracted out to a third party due to current workload, which is also common in smaller community risk reduction offices.

There are many reasons why existing buildings should be inspected for fire code compliance. The obvious purpose is to ensure that occupants of the building are living, working, or occupying a building that is safe for them to do so. Some buildings are required to have specific inspections conducted based on the type of occupancy and the use of the building such as but not limited to healthcare facilities (hospitals, nursing homes, etc.), schools, restaurants, and places of assembly. These inspections are mandated by various statutes, ordinances, and codes. Fire inspections can also identify violations and lead to follow-up inspections to ensure that violations are addressed and that the fire code is enforced.

In fire prevention, the term "enforcement" is most often associated with inspectors performing walk-throughs of entire facilities, looking for any hazards or violations of applicable codes. Educating the owner to the requirements, as well as the spirit and intent, of the code can also attain positive benefits for fire and life safety. This practice also improves community and business relationships.

Taking into consideration that fire prevention activities are important and also a community-wide responsibility, the City Council adopted a city-wide self-inspection program for certain business occupancy types. Title 15.29.020 of the city code of ordinances establishes a self-inspection program for certain occupancies B1 (business) and R1 (hotels, motels, boarding houses, congregate housing) to *maintain functions necessary for the prevention of fire and for the protection of life and property from fire and panic, the city council establishes a business fire safety self-inspection program assuring that certain "B-2" and "R-1" occupancies within the city are inspected on an annual basis for fire safety.*

Under the self-inspection program, and pursuant to Title 15.29.030 of the code, the owner or manager of the occupancy or person in highest authority in the occupancy shall within 30 days inspect each occupancy, complete the forms mentioned in subsection A of this section, correct all deficiencies, and return the same to the National City fire department. All deficiencies observed shall be reported on the forms and corrected prior to returning the forms to the National City fire department.

Public education is the area where the fire service will make the greatest impact on preventing fires and subsequently reducing the accompanying loss of life, injuries, and property damage through adjusting people's attitudes and behaviors regarding fires and fire safety. The NCFD does not have a comprehensive public fire education program due to the current inspection workload, and the effort it is able to commit is commendable and results in time and resources well spent. A substantial percentage of all fires, fire deaths, and injuries occur in the home, an area where code enforcement and inspection programs have little to no jurisdiction. The NCFD

provides community fire extinguisher training, conducts a juvenile fire setter program, and provides community fire prevention classes when requested.

The investigation of the cause and origin of fires is also an important part of a comprehensive fire prevention system. Determining the cause of fires can help with future prevention efforts. Battalion Chiefs and Captains initiate the fire origin and cause determination process by NCFD policy 402.5. When possible, they can and should make the origin and cause determination. When needed, particularly when the on-scene officers cannot determine the origin and cause of the fire, or they believe a crime has been committed, the Fire Marshal or fire investigator responds to perform an in-depth investigation.

§ § §

SECTION 3. ALL-HAZARDS RISK ASSESSMENT OF THE COMMUNITY

COMMUNITY RISKS

Population and Community Growth

The 2020 U.S. Census determined the population of National City is 56,173. This is a 4 percent decrease from the 2010 population of 58,582. As the city land area is about 7.28-square miles, the population density based on Census population data is 8,050/square mile.[3]

In terms of fire and EMS risk, the age and socio-economic profiles of a population can have an impact on the number of requests for fire and EMS services. Evaluation of the number of seniors and children by fire management zones can provide insight into trends in service delivery and quantitate the probability of future service requests. In a 2021 National Fire Protection Association (NFPA) report on residential fires, the following key findings were identified for the period 2015–2019:[4]

- Males were more likely to be killed or injured in home fires than females and accounted for larger percentages of victims (57 percent of the deaths and 55 percent of the injuries).
- The largest number of deaths (19 percent) in a single age group was among people ages 55 to 65.
- 59 percent of the victims of fatal home fires were between the ages of 39 and 74, and three of every five (62 percent) of the non-fatally injured were between the ages of 25 and 64.
- Slightly over one-third (36 percent) of the fatalities were age 65 or older; only 17 percent of the non-fatally injured were in that age group.
- Children under the age of 15 accounted for 11 percent of the home fire fatalities and 10 percent of the injuries. Children under the age of 5 accounted for 5 percent of the deaths and 4 percent of the injuries.
- Adults of all ages had higher rates of non-fatal fire injuries than children.
- Smoking materials were the leading cause of home fire deaths overall (23 percent) with cooking ranking a close second (20 percent).
- The highest percentage of fire fatalities occurred while the person was asleep or physically disabled and not in the area of fire origin, which are key factors to vulnerable populations.

In National City the following age and socio-economic factors are considered when assessing and determining risk for fire and EMS preparedness and response:[5]

- Children under the age of five represent 5.5 percent of the population.
- Persons under the age of 18 represent 20.6 percent of the population.

3. U.S. Census Bureau Quick Facts, National City, California.
4. M. Ahrens, R. Maheshwari "Home Fire Victims by Age and Gender," Quincy, MA: NFPA, 2021.
5. https://www.census.gov/quickfacts/nationalcityCalifornia

- Persons over the age of 65 represent 13.4 percent of the population.
- Female persons represent 49.5 percent of the population.
- There are 3.33 persons per household in National City.
- The median household income in 2019 dollars is $47,119.
- Persons living in poverty make up 18.3 percent of the population.
- Black or African-American alone represents 4.8 percent of the population. The remaining percentage of population by race includes White alone at 64.6 percent, American Indian or Alaska Native alone at 0.5 percent, Asian alone at 18.5 percent, two or more races at 3.0 percent, and Hispanic or Latino at 63.5 percent.

Estimated build-out in National City is discussed in two ways in the city's 2011 General Plan. The plan first contemplates build-out based on allowable denisities, and if all open land is utilized. As this is unlikely to occur, the 2011 Genaral Plan discusses build-out assumptions by 2030 on vacant or underutilized parcels near sites that are likely to redevelop within the city considering site and other development constraints. These assumptions are:[6]

- 5,091 new dwelling units.
- 20,362 new residents.
- 2.6 million square feet of new retail/office space.
- 3.2 million square feet of new industrial space.[7]

Regardless of the build-out in the city, an increase in population, the type of housing units (multi-family, vertical density etc.) built, and the type of industry and retail space have impacts on call demand and increases building risks as outlined further in this section.

Environmental Factors

The City of National City is prone to and will continue to be exposed to certain environmental hazards that may impact the community. The most common natural hazards prevelant to the city according to the National City Emergency Operations Plan (EOP), and that create environmental risks are:

- **Earthquakes**: National City is in proximity to local faults such as the Rose Canyon Fault and that are potential risks to older structures (structural integrity and collapse causing natural gas leaks, fires, and trapping residents); potential for loss of life, injuries, and damage to property, as well as disruption to infrastructure and services. According to the San Diego County Multi-Jurisdictional Hazard Mitigation Plan, the city has had no repetitive loss from earthquake risks.
- **Dam Failure**: National City is proximity to and downstream from the Sweetwater Dam. Dam inundation to property and infrastructure in and adjacent to the Sweetwater River channels exists. The National City EOP considers the likelihood of dam failure to be low due to the construction features of the dam; however, it still poses an environmental risk. According to the San Diego County Multi-Jurisdictional Hazard Mitigation Plan, the city has had no repetitive loss from dam failure risks.
- **Floods**: According to the National City EOP, significant portions of the City are within FEMA mapped 100-year floodplains, thus posing a risk of flooding. Urban and flash flooding can

6. National City 2011 General Plan.
7. Ibid.

occur during heavy rain events. According to the San Diego County Multi-Jurisdictional Hazard Mitigation Plan, the city has minimal (two) repetitive losses from flood risks.

- **Tsunami**: Coastal land areas on the east and west coasts of the United States are susceptible to tsunami events that create significant coastal flooding. According to the San Diego County Multi-Jurisdictional Hazard Mitigation Plan, the city has had no repetitive loss from Tsunami risks.
- **Extreme Heat**: Increased risk of medical complications from increased temperatures.
- **Drought**: Periods of prolonged drought may limit water supply available to the region.[8] [9]

The following table describes the potential hazard-related exposure and loss from environmental risks in National City, as detailed by the San Diego County Office of Emergency Services for the San Diego County Multi-Jurisdictional Hazard Mitigation Plan.

TABLE 3-1: Environmental Risks: Potential Hazard and Loss in National City

		Residential		Commercial		Critical Facilities	
Hazard Type	Exposed Population	Number of Residential Buildings	Potential Exposure/ Loss for Residential Buildings (x$1,000)	Number of Commercial Buildings	Potential Exposure/ Loss for Commercial Buildings (x$1,000)	Number of Critical Facilities	Potential Exposure for Critical Facilities (x$1,000)
Coastal Storm / Erosion	0	0	0	0	0	0	0
Sea level Rise	1,276	0	0	64	22,534	15	12,787
Dam Failure	7,362	457	128,646	6,649	2,327,069	74	284,717
Earthquake (Annualized Loss - Includes shaking, liquefaction and landslide components)	56,522*	15,776*	4,440,944*	892*	3,997,676*	0*	0*
Flood (Loss)							
100 Year	2,094	152	42,788	750	262,509	17	14,926
500 Year	4,801	915	257,573	3,297	1,153,905	62	63,798
Rain-Induced Landslide							
High Risk	0	0	0	0	0	0	0
Moderate Risk	6	2	563	0	0	1	339
Tsunami	1,306	0	0	5	22,409	5	60,384

Note: *Represents best data available at time of analysis

8. 2020 National City Emergency Operations Plan.
9. 2018 San Diego County Multi-Jurisdictional Hazard Mitigation Plan.

Building and Target Hazards

A community risk and vulnerability assessment will evaluate the community, and regarding buildings, it will review all buildings and the risks associated with each property segregating the property as either a high-, medium-, or low-hazard depending on factors such as the life and building content hazard, and the potential fire flow and staffing required to mitigate an emergency in the specific property. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosives plants, refineries, high-rise buildings, and other high life-hazard (vulnerable population) or large fire-potential occupancies.

Medium-hazard occupancies: Apartments, offices, and mercantile and industrial occupancies not normally requiring extensive rescue by firefighting forces.

Low-hazard occupancies: One-, two-, or three-family dwellings and scattered small business and industrial occupancies.[10]

The predominant building type/building risk in National City is single-family detached dwellings (*low-hazard*). The primary construction type for residential structures is Type V-B, which does not require a fire resistance rating for any of the building elements (typically wood frame).

Multifamily, apartments, and condominiums (vertical density) represent a large percent of the city's housing stock. Typical construction is mixed and includes fire resistive, ordinary, non-fire resistive, wood frame with one-hour fire rating, and protected combustible. Some apartment and condominium complexes include a multibuilding footprint. The city has an assortment of manufactured homes as well (small percentage), which are typically made of light metal/wood construction with various exterior coverings. Of greater risk is the vertical housing that exists in the city, which not only creates much higher occupant density, but also requires greater response resources if a fire breaks out, particularly to manage the life safety component, even in cold smoke conditions.

The strip mall inventory consists of non-fire resistive, fire resistive (one-hour fire rating), and protected combustible construction (one-hour fire rating). The commercial/industrial structure building inventory is ordinary (block/brick) construction, wood frame with composite siding, and masonry non-combustible.

National City has the following building types:

- Single-family homes, 9,507 (highest total building count at 53.9 percent).[11]
- Multifamily units (apartments, condomuniums, some vertical), 7,636 units (43.3 percent).[12]
- Manufactured homes, 416.[13]
- Professional business, single and multi-story.
- Commercial and industrial buildings.

National City has at least 167 commercial buildings of which 56 have ISO fire flows of 2000 gpm or higher and 13 that have fire flows of 3,500 gpm or higher.
Source: 2009 National City Standard of Cover-Citygate Assoc. LLC

10. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: National Fire Protection Association, 2008), 12.
11. Census Reporter, National City, Calif.
12. Ibid.
13. Ibid.

- Strip malls.
- Assisted living/long-term care buildings/homes (multiple facilities and homes in the city).
- Public education structures (elementary, junior, and high school buildings).
- Public government buildings.
- High-rise buildings.

The next figure illustrates the existing land use map for the city, which indicates the type of building risk and its general location, along with two aerial views of the landscape that illustrate further the building types and risk.[14]

FIGURE 3-1: National City Existing Land Use Map

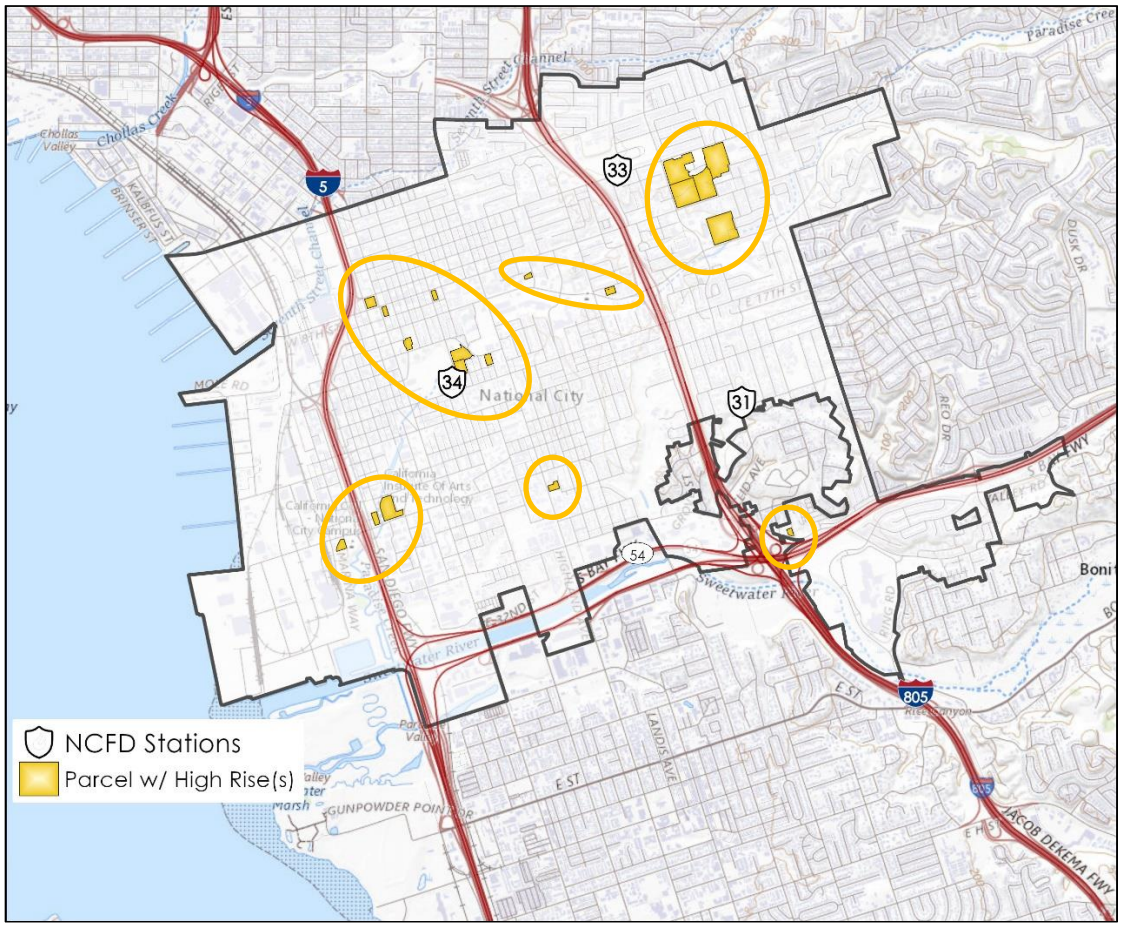
14. National City 2011 General Plan.

In terms of identifying target hazards, consideration must be given to the activities that take place (public assembly, life safety vulnerability, manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped etc.), and other specific aspects related to the construction of the structure. National City has more than 2,700 occupancies that the NCFD considers target hazards such as:

- High-rise target hazards (life safety) of which there are mixed occupancy types and include housing units.
- Hospital/medical center target hazard (Paradise Valley Hospital).
- Educational/school/public assembly target hazard (life safety).
- Mercantile/business/industrial (life safety, hazardous storage and or processes).
- Long-term and assisted care target hazards (life safety, vulnerable population).
- Government business target hazards (life safety, continuity of operations).
- Private business target hazards (life safety).

The following figure illustrates the location of high-rise building risks in the city.

FIGURE 3-2: High-Rise Building Risk Locations



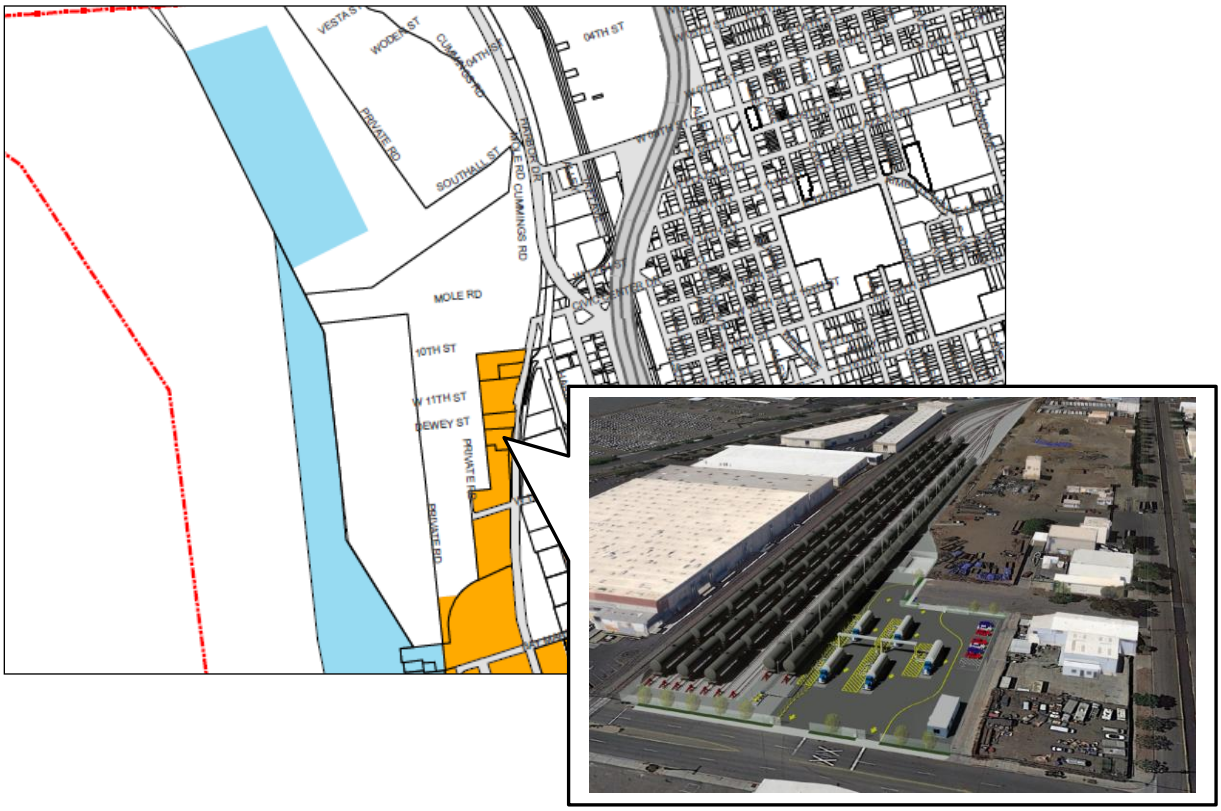
The city has a mix of low- and medium-risk structures that make up the majority of the target hazard risk. High-hazard/high rise building risks are noted in this section as well.

Building risks, associated population, and other factors as discussed include assisted/long-term care facilities, residential structures housing a vulnerable population, hospital/medical center, residential structures more than three stories in height, public assembly structures when occupied, and those mercantile occupancies that have hazardous materials used in processes or that are stored in large quantities.

Future growth calls for vertical density (multifamily/unit) structures to include a 22-story building. The building risk outside of single-family dwellings, particularly those of multi-unit and multi-story residential buildings pose additional firefighting risk in terms of life safety, ability to reach the seat of the fire quickly, and assembling an Effective Response Force needed to mitigate an emergency in structures such as these. Even small fires in these structures create cold smoke issues for multiple units, all requiring some level of mitigation for life safety and smoke removal, or even occupant removal from and by the fire department.

The city also has a potential future risk that is worth noting here. USD Clean Fuels and Plastic Express (USDCF/PEX) are working with the city to locate a biofuels transloading site on the current Pacific Steel property site in the city. This site is situated west of the I-5 corridor in the industrial section of the city and east of the Port of San Diego property (see the next figure). This site will include transloading of biofuels onto rail tank cars and tractor trailer tank trucks. The project is designed with many safety features and will meet state building and fire prevention codes. Fuel transloading, hazardous materials, and transportation risks (rail, rail at-grade crossings, road transportation) discussed herein will be present with this facility.

FIGURE 3-3: USDCF/PEX Biofuels Transloading Project Location

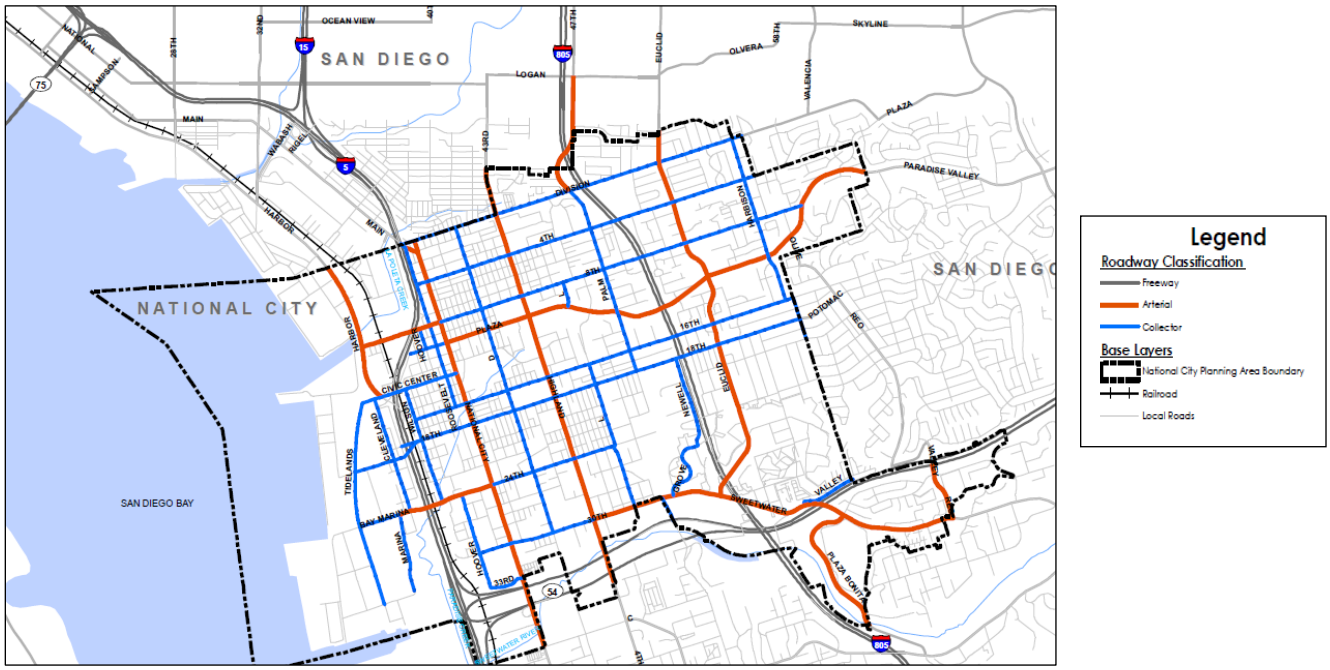


Transportation Factors

The road network in National City is typical of cities in the region. In National City this includes freeways, which are high-speed, high capacity, and of limited access; arterial streets, which carry high volumes of traffic and are typically four lanes with synchronized signals; collector streets, which provide connection to arterial roads and local street networks as well as residential and commercial land uses; and local streets, which provide a direct road network to property and move traffic through neighborhoods and business communities. [15]

At the time of the 2011 General Plan, the city had 110 miles of paved roads, with 15 arterial and 30 collector roads. National City has also designated certain truck routes (primary and alternate) designed to route trucks to and from their likely business destinations and to major freeways. The following figure illustrates the National City transportation road network.

FIGURE 3-4: National City Road Network



The San Diego Metropolitan Transit System (MTS) operates fixed bus routes in the city. There are ten bus routes with 205 individual bus stops. The city also has an MTS trolley line (Blue Line) that runs from San Diego City to the U.S.-Mexico Border. There are two stops in National City. According to the March 2021 *Transportation Elements Draft Report*, National City residents rely more on public transportation such as the MTS bus and trolley systems than other commuters in San Diego County. Bus and trolley accidents during populated rides pose a mass casualty response risk if multiple riders are injured.

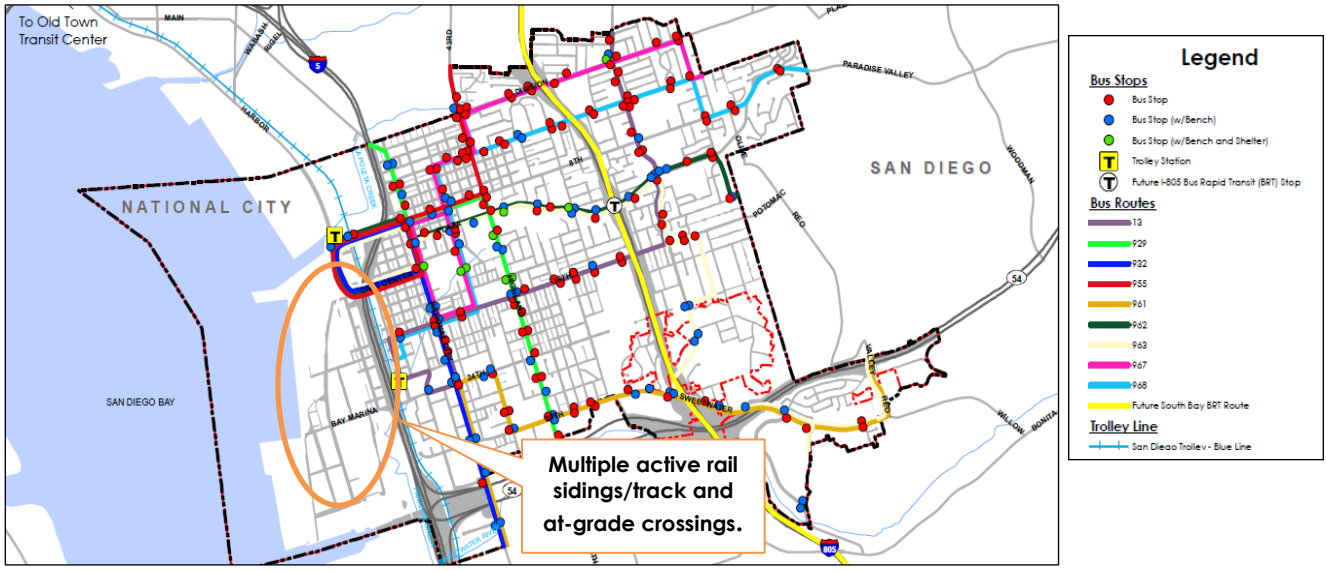
Active railroad lines other than the trolley system are also present in the city. The primary active rail lines are the Burlington Northern Santa Fe (BNSF) and the San Diego and Imperial Valley Railway (SDIV). These rail lines operate on and share track right-of-way with the MTS trolley system. SDIV trains are operated primarily at night along the main line when the trolley service is not operating. This includes to and from the port and to and from other destinations. The primary

15. National City 2011 General Plan.

commodities hauled by the SDIV are petroleum products, agricultural products, and wood pulp. Other commodities transported in and through National City are automobiles and containers originating through the Port of San Diego. While not all these commodities may be considered hazardous materials, fires involving these commodities can produce smoke and other products of combustion risks that may be hazardous to health. Hazardous materials themselves present hazards to health risks if being transported and involved in a rail accident. At-grade crossings exist in the city and pose transportation accident risks.

The next figure illustrates the National City mass transit system.

FIGURE 3-5: National City Mass Transit System



The road and transportation network described herein poses risks for vehicular accidents, some at medium to greater than medium speeds, as well as vehicular-versus-pedestrian risks. There are additional transportation risks since tractor-trailer and other commercial vehicles traverse the roadways of National City to deliver mixed commodities to business locations. Fires involving these products can produce smoke and other products of combustion risks that may be hazardous to health.

Port of San Diego

The Port of San Diego (Port) occupies approximately 7 percent of the city's land area. There are significant risks on the Port property, which include:

- Significant rail traffic on Port property and significant rail traffic not directly on Port property but that serves commercial business on Port property and travels through the city. This rail has multiple at-grade crossings which pose a traffic risk, and rail cars that transport combustibles and other hazards the NCFD will respond to and mitigate.
- The Port property in National City has large footprint buildings that are several thousand square feet in size, and although considered single story have the ceiling height of multistory structures. These buildings have processes and storage that are combustible and hazardous. Larger footprint buildings pose additional building risks to the NCFD in terms of mass storage of commodities and hazardous/combustible materials utilized in work processes, and

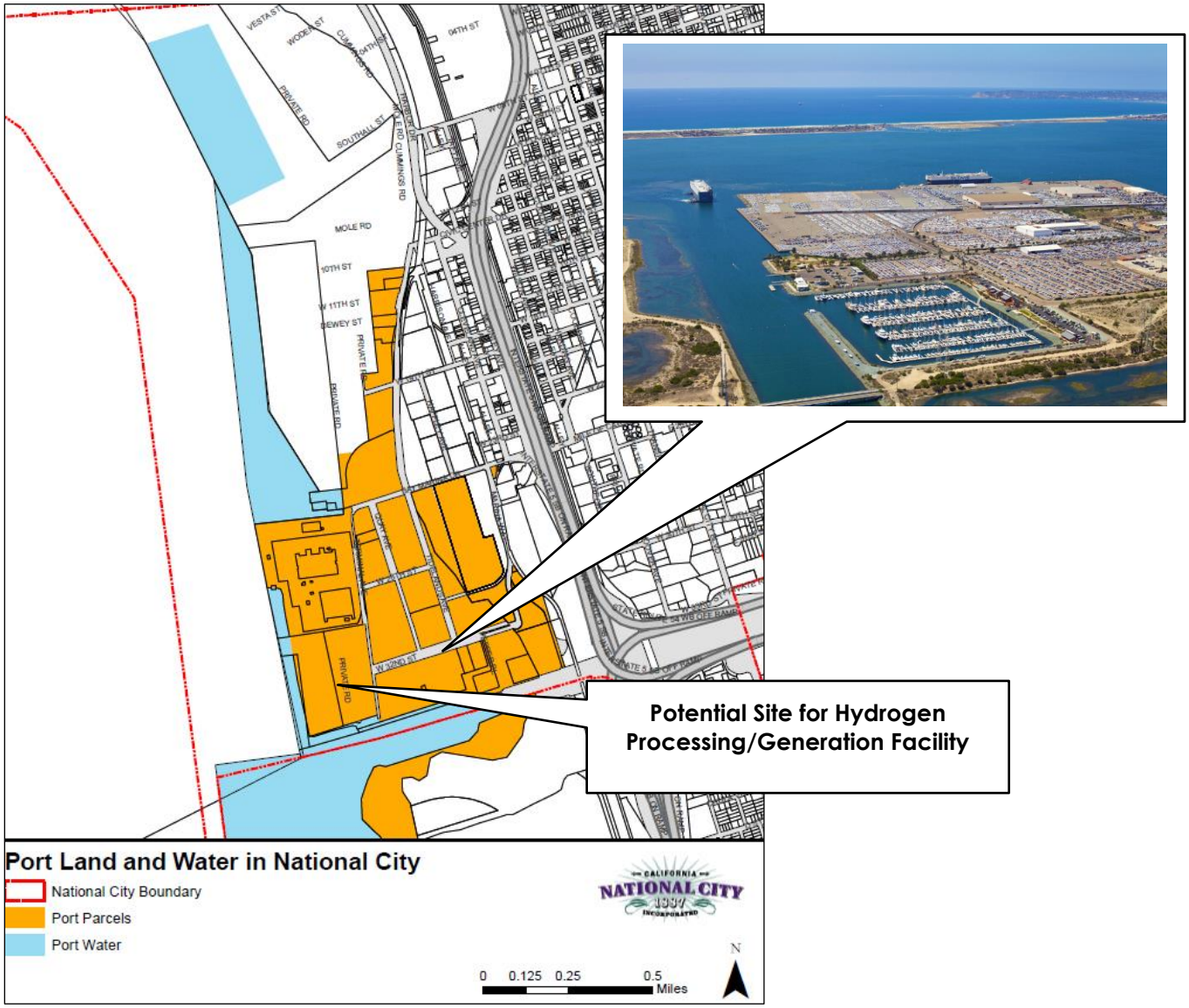
considerable waterflow requirements based on the size of the building footprint, commodities stored, and mercantile processes being conducted.

These buildings are typically built of fire resistive structural members and are sprinklered, but contain internally combustible accessories, materials, storage, processes, and internal structures. While the life-safety hazard normally will not require extensive rescue by firefighting forces (in terms of the number of people on premises at one time to be rescued), the scope and complications of the larger footprint to be covered by initial attack lines and in a search and rescue undertaking raise these types of structures to a high-hazard building risk.

- The Port property has other commercial and mercantile properties, although not large footprint buildings, which pose building and property risk due to the on-site storage (lumber, petroleum products, vehicles, hazardous materials) as well as business processes and storage in the interior of property buildings that are combustible and hazardous. Not all of these buildings have fire protection systems. These buildings are of medium to high risk based on building/property content. These occupancies also support heavy vehicles that move product to and from these properties, posing traffic and hazard risks. Included on Port property is a small retail/restaurant area with significant private vessel docking and boat marina slips.
- Proposed additions to Port property include:
  - Hydrogen Processing Plant south of the Pasha property. If this project is realized, this will be the largest hydrogen processing plant in the nation, according to NCFD staff. Transport of this product will be by marine, rail, and over-the-road vehicles. This facility will be of high/special risk hazard, and all transportation modes will be of high/special risk as well.
  - Hotel(s), restaurants, RV Park. Each of these brings certain building and life-safety risks. Hotels are of a higher risk as they include vertical density. Restaurants are assembly classifications, which raise the life-safety risk when occupied. RV parks, although seemingly a low or no risk hazard, actually are, in that RVs are combustible and when on fire burn rather rapidly because of the interior combustibles. There is also the hazard of on-board fuel (gasoline or diesel fuels, and pressurized gas for cooking). One additional risk is proximity from RV to RV, which creates exposure hazards (when one RV is on fire it typically spreads to another exposed RV).

The next figure illustrates the Port property within National City boundaries.

FIGURE 3-6: Port of San Diego in National City



Fire and Fire-Related Risk

An indication of the community's fire risk is the type and number of fire-related incidents the fire department responds to. CPSM conducted a data analysis for this project that analyzed NCFD incident responses and workload.

The following table details the call types and call type totals for these types of fire-related risks for 2019 and 2020.

TABLE 3-2: Fire Call Types, 2019 and 2020

Call Type	2019		2020	
	Total Calls	Calls per Day	Total Calls	Calls per Day
False alarm	318	0.9	216	0.6
Good intent	56	0.2	81	0.2
Hazard	48	0.1	33	0.1
Outside fire	125	0.3	162	0.4
Public service	121	0.3	139	0.4
Structure fire	31	0.1	29	0.1
Fire Total	**699**	**1.9**	**660**	**1.8**

EMS Risk

As with fire risks, an indication of the community's pre-hospital emergency medical risk is the type and number of EMS calls to which the fire department responds. The following table outlines the call types and call type totals for these types of EMS risks.

TABLE 3-3: EMS Call Types, 2019 and 2020

Call Type	2019		2020	
	Total Calls	Calls per Day	Total Calls	Calls per Day
Breathing difficulty	722	2.0	674	1.8
Cardiac and stroke	779	2.1	740	2.0
Fall and injury	999	2.7	952	2.6
Illness and other	1,344	3.7	1,303	3.6
MVA	407	1.1	349	1.0
Overdose and psychiatric	151	0.4	171	0.5
Seizure and unconsciousness	738	2.0	620	1.7
EMS Total	**5,140**	**14.1**	**4,809**	**13.1**

National City utilizes a private EMS service for EMS transport, which is discussed in a seperate section in this report. Here though, we show the EMS transport demand by the private EMS service, which links to the overall EMS risk factor in National City. The next two tables descibe the EMS ground transport demand in the city for 2019 and 2020.

§ § §

TABLE 3-4: AMR Calls by Call Type, 2019 and 2020

Call Type	Number of Calls		Calls per Day	
	2019	2020	2019	2020
Breathing difficulty	815	758	2.2	2.1
Cardiac and stroke	881	864	2.4	2.4
Fall and injury	1,296	1,229	3.6	3.4
Illness and other	2,453	2,421	6.7	6.6
MVA	677	589	1.9	1.6
Overdose and psychiatric	266	286	0.7	0.8
Seizure and unconsciousness	867	726	2.4	2.0
EMS Total	**7,255**	**6,873**	**19.9**	**18.8**
Fire & FD assist	73	72	0.2	0.2
Total	**7,328**	**6,945**	**20.1**	**19.0**

TABLE 3-5: Transport Calls by Call Type by AMR EMS Service for 2019

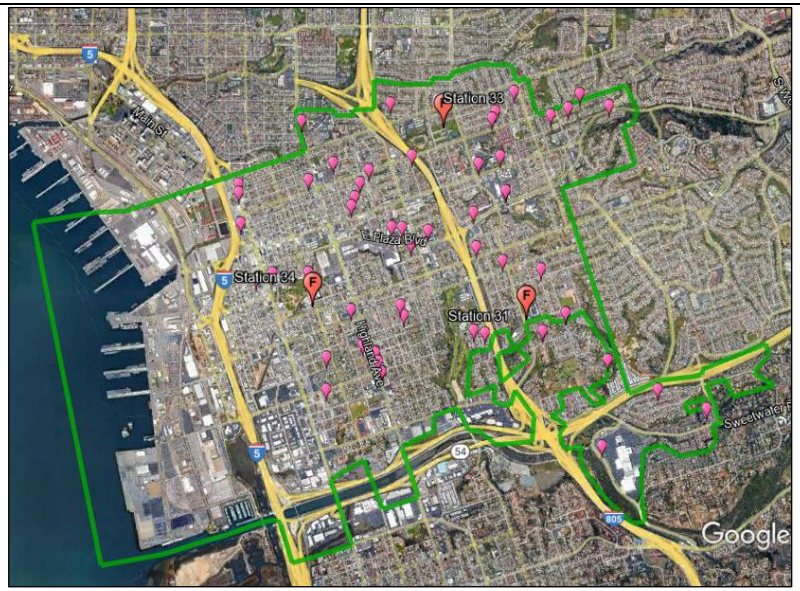
Call Type	Number of Calls			Conversion Rate, Calls to Transports
	Non-transport	Transport	Total	
Breathing difficulty	167	648	815	79.5
Cardiac and stroke	183	698	881	79.2
Fall and injury	458	838	1,296	64.7
Illness and other	846	1,607	2,453	65.5
MVA	422	255	677	37.7
Overdose and psychiatric	116	150	266	56.4
Seizure and unconsciousness	232	635	867	73.2
EMS Transport Total	**2,424**	**4,831**	**7,255**	**66.6**

FIRE AND EMS INCIDENT DEMAND

Analyzing where the fire and EMS incidents occur, and the demand density of fire and EMS incidents, helps to determine adequate fire management zone resource assignment and deployment.

The following figures illustrate fire and EMS demand in the NCFD fire management zone. These include fire incidents (structural and outside fires); other types of fire-related incidents such as good intent and public service calls, which are calls for service such as smoke scares (no fire), wires down, lock outs, water leaks, etc.; false alarms (typically fire alarms); and EMS incident demand that includes all EMS incidents, breathing difficulty and cardiac related, and motor vehicle accidents. All demand maps are the aggregate of 2019 and 2020 responses. Demand maps labeled with "Runs" show demand of multiple NCFD unit response.

FIGURE 3-7: NCFD In-City Fire Incident Demand (Structure and Outside Fires)

Structure Fires	Outside Fires
	

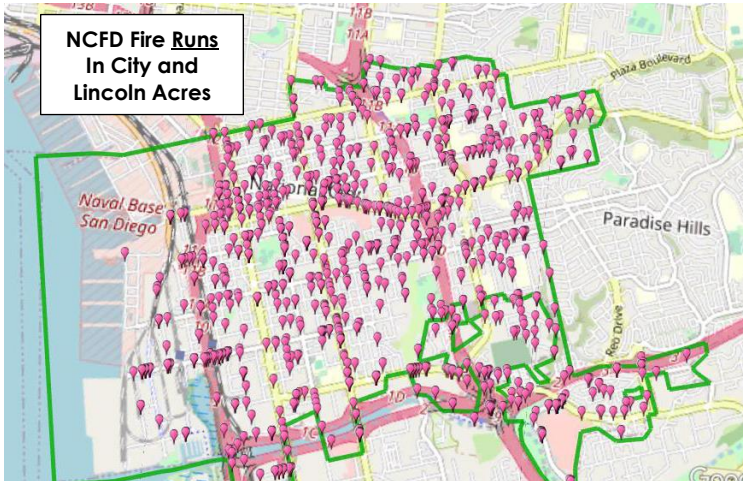


FIGURE 3-8: NCFD In-City False (Fire) Alarms, Good Intent, Hazard, Public Service Call Demand

False Alarms	Good Intent, Hazard, Public Service Calls
	

NCFD Fire Runs In City and Lincoln Acres

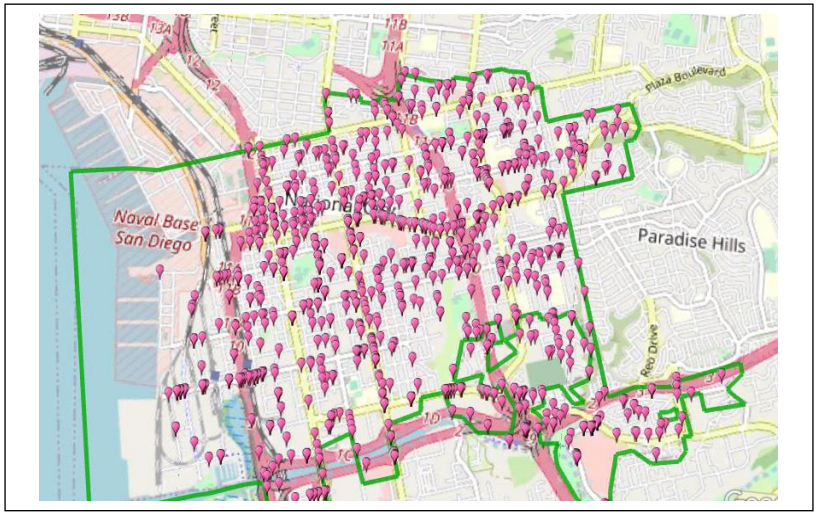
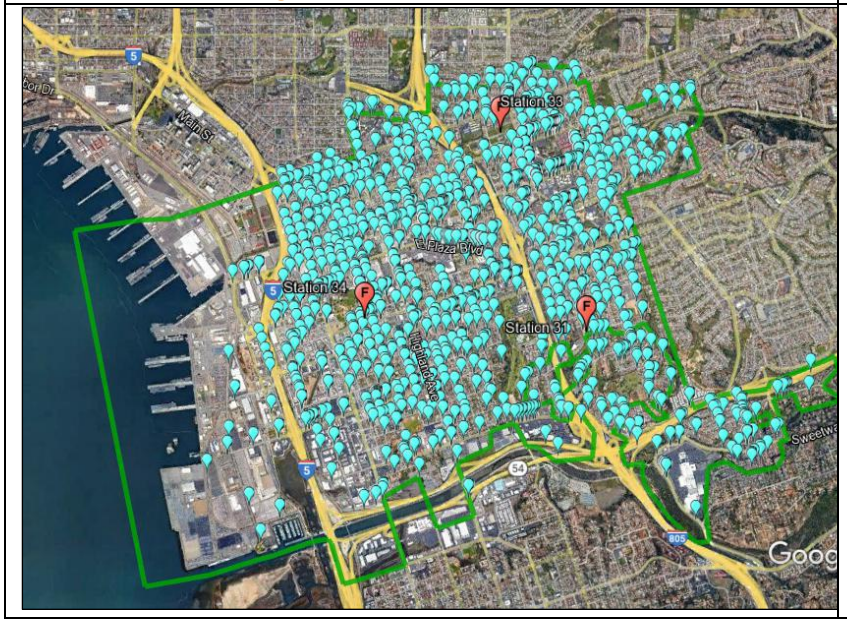


FIGURE 3-9: NCFD In-City EMS High Acuity Demand (Breathing Difficulty, Cardiac and Stroke and MVA)

Breathing Difficulty, Cardiac and Stroke	Motor Vehicle Accident
	

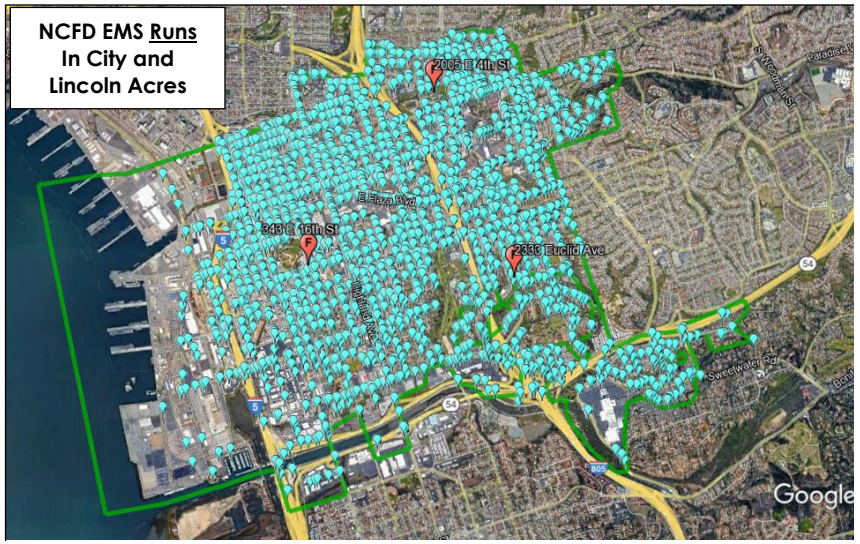
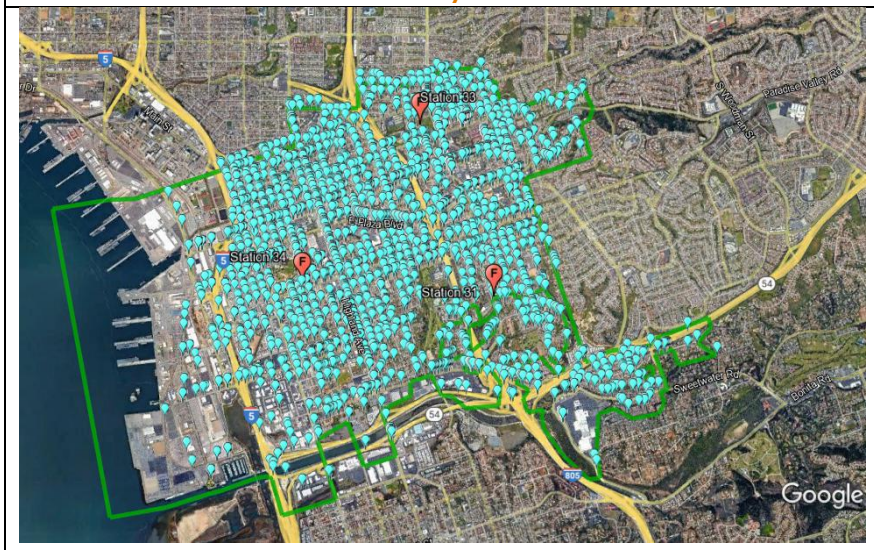
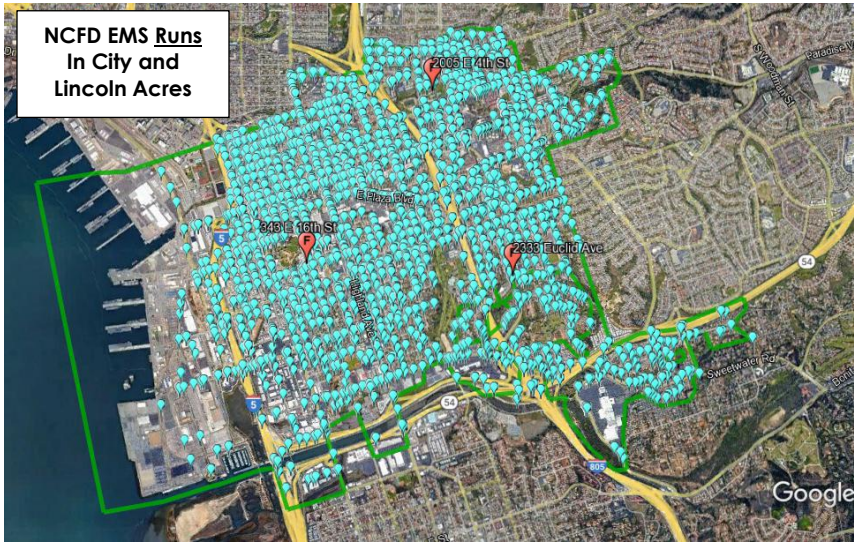


FIGURE 3-10: NCFD In-City EMS Demand and AMR Ground Transport Demand

NCFD Low-Acuity EMS Demand	AMR Ground Transport Demand
	



ISO RATING

The ISO is a national, not-for-profit organization that collects and evaluates information from communities across the United States regarding their capabilities to combat building fires. ISO conducts field evaluations in an effort to rate communities and their relative ability to provide fire protection and mitigate fire risk. This evaluation allows ISO to determine and publish the Public Protection Classification (PPC). The data collected from a community is analyzed and applied to ISO's Fire Suppression Rating Schedule (FSRS) from which a Public Protection Classification (PPC) grade is assigned to a community (1 to 10).

A Class 1 (highest classification/lowest numerical score) represents an exemplary community fire suppression program that includes all of the components outlined below. A Class 10 indicates that the community's fire suppression program does not meet ISO's minimum criteria. It is important to understand the PPC is not just a fire department classification, but a compilation of community services that include the fire department, the emergency communications center, and the community's potable water supply system operator.[16]

The lower score indicates a more favorable rating which potentially translates into lower insurance premiums for the business owner and homeowner. This lower classification makes the community more attractive from an insurance risk perspective. How the PPC for each community affects business and homeowners can be complicated because each insurance underwriter is free to utilize the information as they deem appropriate. Overall, many factors feed into the compilation of an insurance premium, not just the PPC.

A community's PPC grade depends on:

- **Needed Fire Flows** (building locations used to determine the theoretical amount of water necessary for fire suppression purposes).
- **Emergency Communications** (10 percent of the evaluation).
- **Fire Department** (50 percent of the evaluation).
- **Water Supply** (40 percent of the evaluation).

The City of National City has an ISO rating of ***Class 02, the second-highest rating achievable***. This rating became effective in March 2019. The final rating included the following credit by category:

- **Emergency Communications**: 9.14 earned credit points/10.00 credit points available.
- **Fire Department**: 40.90 earned credit points/50.00 credit points available.
- **Water Supply**: 36.85 earned credit points/40.00 credit points available.
- **Community Risk Reduction** (Fire Prevention/Inspection, Public Education, and Fire Investigation activities): 3.31 earned credit points/5.50 credit points available.

Overall, the community PPC rating yielded 88.14 earned credit points out of 105.50 credit points available. There was a 2.06 point diversion reduction assessed as well, which is automatically calculated based on the relative difference between the fire department and water supply scores. **80.00 points or more qualify a community for a rating of 2. National City is on the higher end of this classification.**

16. NCFD ISO PPC report; March 2019.

The following figures illustrate the dispersion of PPC ratings across the United States and in California.

FIGURE 3-11: PPC Ratings in the United States[17]

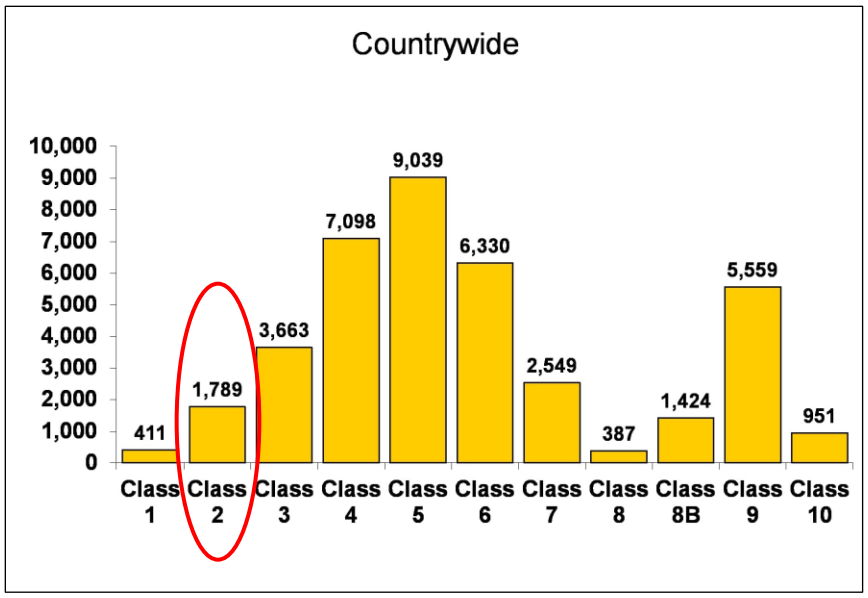
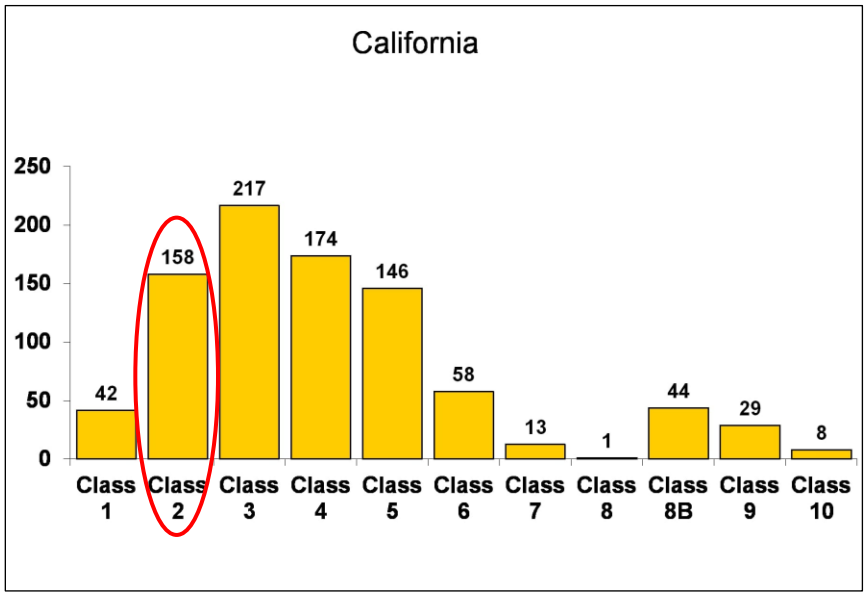


FIGURE 3-12: PPC Ratings in California[18]



Areas of scoring that should be reviewed further internally by the city and the NCFD, and which can have the most impact on individual areas evaluated and scored and that subsequently affect total section scoring include:

17. https://www.isomitigation.com/ppc/program-works/facts-and-figures-about-ppc-codes-around-the-country/
18. Ibid.

- Training: #581(H) Pre-Fire Planning Inspections (0.35/12 credits)
  - For maximum credit, pre-fire planning inspections of each commercial, industrial, institutional, and other similar type building (all buildings except one- to four-family dwellings) should be made annually by company members. Pre-fire planning inspections are company level walk-throughs of commercial, industrial, institutional, hotels/motels, and larger footprint buildings to become familiar with floor plans, hose connections, means of egress, concentrations of population, hazardous materials storage, and the like. Typically fire departments have templates they fill in while conducting these pre-fire plan inspections that include pertinent owner/occupant information, sketched floor plans, hydrant locations, fire department connections, elevator locations, hazardous storage, or process locations in the building etc. Another purpose of a pre-fire plan is its use when an actual incident is occurring at the target hazard site or building. In this case the incident commander has at his/her disposal vital information that he/she can reference when making incident decisions. A record of inspections is important as well to gain appropriate credits.
- Water Supply: #630, #631 Credit for Inspection and Flow Testing (1.60/7.00 credits).
  - This item contemplates fire hydrant inspection and testing frequency in the city, and the completeness of the inspections, to include documentation. This score indicates the hydrants have not been inspected or flow tested on a regular basis.
- Community Risk Reduction: #1025 Credit for Fire Prevention Code Adoption and Enforcement.
  - Evaluation of Fire Prevention Staffing (3.23/8.0 credits).
- Community Risk Reduction: #1044 Credit for Fire Investigation Programs (7.40/20.0 credits).

Recommendation:

- CPSM recommends the NCFD review and address, to the extent possible, deficiencies in the current ISO Public Protection Classification report (Fire Department Section) as outlined in this analysis. This includes, and given the identified building risks in the city, ensuring company personnel conduct (and document for future ISO reviews) some level of commercial, industrial, institutional, and other similar type buildings (all buildings except one- to four-family dwellings) familiarization and pre-plan information gathering; work with Sweetwater Authority to ensure the fire hydrants are inspected and flow-tested on a more regular basis; address Community Risk Reduction staffing and make adjustments to staffing to ensure current (and future) inspectable properties (2,700 total current) are receiving annualized (where required) inspections, and those not requiring annualized inspections receive timely inspections in accordance with applicable laws and standards, and as established by the Fire Marshal. Addressing the Community Risk Reduction deficiency will require additional staffing, to the extent possible with available funding, which has an estimated cost of $87,500 to $117,000 per Community Risk Reduction inspector, dependent on placement in the pay range. (Recommendation No. 5.)

COMMUNITY LOSS AND SAVE INFORMATION

Fire loss is an estimation of the total loss from a fire to the structure and contents in terms of replacement. Fire loss includes contents damaged by fire, smoke, water, and overhaul. Fire loss does not include indirect loss, such as business interruption.

In a 2021 report published by the National Fire Protection Association on trends and patterns of U.S. fire losses, it was determined that home fires still cause the majority of all civilian fire deaths, civilian injuries, and property loss due to fire. Key findings from this report include:[19]

- Public fire departments responded to 1,338,500 fires in 2020, a 7.5-percent increase from the previous year.
- 490,500 fires occurred in structures (37 percent). Of these fires, 379,500 occurred is residential structures and 86,000 occurred in apartments or multifamily structures.
- 2,230 civilian fire deaths occurred in residential fires, and 350 deaths occurred in apartments or multifamily structures.
- Home fires were responsible for 11,500 civilian injuries.
- An estimated $21.9 billion in direct property damage occurred as a result of fire in 2020 (includes fires in the California Wildland Urban Interface and a large loss naval ship fire in California).

The next table describes National City fire loss in terms of dollars for the years indicated.

TABLE 3-6: Content and Property Loss, Structure and Outside Fires, 2016–2020

2016	2017	2018	2019	2020
$870,370	$963,900	$440,050	$1,406,300[20]	$522,760

AUTOMATIC-MUTUAL AID

The NCFD primarily receives and provides fire services automatic aid with:

- San Diego City Fire Department.
- Bonita-Sunnyside Fire Protection District.
- Chula Vista City Fire Department.

The primary purpose of automatic aid is the response of primary units to multi-company response incidents regardless of jurisdiction, where another jurisdiction may be closer by location, and to supplement an intial alarm assignment, particularly to multi-unit responses, to ensure an Effective Reponse Force is assmbled to mitigate the incident.

The next table illustrates the response metrics for certain fire structural fire responses in the metro San Diego region. The NCFD staffs two engines, one truck, and one quick response squad. By the metrics in the next table, it can be seen that the NCFD relies heavily on automatic aid from surrounding fire departments.

19. Fire Loss in the United States During 2020, National Fire Protection Association.
20. Includes fire loss of $1,077,500 in category 14b. Fires in Other Vehicles (planes, trains, ships, construction, or farm vehicles, etc.).

TABLE 3-7: San Diego Metro Zone Response Plan Matrix

STRUCTURE RESIDENTIAL

1ST ALARM						2ND ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
4 E	4 E	4 E	4 E	4 E	4 E	4 E	E 4	4 E	E 4	4 E	4 E
1 T	1 T	1 T	1 T	1 T	1 T	1 T	1 T	1 T	2T	2 T	1 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2BC	2 BC	2 BC
1 ALS	1 ALS	1 ALS	1 ALS	USAR53	1 ALS	1 R	1 ALS		1R	CVEMS1	
				1 ALS*			1 R		MC1		
				*Workng Fire			MC1				
							LA1				
							SC1				
							MAST				

3RD ALARM						4TH ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
4 E	E 4	4 E	4 E	4 E	4 E	4 E	E 4	4 E	4 E	4 E	4 E
1 T	1 T	1 T	1T	2 T	1 T	1 T	1 T	1 T	1 T	2 T	1 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	1 BC	2 BC	2 BC
	1 ALS		COM1				1 ALS				
	COM1						COM1				

STRUCTURE COMMERCIAL

1ST ALARM						2ND ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
4 E	E 4	4 E	4 E	4 E	4 E	4 E	E 4	4 E	4 E	4 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	1 BC	2 BC	2 BC
1 ALS	1 ALS	1 ALS	1 ALS	USAR53	1 ALS	1 R	1 ALS	1 ALS	1 R	1 ALS	
				1 ALS*		1 ALS	1 R		1 ALS	CVEMS1	
				*Workng Fire			1 LA		COM1		
							1 FM				
							MAST				
							CPTR				
							MC1				
							SC1				

3RD ALARM						4TH ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
4 E	E 4	4 E	4 E	4 E	4 E	4 E	E 4	4 E	4 E	4 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	1 BC	1 BC	2 BC	2 BC
	1 ALS						1 ALS		CPTR1		

STRUCTURE HIRISE

1ST ALARM						2ND ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
5 E	5 E	5 E	5 E	5 E	4 E	5 E	5 E	5 E	4 E	5 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC
1 R	1 R		1 R	USAR53	1 ALS	1 R	1 R		1 LA	1 R	
1 ALS	1 ALS		1 ALS	T53		1ALS	1 ALS		COM1	1 ALS	
				1 ALS*			E26/E9		MC1	CVEMS1	
				*Workng Fire			CPTR				
							COM1				
							MC1				
							1 LA				
							SC1				
							MAST				

3RD ALARM						4TH ALARM					
NAT	SND	IMP	POW	CHV	CRD	NAT	SND	IMP	POW	CHV	CRD
5 E	5 E	5 E	4 E	5 E	4 E	5 E	5 E	5 E	4 E	5 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T	2 T2	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC	2 BC
	1 ALS						1 ALS				

The next table depicts the aid NCFD received from neighboring departments where the unit actually arrived on scene in National City.

TABLE 3-8: Aid Received Actual Arrivals by Agency, First Due Area, 2019 and 2020

Agency	2019			2020		
	First Due Area		Total	First Due Area		Total
	31	34		31	34	
Bonita FD	75	0	**75**	61	1	**62**
Coronado FD	0	1	**1**	0	0	**0**
Chula Vista FD	95	131	**226**	121	159	**280**
Lemon Grove FD	0	0	**0**	0	1	**1**
San Diego FD	326	207	**533**	372	257	**629**
Total	**496**	**339**	**835**	**554**	**418**	**972**

The next three tables detail the responses that National City provided to areas outside of the municipal boundaries in 2019 and 2020.

TABLE 3-9: Aid Given Workload, Actual Arrival by NCFD, 2019 and 2020

District	2019			2020		
	Calls	Runs	Hours	Calls	Runs	Hours
San Diego City	1,323	1,495	494.5	1,328	1,525	541.6
Chula Vista	699	864	225.1	653	813	224.8
San Diego County	101	105	56.8	77	83	45.1
Imperial Beach	21	21	4.5	21	25	5.8
Coronado	7	9	4.4	10	13	5.6
Lemon Grove	3	3	0.5			
Fresno County *				1	3	752.9
Total	**2,154**	**2,497**	**785.7**	**2,090**	**2,462**	**1,575.7**

One area of particular interest is Lincoln Acres. While not officially part of National City, it is an unincorporated area of San Diego County that is entirely enclosed within National City's boundaries, and to which the NCFD provides initial response. Lincoln Acres has been included in all prior workload tables for NCFD. The next table calls out specifically the NCFD workload in Lincoln Acres.

TABLE 3-10: Calls and Workload in Lincoln Acres by Call Type, 2019 and 2020

Call Type	2019			2020		
	Calls	Hours	Runs	Calls	Hours	Runs
Breathing difficulty	16	20.7	34	16	23.7	35
Cardiac and stroke	19	30.7	46	21	27.7	48
Fall and injury	16	23.9	35	15	24.4	34
Illness and other	23	31.4	54	31	42.6	67
MVA	23	30.4	74	31	30.4	93
OD	2	2.0	4	6	6.6	13
Seizure and UNC	14	19.7	29	15	23.2	31
EMS Total	**113**	**158.8**	**276**	**135**	**178.6**	**321**
False alarm	5	1.8	9	5	7.0	15
Good intent	3	2.6	5	6	5.1	24
Hazard	1	0.1	1	4	2.3	10
Outside fire	5	5.6	20	7	12.5	20
Public service	5	1.6	6	3	0.9	3
Structure fire	4	42.0	36	0	0.0	0
Fire Total	**23**	**53.8**	**77**	**25**	**27.7**	**72**
Canceled	28	23.7	77	41	34.9	100
Total	**164**	**236.2**	**430**	**201**	**241.2**	**493**

Another area of particular interest is Paradise Hills, an urban neighborhood in the southeast portion of the City of San Diego, and to which the NCFD provides automatic aid on a regular basis. The next table shows the workload of the NCFD into Paradise Hills.

TABLE 3-11: Calls and Workload in Paradise Hills by Call Type. 2019 and 2020

Call Type	2019			2020		
	Calls	Hours	Runs	Calls	Hours	Runs
Breathing difficulty	95	31.3	95	110	45.1	111
Cardiac and stroke	116	46.2	116	107	48.2	108
Fall and injury	91	31.6	94	99	36.2	102
Illness and other	120	47.6	128	127	48.2	128
MVA	17	8.3	20	23	7.5	28
OD	7	2.2	7	14	5.9	14
Seizure and UNC	93	39.9	94	73	28.8	73
EMS Total	**539**	**207.3**	**554**	**553**	**219.9**	**564**
False alarm	19	7.1	19	21	5.9	26
Good intent	2	0.4	2	7	1.4	7
Hazard	3	1.7	6	4	19.3	9
Outside fire	6	3.2	6	6	2.6	9
Public service	9	2.6	9	7	2.8	7
Structure fire	12	7.5	18	13	6.8	20
Fire Total	**51**	**22.5**	**60**	**58**	**38.8**	**78**
Canceled	73	12.3	99	93	19.1	129
Total	**663**	**242.0**	**713**	**704**	**277.9**	**771**

Key takeaways from the auto/mutual aid response data tells us:

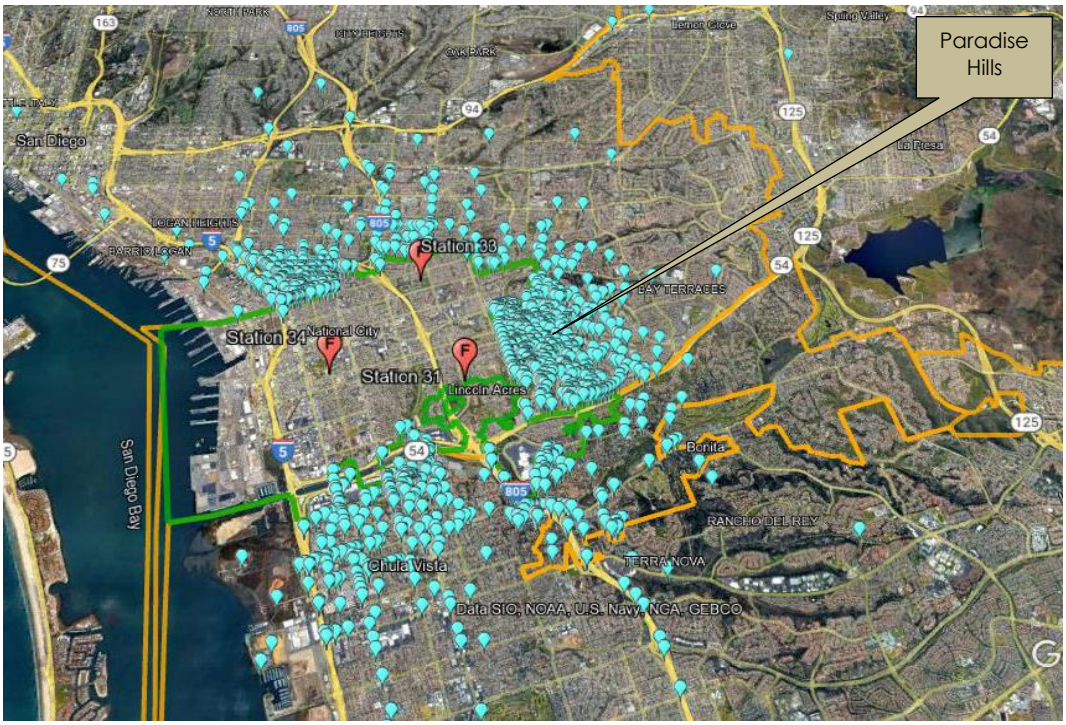
- The NCFD receives the largest number of auto/mutual aid responses from the City of San Diego, and provides the greatest amount of response aid to San Digo by a greater than a 2 to 1 ratio. ***The NCFD serves as the de facto fire department for Paradise Hills in San Diego.***
- The NCFD also provides response aid to Chula Vista at a greater than 2 to 1 ratio.

The importance of auto/mutual aid cannot be stressed enough, particularly for small fire departments that have the population density, building, and hazard risks such as that in National City, and which do not have the ability to assemble an Effective Response Force with on-duty equipment and staffing. However, where the NCFD is the de facto fire department for San Diego City for the Paradise Hills district, this goes beyond the concept of automatic/mutual aid.

The next figure shows the demand areas for auto/mutual aid provided by the NCFD as described in the tables above.

FIGURE 3-13: NCFD Structure and Outside Fire Auto/Mutual Aid Demand Map (Out of City)

FIGURE 3-14: NCFD EMS Auto/Mutual Aid Demand Map (Out of City)



RESILIENCY

Resiliency as defined by the Center for Public Safety Excellence (CPSE) in the Fire and Emergency Service Self-Assessment Manual (FESSAM), Ninth Edition, is: "An organization's ability to quickly recover from an incident or events, or to adjust easily to changing needs or requirements." Greater resiliency can be achieved by constant review and analysis of the response system and focuses on three key components:

- Resistance: The ability to deploy only resources necessary to control an incident and bring it to termination safely and effectively.
- Absorption: The ability of the agency to quickly add or duplicate resources necessary to maintain service levels during heavy call volume or incidents of high resource demand.
- Restoration: The agency's ability to quickly return to a state of normalcy.

Resistance is controlled by the NCFD through staffing and response protocol, and with NCFD resources dependent on the level of staffing and units available at the time of the alarm.

Absorption is accomplished through availability to respond by NCFD units and through regional auto aid resources. This is aided through the computer-aided dispatch at the regional fire dispatch center.

Restoration is managed by NCFD unit availability as simultaneous calls occur, the availability of regional auto aid resources, recall of staff to staff fire units during campaign events when warranted, and backfilling NCFD stations when needed through the computer-aided dispatch at the regional fire dispatch center.

The following tables and figure analyze NCFD resiliency. In this analysis, CPSM included all 9,298 calls that occurred inside and outside National City in the data analysis study period. We did this because NCFD is part of a regional auto/mutual aid system, so responses outside of the city impact resiliency of the department to respond to calls inside of the city.

TABLE 3-12: Call Workload by NCFD Units, 2019 and 2020

Station	Unit	Unit Type	2019		2020	
			Hours	Runs	Hours	Runs
31	NCE31	Engine	915.3	3,031 8.3/day	916.6	2,989 8.2/day
	NCE231	Engine	0.6	3		
	Total		**915.9**	**3,034**	**916.6**	**2,989**
33	NCSQ33	Squad	742.2	2,201 6.0/day	696.3	2,098 5.7/day
34	B57	Battalion	145.2	462	182.8	460
	NCE34	Engine	1,011.5	3,495 9.6/day	1,711.0	3,152 8.6/day
	NCE234	Engine	10.8	1	113.3	368
	NCT34	Truck	280.0	1,046 2.9/day	275.9	935 2.6/day
	Total		**1,447.5**	**5,004**	**2,282.9**	**4,915**
Total			**3,105.6**	**10,239**	**3,895.8**	**10,002**

FIGURE 3-15: Calls by Hour of Day

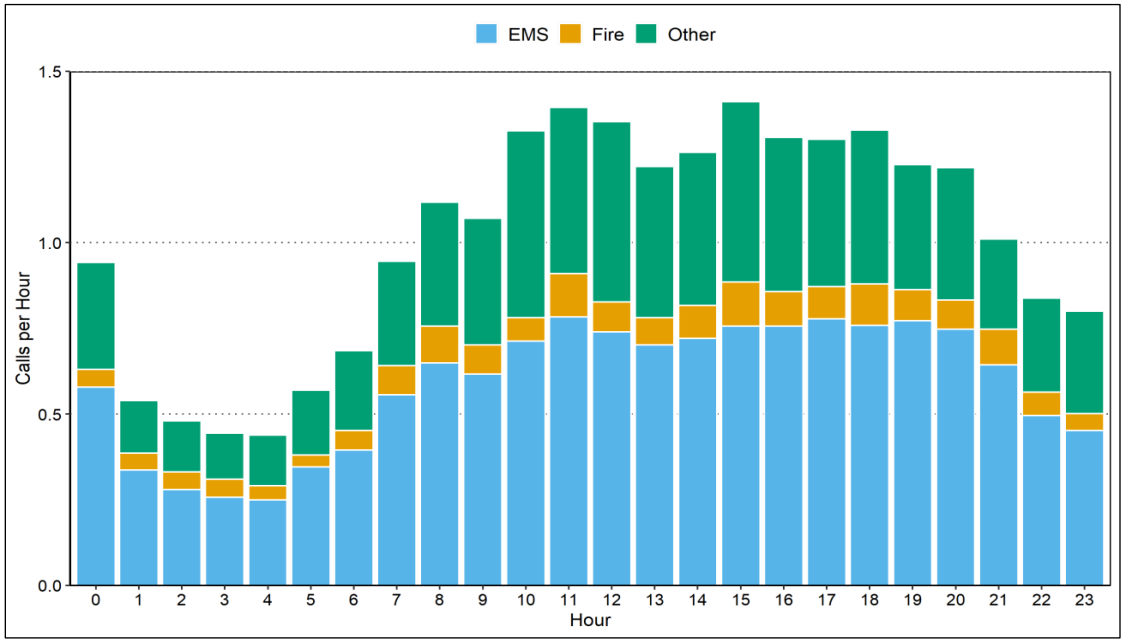


TABLE 3-13: Trend of Frequency of Overlapping Calls

Station	Scenario	Number of Calls	Percent of All Calls	Total Hours
31	No overlapped call	2,862	87.1	995.8
	Overlapped with one call	380	11.6	65.9
	Overlapped with two calls	41	1.2	4.8
	Overlapped with three calls	3	0.1	0.5
34	No overlapped call	3,289	85.3	1,048.1
	Overlapped with one call	505	13.1	87.6
	Overlapped with two calls	55	1.4	7.6
	Overlapped with three calls	7	0.2	0.6
	Overlapped with four calls	2	0.1	0.0
Outside	No overlapped call	1,968	91.4	631.1
	Overlapped with one call	173	8.0	34.3
	Overlapped with two calls	13	0.6	1.3

TABLE 3-14: Station Availability to Respond to Calls

Station	Calls in Area	First Due Responded	First Due Arrived	First Due First	Percent Responded	Percent Arrived	Percent First
31	3,063	1,430	1,347	1,270	46.7	44.0	41.5
34	3,508	2,700	2,639	2,588	77.0	75.2	73.8
Total	6,571	4,130	3,986	3,858	62.9	60.7	58.7

TABLE 3-15: Trend of Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	3,297	37.6
1	2,938	33.5
2	1,641	18.7
3	582	6.6
4	217	2.5
5	62	0.7
6+	23	0.3
Total	**8,760**	**100.0**

Regarding the NCFD's resiliency to respond to calls, analysis of these tables and figure tells us:

- The peak call time is consistently between 10:00 a.m. and 8:00 p.m.
- E34 has the highest workload in terms of runs for 2019 and 2020 followed closely by E31.
- Overall, in 2019, all four first response units aggregately averaged 27 runs per day. In 2020, all four first response units averaged 25 runs per day.
- 13 percent of the time the E31 fire management zone has an overlapped call. The greatest percentage of the time the zone is overlapped with one call.
- 15 percent of the time the E34 fire management zone has an overlapped call. The greatest percentage of the time the zone is overlapped with one call.
  - 9 percent of the time when a NCFD unit is on an auto/mutual aid run, their district is overlapped with a call. The greatest percentage of the time the zone is overlapped with one call.
  - Aggregately, 28 percent of the time the E31 and E34 fire management zones have an overlapped call. The greatest percentage of the time the zones are overlapped with one call.
- 62 percent of the time one to six-plus calls occur in an hour. The greatest percent of the time (33.5 percent) one call occurs in an hour and the second gretaest percent of the time (18.7 percent) two calls occur in an hour.
- E31 as a single apparatus station and due to the demand in this fire management zone arrived on scene in its first due district only 41.5 percent of the time. The E34 fire management zone was markedly better (73.8 percent). This is because two units (E34, T34) are available to respond out of this station.

The NCFD does have resilliency issues as detailed above. Specifically the workload of the engine companies, aggregate percent of the time each fire management zone has an overlapped call, ability to arrive first in their specific fire management zone due to being out of position due to a previous call or on another call, and that over 50 percent of the day one or two calls occur in an hour that are either single appratus or multiple appratus responses.

One resiliency element the NCFD has built in is the implementation of Squad 33. This unit primarily responds to EMS and lower acuity fire calls for service, which account for a sizable percentage of calls to which the NCFD responds in the city. In 2019, Squad 33 responded to 2,201 runs (21 percent of the NCFD total) and in 2020 this unit responded to 2,098 runs (21 percent of the NCFD total). The greatest percentage of runs Squad 33 made were EMS in each year. Squad 33 did

respond to fire incidents as well, when available, as added staffing to assist in the assembling of an Effective Response Force.

Deploying a unit such as this for specific calls and to augment the assembling of an Effective Response Force for building fires when the unit is available, ***is a best practice.***

When implementing this type of unit, which is designed to reduce workload on engine and ladder companies, it is important to measure its efficiency as a single responding company. CPSM analyzed this in the following table. The NCFD Squad program is extremely efficient! In 2019 the Squad arrived with an Engine (dual response) only 8 percent of the time. In 2020 the dual response/arrival occurred on 10 percent of the calls the Squad responded to.

The next table describes the workload for Squad 33 in 2019 and 2020.

TABLE 3-16: Squad 33 Workload in 2019 and 2020

Run Type	2019			2020		
	Dispatched	Arrived	Arrived with Engine	Dispatched	Arrived	Arrived with Engine
Breathing difficulty	273	269	0	278	273	3
Cardiac and stroke	285	279	31	293	283	41
Fall and injury	412	406	2	380	367	6
Illness and other	433	420	10	386	362	8
MVA	86	73	25	66	59	26
OD	47	41	0	55	52	1
Seizure and UNC	237	232	5	215	213	9
EMS Total	**1,773**	**1,720**	**73**	**1,673**	**1,609**	**94**
False alarm	76	66	29	65	56	27
Good intent	12	10	2	20	16	9
Hazard	13	10	5	10	8	4
Outside fire	29	27	18	28	21	11
Public service	37	34	3	33	27	10
Structure fire	23	22	20	23	20	20
Fire Total	**190**	**169**	**77**	**179**	**148**	**81**
Canceled	229	111	9	237	90	12
Aid given	9	5	1	9	2	0
Total	**2,201**	**2,005**	**160**	**2,098**	**1,849**	**187**

Recommendation:

- CPSM recommends the NCFD continue with the Squad program as designed, due to the efficiencies and effectiveness this unit has produced for the city. CPSM further recommends the NCFD monitor dual responses (Squad/Engine) and make any necessary adjustments to maintain a 10 percent ratio. (Recommendation No. 6.)

RISK CATEGORIZATION

A comprehensive risk assessment is a critical aspect of creating standards of cover and can assist the NCFD in quantifying the risks that it faces. Once those risks are known, the department is better equipped to determine if the current response resources are sufficiently staffed, equipped, trained, and positioned.

In this component, the factors that drive the service needs are examined and then link directly to discussions regarding the assembling of an effective response force (ERF) and when contemplating the response capabilities needed to adequately address the existing risks, which encompasses the component of critical tasking.

The risks that the department faces can be natural or manufactured and may be affected by the changing demographics of the community served. With the information available from the CPSM data analysis, the NCFD, the city, and public research, CPSM and the NCFD can begin an analysis of the city's risks and can begin working towards recommendations and strategies to mitigate and minimize their effects. This section contains an analysis of the various risks considered within the NCFD's service area.

Risk is often categorized in three ways: consequence of the event on the community, the probability the event will occur in the community, and the impact on the fire department. The following three tables look at the probability of the event occurring (Table 3-16) which ranges from unlikely to frequent; consequence to the community (Table 3-17), which is categorized as ranging from insignificant to catastrophic; and the impact to the organization (Table 3-18), which ranges from insignificant to catastrophic.

TABLE 3-17: Event Probability

Probability	Chance of Occurrence	Description	Risk Score
Unlikely	2%-25%	Event may occur only in exceptional circumstances.	**2**
Possible	26%-50%	Event could occur at some time and/or no recorded incidents. Little opportunity, reason, or means to occur.	**4**
Probable	51%-75%	Event should occur at some time and/or few, infrequent, random recorded incidents, or little anecdotal evidence. Some opportunity, reason, or means to occur; may occur.	**6**
Highly Probable	76%-90%	Event will probably occur and/or regular recorded incidents and strong anecdotal evidence. Considerable opportunity, means, reason to occur.	**8**
Frequent	90%-100%	Event is expected to occur. High level of recorded incidents and/or very strong anecdotal evidence.	**10**

TABLE 3-18: Consequence to Community Matrix

Impact	Consequence Categories	Description	Risk Score
Insignificant	Life Safety	■ 1 or 2 people affected, minor injuries, minor property damage, and no environmental impact.	**2**
Minor	Life Safety Economic and Infrastructure Environmental	■ Small number of people affected, no fatalities, and small number of minor injuries with first aid treatment. Minor displacement of people for <6 hours and minor personal support required. ■ Minor localized disruption to community services or infrastructure for <6 hours. Minor impact on environment with no lasting effects.	**4**
Moderate	Life Safety Economic and Infrastructure Environmental	■ Limited number of people affected (11 to 25), no fatalities, but some hospitalization and medical treatment required. Localized displacement of small number of people for 6 to 24 hours. Personal support satisfied through local arrangements. Localized damage is rectified by routine arrangements. ■ Normal community functioning with some inconvenience. Some impact on environment with short-term effects or small impact on environment with long-term effects.	**6**
Significant	Life Safety Economic and Infrastructure Environmental	■ Significant number of people (>25) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization. ■ Large number of people displaced for 6 to 24 hours or possibly beyond. External resources required for personal support. Significant damage that requires external resources. Community only partially functioning, some services unavailable. Significant impact on environment with medium- to long-term effects.	**8**
Catastrophic	Life Safety Economic and Infrastructure Environmental	■ Very large number of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization; serious injuries with long-term effects. General and wide-spread displacement for prolonged duration; extensive personal support required. Extensive damage to properties in affected area requiring major demolition. ■ Serious damage to infrastructure. Significant disruption to, or loss of, key services for prolonged period. ■ Community unable to function without significant support. ■ Significant long-term impact on environment and/or permanent damage.	**10**

TABLE 3-19: Impact on NCFD

Impact	Impact Categories	Description	Risk Score
Insignificant	Personnel and Resources	One apparatus out of service for period not to exceed one hour.	**2**
Minor	Personnel and Resources	More than one but not more than two apparatus out of service for a period not to exceed one hour.	**4**
Moderate	Personnel and Resources	More than 50 percent of available resources committed to incident for over 30 minutes.	**6**
Significant	Personnel and Resources	More than 75 percent of available resources committed to an incident for over 30 minutes.	**8**
Catastrophic	Personnel, Resources, and Facilities	More than 90 percent of available resources committed to incident for more than two hours or event which limits the ability of resources to respond.	**10**

This section also contains an analysis of the various risks considered in the city. In this analysis, information presented and reviewed in this section (All-Hazards Risk Assessment of the Community) have been considered. Risk is categorized as Low, Moderate, High, or Special.

Prior risk analysis has only attempted to evaluate two factors of risk: probability and consequence. Contemporary risk analysis considers the impact of each risk to the organization, thus creating a three-axis approach to evaluating risk as depicted in the following figure. A contemporary risk analysis now includes probability, consequences to the community, and impact on the organization, in this case the NCFD.

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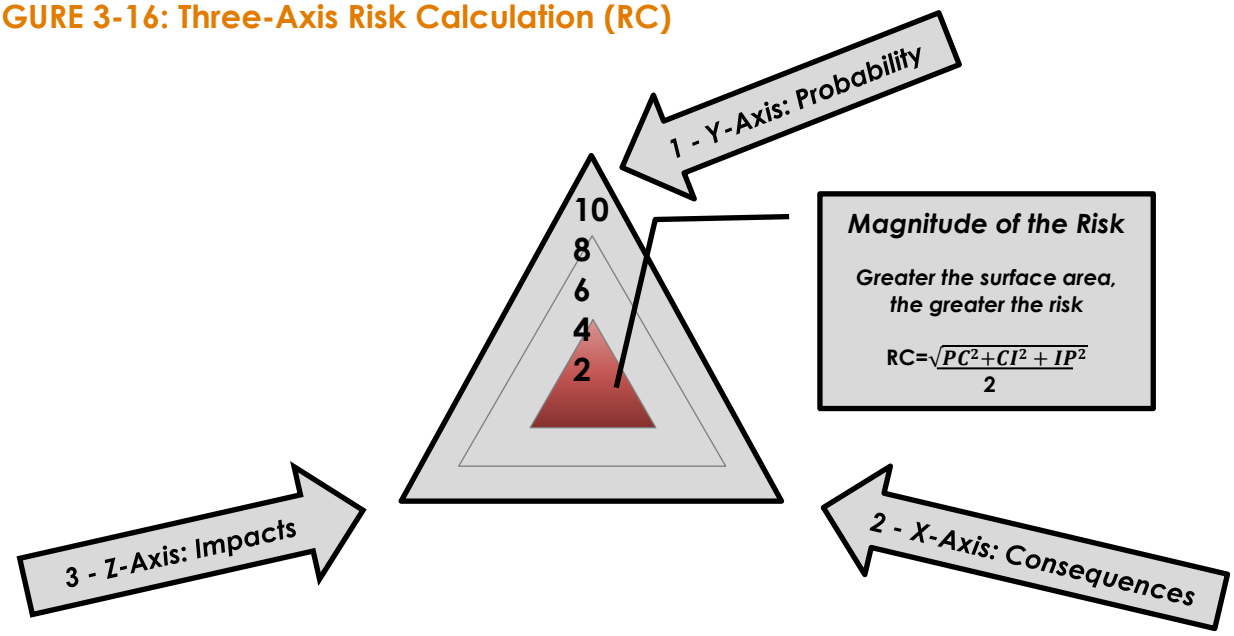
FIGURE 3-16: Three-Axis Risk Calculation (RC)



The following factors/hazards were identified and considered:

- **Demographic factors** such as age, socio-economic, vulnerability.
- **Natural hazards** such as flooding, wind events, wildland fires.
- **Manufactured hazards** such as rail lines, roads and intersections, target hazards.
- **Structural/building risks**.
- **Fire and EMS incident numbers and density**.

The assessment of each factor and hazard as listed below took into consideration the likelihood of the event, the impact on the city itself, and the impact on NCFD's ability to deliver emergency services, which includes NCFD resiliency and automatic aid capabilities as well. The list is not all inclusive but includes categories most common or that may present to the city and the NCFD.

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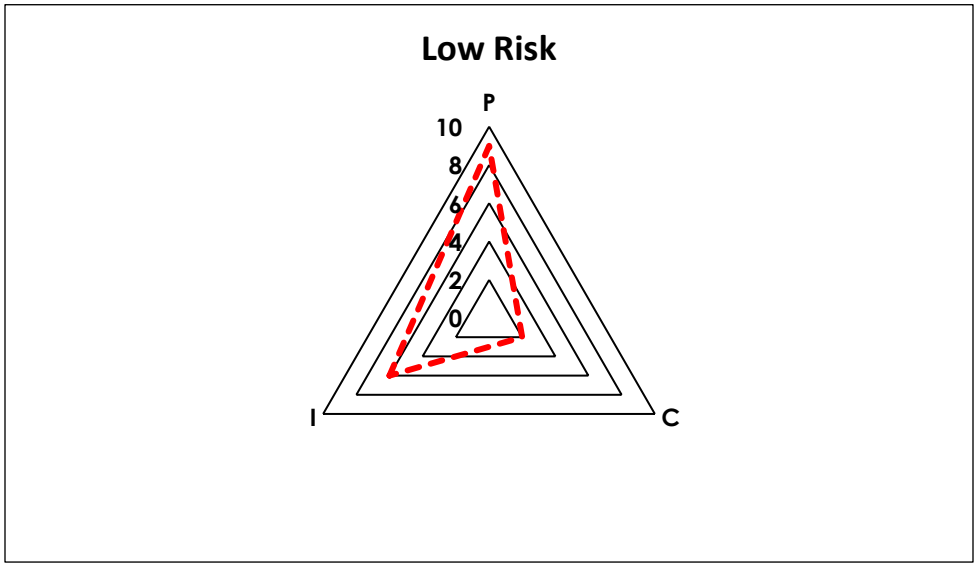
Low Risk

- Automatic fire/false alarms.
- Low acuity-BLS EMS Incidents.
- Low-risk environmental event.
- Motor vehicle accident (MVA).
- Good intent/hazard/public service fire incidents with no life-safety exposure.
- Outside fires such as grass, rubbish, dumpster, vehicle with no structural/life-safety exposure.

FIGURE 3-17: Low Risk



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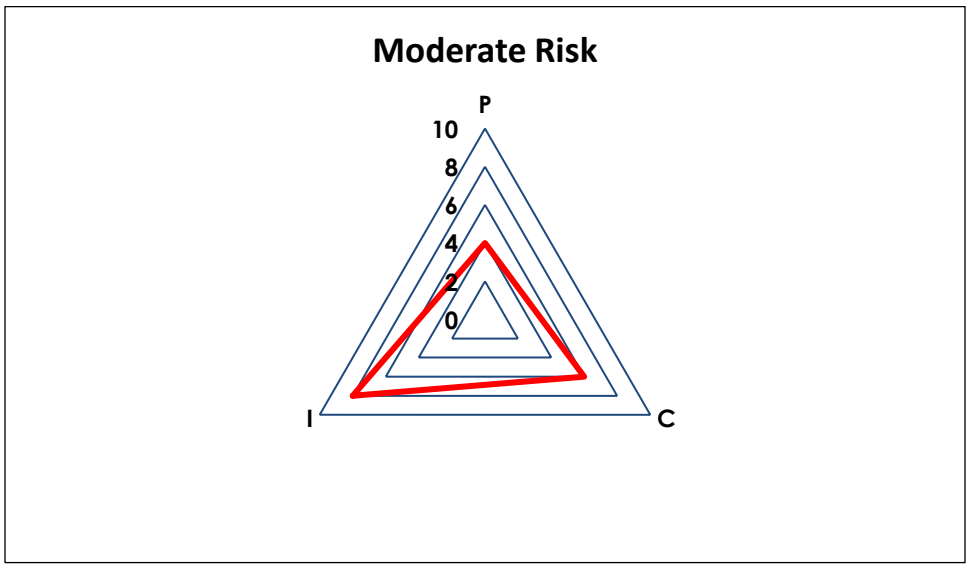
Moderate Risk

- Fire incident in a single-family dwelling where fire and smoke or smoke is visible, indicating a working fire.
- Suspicious substance investigation involving multiple fire companies and law enforcement agencies.
- ALS EMS incident.
- MVA with entrapment of passengers.
- Grass/brush fire with structural endangerment/exposure.
- Low-angle rescue involving ropes and rope rescue equipment and resources.
- Surface water rescue.
- Good intent/hazard/public service fire incidents with life-safety exposure.
- Rail event with no release of product or fire, and no threat to life safety.

FIGURE 3-18: Moderate Risk



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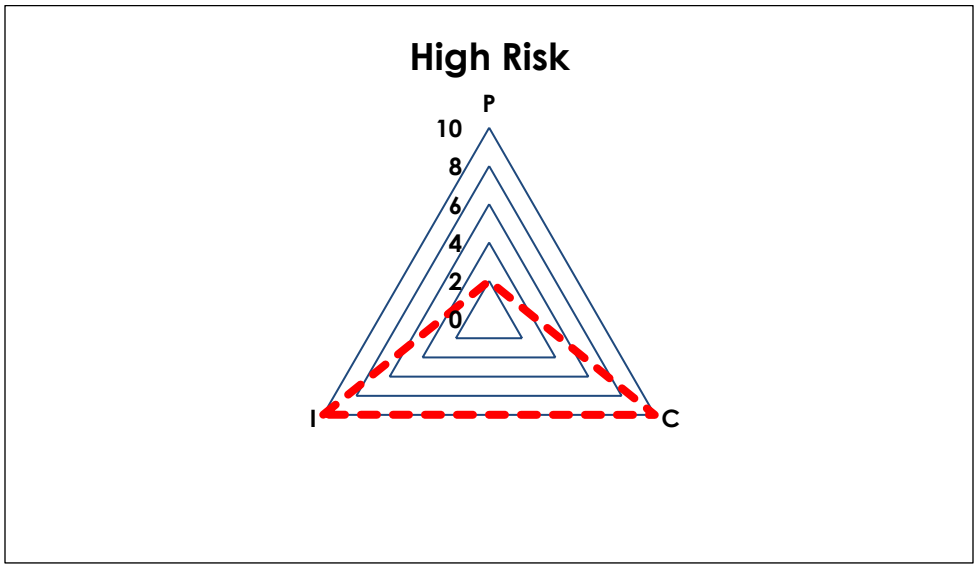
High Risk

- Working fire in a target hazard.
- Cardiac arrest.
- Mass casualty incident of more than 10 patients but fewer than 25 patients.
- Confined space rescue.
- Structural collapse involving life-safety exposure.
- High-angle rescue involving ropes and rope rescue equipment.
- Trench rescue.
- Suspicious substance incident with multiple injuries.
- Industrial leak of hazardous materials that causes exposure to persons or threatens life safety.
- Weather event that creates widespread flooding, heavy winds, building damage, and/or life-safety exposure.

FIGURE 3-19: High Risk



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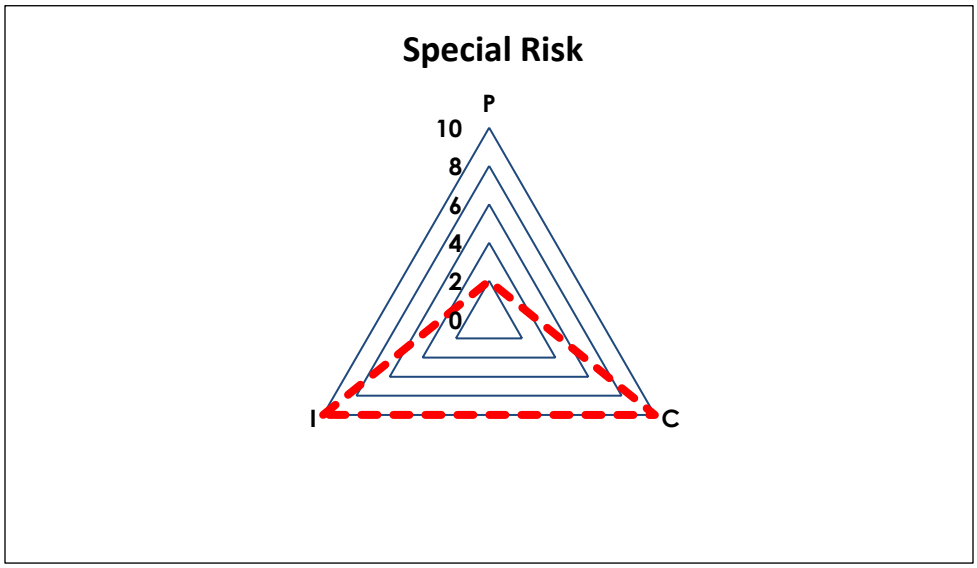
Special Risk

- Working fire in a structure of more than three floors.
- Fire at an industrial building or complex with hazardous materials.
- Fire in an occupied targeted hazard with special life-safety risks such as age, medical condition, or other identified vulnerabilities.
- Mass casualty incident of more than 25 patients.
- Rail or transportation incident that causes life-safety exposure or threatens life safety through the release of hazardous smoke or materials and evacuation of residential and business occupancies.
- Explosion in a building that causes exposure to persons or threatens life safety or outside of a building that creates exposure to occupied buildings or threatens life safety.
- Massive river/estuary flooding, fire in a correctional or medical institution, high-impact environmental event, pandemic.
- Mass gathering with threat fire and threat to life safety or other civil unrest, weapons of mass destruction release.

FIGURE 3-20: Special Risk



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SECTION 4. STAFFING, DEPLOYMENT, AND PERFORMANCE

When exploring staffing and deployment of fire departments it makes the most sense to design an operational strategy around the actual circumstances that exist in the community and the fire and risk problems that are identified. The strategic and tactical challenges presented by the widely varied hazards that a fire department protects against are identified and planned for through a community risk analysis as described in this report. It is ultimately the responsibility of elected officials working closely with a local government's senior management and Fire Chief to staff and deploy a fire department to the extent possible with available financing to manage the community risk through well-defined operational service goals.

The staffing of fire and EMS companies is a never-ending focus of attention among fire service and governmental leadership. While NFPA 1710 and OSHA provide guidelines (and to some extent the law, specifically OSHA in OSHA states) as to the level of staffing and response of personnel, the adoption of these documents varies from state to state and department to department. NFPA 1710 addresses the recommended staffing in terms of specific types of occupancies and building risks. The needed staffing to conduct the critical tasks for each specific occupancy and risk are defined as an *Effective Response Force* (ERF). The ERF for each of these occupancies is detailed in NFPA 1710 (2020 edition), section 5.2.4, Deployment, and further discussed in this section.

CPSM has researched and compiled eleven staffing and deployment topics we consider to be among the leading industry standards the fire service follows and utilizes when making decisions about staffing and deployment of fire resources. These are:

All-Hazard Risk Assessment of the Community: A fire department collects and organizes risk evaluation information about community risk (population and demographics; environmental; transportation; fire and EMS call demand and call types) and individual property types. The all-hazard community risk and community assessment is used to evaluate the community. With regard to individual property types, the assessment is used to measure all property and the risk associated with that property and then segregate the property as either a high-, medium-, or low-hazard risk depending on factors such as the life and building content hazard, the potential fire flow, and the staffing and apparatus types required to mitigate an emergency in the specific property. Factors such as fire protection systems are considered in each building evaluation. Included in this assessment should be both a structural and nonstructural (weather, wildland-urban interface, transportation routes, rail, mass-transit, etc.) analysis. All factors are then analyzed and the probability of an event occurring, the impact on the fire department, and the consequences on the community are measured and scored.

Population, Demographics, and Socio-economic Factors of a Community: Population and population density is a primary driver of calls for local government service, particularly public safety. The risk from fire is not the same for everyone, with studies telling us age, gender, race, socio-economic factors, and what region in the country one might live in contribute to the risk of death from fire. Studies also tell us these same factors affect demand for EMS, such as the increased use of hospital emergency departments by uninsured or underinsured patients, who rely on emergency services for their primary and emergency care and utilize pre-hospital EMS transport systems as their entry point.

Call Demand: Demand is made up of the types of calls to which fire and EMS units are responding and the location of the calls. This drives workload and station staffing and apparatus considerations. Higher population centers with increased demand and building risk require greater resources.

Workload of Units: This factor involves the types of calls to which units are responding and the workload of each unit in the deployment model. This defines what resources are needed and where; it links to demand and station location, or in a dynamic deployed system, the area(s) in which to post units, and the resiliency of the fire department to respond to multiple calls for service at once or calls for service that require multiple units to respond due to the higher risk.

Travel Times from Fire Stations: Analyzes the ability to cover the fire management zone/response district in a reasonable and acceptable travel time when measured against national benchmarks such as NFPA 1710, 1720, and the ISO-FSRS engine and ladder company grading parameters. This metric links to demand, risk assessment, unit workload, and resiliency.

NFPA Standards, ISO, OSHA, State OSHA requirements (and other national benchmarking).

EMS Demand: Community demand; demand on available units and crews; hospital off-load wait times; demand on non-EMS transport units responding to calls for service (fire/police units); availability of crews in departments that utilize cross-trained EMS staff to perform fire suppression.

Critical Tasking: On-scene capabilities to control and mitigate emergencies is determined by staffing and deployment of certain resources for low-, medium-, and high-risk responses. Critical tasking is the individual or team level task that is required to be performed by on-scene personnel based on the type of incident the firefighting and EMS force is responding to. Critical tasks are to the greatest extent performed simultaneously for a more effective operation aimed at increased firefighter and the public's safety. Those risks/incidents that require more critical tasks to be performed simultaneously drive a larger response force. An example of simultaneous critical tasking is a search and rescue crew and a ventilation crew operating while a crew or crews are advancing attack lines.

Effective Response Force: The ability of the jurisdiction to assemble the necessary personnel on the scene to perform the critical tasks necessary in rapid sequence to mitigate the emergency. The speed, efficiency, and safety of on-scene operations are dependent upon the number of firefighters performing the tasks. If fewer firefighters are available to complete critical on-scene tasks, those tasks will require more time to complete and impact overall operations and the safety of firefighters and the public, and in some cases intensify the spread of fire or the inability to mitigate the non-fire emergency.

Innovations in Staffing and Deployable Apparatus: This is the fire department's ability and willingness to develop and deploy innovative apparatus (combining two apparatus functions into one to maximize available staffing, as an example). Deploying quick response vehicles (light vehicles equipped with medical equipment and some light fire suppression capabilities) on those lower acuity calls (typically the largest percentage of calls) that do not require heavy fire apparatus.

Community Expectations: The gathering of input and feedback from the community, then measuring, understanding, and developing goals and objectives to meet community expectations.

Ability to Fund: The community's understanding of, and its ability and willingness to fund fire and EMS services, while considering how budgetary revenues are divided up to meet all community's expectations.

NFPA 1710 AND TWO-IN/TWO-OUT

National Fire Protection Association (NFPA) standards are consensus standards; they are not mandates nor are they the law. Many cites and countries strive to achieve these standards to the extent possible without causing an adverse fiscal impact to the community and use these standards as benchmarks and service delivery goals.

NFPA 1710 outlines organization and deployment of operations by career, and primarily career fire and rescue organizations.[21] It serves as a benchmark to measure staffing and deployment of resources to certain structures and emergencies.

According to NFPA 1710, fire departments should base their capabilities on a formal all-hazards community risk assessment, as discussed earlier in this report, and taking into consideration:[22]

- Life hazard to the population protected.
- Provisions for safe and effective firefighting performance conditions for the firefighters.
- Potential property loss.
- Nature, configuration, hazards, and internal protection of the properties involved.
- Types of fireground tactics and evolutions employed as standard procedure, type of apparatus used, and results expected to be obtained at the fire scene.

According to NFPA 1710, if a community follows this standard, engine and ladder companies shall be staffed with a minimum of four on-duty members.[23] Additional staffing parameters in this standard for engine and ladder companies is based on geographical isolation and tactical hazards, and increases each to five or six as a minimum.[24] This staffing configuration is designed to ensure a fire department can efficiently assemble an effective response force for each risk the department may encounter and complete the critical tasking necessary on building fires and other emergency incidents simultaneously to the extent possible. ***NFPA 1710 permits fire departments to use established automatic aid and mutual aid agreements to comply with the assembling of on-scene personnel to complete critical tasks as outlined in the standard.***

Another consideration, and one that links to critical tasking and assembling an effective response force, is that of two-in/two-out regulations. Essentially, prior to starting any fire attack in an immediately dangerous to life and health (IDLH) environment [with no confirmed rescue in progress], the initial two-person entry team shall ensure that there are sufficient resources on-scene to establish a two-person initial rapid intervention team (IRIT) located outside of the building.

This critical tasking model has its genesis with the Occupational Safety and Health Administration, specifically 29 CFR 1910.134(g)(4). The California State Plan also applies to state and local government employers. Federal OSHA covers the issues not covered by the California State Plan.[25] The federal rule (29 CFR 1910.134(g)(4)) applies to the NCFD.

21. NFPA 1710 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the State of California. It is a valuable resource for establishing and measuring performance objectives for the City of National City but should not be the only determining factor when making local decisions about the city's fire services.
22. NFPA 1710, 5.2.1.1, 5.2.2.2
23. NFPA 1710, 5.2.3.1.1; 5.2.3.2.1
24. NFPA 1710, 5.2.3.1.2, 5.2.3.1.2.1.,5.2.3.2.2.,5.3.2.3.2.2.1
25. California State Plan | Occupational Safety and Health Administration (osha.gov)

CFR 1910.134: Procedures for interior structural firefighting. The employer shall ensure that:

(i) At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;

(ii) At least two employees are located outside the IDLH atmosphere; and

(iii) All employees engaged in interior structural firefighting use SCBAs.[26]

According to the standard, one of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

NFPA 1500, *Standard on Fire Department Occupational Health, Safety, and Wellness,* 2021 Edition, has similar language as CFR 1910.134(g)(4) to address the issue of two-in/two-out, stating *the initial stages of the incident where only one crew is operating in the hazardous area of a working structural fire, a minimum of four individuals shall be required consisting of two members working as a crew in the hazardous area and two standby members present outside this hazard area available for assistance or rescue at emergency operations where entry into the danger area is required.*[27]

NFPA 1500 also speaks to the utilization of the two-out personnel in the context of the health and safety of the firefighters working at the incident. *The assignment of any personnel including the incident commander, the safety officer, or operations of fire apparatus, shall not be permitted as standby personnel if by abandoning their critical task(s) to assist, or if necessary, perform rescue, this clearly jeopardizes the safety and health of any firefighter working at the incident.*[28]

In order to meet CFR 1910.134(g)(4), and NFPA 1500, the NCFD must utilize two personnel to commit to interior fire attack while two firefighters remain out of the hazardous area or immediately dangerous to life and health (IDLH) area to form the Initial Rapid Intervention Team (IRIT), while attack lines are charged, and a continuous water supply is established.

However, NFPA 1500 allows for fewer than four personnel under specific circumstances. It states: *Initial attack operations shall be organized to ensure that if on arrival at the emergency scene, initial attack personnel find an imminent life-threatening situation where immediate action could prevent the loss of life or serious injury, such action shall be permitted with fewer than four personnel*.[29]

CFR 1910.134(g)(4) also states that nothing in section (g) is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.[30]

It is also important to note that the OSHA standard (and NFPA 1710) specifically references "interior firefighting." Firefighting activities that are performed from the exterior of the building are not regulated by this portion of the OSHA standard. However, in the end, the ability to assemble adequate personnel, along with appropriate apparatus, on the scene of a structure fire, is critical to operational success and firefighter safety.

26. CFR 1910.134 (g) 4
27. NFPA 1500, 2021, 8.8.2.
28. NFPA 1500, 2021, 8.8.2.5.
29. NFPA 1500, 2021 8.8.2.10.
30. CFR 190.134, (g).

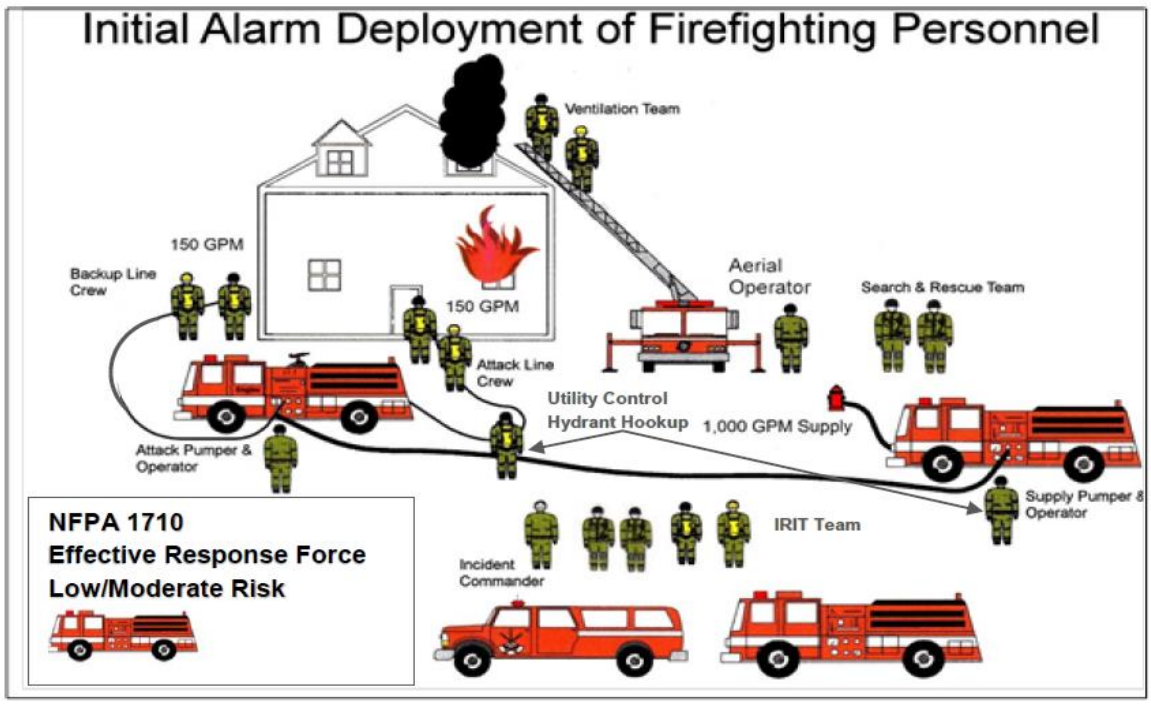
EFFECTIVE RESPONSE FORCE AND CRITICAL TASKING

Critical tasks are those activities that must be conducted on time and preferably simultaneously by responders at emergency incidents to control the situation and minimize/stop loss (property and life-safety). Critical tasking for fire operations is the minimum number of personnel needed to perform the tasks needed to effectively control and mitigate a fire or other emergency. To be effective, critical tasking must assign enough personnel so that all identified functions can be performed simultaneously. However, it is important to note that initial response personnel may manage secondary support functions once they have completed their primary assignment. Thus, while an incident may end up requiring a greater commitment of resources or a specialized response, a properly executed critical tasking assignment will provide adequate resources to immediately begin bringing the incident under control.

The specific number of people required to perform all the critical tasks associated with an identified risk or incident type is referred to as an Effective Response Force (ERF). The goal is to deliver an ERF within a prescribed period. NFPA 1710 provides the benchmarks for effective response forces.

The next figure illustrates an ERF for a single family dwelling as outlined in NFPA 1710 (which is 16 personnel, 17 if the aerial device is in operation).

FIGURE 4-1: Effective Response Force for Single-Family Dwelling Fire



NCFD Staffing Model

The NCFD has three operational shifts, A, B, and C. Each of the shifts is staffed with five firefighters, three engineers, four captains (company officer), and one Battalion Chief (shift commander), for an on-duty operational response force of 13 personnel.

The following table details the positions for each shift.

TABLE 4-1: NCFD Shift Matrix

A Shift (24-Hour Shift)	B Shift (24-Hour Shift)	C Shift (24-Hour Shift)
E31 ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter	**E31** ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter	**E31** ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter
E34 ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter	**E34** ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter	**E34** ■ 1 Captain ■ 1 Engineer ■ 1 Firefighter
L34 ■ 1 Captain ■ 1 Engineer ■ 2 Firefighters	**L34** ■ 1 Captain ■ 1 Engineer ■ 2 Firefighters	**L34** ■ 1 Captain ■ 1 Engineer ■ 2 Firefighters
Squad 33 ■ 1 Captain ■ 1 Firefighter	**Squad 33** ■ 1 Captain ■ 1 Firefighter	**Squad 33** ■ 1 Captain ■ 1 Firefighter
■ **BC:** 1 Battalion Chief	■ **BC:** 1 Battalion Chief	■ **BC:** 1 Battalion Chief

The following discussion and tables will outline how critical tasking and assembling an effective response force is first measured in NFPA 1710, and how the NCFD is benchmarked against this standard for the building types existing in National City. This discussion will cover single-family dwelling buildings, open-air strip mall buildings, and apartment buildings as outlined in the NFPA standard. As discussed above, for certain responses the NCFD relies on automatic aid to assemble an Effective Response Force. NCFD tables are built using the first alarm assignment in accordance with the San Diego Metro Zone Response Plan Matrix.

Single-Family Dwelling: NFPA 1710, 5.2.4.1

The initial full alarm assignment (ERF) to a structural fire in a typical 2,000 square-foot, two-story, single-family dwelling without a basement and with no exposures must provide for a minimum of 16 members (17 if an aerial device is used). The following table outlines the critical task matrix.

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TABLE 4-2: Effective Response Force for Single-Family Dwelling Fire

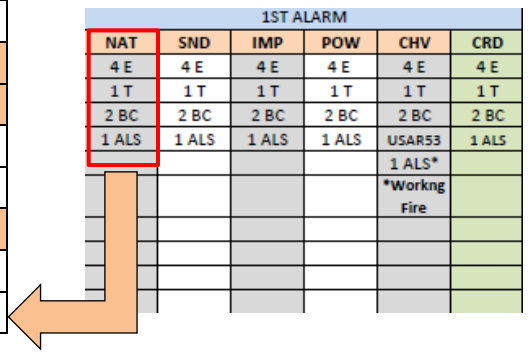
Critical Tasks	Personnel
Incident Command	1
Continuous Water Supply	1
Fire Attack via Two Handlines	4
Hydrant Hook Up – Forcible Entry – Utilities	2
Primary Search and Rescue	2
Ground Ladders and Ventilation	2
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Total Effective Response Force	16 (17 If aerial is used)

The following table outlines how the NCFD assembles staffing and deployable resources as measured against NFPA 1710 benchmarking for an effective response force for a single-family dwelling fire. NCFD units are highlighted.

TABLE 4-3: NCFD Effective Response Force for Single-Family Dwelling Fire

Apparatus	Personnel
NCFD Battalion Chief	1
Auto Aid Battalion Chief	1
NCFD Engine	3
NCFD Engine	3
Auto Aid Engine	4
Auto Aid Engine	4
NCFD Ladder	4
1-ALS unit	2
Total NCFD ERF	**22**

San Diego Metro Zone Response Plan Matrix
Residential Structure Fire



As a single responding agency, NCFD does not meet the minimum benchmarks of NFPA 1710 for an Effective Response Force for single-family dwelling fires. With regional automatic aid, the NCFD does meet this benchmark. ***NFPA 1710 permits fire departments to use established automatic aid and mutual aid agreements to comply with section 5.2 of this standard.***[31]

Open-Air Strip Mall/Commercial, NFPA 5.2.4.2

The initial full alarm assignment (ERF) to a structural fire in a typical open-air strip center/commercial structure ranging from 13,000 square feet to 196,000 square feet in size must provide for a minimum of 27 members (28 if an aerial device is used). The following table outlines the critical tasking matrix for this type of fire. This can also be typed as a commercial building fire response.

31. NFPA 1710. 5.2.1.3

TABLE 4-4: Effective Response Force for Open-Air Strip Mall/Commercial Fire

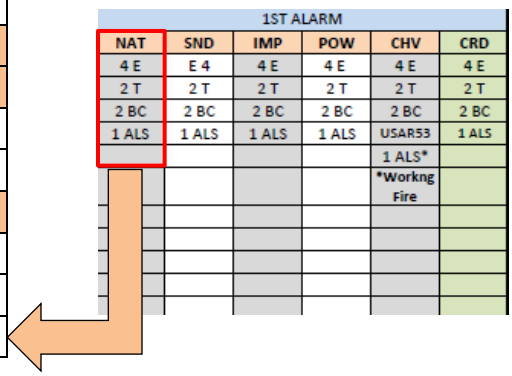
Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	2
Fire Attack via Two Handlines	6
Hydrant Hook Up – Forcible Entry - Utilities	3
Primary Search and Rescue	4
Ground Ladders and Ventilation	4
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Medical Care Team	2
Total Effective Response Force	**27 (28 If aerial is used)**

The following table outlines how the NCFD assembles staffing and deployable resources as measured against NFPA 1710 benchmarking for an effective response force for an open-air strip mall and commercial building fire. NCFD units are highlighted.

TABLE 4-5: NCFD Effective Response Force for Open-Air Strip Mall/Commercial Fire

Apparatus	Personnel
NCFD Battalion Chief	1
Auto Aid Battalion Chief	1
NCFD Engine	3
NCFD Engine	3
Auto Aid Engine	4
Auto Aid Engine	4
NCFD Ladder	4
Auto Aid Ladder	4
1 ALS unit	2
Total NCFD ERF	**26**

San Diego Metro Zone Response Plan Matrix
Commercial Structure Fire



1ST ALARM					
NAT	SND	IMP	POW	CHV	CRD
4 E	E 4	4 E	4 E	4 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC
1 ALS	1 ALS	1 ALS	1 ALS	USAR53	1 ALS
				1 ALS*	
				*Workng Fire	

As a single responding agency, NCFD does not meet the minimum benchmarks of NFPA 1710 for an Effective Response Force for an open-air strip mall fire. With regional automatic aid, the NCFD does not meet the benchmark (minus 2 FFs). ***NFPA 1710 permits fire departments to use established automatic aid and mutual aid agreements to comply with section 5.2 of this standard.***[32]

Apartment Building, NFPA 5.2.4.3

The initial full alarm assignment (ERF) to a structural fire in a typical 1,200 square-foot apartment within a three-story, garden-style apartment building must provide for a minimum of 27 members (28 if an aerial device is used). The following table outlines the critical tasking matrix for this type

32. NFPA 1710. 5.2.1.3

of building fire. The NCFD has no specific response matrix for apartment buildings, so we utilized the NFPA commercial fire ERF matrix has it has similar staffing.

TABLE 4-6: Effective Response Force for Apartment Building Fire

Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	2
Fire Attack via Two Handlines	6
Hydrant Hook Up – Forcible Entry – Utilities	3
Primary Search and Rescue	4
Ground Ladders and Ventilation	4
Aerial Operator if Aerial is Used	1
Establishment of IRIC (Initial Rapid Intervention Crew	4
Medical Care Team	2
Total Effective Response Force	**27 (28 If aerial is used)**

The following table outlines how the NCFD assembles staffing and deployable resources as measured against NFPA 1710 benchmarking for an effective response force for an apartment building or other multi-unit housing type building fire. NCFD units are highlighted.

TABLE 4-7: NCFD Effective Response Force for Apartment Building Fire

Apparatus	Personnel
NCFD Battalion Chief	1
Auto Aid Battalion Chief	1
NCFD Engine	3
NCFD Engine	3
Auto Aid Engine	4
Auto Aid Engine	4
NCFD Ladder	4
Auto Aid Ladder	4
1 ALS unit	2
Total NCFD ERF	**23-26**

San Diego Metro Zone Response Plan Matrix
Apartment-Commercial Structure Fire

1ST ALARM					
NAT	SND	IMP	POW	CHV	CRD
4 E	E 4	4 E	4 E	4 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC
1 ALS	1 ALS	1 ALS	1 ALS	USAR53	1 ALS
				1 ALS*	
				*Workng Fire	

As a single responding agency, NCFD does not meet the minimum benchmarks of NFPA 1710 for an Effective Response Force for an apartment building fire. With regional automatic aid, the NCFD does not meet the benchmark (minus 2 FFs). ***NFPA 1710 permits fire departments to use established automatic aid and mutual aid agreements to comply with section 5.2 of this standard.***[33]

33. NFPA 1710. 5.2.1.3

High-Rise, NFPA 1710 5.2.4.4

The initial full alarm assignment to a fire in a building where the highest floor is greater than 75 feet above the lowest level of fire department vehicle access must provide for a minimum of 42 members (43 if the building is equipped with a fire pump).

TABLE 4-8: Structure Fire – High Rise

Critical Tasks	Personnel
Incident Command	2
Continuous Water Supply	1 FF for continuous water; if fire pump exists, 1 additional FF required.
Fire Attack via Two Handlines	4
One Handline above the Fire Floor	2
Establishment of IRIC (Initial Rapid Intervention Crew)	4
Primary Search and Rescue Teams	4
Entry Level Officer with Aide near entry point of Fire Floor	2
Entry Level Officer with Aide near the entry point above the Fire Floor	2
Two Evacuation Teams	4
Elevator Operations	1
Safety Officer	1
FF Two Floors below Fire to Coordinate Staging	1
Rehabilitation Management	2
Officer and FFs to Manage Vertical Ventilation	4
Lobby Operations	1
Transportation of Equipment below Fire Floor	2
Officer to Manage Base Operations	1
Two ALS Medical Care Teams	4
Total Effective Response Force	**42** (43 If building is equipped with pump)

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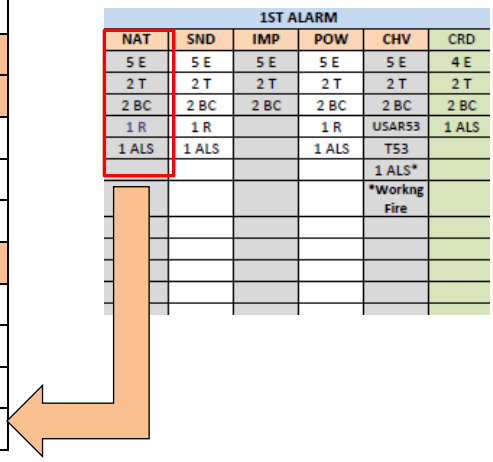
TABLE 4-9: NCFD Effective Response Force for High-Rise Fire

Apparatus	Personnel
NCFD Battalion Chief	1
Auto Aid Battalion Chief	1
NCFD Engine	3
NCFD Engine	3
Auto Aid Engine	4
Auto Aid Engine	4
Auto Aid Engine	4
NCFD Ladder	4
Auto Aid Ladder	4
1 Rescue	4
1 ALS unit	2
Total NCFD ERF	**34**

San Diego Metro Zone Response Plan Matrix
High Rise Structure Fire



1ST ALARM					
NAT	SND	IMP	POW	CHV	CRD
5 E	5 E	5 E	5 E	5 E	4 E
2 T	2 T	2 T	2 T	2 T	2 T
2 BC	2 BC	2 BC	2 BC	2 BC	2 BC
1 R	1 R		1 R	USAR53	1 ALS
1 ALS	1 ALS		1 ALS	T53	
				1 ALS*	
				*Workng Fire	

As a single responding agency, NCFD does not meet the minimum benchmarks of NFPA 1710 for an Effective Response Force for a high-rise fire. With regional automatic aid, the NCFD does not meet this benchmark. ***NFPA 1710 permits fire departments to use established automatic aid and mutual aid agreements to comply with section 5.2 of this standard.***[34]

Recommendations:

- CPSM recommends the NCFD, to the extent possible and if practical depending on available automatic and mutual aid resources, work with regional Fire Chiefs to increase response resources to commercial, apartment, and high-rise fire responses that align more closely with the NFPA 1710 standard. (Recommendation No. 7.)
- CPSM further recommends due to the following factors: demand for service on the NCFD; population density that includes substantial current and projected vertical density structures, many involving assisted and/or senior living; building and other risks identified in this report such as the San Diego Port property; industrial and commercial properties that include heavy rail and tractor-trailer transportation; proposed industrial and commercial properties; the resiliency issues the department faces due to demand for service; and to increase NCFD resources regarding assembling an Effective Response Force, that the city develop a one- to three-year funding plan to increase staffing on Engine 31 to four per shift (three total personnel with estimated salary costs of $263,000) as this is a single station response unit in a high-demand fire management zone, and in the subsequent three- to five-year period develop a funding plan to increase staffing on Engine 34 to four per shift (three total personnel with estimated costs of $263,000 to $300,000, depending on implementation year). (Recommendation No. 8.)

34. NFPA 1710. 5.2.1.3

NCFD RESPONSE TIMES

Response times are typically utilized as a primary measurement for evaluating fire and EMS services. Response times are used as a benchmark to determine how well a fire department is currently performing, to help identify response trends, and to predict future operational needs and station placement. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department.

Fire incident response time criterion is linked to the concept of "flashover." This is the state at which super-heated gasses from a fire are released rapidly, causing the fire to burn freely, and become so volatile that the fire reaches an explosive state (simultaneous ignition of all the combustible materials in a room). In this situation, usually after an extended period (often eight to twelve minutes after ignition but at times as quickly as five to seven minutes), and a combination of the right conditions (fuel and oxygen), the fire expands rapidly and is much more difficult to contain. When the fire does reach this extremely hazardous state, initial firefighting forces are often overwhelmed, larger and more destructive fire occurs, the fire escapes the room and possibly even the building of origin, and significantly more resources are required to affect fire control and extinguishment.

Flashover occurs more quickly and more frequently today and is caused at least in part by the introduction of significant quantities of plastic and foam-based products into homes and businesses (e.g., furnishings, mattresses, bedding, plumbing and electrical components, home and business electronics, decorative materials, insulation, and structural components). These materials ignite and burn quickly and produce extreme heat and toxic smoke.

The next figure illustrates the time progression of a fire from inception (event initiation) through flashover. The time-versus-products of combustion curve shows activation times and effectiveness of residential sprinklers (approximately one minute), commercial sprinklers (four minutes), flashover (eight to ten minutes), and firefighters applying first water to the fire after notification, dispatch, response, and set up (ten minutes).

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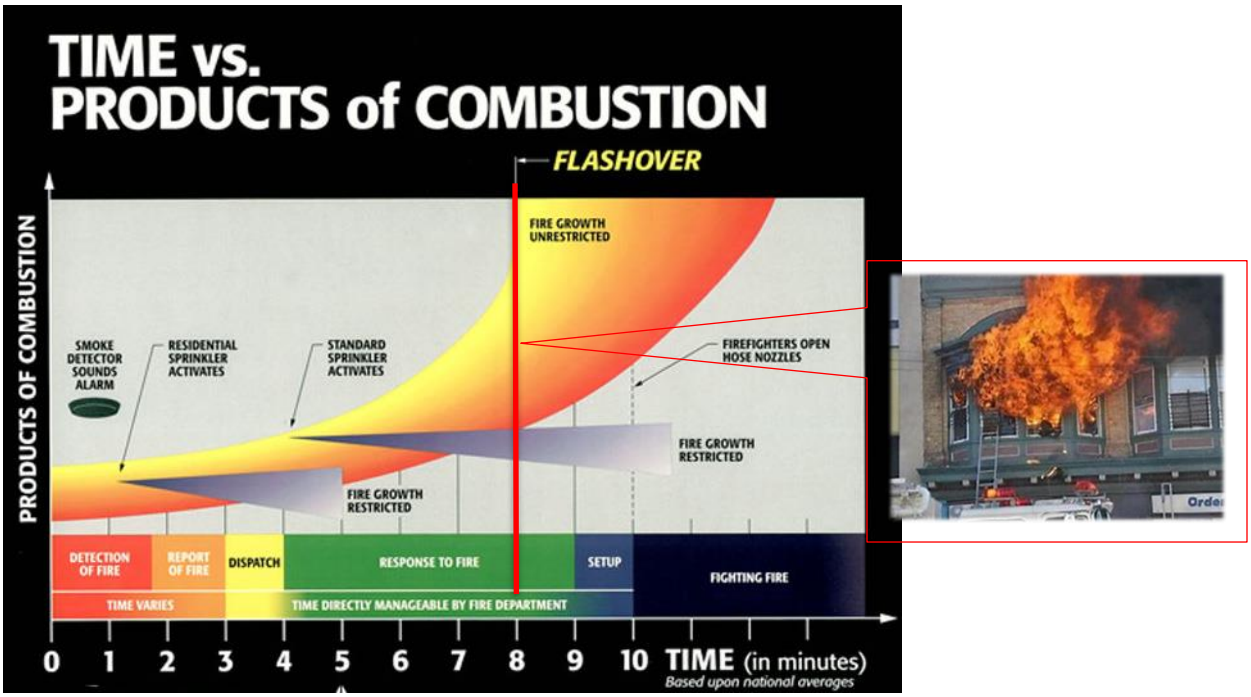
FIGURE 4-2: Fire Growth from Inception to Flashover[35]



EMS response times are measured differently than fire service response times. Where the fire service uses NFPA 1710 as a response time benchmarking document, the focus for EMS is and should be directed to the evidence-based research relationship between clinical outcomes and response times. Much of the current research suggests response times have reduced impact on clinical outcomes outside of a small segment of call types. These include cerebrovascular accidents (stroke); injury or illness compromising the respiratory system; injury or illness compromising the cardiovascular system to include S-T segment elevation emergencies, high-acuity medical and pediatric emergencies; cardiac and respiratory arrest; and certain high-risk obstetrical emergencies to name a few. Each requires rapid response times, rapid on-scene treatment and packaging for transport, and rapid transport to the hospital.

The next figure illustrates the chance of survival from the onset of cardiac arrest, largely due to ventricular fibrillation in terms of minutes without emergency defibrillation delivered by the public or emergency responders. The chance of survival has not changed over time since this graphic was first published by the American Heart Association in 2000.

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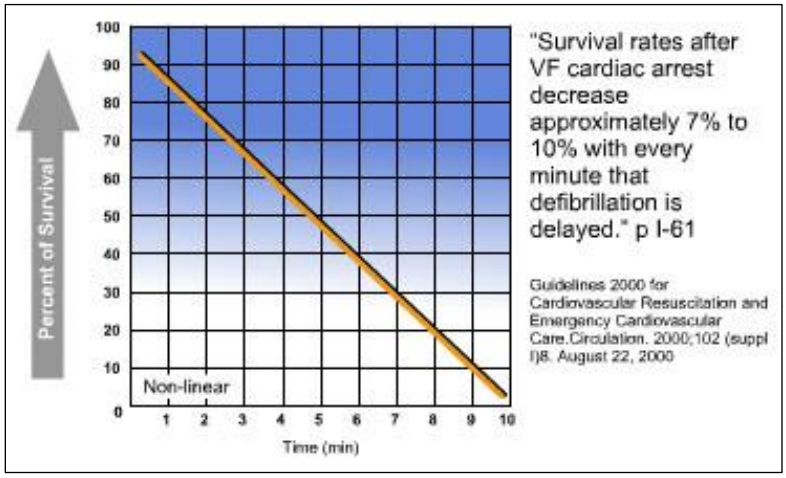
35. Source: https://www.slideserve.com/tavon/the-international-society-of-fire-service-instructors

FIGURE 4-3: Cardiac Arrest Survival Probability by Minute



A crucial factor in the whole response time question is what we term "**detection time**." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are not present or inoperable, the fire detection process can be extended. The same holds true for EMS incidents. Many medical emergencies are often thought to be something minor by the patient, treated with home remedies, and the true emergency goes undetected until signs and symptoms are more severe. When the fire-EMS department responds, they often find these patients in acute states. Fires that go undetected and are allowed to expand in size become more destructive, are difficult to extinguish, and require more resources for longer periods of time.

For the purpose of this analysis, ***response time*** is a product of three components: ***dispatch time***, ***turnout time***, and ***travel time***.

For this study, and unless otherwise indicated, response times and travel times measure the first arriving unit only. The primary focus of this section is the dispatch and response time of the first arriving units for calls responded to with lights and sirens.

Dispatch time is the difference between the time a call is received and the earliest time an agency is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. The NFPA 1710 standard for this component of response times is the event is processed and dispatched in:

- ≤ 64 seconds 90 percent of the time.
- ≤ 106 seconds 95 percent of the time.
- Special call types
  - ≤ 90 seconds 90 percent of the time.
  - ≤ 120 seconds 99 percent of the time.

The next component of response time is **turnout time**, an aspect of response which is controlled by the responding fire department. NFPA 1710 states that turnout time shall be:

- ≤ 80 seconds (1.33 minutes) for fire and special operations 90 percent of the time.
- ≤ 60 seconds (1.0 minute) for EMS responses.

The last component of response time is **travel time,** an aspect of response time that is affected by factors such as station location, road conditions, weather, and traffic control systems. NFPA 1710 states that travel time for the first arriving fire suppression unit to a fire incident shall be:

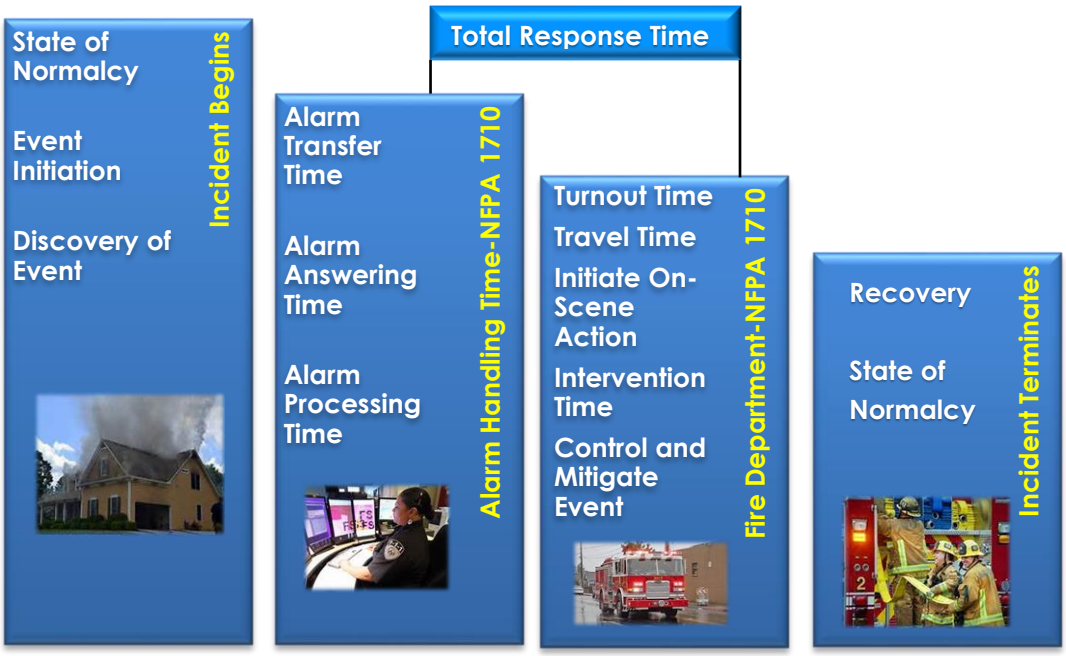
- ≤ 240 seconds for the first arriving engine company to a fire suppression incident 90 percent of the time.
- ≤ 360 seconds for the second company 90 percent of the time.
- ≤ 480 seconds to assemble the initial first alarm assignment on scene 90 percent of the time for low/medium hazards, and 610 seconds for high-rise fire incidents 90 percent of the time.

For EMS incidents the standard NFPA 1710 standard establishes a travel time of:

- ≤ 240 seconds for the first arriving engine company with automatic external defibrillator (AED) or higher level capability.
- ≤ 480 seconds or less travel time of an Advanced Life Support (ALS) unit at an EMS incident where the service is provided by the fire department provided a first responder with an AED or basic life support unit arrived in 240 seconds or less travel time.

The following figure provides an overview of the fire department incident cascade of events and further describes the total cascade of events and their relationship to the total response time of a fire incident.

FIGURE 4-4: Incident Cascade of Events



Travel time is key to understanding how fire and EMS station location influences a community's aggregate response time performance. Travel time can be mapped when existing and proposed station locations are known. The location of responding units is one key factor in response time; reducing response times, which is typically a key performance measure in determining the efficiency of department operations, often depends on this factor. The goal of placement of a single fire station or creating a network of responding fire stations in a single

community is to optimize coverage with short travel distances, when possible, while giving special attention to natural and manmade barriers, and response routes that can create response-time problems.[36] This goal is generally budget-driven and based on demand intensity of fire and EMS incidents, travel times, and identified risks.

As already discussed, the NCFD responds fire suppression units (engines/ladder/squad) from three stations and receives automatic aid from surrounding jurisdictions. This section expands on the earlier discussion on travel times and depicts how travel times of 240, 360, and 480 seconds look when mapped from the current fire station locations. Illustrating response time is important when considering the location from which assets should be deployed. When historic demand is coupled with risk analysis, a more informed decision can be made.

The following figures use GIS mapping to illustrate travel time bleeds using the existing street network from the current NCFD stations. CPSM also mapped the travel time projections from primary auto aid stations that may respond into National City.

The GIS data for streets includes speed limits for each street segment and allows for "U-turns" for dead-end streets and intersections, as well as other travel obstacles.

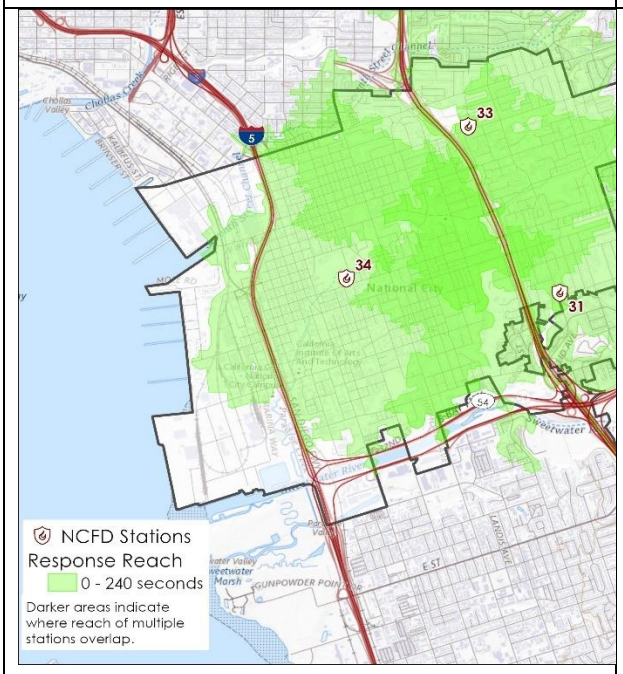
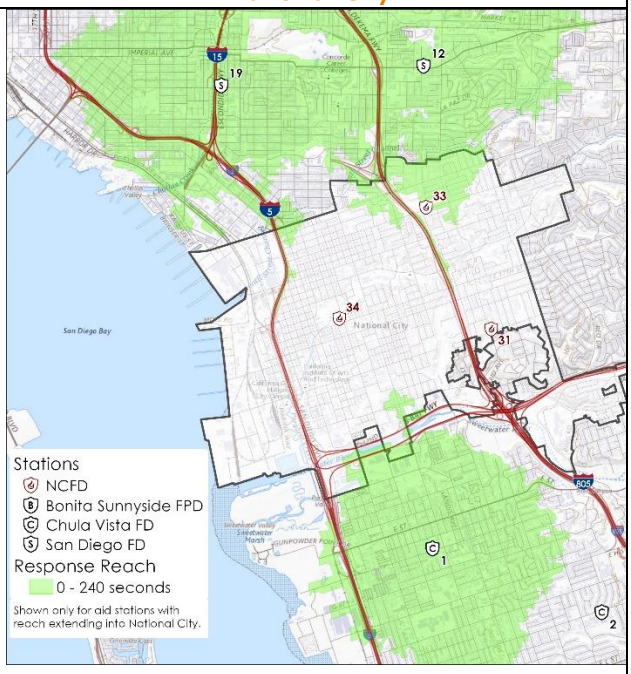
It is important to understand that measuring and analyzing response times and response time coverage are measurements of performance. When we discussed community risk above, we identified that the NCFD like most other fire departments in the nation is an all-hazards response agency. While different regions of the country respond to different environmental risks, the remaining hazards that fire departments confront remain the same. Linking response data to community risks lays the foundation for future fire department planning in terms of fire station location, the need for additional fire stations, and staffing levels whether supplied by the fire department or a combination of a city's fire department and automatic aid. Managing fire department response capabilities to the identified community's risk focuses on three components which are:

- Having a full understanding of the total risk in the community and how each risk impacts the fire department in terms of resiliency, what the consequences are to the community and fire department should a specific risk or combination of two or more occur and preparing for and understanding the probability that the risk may occur.
- Linking risk to the deployment of resources to effectively manage every incident. This includes assembling an Effective Response Force for the response risk in measurable times benchmarked against NFPA standards, deploying the appropriate apparatus (engines, ladders, heavy rescues, ambulances), and having a trained response force trained to combat a specific risk.
- Understanding that each element of response times plays a role in the management of community risk. Low response times of the initial arriving engine and low time to assemble an Effective Response Time on fire and other incidents is associated with positive outcomes.

36. NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments*, 2020 Edition.

The following figure looks at the travel time projection at 240 seconds from NCFD stations and the primary auto aid stations that respond into National City. From the NCFD stations, all but the western edges of the city are covered as benchmarked against the NFPA standard. These areas are largely industrial. In the central and central east potions of the city there is good overlap by NCFD stations, which supports resiliency. Auto/mutual aid stations do not have an impact other than the northeast portion of the city.

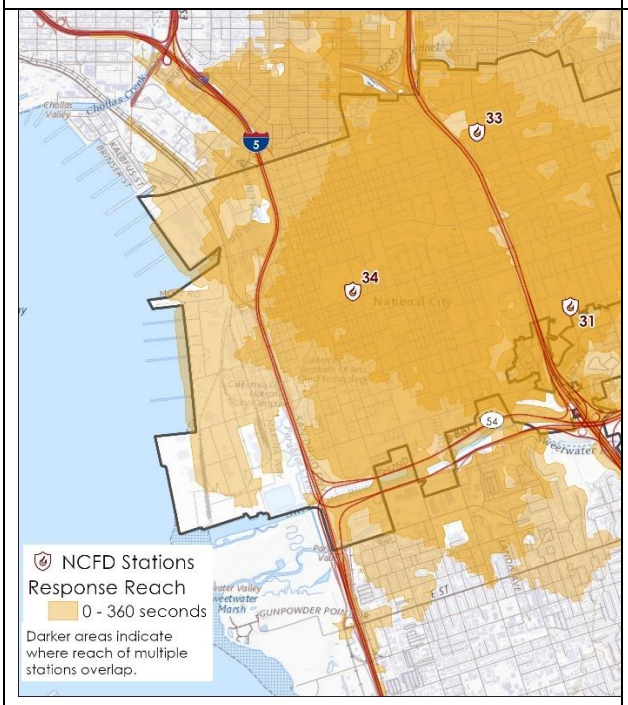
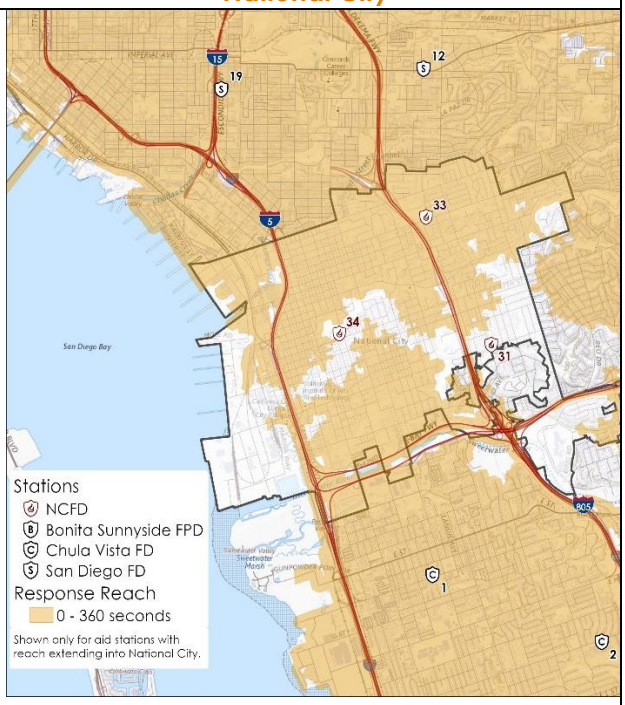
FIGURE 4-5: 240-Second Travel Time Maps

NCFD 240-Second Travel Time	Auto/Mutual Aid 240-Second Travel Time into National City
	

The next figure shows travel time projections at 360 seconds, which in the NFPA 1710 standard is the time benchmark for the second fire company to arrive on the scene in less than or equal to 360 seconds 90 percent of the time. This standard links to the two-in/two-out regulation from OSHA and NFPA 1500 standards, as well as the initial critical tasking and the early assembly of an Effective Response Force for the incident. This figure compares the 360-second response from the NCFD stations and as well from the primary auto aid stations that respond into National City.

From the NCFD stations, nearly 100 percent of the city is covered as benchmarked against the NFPA standard. Station 33 is included here as Squad 33 counts as a second arriving fire unit per the standard. Auto/mutual aid stations have a positive impact in meeting this benchmark in a substantial share of the north and south areas of the city.

FIGURE 4-6: 360-Second Travel Time Maps

NCFD 360-Second Travel Time	Auto/Mutual Aid 360-Second Travel Time into National City
	

The next figure looks at the travel time bleeds of 480 seconds, which in the NFPA 1710 standard is the time benchmark for the assembly of the initial first alarm assignment on scene in 480 seconds or less 90 percent of the time for low/medium hazards. This standard links to the incident critical tasking and the assembly of an Effective Response Force for the incident. This figure shows the 480 seconds response bleed from the NCFD stations and the primary auto aid stations that respond into National City.

These maps show us that together, NCFD and auto/mutual aid stations cover the city nearly 100 percent, with small gaps in the northeast and northwest corners. As the city is covered at 480 seconds, at the 610 second mark for high-rise incidents, the city is covered as well under the response standard (number of companies) the regional response plan designates for National City.

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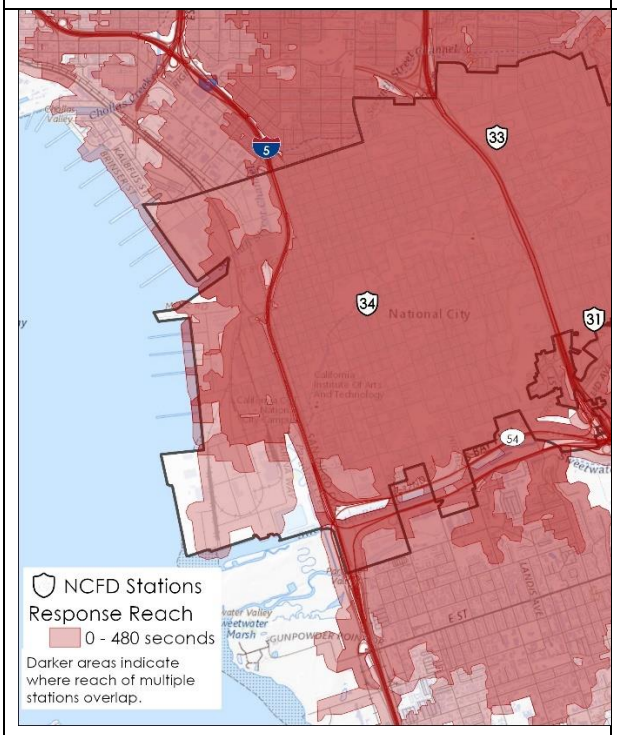
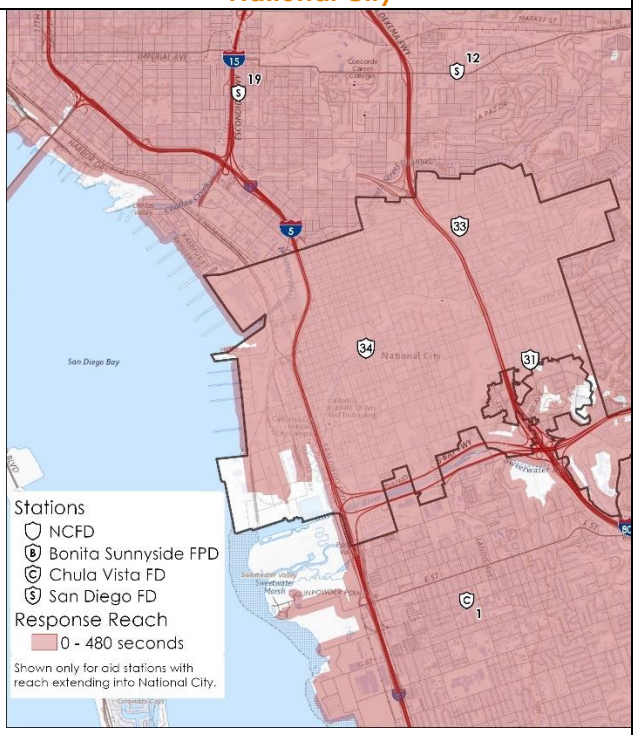
FIGURE 4-7: 480-Second Travel Time Maps

NCFD 480-Second Travel Time	Auto/Mutual Aid 480-Second Travel Time into National City
	

The next two tables depict the NCFD's turnout, travel, and total response times for 2019 and 2020 as an average and at the 90th percentile as benchmarked against the NFPA 1710 standard.

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TABLE 4-9: Average Response Time of First Arriving Unit, by Call Type, 2019 and 2020

Call Type	2019					2020				
	Minutes				Calls	Minutes				Calls
	Dispatch	Turnout	Travel	Total		Dispatch	Turnout	Travel	Total	
False alarm	1.7	1.2	3.5	6.4	300	1.8	1.1	3.9	6.8	203
Good intent	2.3	1.1	5.3	8.7	51	2.0	1.1	4.4	7.6	75
Hazard	1.7	1.2	4.0	6.9	47	1.7	1.0	3.4	6.1	33
Outside fire	1.7	1.3	3.6	6.5	123	1.8	1.2	4.1	7.0	160
Public service	2.3	1.1	4.1	7.5	112	2.0	1.1	4.3	7.3	126
Structure fire	2.2	1.0	2.6	5.8	30	1.7	0.9	3.3	5.8	29
Fire Total	**1.9**	**1.2**	**3.7**	**6.8**	**663**	**1.8**	**1.1**	**4.0**	**7.0**	**626**
EMS Total	**2.0**	**1.0**	**3.3**	**6.4**	**4,991**	**2.1**	**1.1**	**3.7**	**6.8**	**4,738**
Total	**2.0**	**1.1**	**3.4**	**6.5**	**5,654**	**2.1**	**1.1**	**3.7**	**6.9**	**5,364**

TABLE 4-10: 90th Percentile Response Time of First Arriving Unit, by Call Type, 2019 and 2020

Call Type	2019					2020				
	Dispatch	Turnout	Travel	Total	Calls	Dispatch	Turnout	Travel	Total	Calls
False alarm	2.7	2.1	5.5	8.7	300	2.9	2.0	6.1	9.4	203
Good intent	4.7	1.7	10.6	13.8	51	3.6	2.0	6.4	11.0	75
Hazard	2.7	2.0	5.8	10.8	47	3.0	1.5	5.0	8.4	33
Outside fire	2.5	2.0	5.6	9.3	123	3.0	2.1	6.2	9.4	160
Public service	3.5	2.0	6.6	10.8	112	3.9	2.0	7.3	10.8	126
Structure fire	3.3	1.7	4.4	7.7	30	2.4	1.8	5.1	8.2	29
Fire Total	**3.2**	**2.0**	**6.1**	**9.7**	**663**	**3.1**	**2.0**	**6.2**	**9.4**	**626**
EMS Total	**3.5**	**1.8**	**5.2**	**8.6**	**4,991**	**3.6**	**2.0**	**5.5**	**9.3**	**4,738**
Total	**3.5**	**1.8**	**5.3**	**8.7**	**5,654**	**3.5**	**2.0**	**5.6**	**9.3**	**5,364**

The call demands the NCFD experiences have an effect on response travel times when compared to each station's ability to cover its fire management zone in 240 seconds as illustrated in Figure 4-5 above. Companies are at times out of position for the next call and often cross districts for first due responses. This is noted when reviewing the 90th percentile travel times in the table above and discussed in the resiliency section above. Turnout times at the 90th percentile should be reviewed by NCFD leadership to determine if there are any physical issues contributing to the overage in this response time element. This is an element the fire department has the greatest control over.

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SECTION 5. EMS ANALYSIS

NATIONAL CITY EMS PROVIDER BACKGROUND

Emergency medical services (EMS) in National City are provided through a partnership between the National City Fire Department (NCFD) and a contracted ambulance provider, American Medical Response (AMR).

The NCFD provides Advanced Life Support (ALS) medical first response for high-acuity medical responses (Priority 1 and Priority 2), as presumptively determined through an Emergency Medical Dispatch (EMD) call-taking process through San Diego Metro Dispatch. NCFD does not typically respond to low-acuity medical calls (Priority 3 and Priority 4); those responses are managed by an AMR ambulance response only.

Evidence of the effectiveness of this response configuration is demonstrated in the response volume differences between NCFD and AMR.

In 2019, NCFD responded to 5,140 EMS calls (58 percent of all NCFD calls), an average of 14.1 calls per day. Comparatively, AMR responded to 7,328 EMS response in National City, an average of 20.1 calls per day.

This response configuration is an optimal use of ALS first response resources by not committing these resources to low-acuity calls in which an ALS first response would likely not be necessary to affect the patient's outcome. Rather, ALS first response is preserved for the responses in which the arrival of additional ALS resources may have an impact on patient outcomes.

NATIONAL CITY EMS WORKLOAD

The workload of NCFD's units is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs (10,239) than calls (8,846) and the average deployed time per run varies from the average duration per call.

Deployed time, also referred to as deployed hours, is the total deployment time of NCFD units deployed on all runs. The CPSM data analysis shows that the total deployed time for NCFD's 5,596 EMS responses was 1,824.5 hours, an average of 0.326 hours per EMS response, or an average of 19.6 minutes per response.

Another method for measuring workload is *Unit Hour Utilization* (UHU). UHU is a measure of activity, essentially measuring the amount of on-duty time that an EMS response unit is dispatched on a call.

A *Unit Hour* is defined as one unit, fully staffed, equipped and available for a response. For example, one unit on-duty, 24 hours per pay, 365 days per year equates to 8,760 unit hours (1 x 24 x 365). A UHU is derived by dividing the number of *responses* by the total number of *unit hours*.

NCFD staffs three primary EMS response units from three response stations, NCE31, NCSQ33, and NCE34. These three response units responded to 81.6 percent of EMS requests in National City in 2019, with the remaining EMS requests being handled by secondary EMS response units of NCE231, B57, and NCT34.

Using the Unit Hours of NCFD's three primary EMS response units, we derive a Unit Hour staffing of 26,280 hours (3 x 8,760). Dividing the number of responses into the number of Unit Hours, we derive a *response* UHU of 0.213. This essentially means that an NCFD unit is on an EMS response 21.3 percent of the time they are on-duty.

A limitation of the UHU calculation is that it generally presumes that an EMS response will last one hour. However, as referenced earlier, an NCFD unit is typically committed on an EMS call for only an average of 19.6 minutes. Therefore, we can also use a ***time*** analysis to more clearly indicate the percentage of ***time*** that NCFD units are committed on EMS responses.

As referenced, the CPSM data analysis reveals that in 2019, the total time that NCFD units were committed on EMS calls was 1,824.5 hours. Using the 26,280 annual staffed Unit Hours for the three primary EMS response units, we can calculate the percentage of time that NCFD's primary EMS response units were committed on EMS responses as 0.069, or 6.9 percent of their on-duty time. In other words. NCFD's primary EMS first response units maintain an available percentage of 93.1 percent.

EMS response volume is generally not evenly distributed by time of day. Typically, EMS volume peaks during times when people are engaging in activity as opposed to when they are sleeping. Figure 7-6 in the data analysis displays NCFD's average deployed minutes by time of day. Average deployed time peaked between noon and 1:00 p.m., averaging 28.4 minutes. During this time, NCFD typically has three primary EMS first response units on duty (3 unit hours), meaning that even at peak times, only 15.8 percent of on duty time is committed on responses (28.4 minutes ÷ 90 minutes (3 Unit Hours)).

From an EMS response perspective, this represents a very high degree of response capability, because of a very desirable system design in which first response units maintain a high level of availability, while ambulance resources may be committed on much longer task times due to ambulance transport and hospital destination times.

EMS Reliability

A detailed response time analysis for NCFD was completed by CPSM. To review, we separate response time into its identifiable components.

To derive the total response times for NCFD, and as discussed in an earlier section, we analyze three specific time segments:

- **Dispatch time** is the difference between the time a call is received and the earliest time an agency is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch.
- **Turnout time** is the difference between the earliest dispatch time and the earliest time an agency's unit is en route to a call's location.
- **Travel time** is the difference between the earliest en route time and the earliest arrival time. Response time is the total time elapsed between receiving a call to arriving on scene.

CPSM uses two response time measures to evaluate EMS response times, *average* and *fractile*. The average time represents the response time internal at which half of the responses are LESS than that interval, and half are LONGER than that interval. It is a level of performance, but not necessarily a level of reliability.

The 90th percentile measure is a measure of reliability. A 90th percentile analysis determines the response interval in which 90 percent of the EMS response times fall under that interval. In other

words, the response time interval in which only 10 percent of the EMS response time was longer than that 90th percent interval.

For NCFD's EMS responses, the *average and 90th percentile* times for each segment are described in the following tables for 2019.

TABLE 5-1: NCFD Average EMS Response Times

EMS Response Segment	Dispatch	Turnout	Travel	Total
Average, Minutes	2.0	1.0	3.3	6.4

TABLE 5-2: NCFD 90th Percentile EMS Response Times

EMS Response Segment	Dispatch	Turnout	Travel	Total
90th Percentile, Minutes	3.5	1.8	5.2	8.6

The following tables depict the *average* dispatch, turnout, travel, and total response times for all calls to which AMR responded within the National City fire district in 2019.

TABLE 5-3: AMR Average EMS Response Times

AMR Response Segment	Dispatch	Turnout	Travel	Total
Average, Minutes	0.9	0.8	6.4	8.0

TABLE 5-4: AMR 90th Percentile EMS Response Times

AMR Response Segment	Dispatch	Turnout	Travel	Total
90th Percentile, Minutes	2.4	1.8	10.9	13.2

Both the average and fractile response times for AMR are consistent with national standards, and compliant with contractual requirements.

Because of the dual-tier EMS response configuration for Priority 1 and Priority 2 EMS responses, that is, those in which both a NCFD and AMR unit respond, on average an NCFD unit will arrive on scene in 6.4 minutes with an AMR ambulance arriving in 8.0 minutes, or a 1.6-minute time difference. At the 90th percentile level, the time difference is 4.6 minutes.

CPSM was provided 37 monthly AMR response time compliance reports from January 2018 through December 2020. An analysis of these reports revealed that nearly every monthly report showed that AMR was response time compliant with the requirements in their service agreement with National City; in some months AMR achieved a 99 percent compliance rate.

This data analysis depicts a highly functional and reliable EMS response system.

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CONSIDERATION FOR NCFD GROUND AMBULANCE OPERATIONS

As part of our analysis, CPSM has been asked to evaluate the feasibility for NCFD to engage in ground ambulance transport services.

CPSM has been engaged in a multi-year study in San Diego County, which includes a detailed financial analysis for ambulance operations in two County Service Areas (CSAs) within the county. This project has provided us a unique insight into revenues generated from ambulance operations.

For this part of the report, we will begin with potential revenue generation from ground ambulance services provided by NCFD.

Payer Mix

Payer mix refers to the sources of revenue from ground ambulance services. The payer mix impacts the ability for revenue generation since payer sources reimburse ambulance services in vastly different ways. For example, collection percentages from self-pay patients are generally only 2 to 3 percent, while collection rates from commercial insurers is generally much higher. Medicare and Medi-Cal generally pay fixed amounts, but generally less than the cost of providing the service.

Based on our experience with other San Diego County CSAs, National City would likely experience a payer mix shown in the 2022 column of the following table.

TABLE 5-5: National City Projected EMS Payer Mix

Payer	2019	2020	2021	National City
Medicare	14.7%	16.7%	16.5%	15.2%
Medicare MCO	26.9%	30.7%	28.8%	25.5%
Medi-Cal	2.7%	4.3%	4.0%	3.7%
Medi-Cal MCO	17.0%	22.0%	22.6%	22.6%
Dual Eligible	N/A	2.1%	2.2%	2.2%
Commercial	12.0%	16.1%	17.7%	15.3%
Self-Pay	10.9%	6.3%	6.0%	14.1%
Other	15.7%	1.8%	2.1%	1.5%
Total	**99.9%**	**100.0%**	**100.0%**	**100.0%**

Recent trends in employment have led to a shift from commercially insured patients to self-pay, due to people leaving employment with health insurance benefits to start business on their own, or even becoming unemployed. Since reimbursement from self-pay patients tends to be significantly less than commercially insured patients, EMS systems across the country have experienced a reduction in revenue for services provided.

Potential National City Ground Transport Revenues

Revenue from ambulance service is generally based on four factors; transport volume, service mix (ALS/BLS, emergency/non-emergency), ambulance rate schedule, and payer mix (which impacts collection amounts).

For our analysis, we used the prevailing ambulance rate schedule that is consistent with surrounding communities in San Diego County.

TABLE 5-6: Projected Transport Fee Schedule

Ambulance Fee Schedule	HCPCS Code	Fee
ALS Base Emergency	A0427	$2,356.37
ALS Level 2 Emergency	A0433	$2,626.09
Mileage Urban	A0425	$45.27
Oxygen	A0422	$148.52
BLS Base Emergency	A0429	$1,173.37
BLS Base (Non-Emergency)	A0428	$1,058.73
Treat No Transport	A0998	$175.75

Using this fee schedule, we estimate that the Average Patient Charge (APC) for an NCFD-based ambulance service would be $2,816.88, with a net (collected) reimbursement of $567.60 (a 20.15 percent gross collection rate).

Using these predictions, we can estimate the revenue generated by an ambulance service run by NCFD over the next three years as follows:

TABLE 5-7: NCFD 3-Year Estimated EMS Transport Revenues

Year 1		Average Patient Charge	Gross Fees	Collection %	Average Collected	Net Collections
Responses	7,137					
Transports	4,782	$2,816.88	$13,469,729	20.2%	$567.60	$2,714,150
Non-Transports	2,355	$175.75	$413,928	5.0%	$8.79	$20,696
Total			**$13,883,657**			**$2,734,847**
Year 2		**Average Patient Charge**	**Gross Fees**	**Collection %**	**Average Collected**	**Net Collections**
Responses	7,351					
Transports	4,925	$2,901.39	$14,290,035	20.1%	$583.18	$2,872,297
Non-Transports	2,426	$181.02	$439,136	5.0%	$9.05	$21,957
Total			**$14,729,171**			**$2,894,254**
Year 3		**Average Patient Charge**	**Gross Fees**	**Collection %**	**Average Collected**	**Net Collections**
Responses	7,572					
Transports	5,073	$2,988.43	$15,160,298	19.7%	$588.72	$2,986,579
Non-Transports	2,499	$186.45	$465,880	5.0%	$9.32	$23,294
Total			**$15,626,178**			**$3,009,873**

Ambulance service billing is complex, and it is recommended that NCFD use the services of an outside ambulance billing agency for ambulance billing. Generally, contracted billing services charge fees based on the actual revenue collected. These fees are typically 4.5 percent of net collections. Billing expenses are included later in this analysis.

Potential National City Ground Transport Expenses

To provide services comparable to what is currently provided by AMR, NCFD would need to staff three ambulances, 24/7. Based on response volume and overall task times, this would yield a Unit Hour Utilization of 0.300.

TABLE 5-8: NCFD 24/7 Ambulance Needs

	Responses	Transports	Non-Transports	Transport Ratio	Transport Task Time	Non-Transport Task Time	Average Task Time	Total Time on Task	Unit Hour Utilization	Unit Hours Needed	Ambulances Needed
2022	7,137	4,782	2,355	0.670	1.5	0.617	1.21	7,553	0.300	25,178	2.9
2023	7,351	4,925	2,426	0.670	1.5	0.617	1.21	7,780	0.300	25,933	3.0
2024	7,572	5,073	2,499	0.670	1.5	0.617	1.21	8,013	0.300	26,711	3.0

For the projected expenses for running an NCFD-based ambulance system, we presume NCFD would use sworn personnel to staff the ambulances, giving the system additional flexibilities for cross-staffing and cross-functioning personnel that could be deployed for a fire or medical response. We also presume an EMT/Paramedic staffing configuration, since currently, a second paramedic, if needed for ALS patient care, would be typically provided by an engine co-responding on the medical call.

NCFD could use non-sworn, dual-role personnel for ambulance service provision. This would reduce some of the personnel expenses; however, it would also limit the ability of personnel assigned to ambulance duties to fulfill other duties that may be valuable for the city.

For this analysis, we used the pay rates, salary schedule, and shift patterns as outlined in the July 2020 – December 2021 Memorandum of Understanding between National City and the Fire Fighters Association.

Based on these presumptions, and using the current and future pay rates for each position, including the wage differences based on hours worked per week, the staffing configuration and costs for three years is shown in the tables that follow.

TABLE 5-9: NCFD EMS Staffing Cost: Year 1

Ambulance Personnel	Rate	#	Reg. Hours	Regular Wages	Overtime Rate	FLSA Pay (1)	Training Hours (2)	Overtime Wages	Total Wages	Benefit %	Total Expense
A-Shift Ambulance 1 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
B-Shift Ambulance 1 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
C-Shift Ambulance 1 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
A-Shift Ambulance 2 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
B-Shift Ambulance 2 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
C-Shift Ambulance 2 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
A-Shift Ambulance 3 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
B-Shift Ambulance 3 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
C-Shift Ambulance 3 EMT (240 Shift)	$21.63	1.00	2756	$59,611	$32.44	156	10	$5,386	$64,997	45.0%	$94,246
A-Shift Ambulance 1 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
B-Shift Ambulance 1 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
C-Shift Ambulance 1 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
A-Shift Ambulance 2 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
B-Shift Ambulance 2 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
C-Shift Ambulance 2 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
A-Shift Ambulance 3 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
B-Shift Ambulance 3 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
C-Shift Ambulance 3 Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
Floater Paramedic (240 Shift)	$24.51	1.00	2756	$67,540	$36.76	156	20	$6,470	$74,010	45.0%	$107,314
Ambulance Supv./Coordinator/Captain	$40.35	1.00	2080	$83,935	$60.53	104	20	$7,506	$91,441	45.0%	$132,589
Year 1 Total Personnel Expense											**$ 2,053,941**

TABLE 5-10: NCFD EMS Staffing Cost: Year 2

Ambulance Personnel	Rate	#	Reg. Hours	Regular Wages	Overtime Rate	FLSA Pay (1)	Training Hours (2)	Overtime Wages	Total Wages	Benefit %	Total Expense
A-Shift Ambulance 1 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
B-Shift Ambulance 1 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
C-Shift Ambulance 1 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
A-Shift Ambulance 2 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
B-Shift Ambulance 2 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
C-Shift Ambulance 2 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
A-Shift Ambulance 3 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
B-Shift Ambulance 3 EMT (240 Shift)	$22.71	1.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
C-Shift Ambulance 3 EMT (240 Shift)	$22.71	2.00	2756	$62,576	$34.06	156	10	$5,654	$68,230	45.0%	$98,934
A-Shift Ambulance 1 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
B-Shift Ambulance 1 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
C-Shift Ambulance 1 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
A-Shift Ambulance 2 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
B-Shift Ambulance 2 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
C-Shift Ambulance 2 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
A-Shift Ambulance 3 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
B-Shift Ambulance 3 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
C-Shift Ambulance 3 Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
Floater Paramedic (240 Shift)	$25.73	1.00	2756	$70,899	$38.59	156	20	$6,792	$77,691	45.0%	$112,652
Ambulance Supv./Coordinator/Captain	$42.39	1.00	2080	$88,169	$63.58	104	20	$7,884	$96,053	45.0%	$139,278
Year 2 Total Personnel Expense											**$ 2,156,201**

TABLE 5-11: NCFD EMS Staffing Cost: Year 3

Ambulance Personnel	Rate	#	Reg. Hours	Regular Wages	Overtime Rate	FLSA Pay (1)	Training Hours (2)	Overtime Wages	Total Wages	Benefit %	Total Expense
A-Shift Ambulance 1 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
B-Shift Ambulance 1 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
C-Shift Ambulance 1 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
A-Shift Ambulance 2 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
B-Shift Ambulance 2 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
C-Shift Ambulance 2 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
A-Shift Ambulance 3 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
B-Shift Ambulance 3 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	10	$5,937	$71,646	45.0%	$103,887
C-Shift Ambulance 3 EMT (240 Shift)	$23.84	1.00	2756	$65,710	$35.76	156	11	$5,973	$71,682	45.0%	$103,939
A-Shift Ambulance 1 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
B-Shift Ambulance 1 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
C-Shift Ambulance 1 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
A-Shift Ambulance 2 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
B-Shift Ambulance 2 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
C-Shift Ambulance 2 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
A-Shift Ambulance 3 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
B-Shift Ambulance 3 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	20	$7,132	$81,581	45.0%	$118,292
C-Shift Ambulance 3 Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	21	$7,172	$81,621	45.0%	$118,351
Floater Paramedic (240 Shift)	$27.01	1.00	2756	$74,449	$40.52	156	22	$7,213	$81,662	45.0%	$118,410
Ambulance Supv./Coordinator/Captain	$44.49	1.00	2080	$92,546	$66.74	104	21	$8,343	$100,889	45.0%	$146,289
Year 3 Total Personnel Expense											**$2,264,422**

Capital Costs

In addition to the personnel costs, NCFD would need to make capital purchases for the provision of ambulance services. For the purposes of this analysis, we will use annual depreciation estimates based on the predicted useful life of the capital equipment, but it should be noted that the initial costs are listed in the Capital Outlay column of the following table.

TABLE 5-12: NCFD EMS Capital Outlay and Capital Annualized Costs

	Capital Expense	Number Needed	Capital Outlay	Useful Life (Years)	Annual Expense
Ambulance	$350,000	4	$1,400,000	5	$280,000
Cardiac Monitor	$45,000	5	$225,000	7	$32,143
Auto-Load/Stretcher	$35,000	5	$175,000	7	$25,000
Radios	$3,500	12	$42,000	4	$10,500
Mobile Computers	$1,750	5	$8,750	2	$4,375
Total	-	-	**$1,850,750**	-	**$352,018**

Annual Operating Expenses

In addition to personnel and capital expenses, NCFD will have other expenses related to providing ambulance services. These include vehicle expenses such as fuel, maintenance, and tires, but also include additional medical supplies for the additional service level of ambulance provision. These are summarized below for Year 1 and escalated by a factor of 7 percent for subsequent years in our analysis.

TABLE 5-13: NCFD EMS Annualized Operating Costs

Annual Responses	7,137				
Annual Transports	4,782				
Category	**Annual Miles**	**Miles Per Gallon**	**Gallons**	**Price**	**Total**
Fuel	49,959	5	9,992	$5.20	$51,957
	Annual Miles	**Cost per Mile**			**Total**
Maintenance/Tires	49,959	$0.41			$20,483
	Per Response	**Responses**			**Total**
Medical Supplies	$21.00	7,137			$149,877
Equipment Maintenance	$3.50	7,137			$24,980
Total Operations Expense					$247,297

Financial Rollup – NCFD Operated Ambulance Service

Combining the potential revenue and expenses for a NCFD operated ambulance service, the net operating margin for services is summarized in the following table.

TABLE 5-14: NCFD EMS Net Operating Margin

Expense	Year 1	Year 2	Year 3
Personnel	$1,949,373	$2,046,431	$2,149,157
Vehicles/Equipment	$352,018	$369,619	$388,100
Operations	$247,297	$264,608	$283,130
Billing Fees	$130,241	$135,444	$135,444
Total	**$2,678,929**	**$2,816,102**	**$2,955,831**
Revenue	**$2,734,847**	**$2,894,254**	**$3,009,873**
Net From Operations	**$63,091**	**$83,355**	**$54,042**

Note that *operationally*, there is slight retained earnings each year, however, this amount decreases over time, as personnel and operational expenses increase at a faster rate than revenues.

However, AMR currently pays fees to the city for ambulance operations in the city. These fees consist of a $320,000 annual franchise fee, and $80,000 annually for renting space in fire station to house ambulances. It is likely that if NCFD assumed ambulance service provision, the fees would no longer be paid to the City. Adding the loss of $400,000 annually, the total financial impact to the city can be illustrated below.

TABLE 5-15: NCFD EMS Financial Impact

Expense	Year 1	Year 2	Year 3
Personnel	$1,949,373	$2,046,431	$2,149,157
Vehicles/Equipment	$352,018	$369,619	$388,100
Operations	$247,297	$264,608	$283,130
Billing Fees	$123,068	$130,241	$135,444
Total	**$2,671,756**	**$2,810,899**	**$2,955,831**
Revenue	$2,734,847	$2,894,254	$3,009,873
Net From Operations	**$63,091**	**$83,355**	**$54,042**
Loss of AMR Fees	**$ (400,000)**	**$ (400,000)**	**$ (400,000)**
Net to the City	**$ (336,909)**	**$ (316,645)**	**$ (345,958)**

Overall, there will be significant net financial losses to the city if NCFD assumes responsibility for providing ambulance service.

Based on the fact that AMR is providing services that are consistent with the contractual requirements, and the contract is contributing a net financial benefit to the city, it is our recommendation that the current method of ambulance service provision of using an outside contractor be retained, and that NCFD not assume responsibility for providing ambulance services to the city.

Recommendation:

- The current method of ambulance service provision of using an outside contractor should be retained, and the NCFD should not assume responsibility for providing ambulance services to the city. (Recommendation No. 9.)

AMR AMBULANCE SERVICE CONTRACT

AMR is currently operating under a contract with National City that was initially established in 2006. There have been significant changes in National City, as well as with ambulance service delivery over the past 15 years. Additionally, ambulance service providers within the southern San Diego region have changed and there may be other options for contracted ambulance service providers for National City.

Therefore, the city should negotiate with AMR for significant contracting updates or consider options for procuring enhanced service delivery models, either from the current or prospective ambulance service providers.

Recommendation:

- The city should negotiate with AMR for significant contracting updates or consider undergoing an RFP process to seek enhanced service delivery models, either from the current, or prospective ambulance service providers. (Recommendation No. 10.)

MOBILE INTEGRATED HEALTHCARE/COMMUNITY PARAMEDICINE

One of the fastest growing value-added service enhancements in EMS is the development of Mobile Integrated Healthcare / Community Paramedicine (MIH/CP) programs. MIH/CP is comprised of a suite of potential services that EMS could provide to fill gaps in the local healthcare delivery system. In essence, MIH/CP is intended to better manage the increasing EMS call volume and better align the types of care being provided with the needs of the patient. To be effective, MIH/CP is commonly accomplished in a collaborative approach with healthcare and social service agencies within the community.

We believe that there are opportunities for NCFD to use existing service capacity to collaborate with local stakeholders to implement an MIH/CP program to help manage the navigation of patients to treatment options more efficiently.

Recommendation:

- NCFD should engage in discussions with local and regional stakeholders to determine the potential benefits and impact of initiating a Mobile Integrated Healthcare / Community Paramedicine program. (Recommendation No. 11.)

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SECTION 6. FIRE EMERGENCY COMMUNICATIONS SYSTEM

CPSM was asked to review the current fire dispatching system and costs and provide a recommendation on brining this function in-house. The police department currently provides law enforcement dispatch services to the National City Police Department.

The NCFD currently has an agreement with San Diego City for the receiving of fire and medical related emergency calls as a secondary Public Safety Answering Point (PSAP), processing the call, and then dispatching the appropriate response assets as defined in the San Diego metro call algorithms. Key components of this the agreement include:

- Triaging medical calls to ensure the most appropriate resource is dispatched.
- Dispatching the closest available unit via Automatic Vehicle Location (AVL).
- Fire Station Alerting via CAD to station interface utilizing agency self-managed alerting system.
- Mobile Data Computer (MDC) or other mobile platform services such as mapping, live-routing, and loading agency self-managed building pre-plans.
- Records Management System (RMS) services for a CAD-to-Fire RMS interface.

Compensation to San Diego City for the dispatch service is subject to change each fiscal year of the contract and has a base "cost per call" dispatch fee for service. Dispatch fees are based on the adopted 911-Center budget for personnel services and prior year actuals for non-personnel expenditures (agency per-call volume).

National City currently has a five-year agreement with San Diego City for 911 Fire and EMS Dispatch services that became effective July 1, 2019. The agreement has a five-year extension clause. Year-to-year cost increases are based on any increase in call volume, with a five percent increase (plus or minus) service as the base fee escalator. Should NCFD's call volume increase more than five percent, an increase in non-personnel expenditures will increase equal to the percent increase in call volume rounded to the nearest tenth. A five percent escalator applies if the call volume does not increase to a sum equaling five percent. The base agreement cost in 2019 was $361,050. The current fire dispatch agreement cost is $442,000.

CPSM visited the National City Police 911 Center and spoke with the Support Services Manager (SSM) who manages the center. In our conversation with the SSM, CPSM was informed that to bring fire dispatching into the National City 911 Center, the following would have to be added:

- Two 911 Center workstations.
  - Workstation with chair, radio, computer, computer monitors, and ancillary console equipment and interfaces, with a cost of $25,000 to $30,000 per workstation depending on availability of current city radio and computer equipment. Total estimated cost: $50,000 to$60,000. Annualized software support per console would be $500 to $1,000.
- The current CAD system would have to be upgraded with a fire module solution to include all GIS, AVL, RMS Fire Station Alerting, On-screen Tablet Incident Command with GIS and Pre-Plan function, and other interfaces NCFD has with San Diego City. Currently the National City 911 Center only has the module and licensing for a law enforcement module.

- Cost for this is dependent on features and if the current CAD system can perform all the functions the NCFD currently utilizes through San Diego City. Quote from current vendor would be needed to establish start-up and annualized fire CAD solution costs.

- A priority medical dispatch solution would have to be purchased and added to the CAD to continue the efficiency of a prioritized medical dispatch the NCFD is currently operating under.
  - For four radio positions the initial start-up fee is estimated to be $85,000 to $95,000 and includes licensing for four positions, training software, case review software, on-site training, and ancillary components included in the system.
  - Annualized-licensing fees are estimated to be $21,000 to $25,000.
- Two dispatchers per shift (1 call taker, 1 radio position) would have to be added (total of eight personnel).
  - The current starting hourly rate for 911 dispatcher in National City is $27.74/hour. At 2,080 hours/year, the annualized salary is $57,699 (+40% benefits=$80,779). The cost of eight personnel is estimated to be $646,228.
  - The Priority Medical Dispatch solution typically requires a dedicated Quality Assurance staff member. Annualized salary for this position is estimated to be $88,857 (dispatcher salary + 40% benefits +10% for QA supervisory work).

Overall, to implement fire dispatch in the NCPD 911 Center, CPSM estimates it would cost:

- Startup fees, licensing, hardware: $135,000 to $155,000 + current CAD vendor quote to start up a fire CAD system software solution that can perform all functions the NCFD currently utilizes through San Diego City.
- Annualized licensing fees and salaries (no overtime included): $756,585 to $761,085.

During the on-site visit CPSM conducted in March 2022, CPSM visited the San Diego Metro Fire Dispatch Center and spoke the Center's senior staff, and also observed Center operations to include call-taking and dispatching. The center was adequately staffed (average of nine personnel on duty around the clock, including a uniform fire officer who serves as an operational liaison) and was performing all operations without incident. Based on our observations and discussion with NCFD and San Diego dispatch center staff, we view the San Diego center as a high-performing fire and EMS dispatch system.

Recommendation:

- Based on the estimated start-up and annualized costs, the annualized costs for fire dispatching through the National City Police 911 Center would be almost double the cost of the contract with San Diego Metro Fire Dispatch. CPSM strongly recommends that National City continue with the current agreement with San Diego City for fire dispatch services. CPSM does recommend, however, that National City work with San Diego City to reduce the current fire dispatch agreement costs to offset the costs the NCFD incurs as the de facto fire department for Paradise Hills, a situation that was demonstrated in the analysis. (Recommendation No. 12.)

SECTION 7. NCFD DATA ANALYSIS

This data analysis was prepared as a key component of the study of the National City Fire Department (NCFD), which provides fire protection service to the City of National City and surrounding communities. This analysis examines all calls for service between January 1, 2019, and December 31, 2020, as recorded in the regional computer-aided dispatch (CAD) system, with National Fire Incident Reporting System (NFIRS) data obtained from multiple sources. The analysis results are primarily presented for 2019; the results for 2020 are compared with those for the prior year in Attachment I.

This analysis is made up of five parts. The first part focuses on call types and dispatches. The second part explores the time spent and the workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of the studied agency's units. The fifth and final part analyzes the total fire loss.

The NCFD is a multi-service fire department, primarily serving an area of approximately 9.1 square miles and 63,000 residents. It provides fire, rescue, and paramedic first responder emergency medical services (EMS) to the National City Fire District including the City of National City, Lower Sweetwater Fire Protection District, the Port of San Diego, and surrounding communities. The department operates out of three fire stations and utilizes two frontline engines, one fire truck, one squad unit, and one command unit (battalion chief).

In 2019, the NCFD responded to 8,846 calls, of which 58 percent were EMS calls. The total combined workload (deployed time) for NCFD units was 3,105.6 hours. The average response time was 6.5 minutes. The 90th percentile response time was 8.7 minutes.

In 2020, the NCFD responded to 8,481 calls, of which 57 percent were EMS calls. The total combined workload (deployed time) for NCFD units was 3,895.8 hours. The average response time was 6.9 minutes. The 90th percentile response time was 9.3 minutes.

METHODOLOGY

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

We linked the CAD and NFIRS data sets. Then, we classified the calls in a series of steps. We first used the NFIRS incident type to identify canceled calls, motor vehicle accidents (MVA), and fire category call types. Calls identified by NFIRS as EMS calls along with any calls that lacked a matching NFIRS record were categorized using the CAD system's incident descriptions. We describe the method in Attachment VII.

The analysis focuses on calls that involved a responding NCFD unit. We examine aid received by other fire departments within National City in Table 7-1 and provide greater detail in Attachment IV. We analyze American Medical Response's (AMR) EMS calls within National City in a separate section.

We received records for a total of 23,415 calls in 2019 and 2020. We removed 3,150 calls that had no responding units. These calls were canceled, and their cancel reasons are summarized in Attachment VIII. We also removed 2,022 calls in National City where only AMR responded. In addition, we removed 21 calls outside National City that did not record a responding NCFD unit. Finally, we excluded one incident to which the NCFD's administrative unit was the sole responder; however, the workload of administrative units is documented in Attachment II. The remaining 18,221 calls included in this analysis are summarized in Table 7-1.

The main analysis in the following sections focuses on the 8,846 calls in 2019 where NCFD responded inside and outside of its fire district (see the highlighted rows in Table 7-1). All calls outside NCFD's fire district are identified as aid given. The detailed call types for aid given calls are presented in Attachment III. During the two years, NCFD received aid from other fire departments for incidents that occurred inside National City. This included 1,069 calls together with NCFD and 894 calls without a responding NCFD unit. Attachment IV provides further detail for aid received calls.

TABLE 7-1: Studied Calls by Location, Responding Agency, and Year

Location	Responding Agency	2019	2020	Total
Inside NCFD District	NCFD only	6,193	5,821	12,014
	NCFD and FD agencies	499	570	1,069
	NCFD Total	**6,692**	**6,391**	**13,083**
	Other FD agencies only	452	442	894
	Total	**7,144**	**6,833**	**13,977**
Outside NCFD District	**NCFD Total**	**2,154**	**2,090**	**4,244**
Total		**9,298**	**8,923**	**18,221**

Observations:

- Of all calls involving NCFD, 76 and 75 percent were inside the National City fire district in 2019 and 2020, respectively.
- Of all calls within the National City fire district, outside agencies responded independently to 6 percent of calls in both years.

AGGREGATE CALL TOTALS AND RUNS

In 2019, NCFD responded to 8,846 calls, of which, 6,692 occurred inside and 2,154 occurred outside the National City fire district, respectively. During the year, there were 31 structure fire calls and 125 outside fire calls within the National City fire district.

Calls by Type

Table 7-2 shows the number of calls that NCFD responded to by call type, average calls per day, and the percentage of calls that fall into each call type category. Figures 7-1 and 7-2 show the percentage of calls that fall into each EMS (Figure 7-1) and fire (Figure 7-2) type category.

TABLE 7-2: Calls by Type

Call Type	Total Calls	Calls per Day	Call Percentage
Breathing difficulty	722	2.0	8.2
Cardiac and stroke	779	2.1	8.8
Fall and injury	999	2.7	11.3
Illness and other	1,344	3.7	15.2
MVA	407	1.1	4.6
Overdose and psychiatric	151	0.4	1.7
Seizure and unconsciousness	738	2.0	8.3
EMS Total	**5,140**	**14.1**	**58.1**
False alarm	318	0.9	3.6
Good intent	56	0.2	0.6
Hazard	48	0.1	0.5
Outside fire	125	0.3	1.4
Public service	121	0.3	1.4
Structure fire	31	0.1	0.4
Fire Total	**699**	**1.9**	**7.9**
Canceled	853	2.3	9.6
Aid given	2,154	5.9	24.3
Total	**8,846**	**24.2**	**100.0**

FIGURE 7-1: EMS Calls by Type

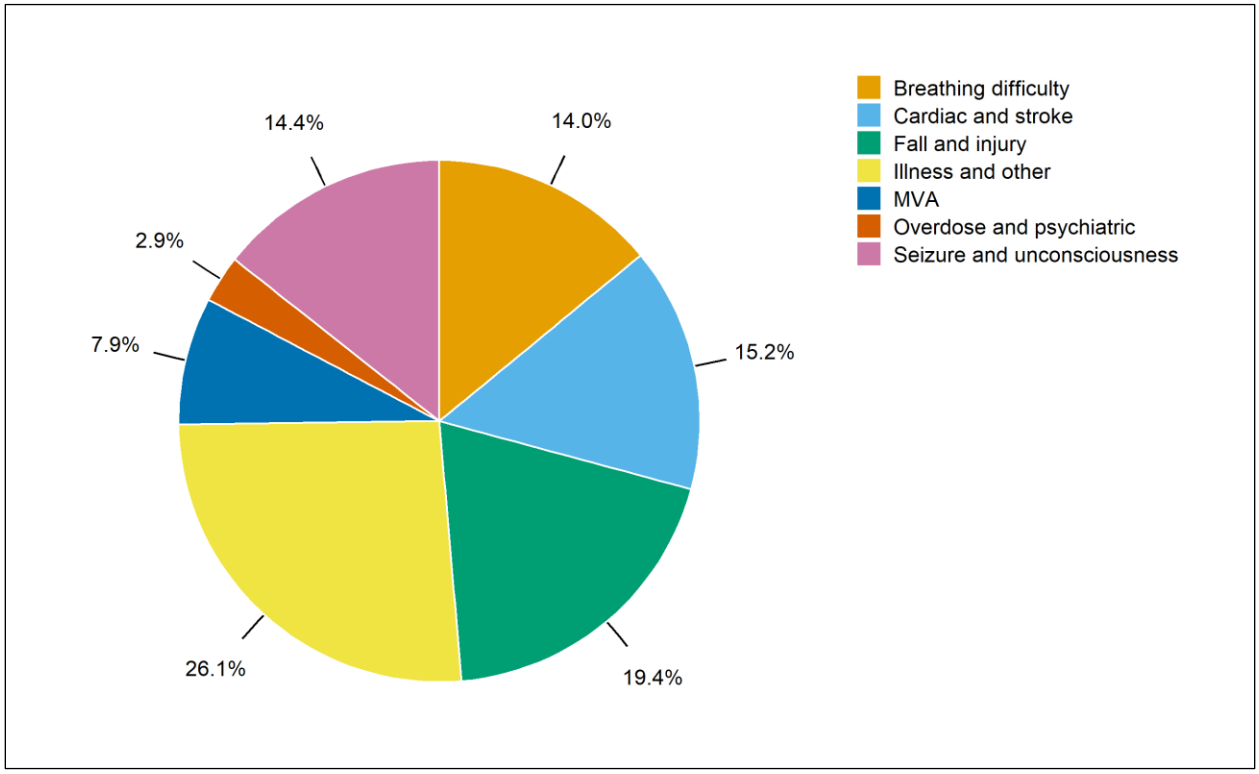
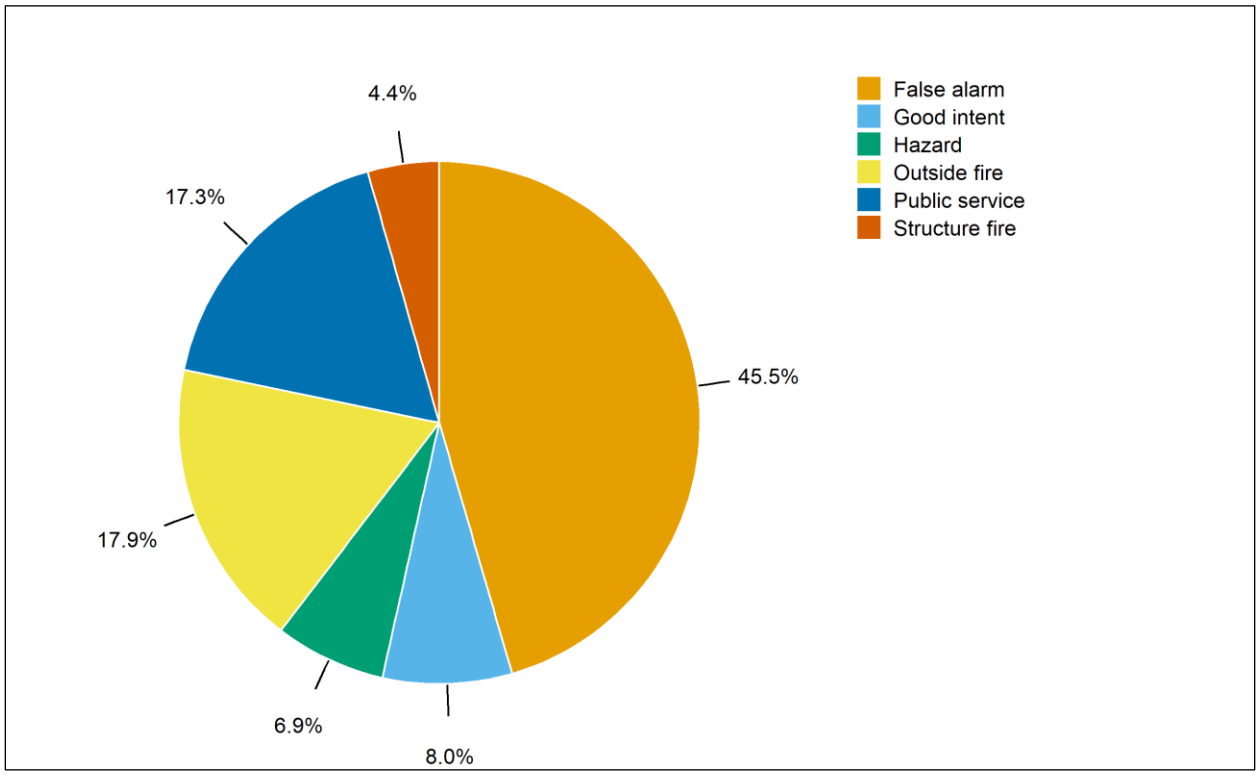


FIGURE 7-2: Fire Calls by Type



Observations:

- In 2019, NCFD responded to an average of 24.2 calls per day, including 2.3 canceled (10 percent) and 5.9 (24 percent) mutual aid calls per day.
- EMS calls for the year totaled 5,140 (58 percent of all calls), an average of 14.1 calls per day.
  - Illness and other calls were the largest category of EMS calls at 15 percent of total calls (26 percent of EMS calls).
  - Motor vehicle accidents (MVA) made up 5 percent of total calls (8 percent of EMS calls).
  - Cardiac and stroke calls made up 9 percent of total calls (15 percent of EMS calls).
- Fire calls for the year totaled 699 (8 percent of all calls), or an average of 1.9 calls per day.
  - False alarm calls made up 4 percent of total calls (45 percent of fire calls).
  - Structure and outside fire calls combined made up 2 percent of total calls (22 percent of fire calls), or an average of 0.4 calls per day, or one call every 2.3 days.

Calls by Type and Duration

The following table shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and two or more hours.

TABLE 7-3: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	Two or More Hours	Total
Breathing difficulty	633	84	5	0	722
Cardiac and stroke	662	81	34	2	779
Fall and injury	876	102	20	1	999
Illness and other	1,212	117	14	1	1,344
MVA	359	39	9	0	407
OD	136	13	2	0	151
Seizure and UNC	642	84	12	0	738
EMS Total	**4,520**	**520**	**96**	**4**	**5,140**
False alarm	289	25	4	0	318
Good intent	52	3	1	0	56
Hazard	34	12	2	0	48
Outside fire	84	29	10	2	125
Public service	95	18	5	3	121
Structure fire	18	5	4	4	31
Fire Total	**572**	**92**	**26**	**9**	**699**
Canceled	837	11	5	0	853
Aid given	1,883	210	44	17	2,154
Total	**7,812**	**833**	**171**	**30**	**8,846**

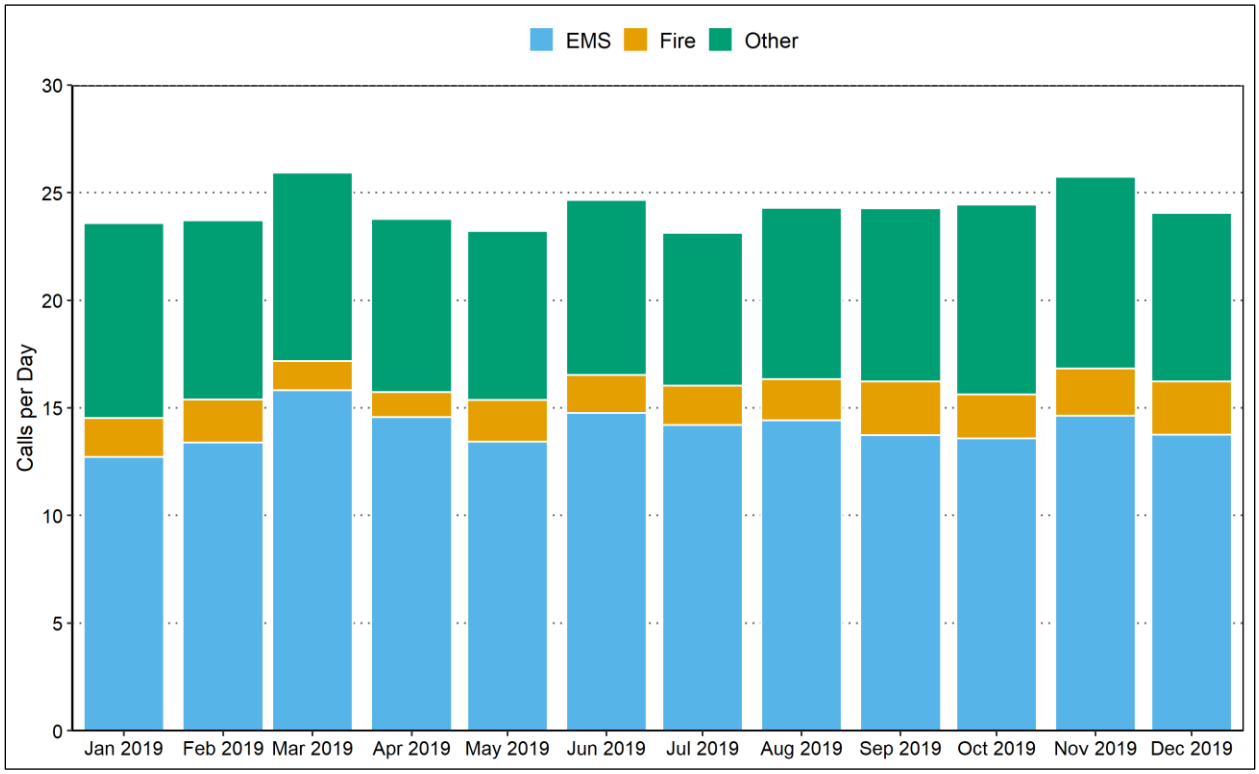
Observations:

- A total of 5,040 EMS calls (98.1 percent) lasted less than one hour, 96 EMS calls (1.9 percent) lasted one to two hours, and 4 EMS calls (0.1 percent) lasted two or more hours.
- A total of 664 fire calls (95.0 percent) lasted less than one hour, 26 fire calls (3.7 percent) lasted one to two hours, and 9 fire calls (1.3 percent) lasted two or more hours.
- A total of 113 outside fire calls (90.4 percent) lasted less than one hour, 10 outside fire calls (8.0 percent) lasted one to two hours, and two outside fire calls (1.6 percent) lasted two or more hours.
- A total of 23 structure fire calls (74.2 percent) lasted less than one hour, four structure fire calls (12.9 percent) lasted one to two hours, and four structure fire calls (12.9 percent) lasted two or more hours.

Average Calls by Month and Hour of Day

Figure 7-3 shows the monthly variation in the average daily number of calls handled by NCFD in 2019. Similarly, Figure 7-4 illustrates the average number of calls received each hour of the day.

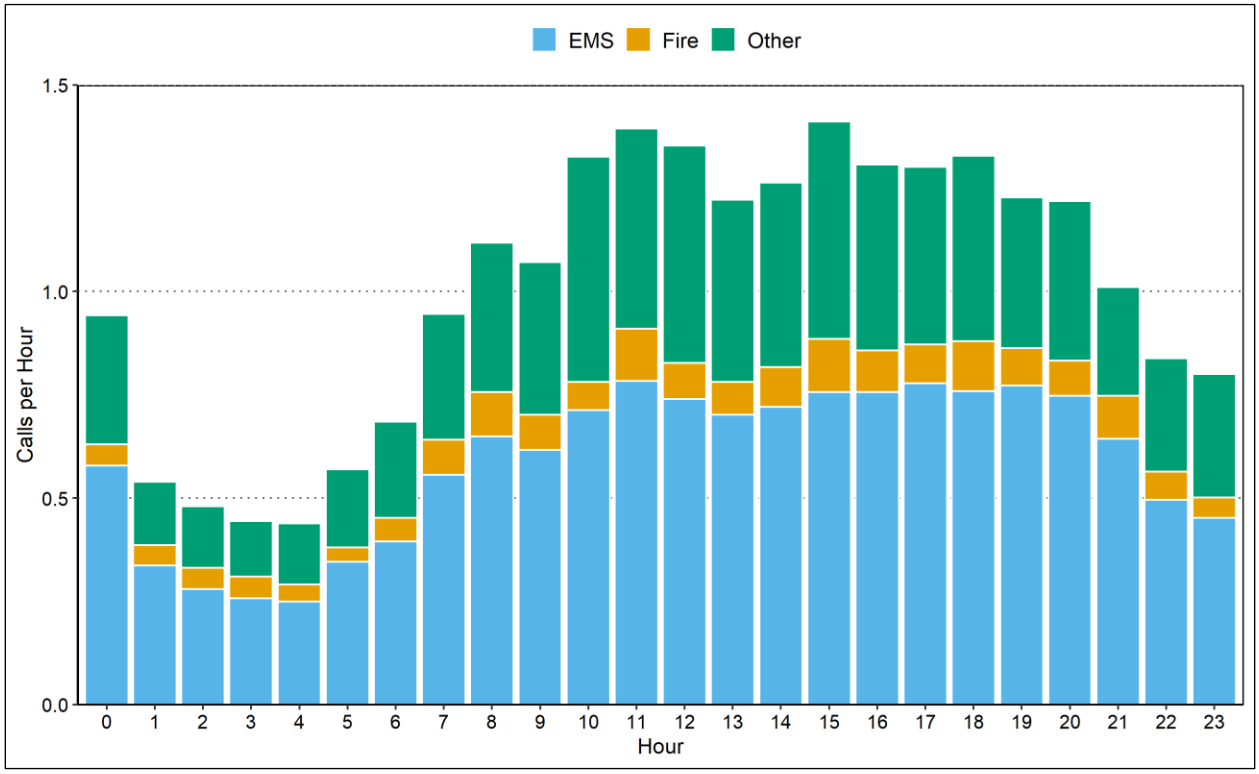
FIGURE 7-3: Calls per Day by Month



Observations:

- EMS calls per day ranged from 12.7 in January 2019 to 15.8 in March 2019.
- Fire calls per day ranged from 1.2 in April 2019 to 2.5 in September 2019.
- Other calls per day ranged from 7.1 in July 2019 to 9.1 in January 2019.
- Total calls per day ranged from 23.1 in July 2019 to 25.9 in March 2019.

FIGURE 7-4: Average Calls by Hour of Day



Observations:

- Average EMS calls per hour ranged from 0.25 between 4:00 a.m. and 5:00 a.m. to 0.78 between 11:00 a.m. and noon.
- Average fire calls per hour ranged from 0.04 between 5:00 a.m. and 6:00 a.m. to 0.13 between 3:00 p.m. and 4:00 p.m.
- Average other calls per hour ranged from 0.13 between 3:00 a.m. and 4:00 a.m. to 0.55 between 10:00 a.m. and 11:00 a.m.
- Average total calls per hour ranged from 0.44 between 4:00 a.m. and 5:00 a.m. to 1.41 between 3:00 p.m. and 4:00 p.m.

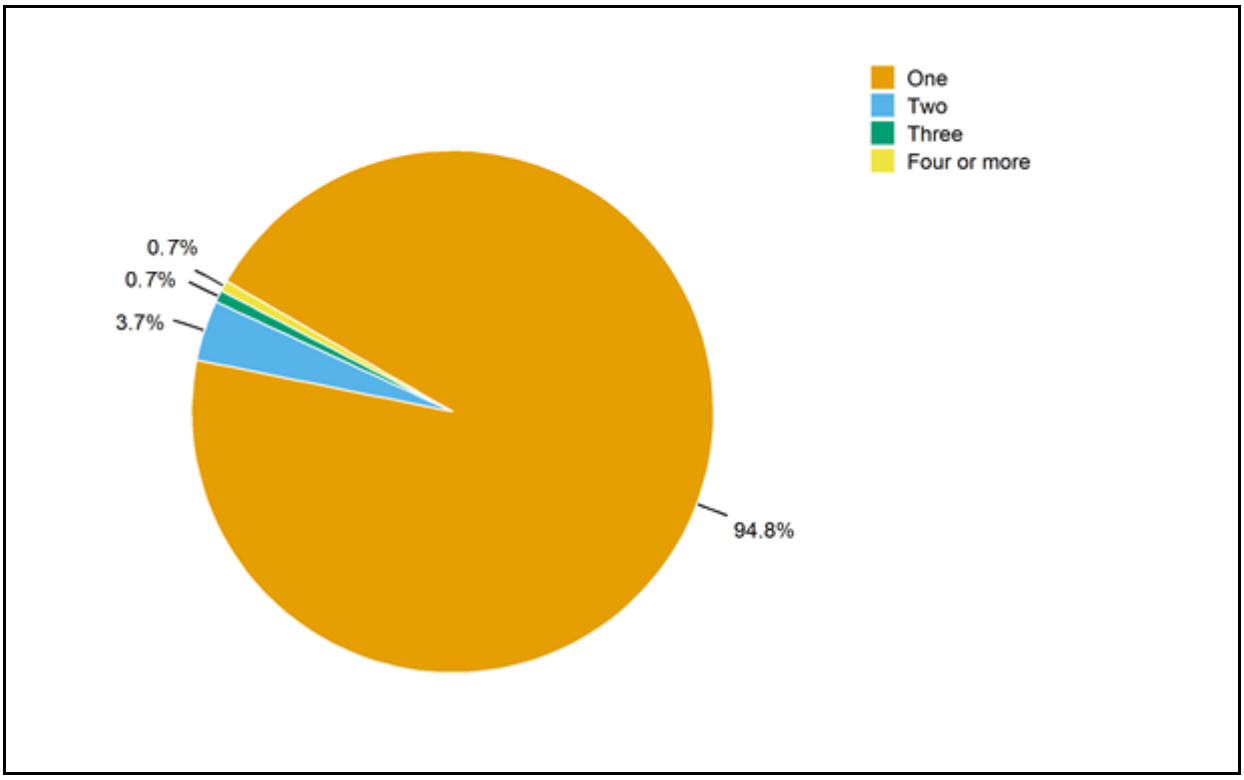
Units Arriving at Calls

In this section, we limit ourselves to calls where a unit from NCFD arrived. For this reason, there are fewer calls in Table 7-4 than in Table 7-2. For 2019, Table 7-4, along with Figure 7-5, detail the number of calls with one, two, three, and four or more NCFD units arriving at a call, broken down by call type.

TABLE 7-4: Calls by Call Type and Number of Arriving NCFD Units

Call Type	Number of Units				Total Calls
	One	Two	Three	Four or More	
Breathing difficulty	715	0	1	0	716
Cardiac and stroke	743	31	0	0	774
Fall and injury	975	3	0	0	978
Illness and other	1,298	22	1	1	1,322
MVA	319	61	12	1	393
Overdose and psychiatric	138	0	0	0	138
Seizure and unconsciousness	728	6	0	0	734
EMS Total	**4,916**	**123**	**14**	**2**	**5,055**
False alarm	233	63	4	5	305
Good intent	49	4	1	0	54
Hazard	41	2	3	2	48
Outside fire	92	14	9	9	124
Public service	111	6	1	2	120
Structure fire	6	5	2	18	31
Fire Total	**532**	**94**	**20**	**36**	**682**
Canceled	400	20	1	1	422
Aid given	1,513	53	23	14	1,603
Total	**7,361**	**290**	**58**	**53**	**7,762**
Percentage	**94.8**	**3.7**	**0.7**	**0.7**	**100.0**

FIGURE 7-5: Calls by Number of Arriving NCFD Units



Observations:

Overall

- On average, 1.1 units arrived at all calls; for 94.8 percent of calls, only one unit arrived.
- Overall, four or more units arrived at 0.7 percent of calls.

EMS

- On average, 1.0 units arrived per EMS call.
- For EMS calls, one unit arrived 97.3 percent of the time, two units arrived 2.4 percent of the time, three units arrived 0.3 percent of the time, and four units arrived less than 0.1 percent of the time.

Fire

- On average, 1.4 units arrived per fire call.
- For fire calls, one unit arrived 78.0 percent of the time, two units arrived 13.8 percent of the time, three units arrived 2.9 percent of the time, and four or more units arrived 5.3 percent of the time.
- For outside fire calls, three or more units arrived 14.5 percent of the time.
- For structure fire calls, three or more units arrived 64.5 percent of the time.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of NCFD's units is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs (10,239) than calls (8,846) and the average deployed time per run varies from the average duration per call.

Runs and Deployed Time – NCFD Units

Deployed time, also referred to as deployed hours, is the total deployment time of NCFD units deployed on all runs. Table 7-5 shows the total deployed time, both overall and broken down by type of run, for all non-administrative NCFD units in 2019. Table 7-6 and Figure 7-6 present the average deployed minutes by hour of day.

TABLE 7-5: Annual Runs and Deployed Time by Run Type

Run Type	Deployed Minutes per Run	Total Annual Hours	Percent of Total Hours	Deployed Minutes per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	20.0	251.2	8.1	41.3	753	2.1
Cardiac and stroke	22.2	315.3	10.2	51.8	851	2.3
Fall and injury	20.1	349.7	11.3	57.5	1,046	2.9
Illness and other	17.9	433.4	14.0	71.2	1,451	4.0
MVA	17.2	160.3	5.2	26.4	558	1.5
OD	18.4	47.5	1.5	7.8	155	0.4
Seizure and UNC	20.5	267.1	8.6	43.9	782	2.1
EMS Total	**19.6**	**1,824.5**	**58.8**	**299.9**	**5,596**	**15.3**
False alarm	13.5	103.1	3.3	16.9	459	1.3
Good intent	15.8	17.9	0.6	2.9	68	0.2
Hazard	17.5	22.5	0.7	3.7	77	0.2
Outside fire	25.1	89.3	2.9	14.7	213	0.6
Public service	23.0	57.5	1.9	9.4	150	0.4
Structure fire	41.1	81.5	2.6	13.4	119	0.3
Fire Total	**20.5**	**371.8**	**12.0**	**61.1**	**1,086**	**3.0**
Canceled	7.0	123.6	4.0	20.3	1,060	2.9
Aid given	18.9	785.7	25.3	129.2	2,497	6.8
Other Total	**15.3**	**909.3**	**29.3**	**149.5**	**3,557**	**9.7**
Total	**18.2**	**3,105.6**	**100.0**	**510.5**	**10,239**	**28.1**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness.

Observations:

Overall

- The total deployed time for 2019 was 3,105.6 hours. The daily average was 8.5 hours for all NCFD units combined.
- There were 10,239 runs, including 1,060 runs dispatched for canceled calls and 2,497 runs dispatched for aid given calls. The daily average was 28.1 runs.

EMS

- EMS runs accounted for 59 percent of the total workload.
- The average deployed time for EMS runs was 19.6 minutes. The deployed time for all EMS runs averaged 5.0 hours per day.

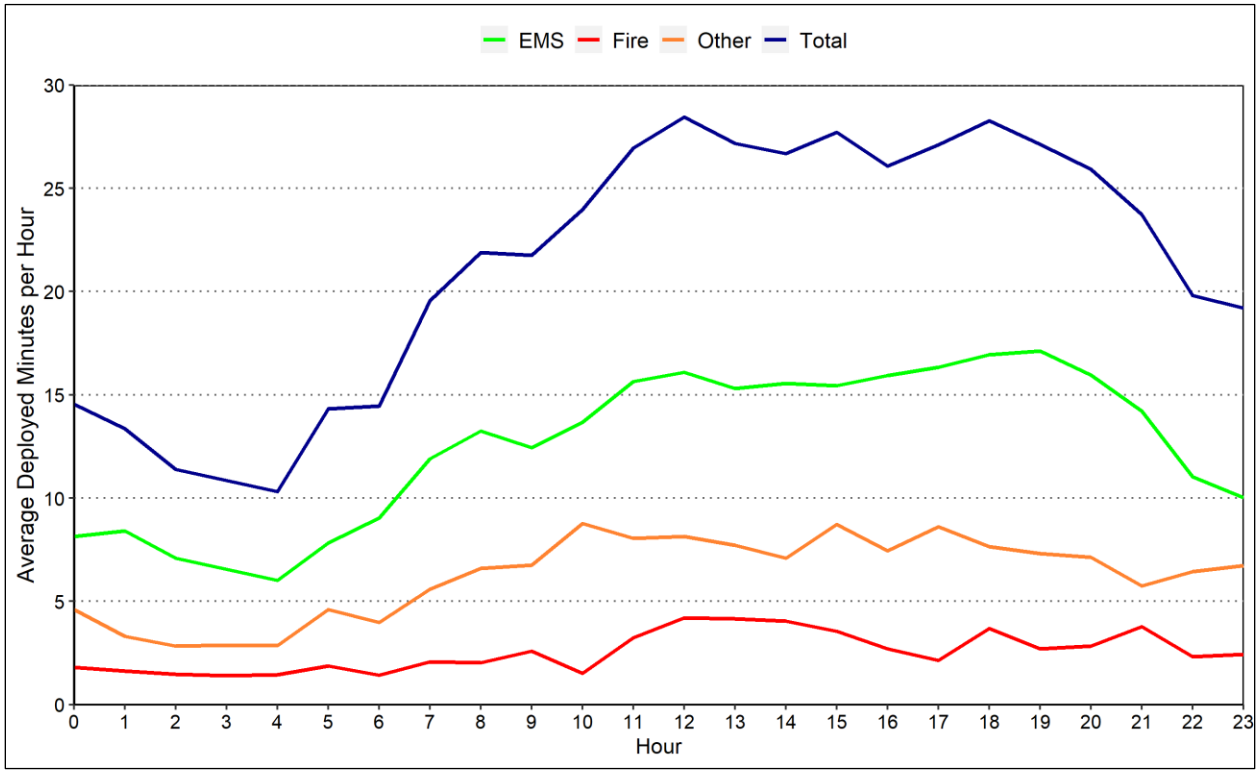
Fire

- Fire runs accounted for 12 percent of the total workload.
- The average deployed time for fire runs was 20.5 minutes. The deployed time for all fire runs averaged 1.0 minutes per day.
- There were 332 runs for structure and outside fire calls combined, with a total workload of 170.8 hours. This accounted for 5 percent of the total workload.
- The average deployed time for outside fire runs was 25.1 minutes per run, and the average deployed time for structure fire runs was 41.1 minutes per run.

TABLE 7-6: Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	8.1	1.8	4.6	14.5
1	8.4	1.6	3.3	13.4
2	7.1	1.5	2.8	11.4
3	6.6	1.4	2.9	10.8
4	6.0	1.4	2.9	10.3
5	7.8	1.9	4.6	14.3
6	9.0	1.4	4.0	14.4
7	11.9	2.1	5.6	19.6
8	13.2	2.0	6.6	21.9
9	12.4	2.6	6.8	21.8
10	13.7	1.5	8.8	24.0
11	15.6	3.2	8.1	26.9
12	16.1	4.2	8.2	28.4
13	15.3	4.2	7.7	27.2
14	15.6	4.1	7.1	26.7
15	15.4	3.6	8.7	27.7
16	15.9	2.7	7.4	26.1
17	16.3	2.2	8.6	27.1
18	16.9	3.7	7.7	28.3
19	17.1	2.7	7.3	27.1
20	16.0	2.8	7.1	25.9
21	14.2	3.8	5.8	23.7
22	11.0	2.3	6.4	19.8
23	10.0	2.4	6.7	19.2
Daily Avg.	**299.9**	**61.1**	**149.5**	**510.5**

FIGURE 7-6: Average Deployed Minutes by Hour of Day



Observations:

- Hourly deployed time was highest during the day from 11:00 a.m. to 9:00 p.m., averaging more than 26 minutes per hour.
- Average deployed time peaked between noon and 1:00 p.m., averaging 28.4 minutes.
- Average deployed time was lowest between 4:00 a.m. and 5:00 a.m., averaging 10.3 minutes.

Workload by Unit

Table 7-7 provides a summary of each NCFD unit's workload for the year. Tables 7-8 and 7-9 provide a more detailed view of workload, showing each unit's runs broken out by run type (Table 7-8) and its daily average deployed time by run type (Table 7-9).

TABLE 7-7: Workload by Unit

Station	Unit	Unit Type	Deployed Minutes per Run	Total Hours	Total Pct.	Deployed Minutes per Day	Total Runs	Runs per Day
31	NCE31	Engine	18.1	915.3	29.5	150.5	3,031	8.3
	NCE231	Engine	12.3	0.6	0.0	0.1	3	0.0
	Total		**18.1**	**915.9**	**29.5**	**150.6**	**3,034**	**8.3**
33	NCSQ33	Squad	**20.2**	**742.2**	**23.9**	**122.0**	**2,201**	**6.0**
34	B57	Battalion	18.9	145.2	4.7	23.9	462	1.3
	NCE34	Engine	17.4	1,011.5	32.6	166.3	3,495	9.6
	NCE234	Engine	648.0	10.8	0.3	1.8	1	0.0
	NCT34	Truck	16.1	280.0	9.0	46.0	1,046	2.9
	Total		**17.4**	**1,447.5**	**46.6**	**237.9**	**5,004**	**13.7**
Total			**18.2**	**3,105.6**	**100.0**	**510.5**	**10,239**	**28.1**

TABLE 7-8: Total Runs by Run Type and Unit

Station	Unit	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Cancel	Aid Given	Total
31	NCE31	1,279	101	27	21	68	31	26	279	1,199	3,031
	NCE231	2	0	0	0	0	0	0	1	0	3
	Total	**1,281**	**101**	**27**	**21**	**68**	**31**	**26**	**280**	**1,199**	**3,034**
33	NCSQ33	**1,773**	**76**	**12**	**13**	**29**	**37**	**23**	**229**	**9**	**2,201**
34	B57	33	12	3	6	28	5	22	17	336	462
	NCE34	2,008	181	22	29	65	60	22	428	680	3,495
	NCE234	0	0	0	0	0	0	0	0	1	1
	NCT34	501	89	4	8	23	17	26	106	272	1,046
	Total	**2,542**	**282**	**29**	**43**	**116**	**82**	**70**	**551**	**1,289**	**5,004**
Total		**5,596**	**459**	**68**	**77**	**213**	**150**	**119**	**1,060**	**2,497**	**10,239**

Note: See Table 7-7 for unit type.

TABLE 7-9: Deployed Minutes per Day by Run Type and Unit

Station	Unit	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Cancel	Aid Given	Total
31	NCE31	66.1	3.3	1.1	1.0	4.8	1.3	2.9	4.7	65.1	150.5
	NCE231	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Total	**66.2**	**3.3**	**1.1**	**1.0**	**4.8**	**1.3**	**2.9**	**4.7**	**65.1**	**150.6**
33	NCSQ33	**107.0**	**2.6**	**0.3**	**0.7**	**1.8**	**1.7**	**2.3**	**5.4**	**0.2**	**122.0**
34	B57	1.4	0.3	0.2	0.2	1.5	0.9	2.0	0.3	17.1	23.9
	NCE34	104.1	7.7	1.1	1.4	5.0	4.3	2.9	8.1	31.7	166.3
	NCE234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.8
	NCT34	21.2	3.0	0.3	0.4	1.5	1.3	3.3	1.8	13.3	46.0
	Total	**126.7**	**11.0**	**1.5**	**2.0**	**8.1**	**6.4**	**8.2**	**10.2**	**63.9**	**237.9**
Total		**299.9**	**16.9**	**2.9**	**3.7**	**14.7**	**9.4**	**13.4**	**20.3**	**129.2**	**510.5**

Note: See Table 7-7 for unit type.

Observations:

- Station 34 made the most runs (5,004 or an average of 13.7 runs per day) and had the highest total annual deployed time (1,447.5 or an average of 4.0 hours per day).
  - EMS calls accounted for 51 percent of runs and 53 percent of total deployed time.
  - Outside and structure fire calls accounted for 4 percent of runs and 7 percent of total deployed time.
- Station 31 made the second-most runs (3,034 or an average of 8.3 runs per day) and had the second-highest total annual deployed time (915.9 or an average of 2.5 hours per day).
  - EMS calls accounted for 42 percent of runs and 44 percent of total deployed time.
  - Outside and structure fire calls accounted for 3 percent of runs and 5 percent of total deployed time.
- Unit NCE34 made the most runs (3,495 or an average of 9.6 runs per day) and had the highest total annual deployed time (1,011.5 or an average of 2.8 hours per day).
  - EMS calls accounted for 57 percent of runs and 63 percent of total deployed time.
  - Outside and structure fire calls accounted for 2 percent of runs and 5 percent of total deployed time.
- Unit NCE31 made the second most runs (3,031 or an average of 8.3 runs per day) and had the second-highest total annual deployed time (915.3 or an average of 2.5 hours per day).
  - EMS calls accounted for 42 percent of runs and 44 percent of total deployed time.
  - Outside and structure fire calls accounted for 3 percent of runs and 5 percent of total deployed time.

Workload by Fire District

Table 7-10 breaks down the agency's workload by fire district. Table 7-11 provides further detail for the workload associated with structure and outside fire calls. Table 7-11 includes the aid given runs to outside and structure fires outside the National City fire district.

TABLE 7-10: Annual Workload by Fire District

District	Calls	Pct. Annual Calls	Runs	Runs Per Day	Deployed Minutes Per Run	Annual Hours	Pct. Annual Work	Deployed Minutes Per Day
National City	6,692	75.7	7,742	21.2	18.0	2,319.9	74.7	381.3
San Diego City	1,323	15.0	1,495	4.1	19.8	494.5	15.9	81.3
Chula Vista	699	7.9	864	2.4	15.6	225.1	7.2	37.0
San Diego County	101	1.1	105	0.3	32.4	56.8	1.8	9.3
Imperial Beach	21	0.2	21	0.1	13.0	4.5	0.1	0.7
Coronado	7	0.1	9	0.0	29.0	4.4	0.1	0.7
Lemon Grove	3	0.0	3	0.0	9.3	0.5	0.0	0.1
Total	**8,846**	**100.0**	**10,239**	**28.1**	**18.2**	**3,105.6**	**100.0**	**510.5**

TABLE 7-11: Structure and Outside Fire Runs by Fire District

District	Structure Fire Runs	Structure Fires Deployed Min. per Run	Outside Fire Runs	Outside Fires Deployed Min. per Run	Hours for Structure and Outside Fires	Pct. of Structure and Outside Fire Workload
National City	119	41.1	213	25.1	170.8	51.3
San Diego	122	22.9	44	62.1	92.2	27.7
Chula Vista	75	34.3	36	22.0	56.1	16.8
Imperial Beach	12	17.6	0	NA	3.5	1.0
San Diego County	3	53.9	3	78.6	6.6	2.0
Coronado	2	119.0	0	NA	4.0	1.2
Total	**333**	**32.7**	**296**	**30.8**	**333.2**	**100.0**

Note: All runs outside the National City fire district were mutual aid. The runs within National City match the number of runs described in Table 7-5.

Observations:

National City Fire

- There were 6,692 calls or 76 percent of the total calls.
- There were 7,742 runs or 21.2 runs per day.
- Total deployed time for the year was 2,319.9 hours or 75 percent of the total annual workload. The daily average was 381.3 minutes for all units combined.

San Diego Fire

- There were 1,323 calls or 15 percent of the total calls.
- There were 1,495 runs or 4.1 runs per day.
- Total deployed time for the year was 494.5 hours or 16 percent of the total annual workload. The daily average was 81.3 minutes for all units combined.

Chula Vista Fire

- There were 699 calls or 8 percent of the total calls.
- There were 864 runs or 2.4 runs per day.
- Total deployed time for the year was 225.1 hours or seven percent of the total annual workload. The daily average was 37.0 minutes for all units combined.

Other

- There were 132 calls or one percent of the total calls.
- There were 138 runs or 0.4 runs per day.
- Total deployed time for the year was 66.2 hours or two percent of the total annual workload. The daily average was 10.9 minutes for all units combined.

ANALYSIS OF BUSIEST HOURS

In this analysis, we included all 9,298 calls that occurred inside and outside National City's fire district in 2019. For these calls, there is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 7-12 shows the number of hours in the year in which there were zero to six and more calls during the hour. Table 7-13 shows the ten one-hour intervals which had the most calls during the year. Table 7-14 examines the number of times a call overlapped with another call in each station area in 2019.

TABLE 7-12: Frequency Distribution of the Number of Calls by Year

Calls in an Hour	Frequency	Percentage
0	3,297	37.6
1	2,938	33.5
2	1,641	18.7
3	582	6.6
4	217	2.5
5	62	0.7
6+	23	0.3
Total	**8,760**	**100.0**

TABLE 7-13: Top Ten Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
5/14/2019, midnight to 1:00 a.m.	10	10	3.1
3/5/2019, midnight to 1:00 a.m.	9	12	2.2
11/28/2019, 11:00 a.m. to noon	8	19	2.8
7/20/2019, 2:00 p.m. to 3:00 p.m.	8	13	4.9
6/3/2019, midnight to 1:00 a.m.	8	11	1.7
10/31/2019, 11:00 a.m. to noon	8	10	1.0
11/15/2019, 2:00 p.m. to 3:00 p.m.	7	7	2.0
4/12/2019, 2:00 p.m. to 3:00 p.m.	6	10	2.4
1/8/2019, 3:00 p.m. to 4:00 p.m.	6	9	2.6
12/28/2019, 3:00 p.m. to 4:00 p.m.	6	9	2.4

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour. The deployed time from these calls may extend into the next hour or hours. The number of runs and deployed hours includes all units from the studied agencies. Here we considered units from all responding agencies

TABLE 7-14: Frequency of Overlapping Calls

Station	Scenario	Number of Calls	Percent of All Calls	Total Hours
31	No overlapped call	2,862	87.1	995.8
	Overlapped with one call	380	11.6	65.9
	Overlapped with two calls	41	1.2	4.8
	Overlapped with three calls	3	0.1	0.5
34	No overlapped call	3,289	85.3	1,048.1
	Overlapped with one call	505	13.1	87.6
	Overlapped with two calls	55	1.4	7.6
	Overlapped with three calls	7	0.2	0.6
	Overlapped with four calls	2	0.1	0.0
Outside	No overlapped call	1,968	91.4	631.1
	Overlapped with one call	173	8.0	34.3
	Overlapped with two calls	13	0.6	1.3

Table 7-15 examines each NCFD station's availability to respond to calls within its first due area. At the same time, it focuses on calls where at least one unit (NCFD or another FD agency) eventually arrived and ignores calls where no unit arrived. While there were 7,144 calls within National City's fire district (See Table 7-1, the fifth row of the "Total" column), there were 573 calls without an arriving unit.

TABLE 7-15: NCFD Station Availability to Respond to Calls

Station	Calls in Area	First Due Responded	First Due Arrived	First Due First	Percent Responded	Percent Arrived	Percent First
31	3,063	1,430	1,347	1,270	46.7	44.0	41.5
34	3,508	2,700	2,639	2,588	77.0	75.2	73.8
Total	**6,571**	**4,130**	**3,986**	**3,858**	**62.9**	**60.7**	**58.7**

Note: For each station, we count the number of calls occurring within its first due area. Then, we count the number of calls to where at least one unit arrived. Next, we focus on units from the first due station to see if any of its units responded, arrived, or arrived first.

Observations:

- During 23 hours (0.3 percent of all hours), six or more calls occurred; in other words, the department responded to six or more calls in an hour roughly once every 16 days.
  - The highest number of calls to occur in an hour was 10, which happened once.
- The hour with the most calls was from midnight to 1:00 a.m. on May 14, 2019. The hour's 10 calls involved 10 individual dispatches resulting in 3.1 hours of deployed time. These 10 calls included three cardiac and stroke calls, two illness and other calls, two MVA calls, one breathing difficulty call, one fall and injury call, and one seizure and unconsciousness call.

RESPONSE TIME

In this part of the analysis, we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is en route to a call's location. *Travel time* is the difference between the time en route and arrival on scene. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, we included all calls within the National City fire district to which at least one non-administrative NCFD unit arrived. Units from non-NCFD agencies were also included. Also, calls with a total response time exceeding 30 minutes were excluded. In addition, non-emergency calls were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, for 8,846 calls in 2019, we excluded 2,154 aid given calls (outside National City), 853 canceled calls, one non-emergency call, 43 calls where no units recorded a valid on-scene time, 85 calls with a total response time exceeding 30 minutes, and 56 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, in this section, a total of 5,654 calls are included in the analysis. Using the same method, we obtained 5,364 calls for the same analysis for 2020. 2020's response time analysis is compared with that of 2019 in Attachment I.

Response Time by Type of Call

Table 7-16 breaks down the average dispatch, turnout, travel, and total response times by call type for all 2019 calls in the National City fire district, and Table 7-17 does the same for 90th percentile response times. A 90th percentile means that 90 percent of calls had response times at or below that number. For example, Table 7-17 shows an overall 90th percentile response time of 8.7 minutes, which means that 90 percent of the time, a call had a response time of no more than 8.7 minutes. Figures 7-7 and 7-8 illustrate the same information.

TABLE 7-16: Average Response Time of First Arriving Unit, by Call Type

Call Type	Time in Minutes				Number of Calls
	Dispatch	Turnout	Travel	Total	
Breathing difficulty	1.8	1.1	3.2	6.1	703
Cardiac and stroke	2.1	1.0	3.1	6.2	762
Fall and injury	2.1	1.0	3.5	6.7	979
Illness and other	2.2	1.0	3.3	6.6	1,300
MVA	1.2	1.1	3.7	6.0	377
Overdose and psychiatric	2.3	1.1	4.2	7.5	145
Seizure and unconsciousness	2.0	1.0	3.2	6.2	725
EMS Total	**2.0**	**1.0**	**3.3**	**6.4**	**4,991**
False alarm	1.7	1.2	3.5	6.4	300
Good intent	2.3	1.1	5.3	8.7	51
Hazard	1.7	1.2	4.0	6.9	47
Outside fire	1.7	1.3	3.6	6.5	123
Public service	2.3	1.1	4.1	7.5	112
Structure fire	2.2	1.0	2.6	5.8	30
Fire Total	**1.9**	**1.2**	**3.7**	**6.8**	**663**
Total	**2.0**	**1.1**	**3.4**	**6.5**	**5,654**

FIGURE 7-7: Average Response Time of First Arriving Unit, by Call Type – EMS

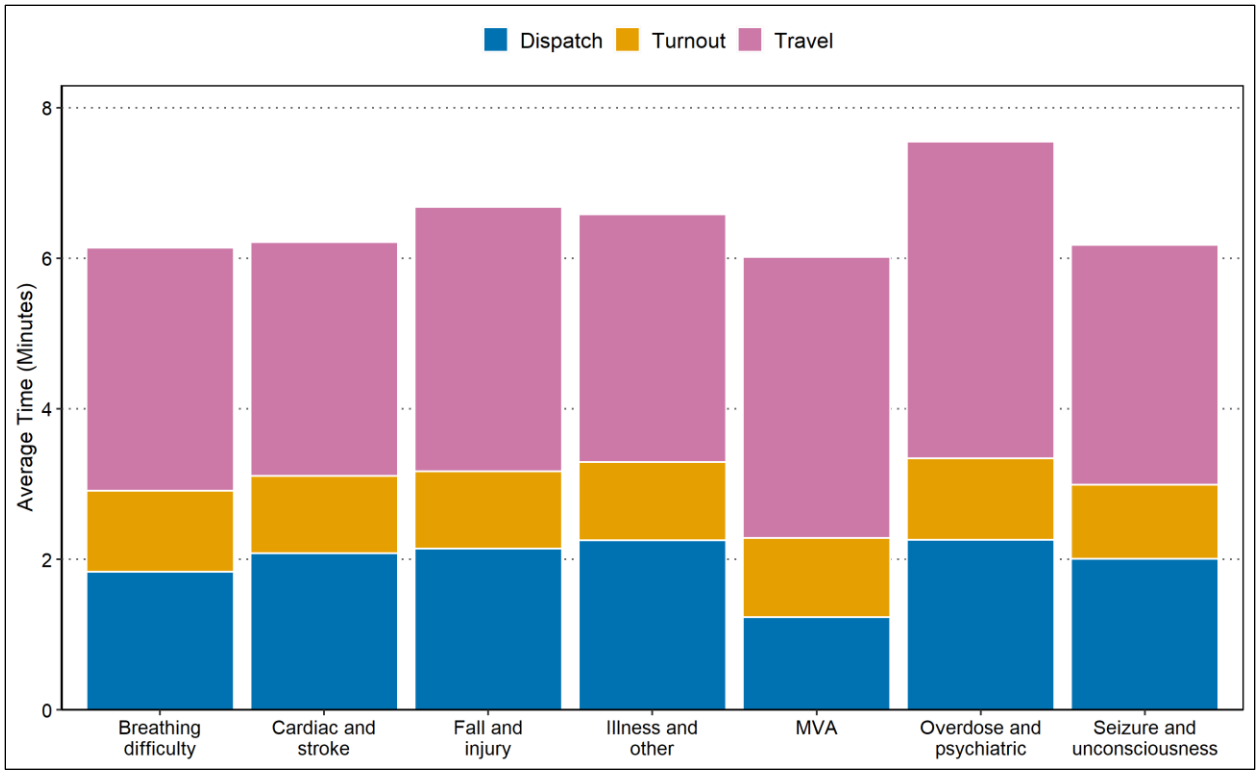


FIGURE 7-8: Average Response Time of First Arriving Unit, by Call Type – Fire

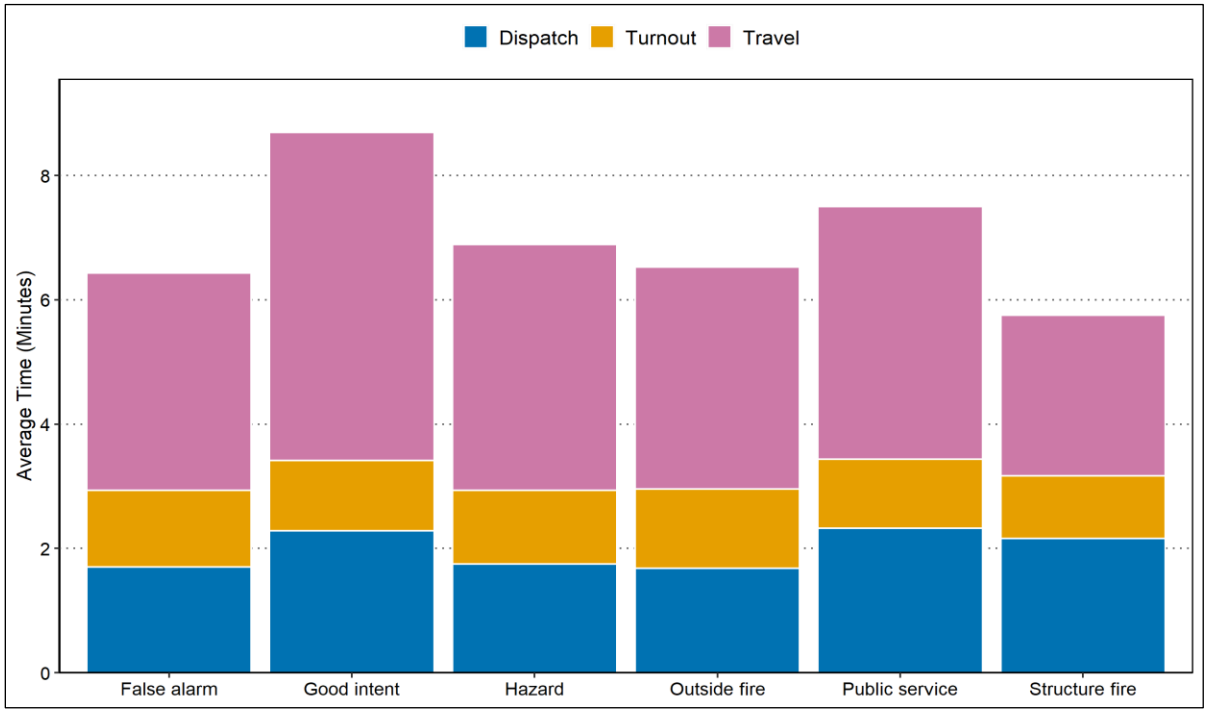


TABLE 7-17: 90th Percentile Response Time of Average Response Time of First Arriving Unit, by Call Type

Call Type	Time in Minutes				Number of Calls
	Dispatch	Turnout	Travel	Total	
Breathing difficulty	3.1	1.9	4.8	8.0	703
Cardiac and stroke	3.4	1.8	4.8	8.3	762
Fall and injury	3.6	1.8	5.4	8.8	979
Illness and other	3.8	1.8	5.1	8.9	1,300
MVA	2.1	1.8	5.9	8.5	377
Overdose and psychiatric	3.9	1.8	6.8	10.4	145
Seizure and unconsciousness	3.5	1.7	4.8	8.2	725
EMS Total	**3.5**	**1.8**	**5.2**	**8.6**	**4,991**
False alarm	2.7	2.1	5.5	8.7	300
Good intent	4.7	1.7	10.6	13.8	51
Hazard	2.7	2.0	5.8	10.8	47
Outside fire	2.5	2.0	5.6	9.3	123
Public service	3.5	2.0	6.6	10.8	112
Structure fire	3.3	1.7	4.4	7.7	30
Fire Total	**3.2**	**2.0**	**6.1**	**9.7**	**663**
Total	**3.5**	**1.8**	**5.3**	**8.7**	**5,654**

Observations:

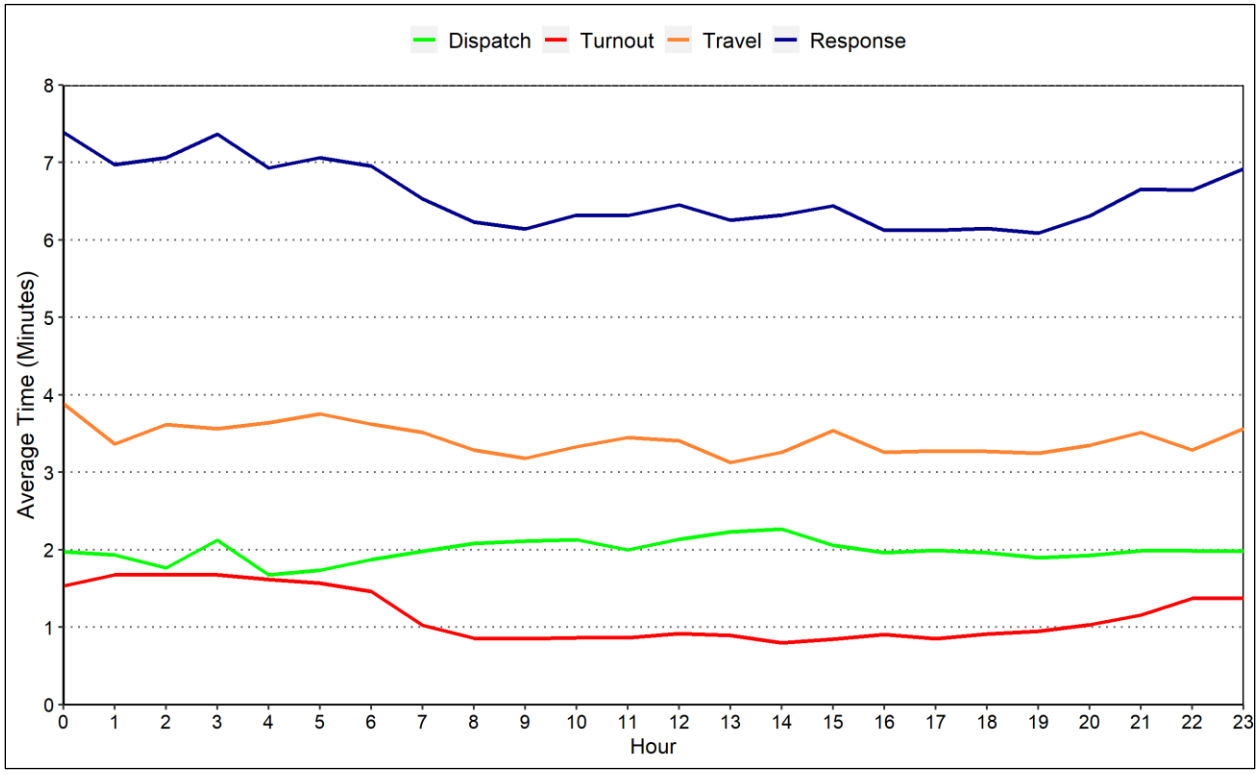
- The average dispatch time was 2.0 minutes.
- The average turnout time was 1.1 minutes.
- The average travel time was 3.4 minutes.
- The average total response time was 6.5 minutes.
- The average response time was 6.4 minutes for EMS calls and 6.8 minutes for fire calls.
- The average response time was 6.5 minutes for outside fires and 5.8 minutes for structure fires.
- The 90th percentile dispatch time was 3.5 minutes.
- The 90th percentile turnout time was 1.8 minutes.
- The 90th percentile travel time was 5.3 minutes.
- The 90th percentile total response time was 8.7 minutes.
- The 90th percentile response time was 8.6 minutes for EMS calls and 9.7 minutes for fire calls.
- The 90th percentile response time was 9.3 minutes for outside fires and 7.7 minutes for structure fires.

Table 7-18 shows the average response time by the time of day. The table also shows 90th percentile response times. Figure 7-9 shows the average response time by the time of day.

TABLE 7-18: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	2.0	1.5	3.9	7.4	9.6	152
1	1.9	1.7	3.4	7.0	9.2	138
2	1.8	1.7	3.6	7.1	9.0	120
3	2.1	1.7	3.6	7.4	9.4	111
4	1.7	1.6	3.6	6.9	8.6	105
5	1.7	1.6	3.8	7.1	8.6	139
6	1.9	1.5	3.6	7.0	9.1	164
7	2.0	1.0	3.5	6.5	8.8	226
8	2.1	0.9	3.3	6.2	8.6	272
9	2.1	0.9	3.2	6.1	8.4	246
10	2.1	0.9	3.3	6.3	8.2	280
11	2.0	0.9	3.4	6.3	8.8	324
12	2.1	0.9	3.4	6.5	8.8	298
13	2.2	0.9	3.1	6.3	8.4	281
14	2.3	0.8	3.3	6.3	8.8	290
15	2.1	0.8	3.5	6.4	9.2	314
6	2.0	0.9	3.3	6.1	8.4	309
17	2.0	0.9	3.3	6.1	8.2	312
18	2.0	0.9	3.3	6.1	8.3	316
19	1.9	0.9	3.2	6.1	8.3	307
20	1.9	1.0	3.3	6.3	8.3	297
21	2.0	1.2	3.5	6.7	8.8	270
22	2.0	1.4	3.3	6.6	8.8	203
23	2.0	1.4	3.6	6.9	9.1	180
Total	**2.0**	**1.1**	**3.4**	**6.5**	**8.7**	**5,654**

FIGURE 7-9: Average Response Time of First Arriving Unit, by Hour of Day



Observations:

- Average dispatch time was between 1.7 minutes (4:00 a.m. to 5:00 a.m.) and 2.3 minutes (2:00 p.m. to 3:00 p.m.).
- Average turnout time was between 0.8 minutes (2:00 p.m. to 3:00 p.m.) and 1.7 minutes (2:00 a.m. to 3:00 a.m.).
- Average travel time was between 3.1 minutes (1:00 p.m. to 2:00 p.m.) and 3.9 minutes (midnight to 1:00 a.m.).
- Average response time was between 6.1 minutes (7:00 p.m. to 8:00 p.m.) and 7.4 minutes (midnight to 1:00 a.m.).
- The 90th percentile response time was between 8.2 minutes (10:00 a.m. to 11:00 a.m.) and 9.6 minutes (midnight to 1:00 a.m.).

Response Time Distribution

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 7-10 and Table 7-19. Figure 7-10 shows response times for the first arriving unit to EMS calls as a frequency distribution in whole-minute increments, and Figure 7-11 shows the same for the first arriving unit to outside and structure fire calls.

The cumulative percentages here are read in the same way as a percentile. In Figure 7-10, the 90th percentile of 8.6 minutes means that 90 percent of EMS calls had a response time of 8.6 minutes or less. In Table 7-19, the cumulative percentage of 84.7, for example, means that 84.7 percent of EMS calls had a response time under 8 minutes.

FIGURE 7-10: Cumulative Distribution of Response Time – First Arriving Unit – EMS

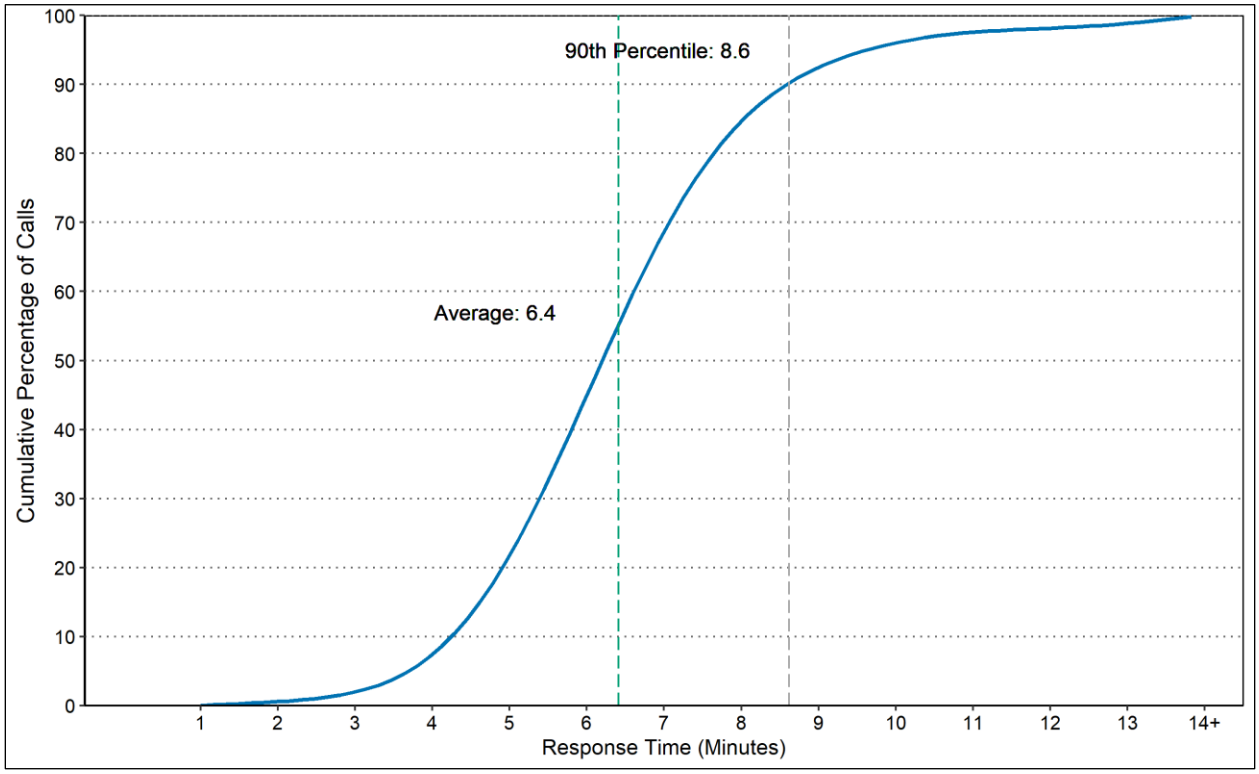


FIGURE 7-11: Cumulative Distribution of Response Timer – First Arriving Unit – Outside and Structure Fires

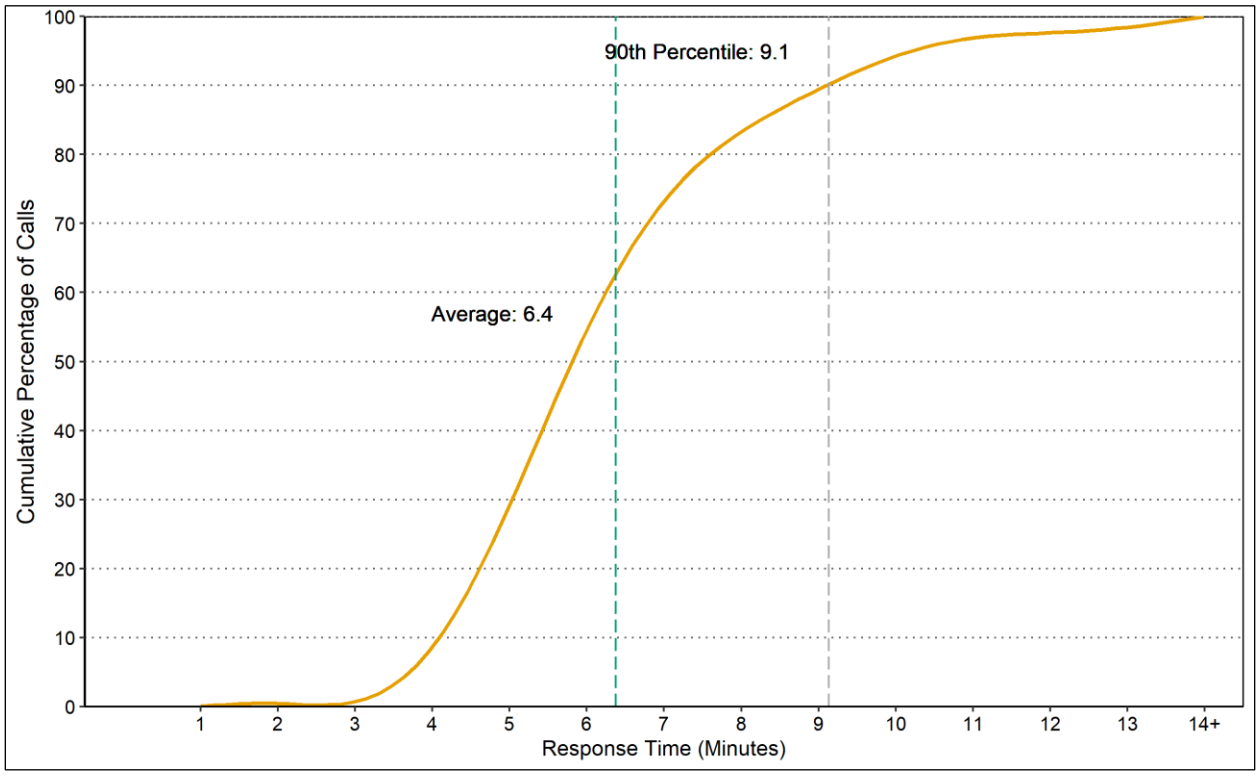


TABLE 7-19: Cumulative Distribution of Response Time – First Arriving Unit – EMS

Response Time (Minute)	Frequency	Cumulative Percentage
1	2	0.0
2	24	0.5
3	79	2.1
4	260	7.3
5	709	21.5
6	1,177	45.1
7	1,183	68.8
8	794	84.7
9	386	92.4
10	177	96.0
11	80	97.6
12	31	98.2
13	26	98.7
14+	63	100.0

TABLE 7-20: Cumulative Distribution of Response Time – First Arriving Unit – Outside and Structure Fires

Response Time (Minute)	Frequency	Cumulative Percentage
1	0	0.0
2	1	0.7
3	1	1.3
4	9	7.2
5	33	28.8
6	42	56.2
7	25	72.5
8	17	83.7
9	8	88.9
10	9	94.8
11	3	96.7
12	1	97.4
13	2	98.7
14+	2	100.0

Observations:

- For 85 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 84 percent of outside and structure fire calls, the response time of the first arriving unit was less than 8 minutes.

FIRE LOSS

Table 7-21 presents the number of outside and structure fires, broken out by levels of fire loss. Table 7-22 shows the amount of property and content loss for outside and structure fires inside the NCFD fire district in 2019.

TABLE 7-21: Total Fire Loss Above and Below $25,000

Call Type	No Loss	Under $25,000	$25,000 plus	Total
Outside fire	108	16	1	125
Structure fire	16	11	4	31
Total	**124**	**27**	**5**	**156**

TABLE 7-22: Content and Property Loss – Structure and Outside Fires

Call Type	Property Loss		Content Loss	
	Loss Value	Number of Calls	Loss Value	Number of Calls
Outside fire	$1,092,100	15	$3,200	5
Structure fire	$287,200	13	$39,700	13
Total	**$1,379,300**	**28**	**$42,900**	**18**

Note: The table includes only fire calls with a recorded loss greater than 0.

Observations:

- 108 outside fires and 16 structure fires had no recorded loss.
- 1 outside fire and 4 structure fires recorded losses above $25,000.
- Structure fires:
  - The highest total loss for a structure fire was $155,000.
  - The average total loss for structure fires with loss was $21,793.
  - 13 structure fires recorded a content loss totaling $39,700.
  - Out of 31 structure fires, 13 recorded a property loss totaling $287,200.
- Outside fires:
  - The highest total loss for an outside fire was $1,000,000.
  - The average total loss for outside fires with loss was $64,429.
  - 5 outside fires recorded content losses totaling $3,200.
  - Out of 125 outside fires, 15 recorded property losses totaling $1,092,100.

ATTACHMENT I: 2019 & 2020 COMPARISON

In this analysis, we compare portions of the previous analysis with similar records for 2020. We compare calls by type, unit workload, agency's availability, and response times.

Calls Volume by Year

Table 7-23 shows the number of calls for both 2019 and 2020. Figure 7-12 shows the monthly variation in the number of calls per day for both years. Similarly, Figure 7-13 illustrates the average number of calls per hour for both years.

TABLE 7-23: Calls by Type and Year

Call Type	2019		2020	
	Total Calls	Calls per Day	Total Calls	Calls per Day
Breathing difficulty	722	2.0	674	1.8
Cardiac and stroke	779	2.1	740	2.0
Fall and injury	999	2.7	952	2.6
Illness and other	1,344	3.7	1,303	3.6
MVA	407	1.1	349	1.0
Overdose and psychiatric	151	0.4	171	0.5
Seizure and unconsciousness	738	2.0	620	1.7
EMS total	**5,140**	**14.1**	**4,809**	**13.1**
False alarm	318	0.9	216	0.6
Good intent	56	0.2	81	0.2
Hazard	48	0.1	33	0.1
Outside fire	125	0.3	162	0.4
Public service	121	0.3	139	0.4
Structure fire	31	0.1	29	0.1
Fire total	**699**	**1.9**	**660**	**1.8**
Canceled	853	2.3	922	2.5
Aid given	2,154	5.9	2,090	5.7
Total	**8,846**	**24.2**	**8,481**	**23.2**

FIGURE 7-12: Average Calls by Month and Year

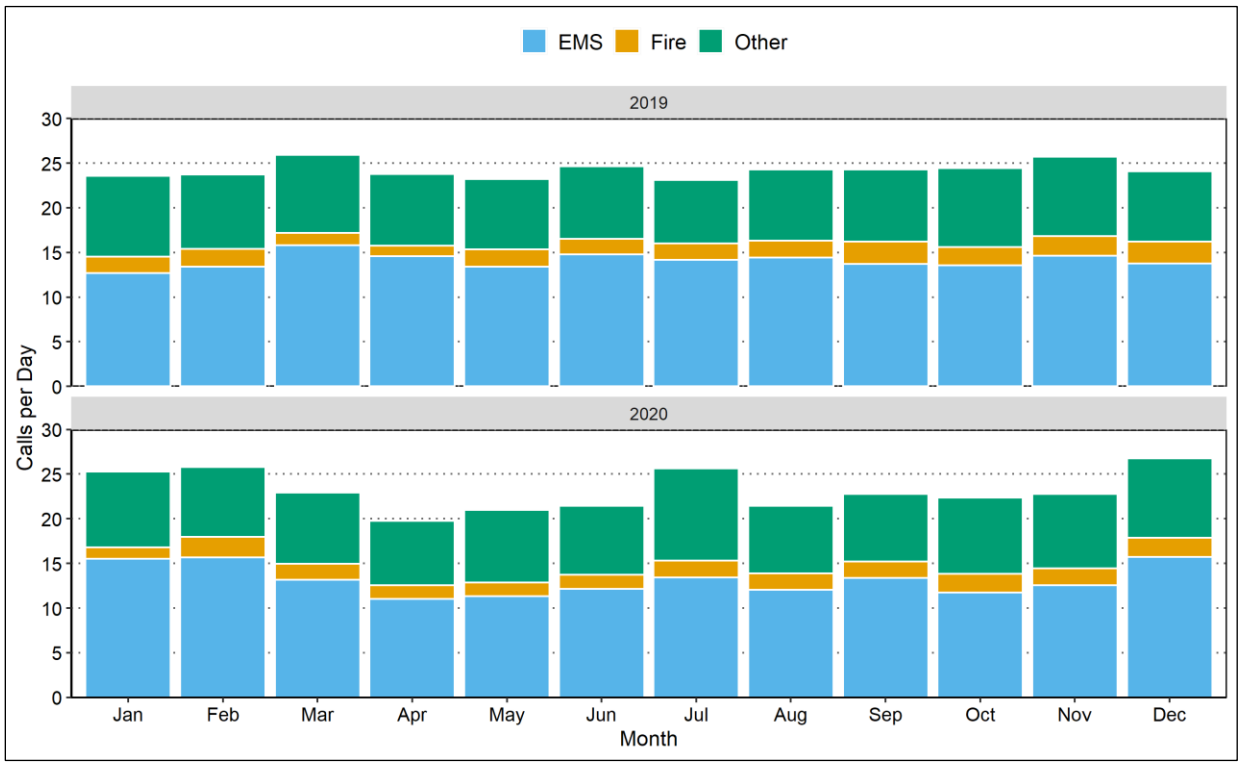
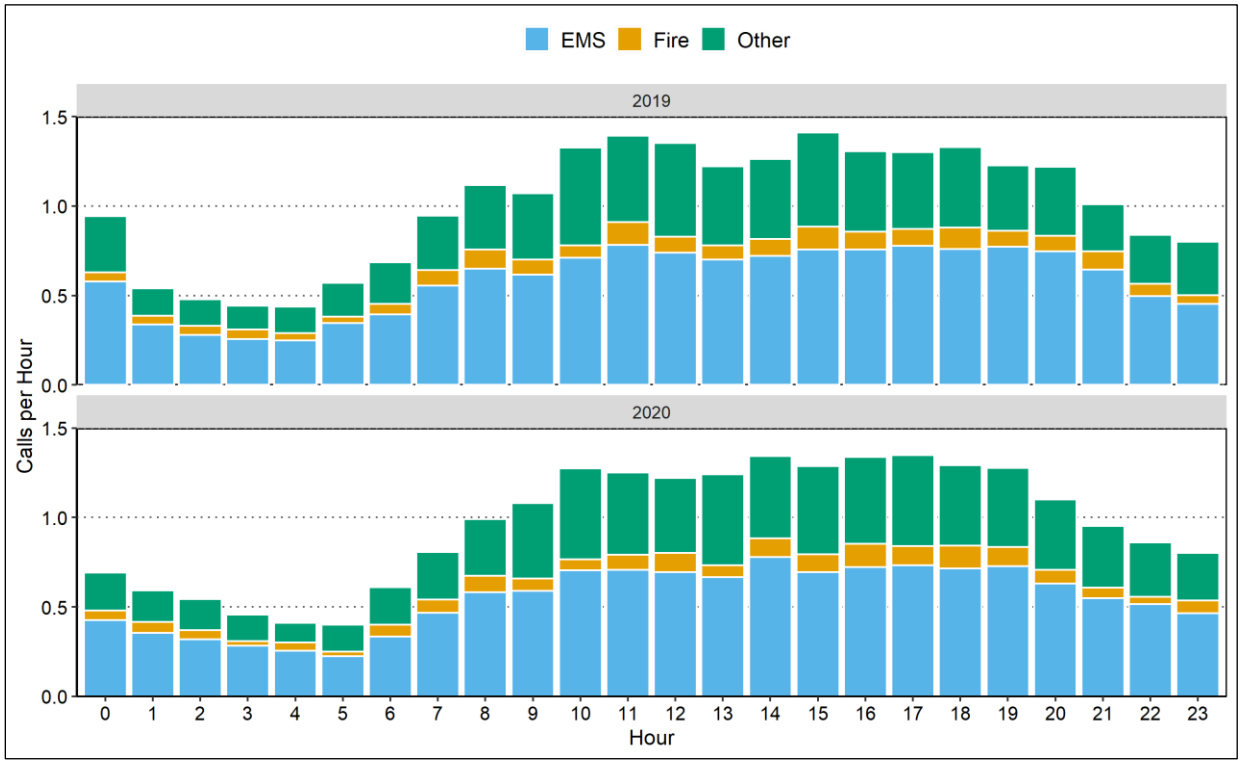


FIGURE 7-13: Average Calls by Hour of Day and Year



Workload by Year

Table 7-24 compares the call volume, annual runs, and workload by fire district in 2019 and 2020. Table 7-25 compares the annual runs and workload by NCFD station and unit during the two years. Figure 7-14 compares the average deployed minutes by the hour of the day in 2019 and 2020. Note that in Figure 7-14, the workload created by incident FMSC202350 was not included. Unit NCE34 responded to this incident with a duration time of 752.9 hours (19 percent of the annual workload). This is an outlier but has a significant influence on the workload in 2020.

TABLE 7-24: Annual Workload by District and Year

District	2019			2020		
	Calls	Runs	Hours	Calls	Runs	Hours
National City	6,692	7,742	2,319.9	6,391	7,540	2,320.1
San Diego	1,323	1,495	494.5	1,328	1,525	541.6
Chula Vista	699	864	225.1	653	813	224.8
San Diego County	101	105	56.8	77	83	45.1
Imperial Beach	21	21	4.5	21	25	5.8
Coronado	7	9	4.4	10	13	5.6
Lemon Grove	3	3	0.5			
Fresno County *				1	3	752.9
Total	**8,846**	**10,239**	**3,105.6**	**8,481**	**10,002**	**3,895.8**

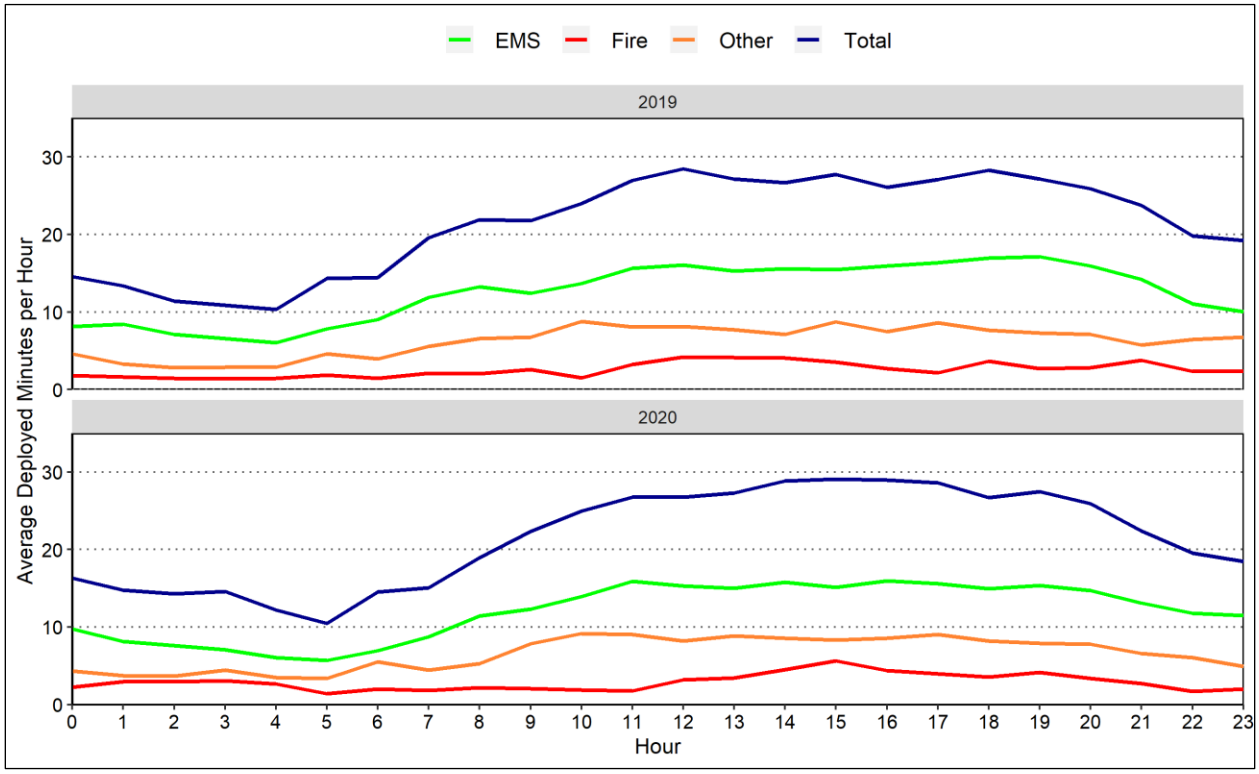
Note: *2020 included responses to one wildfire (Creek Fire) recorded as incident number FMSC202350. Unit NCE34 responded to this call from September 6, 2020, to October 7, 2020.

TABLE 7-25: Annual Workload by Station, Unit, and Year

Station	Unit	Unit Type	2019		2020	
			Hours	Runs	Hours	Runs
31	NCE31	Engine	915.3	3,031	916.6	2,989
	NCE231	Engine	0.6	3		
	Total		**915.9**	**3,034**	**916.6**	**2,989**
33	NCSQ33	Squad	**742.2**	**2,201**	**696.3**	**2,098**
34	B57	Battalion	145.2	462	182.8	460
	NCE34*	Engine	1,011.5	3,495	1,711.0	3,152
	NCE234	Engine	10.8	1	113.3	368
	NCT34	Truck	280.0	1,046	275.9	935
	Total		**1,447.5**	**5,004**	**2,282.9**	**4,915**
Total			**3,105.6**	**10,239**	**3,895.8**	**10,002**

Note: *NCE34 includes 753 hours associated with one wildfire (Creek Fire) in 2020.

FIGURE 7-14: Average Deployed Minutes by Hour of Day in 2019 and 2020



Agency's Availability by Year

Table 7-26 compares each NCFD station's response availability to calls that occurred in its first due area in both years. We focused on calls where a unit eventually arrived and ignores calls where no unit arrived.

TABLE 7-26: NCFD Station Availability to Respond to Calls by Year

Station	2019				2020			
	Calls in Area	Percent Responded	Percent Arrived	Percent First	Calls in Area	Percent Responded	Percent Arrived	Percent First
31	3,137	45.6	42.9	30.1	2,880	46.4	42.7	30.8
34	3,658	73.8	72.1	54.5	3,584	73.7	71.6	53.7
Total	**6,795**	**60.8**	**58.7**	**43.2**	**6,464**	**61.6**	**58.7**	**43.5**

Note: For each station, we count the number of calls occurring within its first due area. Then, we count the number of calls to where at least one unit arrived. Next, we focus on units from the first due station to see if any of its units responded, arrived, or arrived first.

Response Time by Year

Tables **7-**27 and **7-**28 compare the average and 90th percentile response times by call type in 2019 and 2020.

TABLE 7-27: Average Response Time of First Arriving Unit, by Call Type and Year

Call Type	2019					2020				
	Time in Minutes				Calls	Time in Minutes				Calls
	Dispatch	Turnout	Travel	Total		Dispatch	Turnout	Travel	Total	
False alarm	1.7	1.2	3.5	6.4	300	1.8	1.1	3.9	6.8	203
Good intent	2.3	1.1	5.3	8.7	51	2.0	1.1	4.4	7.6	75
Hazard	1.7	1.2	4.0	6.9	47	1.7	1.0	3.4	6.1	33
Outside fire	1.7	1.3	3.6	6.5	123	1.8	1.2	4.1	7.0	160
Public service	2.3	1.1	4.1	7.5	112	2.0	1.1	4.3	7.3	126
Structure fire	2.2	1.0	2.6	5.8	30	1.7	0.9	3.3	5.8	29
Fire Total	**1.9**	**1.2**	**3.7**	**6.8**	**663**	**1.8**	**1.1**	**4.0**	**7.0**	**626**
EMS Total	**2.0**	**1.0**	**3.3**	**6.4**	**4,991**	**2.1**	**1.1**	**3.7**	**6.8**	**4,738**
Total	**2.0**	**1.1**	**3.4**	**6.5**	**5,654**	**2.1**	**1.1**	**3.7**	**6.9**	**5,364**

TABLE 7-28: 90th Percentile Response Time of First Arriving Unit, by Call Type and Year

Call Type	2019					2020				
	Time in Minutes				Calls	Time in Minutes				Calls
	Dispatch	Turnout	Travel	Total		Dispatch	Turnout	Travel	Total	
False alarm	2.7	2.1	5.5	8.7	300	2.9	2.0	6.1	9.4	203
Good intent	4.7	1.7	10.6	13.8	51	3.6	2.0	6.4	11.0	75
Hazard	2.7	2.0	5.8	10.8	47	3.0	1.5	5.0	8.4	33
Outside fire	2.5	2.0	5.6	9.3	123	3.0	2.1	6.2	9.4	160
Public service	3.5	2.0	6.6	10.8	112	3.9	2.0	7.3	10.8	126
Structure fire	3.3	1.7	4.4	7.7	30	2.4	1.8	5.1	8.2	29
Fire Total	**3.2**	**2.0**	**6.1**	**9.7**	**663**	**3.1**	**2.0**	**6.2**	**9.4**	**626**
EMS Total	**3.5**	**1.8**	**5.2**	**8.6**	**4,991**	**3.6**	**2.0**	**5.5**	**9.3**	**4,738**
Total	**3.5**	**1.8**	**5.3**	**8.7**	**5,654**	**3.5**	**2.0**	**5.6**	**9.3**	**5,364**

ATTACHMENT II: ADDITIONAL PERSONNEL

Table 7-29 illustrates the workload of NCFD's administrative units in 2019 and 2020, respectively.

TABLE 7-29: Workload of Administrative Units by Year

Unit ID	Unit Type	2019		2020	
		Annual Hours	Annual Runs	Annual Hours	Annual Runs
5701	Fire Chief	6.9	2	0.0	0
5703	Battalion Chief	0.0	0	0.3	2
5705	Fire Marshal	10.5	10	10.3	6
5706	Deputy Fire Marshal	9.7	6	12.4	9

ATTACHMENT III: CALLS OUTSIDE NATIONAL CITY FIRE DISTRICT

From 2019 to 2020, NCFD responded to 4,244 aid-given calls outside of its fire district (see Table 7-23). Table 7-30 details these calls by call type and year. Of these, 241 were structure fire calls and 153 were outside fire calls. Figures 7-15 and 7-16 show the percentage of calls that fall into each EMS (Figure 7-15) and fire (Figure 7-16) type category by year.

TABLE 7-30: Calls Outside NCFD District by Call Type and Year

Call Type	2019			2020		
	Total Calls	Calls per Day	Pct. Calls	Total Calls	Calls per Day	Pct. Calls
Breathing difficulty	173	0.5	8.0	176	0.5	8.4
Cardiac and stroke	209	0.6	9.7	192	0.5	9.2
Fall and injury	204	0.6	9.5	181	0.5	8.7
Illness and other	347	1.0	16.1	303	0.8	14.5
MVA	128	0.4	5.9	128	0.3	6.1
OD	26	0.1	1.2	36	0.1	1.7
Seizure and UNC	178	0.5	8.3	143	0.4	6.8
EMS Total	**1,265**	**3.5**	**58.7**	**1,159**	**3.2**	**55.5**
False alarm	80	0.2	3.7	81	0.2	3.9
Good intent	16	0.0	0.7	25	0.1	1.2
Hazard	25	0.1	1.2	35	0.1	1.7
Outside fire	67	0.2	3.1	86	0.2	4.1
Public service	31	0.1	1.4	37	0.1	1.8
Structure fire	135	0.4	6.3	106	0.3	5.1
Fire Total	**354**	**1.0**	**16.4**	**370**	**1.0**	**17.7**
Canceled	535	1.5	24.8	561	1.5	26.8
Total	**2,154**	**5.9**	**100.0**	**2,090**	**5.7**	**100.0**

Note: OD=Overdose and psychiatric; UNC=unconsciousness.

FIGURE 7-15: EMS Calls by Type and Year, Outside National City

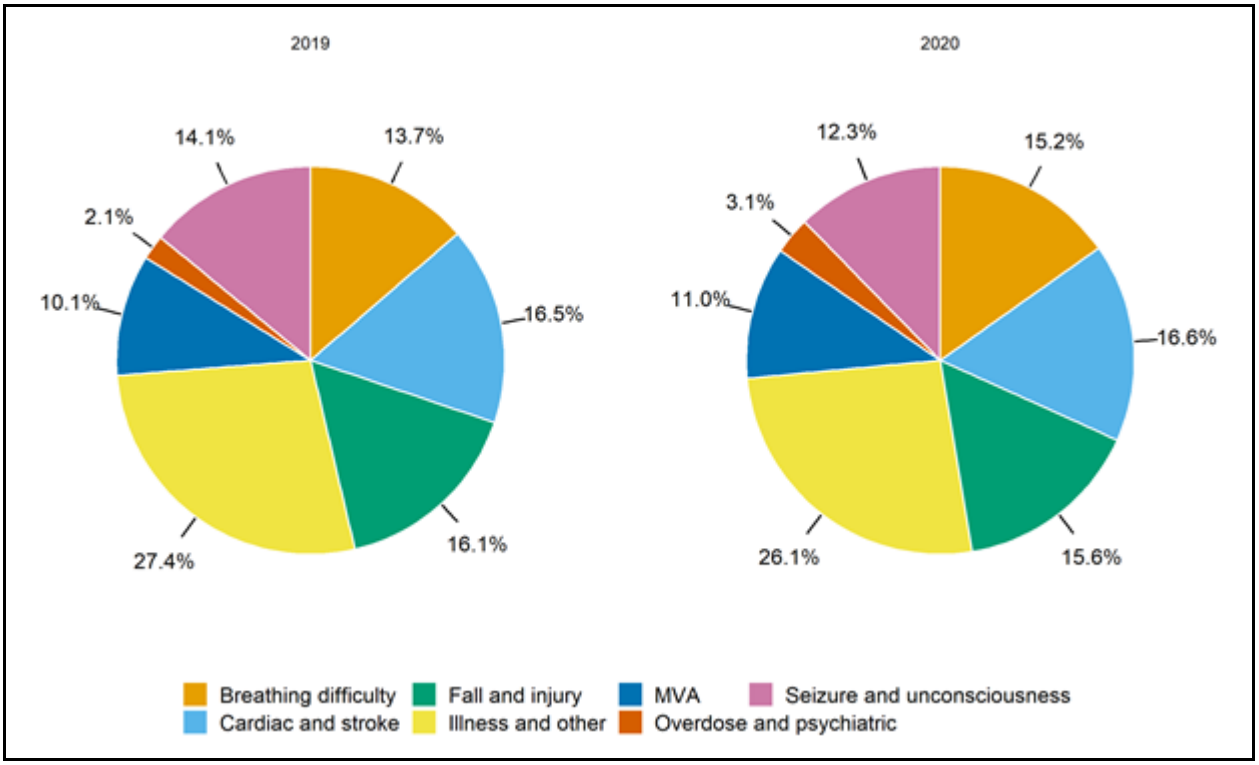
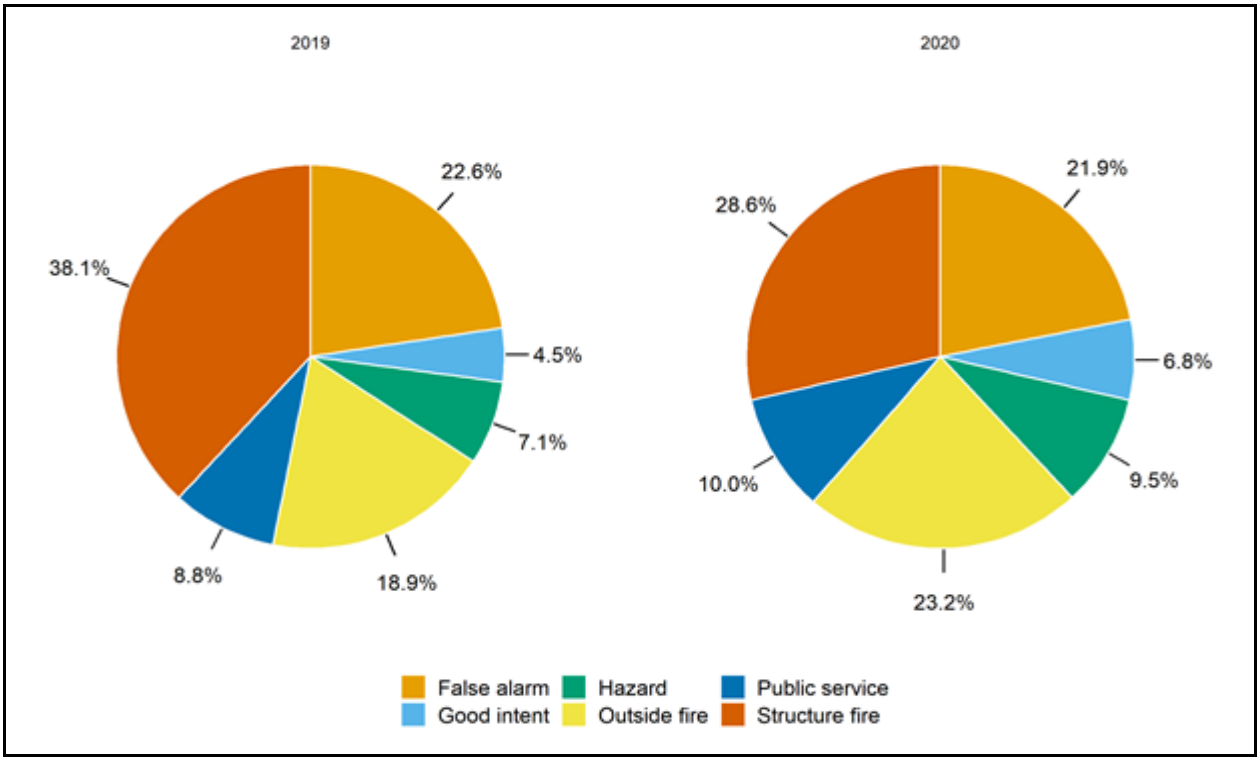


FIGURE 7-16: Fire Calls by Type and Year, Outside National City



ATTACHMENT IV: AID RECEIVED WORKLOAD

This section focuses on aid received within National City's fire district from other fire agencies. From 2019 to 2020, there were 1,963 calls in National City where aid was received from other agencies. Of these, 1,069 calls involved a joint response with NCFD and 894 calls involved a response by other agencies alone (See Table 7-1).

Aid Received Calls by Type

Table 7-31 shows the number of calls to which other FD agencies responded, broken out by call type and year. The table also presents the annual runs and work hours for each type of call.

TABLE 7-31: Aid Received Workload by Type and Year, Inside National City

Call Type	Total Annual Calls		Total Annual Runs		Total Annual Hours	
	2019	2020	2019	2020	2019	2020
Breathing difficulty	62	66	65	72	30.1	40.7
Cardiac and stroke	75	86	85	94	43.9	41.4
Fall and injury	100	114	106	119	38.5	47.2
Illness and other	131	140	144	179	52.7	80.7
MVA	193	177	295	270	75.1	68.7
OD	19	22	22	24	8.6	12.4
Seizure and UNC	69	71	70	75	30.4	42.0
EMS Total	**649**	**676**	**787**	**833**	**279.1**	**333.1**
False alarm	67	52	104	94	15.1	15.2
Good intent	21	48	22	77	5.9	12.5
Hazard	13	18	32	46	9.9	6.2
Outside fire	36	57	94	127	23.5	45.6
Public service	25	31	32	54	12.1	8.8
Structure fire	24	25	106	135	31.7	48.8
Fire Total	**186**	**231**	**390**	**533**	**98.2**	**137.1**
Canceled	116	105	153	146	35.2	29.2
Total	**951**	**1,012**	**1,330**	**1,512**	**412.4**	**499.4**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness.

Runs and Arrivals by Aid Agency

Tables 7-32 and 7-33 compare the number of aid-received runs and arrivals by different agencies in 2019 and 2020.

TABLE 7-32: Aid Received Runs by Agency, First Due Area, and Year

Agency	2019			2020		
	First Due Area		Total	First Due Area		Total
	31	34		31	34	
Bonita FD	104	0	**104**	94	1	**95**
Coronado FD	0	4	**4**	1	1	**2**
Chula Vista FD	136	196	**332**	182	240	**422**
Escondido FD	1	0	**1**	0	0	**0**
Federal FD	0	1	**1**	1	0	**1**
Lemon Grove FD	0	0	**0**	0	1	**1**
San Diego FD	522	364	**886**	569	421	**990**
San Miguel FD	1	1	**2**	1	0	**1**
Total	**764**	**566**	**1,330**	**848**	**664**	**1,512**

TABLE 7-33: Aid Received Arrivals by Agency, First Due Area, and Year

Agency	2019			2020		
	First Due Area		Total	First Due Area		Total
	31	34		31	34	
Bonita FD	75	0	**75**	61	1	**62**
Coronado FD	0	1	**1**	0	0	**0**
Chula Vista FD	95	131	**226**	121	159	**280**
Lemon Grove FD	0	0	**0**	0	1	**1**
San Diego FD	326	207	**533**	372	257	**629**
Total	**496**	**339**	**835**	**554**	**418**	**972**

ATTACHMENT V: LINCOLN ACRES

One area of particular interest is Lincoln Acres. While not officially part of National City, it is an unincorporated area that is entirely enclosed within National City's boundaries. Up until this point, calls within Lincoln Acres were included as part of the National City Fire District. For this section, we used each call's recorded latitude and longitude to locate the calls within Lincoln Acres.

Table 7-34 compares the volume of calls and the workload for this area for both years, broken down by call type. While Table 7-1 distinguishes calls without a responding NCFD unit, all calls within Lincoln Acres involved a responding NCFD unit. To better understand the workload within Lincoln Acres, we included runs and associated work for all fire agencies responding to calls within the area. Table 7-35 shows the average and 90 percentile response time to calls that occurred in this area. Due to the small sample size, we used all calls in two years in the analysis of response time. Table 7-36 examines the average and 90th response times of the first arriving units by the time of day (in four-hour intervals).

TABLE 7-34: Calls and Workload in Lincoln Acres by Call Type and Year

Call Type	2019			2020		
	Calls	Hours	Runs	Calls	Hours	Runs
Breathing difficulty	16	20.7	34	16	23.7	35
Cardiac and stroke	19	30.7	46	21	27.7	48
Fall and injury	16	23.9	35	15	24.4	34
Illness and other	23	31.4	54	31	42.6	67
MVA	23	30.4	74	31	30.4	93
OD	2	2.0	4	6	6.6	13
Seizure and UNC	14	19.7	29	15	23.2	31
EMS Total	**113**	**158.8**	**276**	**135**	**178.6**	**321**
False alarm	5	1.8	9	5	7.0	15
Good intent	3	2.6	5	6	5.1	24
Hazard	1	0.1	1	4	2.3	10
Outside fire	5	5.6	20	7	12.5	20
Public service	5	1.6	6	3	0.9	3
Structure fire	4	42.0	36	0	0.0	0
Fire Total	**23**	**53.8**	**77**	**25**	**27.7**	**72**
Canceled	28	23.7	77	41	34.9	100
Total	**164**	**236.2**	**430**	**201**	**241.2**	**493**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness.

TABLE 7-35: Response Time in Lincoln Acres, by Call Type

Call Type	Average Response Time (Minutes)				90 Percentile Response Time (Minutes)				Call Count
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total	
False alarm	2.7	0.7	3.3	6.8	12.3	1.7	7.2	12.6	8
Good intent	2.3	0.8	4.9	8.0	7.0	1.6	10.6	13.2	7
Hazard	2.5	1.1	4.2	7.7	7.8	1.5	5.6	9.1	5
Outside fire	1.7	1.0	3.9	6.6	2.7	1.8	6.6	8.7	12
Public service	3.2	1.1	4.5	8.8	10.8	2.0	7.9	15.5	7
Structure fire	3.6	0.6	1.6	5.8	7.4	1.2	2.0	9.3	3
Fire Total	**2.5**	**0.9**	**3.9**	**7.3**	**7.0**	**1.7**	**6.6**	**11.5**	**42**
EMS Total	**2.0**	**1.0**	**3.9**	**7.0**	**3.4**	**1.8**	**6.2**	**9.6**	**240**
Total	**2.1**	**1.0**	**3.9**	**7.0**	**3.5**	**1.8**	**6.3**	**9.8**	**282**

TABLE 7-36: Response Time in Lincoln Acres, by Time of Day

Time	Average, Minutes				90 Percentile, Minutes				Call Count
	Dispatch	Turnout	Travel	Total	Dispatch	Turnout	Travel	Total	
00:00 - 03:59	2.1	1.6	3.5	7.2	4.3	2.3	5.4	9.8	28
04:00 - 07:59	1.8	1.3	4.5	7.6	2.9	2.2	8.5	12.4	26
08:00 - 11:59	1.8	0.8	4.0	6.6	3.0	1.4	6.2	9.0	60
12:00 - 15:59	2.3	0.7	3.9	6.9	3.0	1.4	6.2	8.9	50
16:00 - 19:59	2.1	0.8	4.2	7.1	3.4	1.4	6.8	9.2	61
20:00 - 23:59	2.2	1.2	3.6	7.1	5.0	1.9	6.2	10.3	57
Total	**2.1**	**1.0**	**3.9**	**7.0**	**3.5**	**1.8**	**6.3**	**9.8**	**282**

ATTACHMENT VI: PARADISE HILLS

Another area of particular interest is Paradise Hills. Paradise Hills is a neighborhood within San Diego that is located close to National City. Calls into Paradise Hills are part of aid given calls measured in Table 7-10. As in the previous section, we used each call's recorded latitude and longitude to locate calls within Paradise Hills. We compare the volume of calls and the workload for this area over two years. Table 7-37 presents the comparison, broken down by call type. Aid given workload only included calls, workload, and runs associated with NCFD units.

TABLE 7-37: Calls and Workload in Lincoln Acres by Call Type and Year

Call Type	2019			2020		
	Calls	Hours	Runs	Calls	Hours	Runs
Breathing difficulty	95	31.3	95	110	45.1	111
Cardiac and stroke	116	46.2	116	107	48.2	108
Fall and injury	91	31.6	94	99	36.2	102
Illness and other	120	47.6	128	127	48.2	128
MVA	17	8.3	20	23	7.5	28
OD	7	2.2	7	14	5.9	14
Seizure and UNC	93	39.9	94	73	28.8	73
EMS Total	**539**	**207.3**	**554**	**553**	**219.9**	**564**
False alarm	19	7.1	19	21	5.9	26
Good intent	2	0.4	2	7	1.4	7
Hazard	3	1.7	6	4	19.3	9
Outside fire	6	3.2	6	6	2.6	9
Public service	9	2.6	9	7	2.8	7
Structure fire	12	7.5	18	13	6.8	20
Fire total	**51**	**22.5**	**60**	**58**	**38.8**	**78**
Canceled	73	12.3	99	93	19.1	129
Total	**663**	**242.0**	**713**	**704**	**277.9**	**771**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness.

Observations:

- In 2019, there were 663 aid-given calls to Paradise Hills. This was 50 percent of aid-given calls (1,323) to San Diego.
- In 2019, there were 713 aid-given runs to Paradise Hills. This was 48 percent of aid-given runs (1,495) to San Diego
- In 2019, there were 242.0 aid-given work hours associated with calls in Paradise Hills. This was 49 percent (494.5) of aid-given work associated with calls in San Diego.
- In 2020, call volume increased by 6 percent from 663 to 704.
- In 2020, total runs increased by 8 percent from 713 to 771.
- In 2020, the workload increased by 15 percent from 242.0 to 277.9.

ATTACHMENT VII: CALL TYPE IDENTIFICATION

When available, NFIRS data serves as our primary source for assigning call categories. In this work, for an MVA or fire call that had a matched NFIRS record, we used the NFIRS incident type to assign a call category. Otherwise, we used the CAD incident type and problem description to assign a call category. All EMS calls were categorized by the CAD incident type and problem description. Tables 7-38 and 7-39 specify the call categories identified by available NFIRS and CAD information, respectively.

TABLE 7-38: Call Type by NFIRS Incident Type Code

Call Type	Incident Type Code	Frequency	
		2019	2020
Canceled	611	1,357	1,421
	621	1	0
	622	38	64
False Alarm	700	296	217
	710	2	1
	713	1	0
	715	1	1
	730	3	0
	733	3	1
	735	3	4
	736	4	2
	740	1	0
	743	2	0
	744	3	2
	745	4	11
	746	1	10
Good Intent	600	40	39
	631	0	2
	641	0	2
	650	6	4
	651	8	29
	652	2	1
	653	3	3
	661	0	2
	671	5	10
	672	1	0

Call Type	Incident Type Code	Frequency	
		2019	2020
Hazard	223	1	0
	400	4	7
	410	1	1
	411	3	1
	412	6	12
	413	2	0
	420	0	1
	421	2	1
	423	0	1
	424	2	1
	440	7	4
	441	3	2
	442	1	1
	443	1	0
	444	7	1
	445	5	2
	460	1	1
	461	1	1
	480	4	7
	481	0	1
MVA	322	464	392
	323	7	5
	324	2	9
	352	1	1
Outside Fire	100	6	8
	130	29	38
	131	0	1
	140	26	46
	150	101	126
	151	5	3
	161	0	1

Call Type	Incident Type Code	Frequency	
		2019	2020
Public Service	500	14	22
	510	13	9
	511	20	10
	512	1	1
	520	7	7
	521	2	1
	522	5	5
	531	11	24
	540	1	1
	541	0	1
	542	2	1
	550	7	6
	551	6	8
	552	4	9
	553	6	9
	554	25	13
	561	7	23
	571	0	1
	812	1	0
	813	1	0
	900	3	3
	911	0	1
Structure Fire	111	51	59
	113	22	15
Total		**2,686**	**2,730**

TABLE 7-39: Call Type by CAD Problem Description

Call Type	Problem	Frequency	
		2019	2020
Breathing Difficulty	Breathing Problems	909	856
	Choking	30	30
Cardiac and Stroke	Cardiac / Respiratory Arrest	131	175
	Chest Pain	563	512
	Heart Problems	119	116
	Stroke	213	169
Fall and Injury	Assault/Rape	210	214
	Drowning/Diving Accident	1	3
	Electrocution	3	1
	Falls / Back Inj	868	812
	Stabbing/Gunshot	39	42
	Traumatic Injuries Spec	26	19
	Traumatic Injuries, Spec	115	108
False Alarm	Carbon Monoxide Alarm	3	3
	Ringing Alarm	53	27
	Ringing Alarm Coronado	2	0
	Ringing Alarm Highrise	18	13
	Vegetation 1st Alarm	18	17
Good Intent	Noxious Odor	0	1
	Odor of Chemical	0	2
	Odor of Smoke	1	1
	Smoke Check	21	43
Hazard	Nat Gas Leak Broken/Blowing	5	11
	Natural Gas Leak/Odor-Inside	3	3
	Natural Gas Odor - Outside	2	2
	Electrical Short	2	1
	Extinguished Fire	1	4
	Fuel Spill	1	2
	HazMat	1	0
	HazMat Single Engine	0	2
	Illegal Burn	12	2
	Wires down	2	1

Call Type	Problem	Frequency	
		2019	2020
Illness and Other	Confined Space/Trench Rescue	1	0
	Abdominal Pain/Problems	60	63
	Advised Incident*	7	0
	Allergy/Hives/Med Rx/Stng	41	43
	Animal Bites/ Attacks	13	11
	Back Pain	33	19
	Burns / Explosion*	3	4
	C O / Inhalation/ Haz Mat*	2	2
	CV Medical Aid	2	2
	Diabetic Problems	147	141
	Elevator Rescue	11	11
	Eye Problems / Injuries	2	1
	Headache	42	32
	Heat / Cold Exposure	3	6
	Hemorrhage / Lacerations	236	219
	Illegal Burn*	3	0
	Industrial Rescue	0	1
	Lift Assist*	7	2
	Medical Aid	16	13
	Medical Alert Alarm	43	38
	Miscellaneous Rescue	0	1
	NC Medical Aid	0	1
	Open Space Rescue	1	1
	Poison Control	0	1
	Preg/Birth/Miscarriage	30	25
	Sick Person	806	763
	Special Service*	10	5
	Suspected COVID19	0	63
	Traffic Accident*	90	70
	Traffic Accident FWY*	5	3
	Unknown Problem*	152	129
	Vehicle Fire Freeway*	1	0
	Vehicle Rescue	11	13
	Vehicle vs. Pedestrian*	4	3
	Water Rescue	0	2
MVA	Traffic Accident	120	122
	Traffic Accident FWY	30	26
	Vehicle vs Structure	3	5
	Vehicle vs. Pedestrian	1	1

Note: *NRIFS incident type code is 321.

Call Type	Problem	Frequency	
		2019	2020
Outside Fire	Boat Fire 1st Alm	0	1
	Fence*	1	0
	Pole Fire	0	1
	Rubbish Fire	8	8
	Tree*	0	1
	Vegetation Initial Attack	10	13
	Vehicle Fire	5	4
	Vehicle Fire Freeway	5	7
Overdose and Psychiatric	OD/Ingestion/Poisonings	112	122
	Psych / Suicide Attempt	78	100
Public Service	Advised Incident	1	2
	AID - ENGINE	0	1
	Assist PD	1	1
	Assist PD - Ladder Bldg	0	1
	Investigate	1	0
	Knocked Off Hydrant	3	4
	Lift Assist	2	0
	Lock in/out	3	9
	Move Up	7	6
	SNAKE REMOVAL	1	0
	Special Service	4	8
	Strike Team Type 1	1	3
	Strike Team Type 3	1	1
	Water Removal/Flooding CV/NC	2	0
	yGT General Transport	1	0
Seizure and UNC	Convulsions / Seizures	330	258
	Unc/Fainting	634	549
Structure Fire	Oven Fire	1	1
	Structure Fire - Comm / Apt	38	29
	Structure Highrise/Hospital	1	0
	Structure Residential	53	31
Total		**6,612**	**6,193**

Note: *Level 2 fires; UNC = Unconsciousness.

ATTACHMENT VIII: REMOVED CANCELED CALLS

TABLE 7-40: Removed Calls by Cancel Reason and Year

Cancel Reason	Frequency	
	2019	2020
Duplicate Call	754	793
Call complete / Available	425	485
CAD test	263	220
False Alarm	81	46
Caller refused ambulance	11	11
Patient not ready	8	9
Stand back cancellation	8	2
Canceled by PD/CHP on scene	2	6
Canceled/Turned	1	3
Change in level of service	0	2
Delayed in traffic	2	0
Private transport arranged	1	1
Wrong location	1	1
Level 4 triage	0	1
Canceled by first responder	1	0
NA	6	6
Total	**1,564**	**1,586**

SECTION 8. AMR DATA ANALYSIS

This data analysis was prepared as a key component of the study of the American Medical Response (AMR) ambulance service in the National City fire district. This analysis examines all calls for service between January 1, 2019, and January 1, 2021, as recorded in the regional computer-aided dispatch (CAD) system, and AMR's EMS incident Reporting System.

This analysis is made up of five parts. The first part focuses on call types and dispatches. The second part explores the time spent and the workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of the studied agency's units. The fifth and final part is an analysis of unit transports. The analysis results are primarily presented for the 2019 calendar year. The results for 2020 are compared with those for the prior year in Attachment I.

As the primary emergency medical service (EMS) provider within the National City fire district, AMR works closely with the National City Fire Department (NCFD) to provide both advanced life support (ALS) and basic life support (BLS) services. In 2019, AMR responded to 7,328 calls. The total workload was 7,335.9 hours. The average response time to EMS calls was 8.0 minutes, and the 90th percentile response time was 13.2 minutes. In 2020, the AMR responded to 6,945 calls. The total workload was 6,561.9 hours. The average response time to EMS calls was 8.3 minutes, and the 90th percentile response time was 13.5 minutes.

METHODOLOGY

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit (i.e., a unit responding to a call). Thus, a call may include multiple runs.

This analysis studied AMR's 9-1-1 EMS response. We received data from both the regional CAD system and the AMR's EMS incident Reporting System. We first matched the two sets of data based on the available information of call time and location. The AMR data lacked information of incident type and unit transport times. Therefore the analysis was primarily conducted based on the CAD data that included the description of call nature and transport time stamps of AMR units. The method to categorize calls based on the call nature description is detailed in Attachment II. With the AMR data, we used the call received time for the analysis of AMR unit's response time to calls and used the available unit time stamps to fill the missing unit time stamps in the CAD data.

Working independently or jointly with fire departments, AMR responded to 14,273 total calls in the National City fire district in 2019 and 2020. The following table summarizes these calls by responding agency and year. The main analysis in the following sections focuses on the 7,328 calls in 2019. The results for 2020 are presented along with the corresponding 2019 results in Attachment I for comparison.

TABLE 8-1: Studied Calls Responding Agency and Year

Responding Agency	2019	2020	Total
AMR only	1,036	986	2,022
AMR and FD agencies	6,292	5,959	12,251
Total	**7,328**	**6,945**	**14,273**

Observations:

- Of all calls where AMR responded within the National City fire district, AMR responded jointly with FD agencies to 86 percent of calls in both years.

AGGREGATE CALL TOTALS AND RUNS

In 2019, AMR responded to 7,328 calls in the National City fire district. Of these calls, 99 percent were 9-1-1 EMS calls and one percent were the service calls for assisting fire or PD agencies.

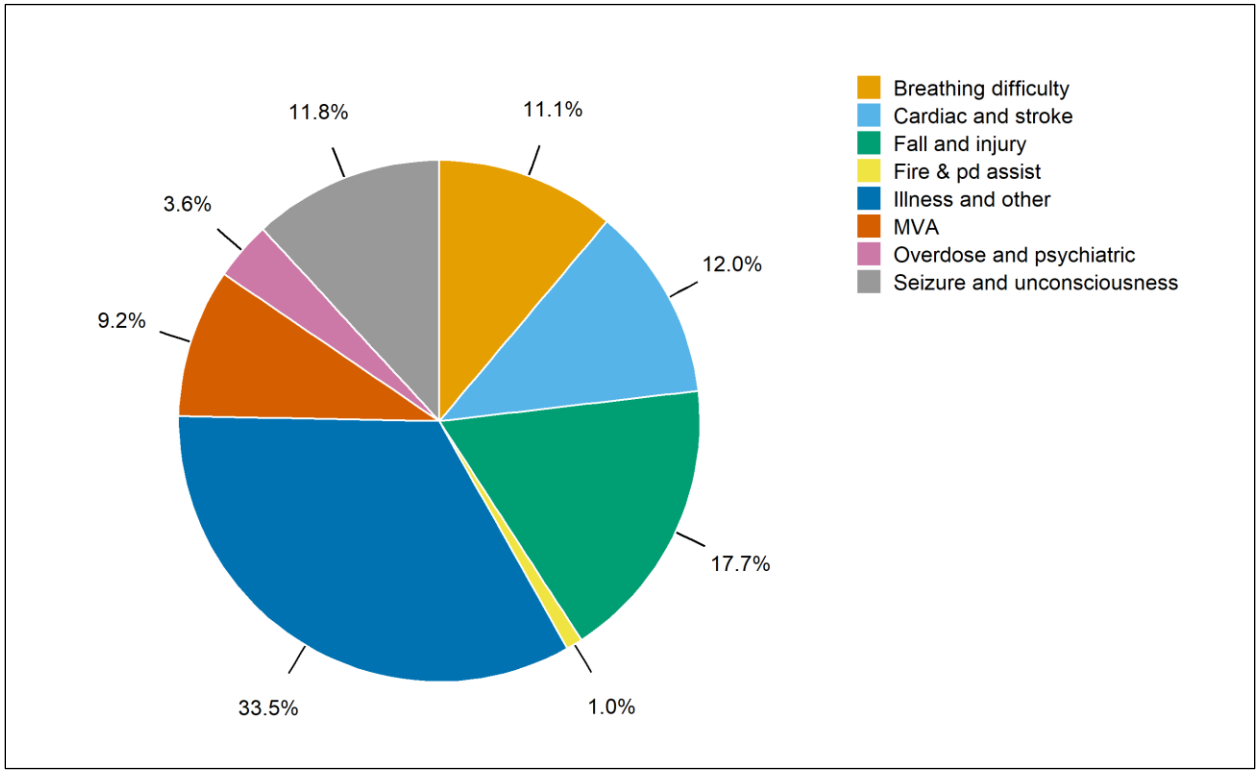
Calls by Type

Th following table and figure show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category for the 12 months studied.

TABLE 8-2: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	815	2.2	11.1
Cardiac and stroke	881	2.4	12.0
Fall and injury	1,296	3.6	17.7
Illness and other	2,453	6.7	33.5
MVA	677	1.9	9.2
Overdose and psychiatric	266	0.7	3.6
Seizure and unconsciousness	867	2.4	11.8
EMS Total	**7,255**	**19.9**	**99.0**
Fire & PD assist	73	0.2	1.0
Total	**7,328**	**20.1**	**100.0**

FIGURE 8-1: Calls by Type



Note: Other includes Canceled and Fire & FD assist calls.

Observations:

- In 2019, AMR responded to an average of 20.1 calls per day.
- EMS calls for the year totaled 7,255 (99 percent of all calls), an average of 19.9 calls per day.
  - Illness and other calls were the largest category of EMS calls at 34 percent of total calls (34 percent of EMS calls) or an average of 6.7 calls per day.
  - Cardiac and stroke calls made up 12 percent of total calls (12 percent of EMS calls) or an average of 2.4 calls per day.
  - Motor vehicle accidents made up 9 percent of total calls (9 percent of EMS calls) or an average of 1.9 calls per day.

Calls by Type and Duration

The following table shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and two or more hours.

TABLE 8-3: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	Two or More Hours	Total
Breathing difficulty	103	202	477	33	815
Cardiac and stroke	118	207	533	23	881
Fall and injury	315	248	683	50	1,296
Illness and other	651	509	1,189	104	2,453
MVA	374	86	201	16	677
Overdose and psychiatric	81	63	113	9	266
Seizure and unconsciousness	161	174	493	39	867
EMS Total	**1,803**	**1,489**	**3,689**	**274**	**7,255**
Fire & FD assist	58	1	13	1	73
Total	**1,861**	**1,490**	**3,702**	**275**	**7,328**

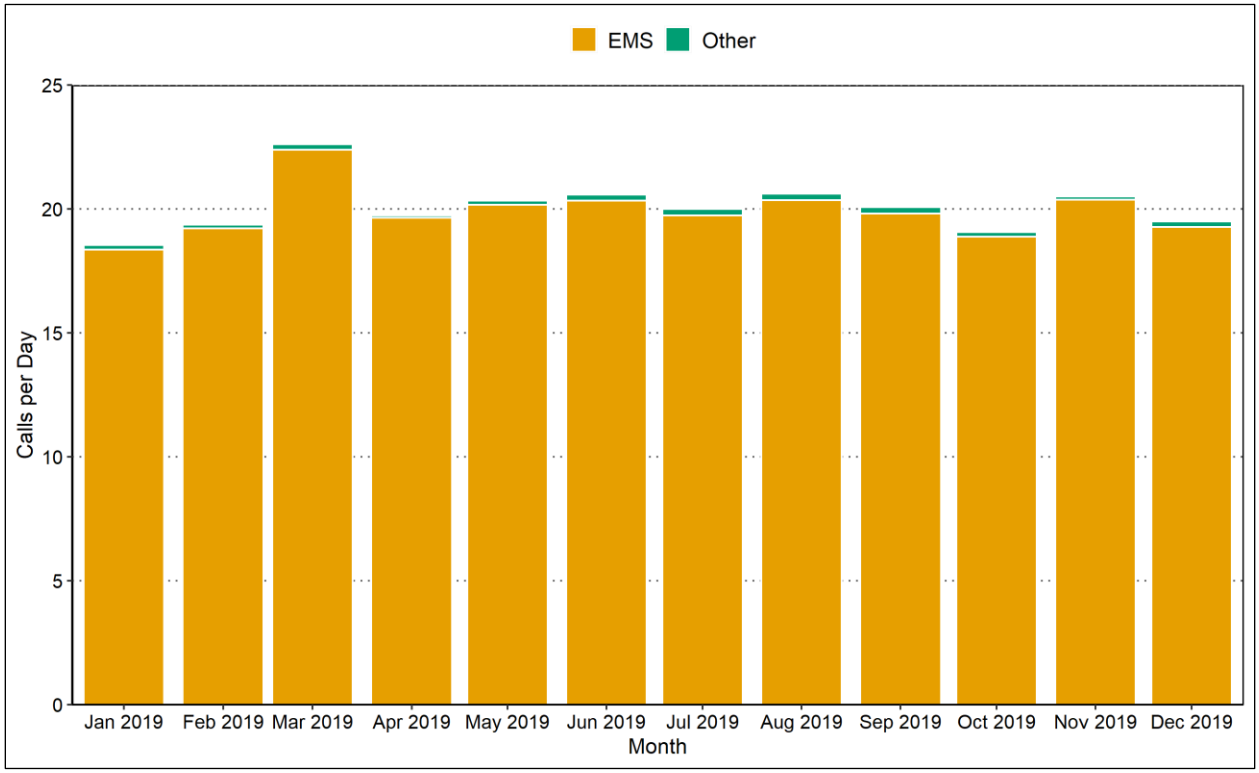
Observations:

- On average, there were 10.9 EMS calls per day that lasted more than one hour.
- A total of 3,292 EMS calls (45 percent) lasted less than one hour, 3,689 EMS calls (51 percent) lasted one to two hours, and 274 EMS calls (4 percent) lasted two or more hours.
- A total of 325 cardiac and stroke calls (37 percent) lasted less than one hour, 533 cardiac and stroke calls (60 percent) lasted one to two hours, and 23 cardiac and stroke calls (3 percent) lasted two or more hours.
- A total of 460 motor vehicle accidents (68 percent) lasted less than one hour, 201 motor vehicle accidents (30 percent) lasted one to two hours, and 16 motor vehicle accidents (2 percent) lasted two or more hours.

Average Calls by Month and Hour of Day

Figure 8-2 shows the monthly variation in the average daily number of calls handled by AMR in 2019. Similarly, Figure 8-3 illustrates the average number of calls received each hour of the day over the year.

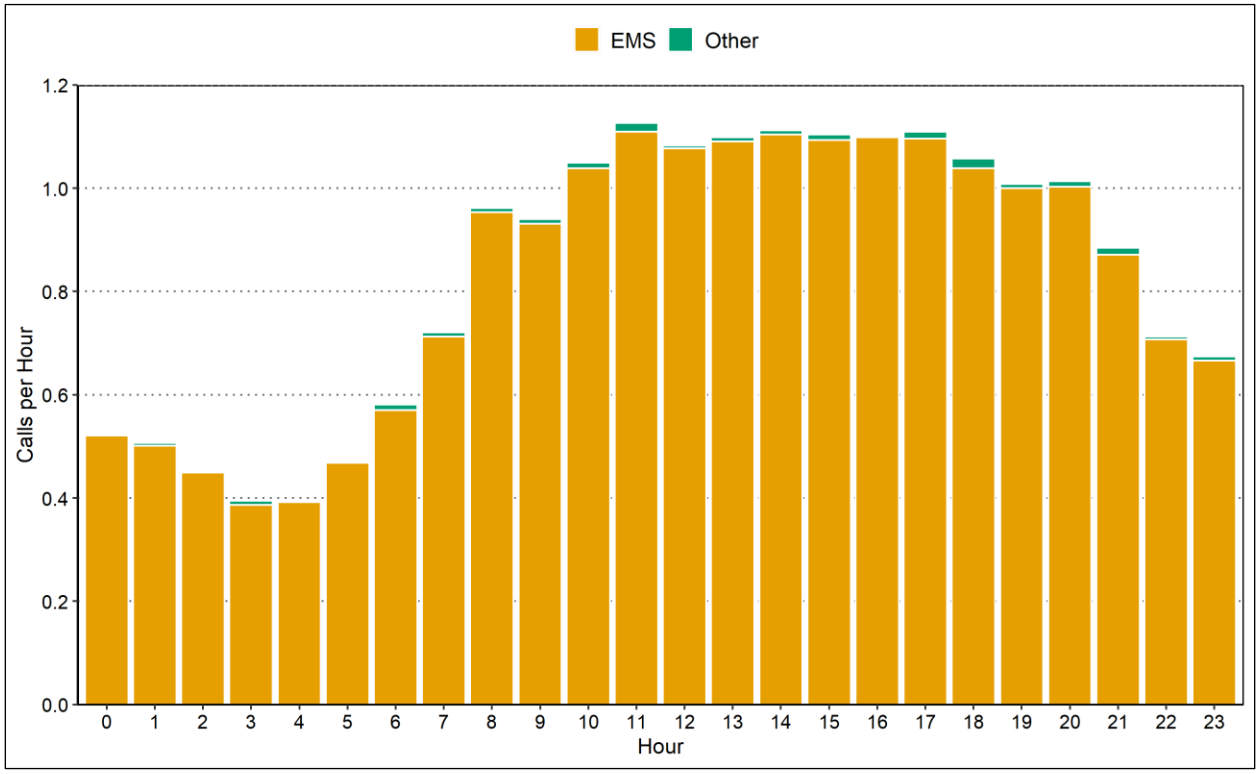
FIGURE 8-2: Average Calls by Month



Observations:

- Average calls per day overall ranged from 18.5 in January 2019 to 22.6 in March 2019.

FIGURE 8-3: Calls by Hour of Day



Observations:

- Average calls per hour overall ranged from 0.4 between 3:00 a.m. and 5:00 a.m. to 1.1 between 11:00 a.m. and noon.

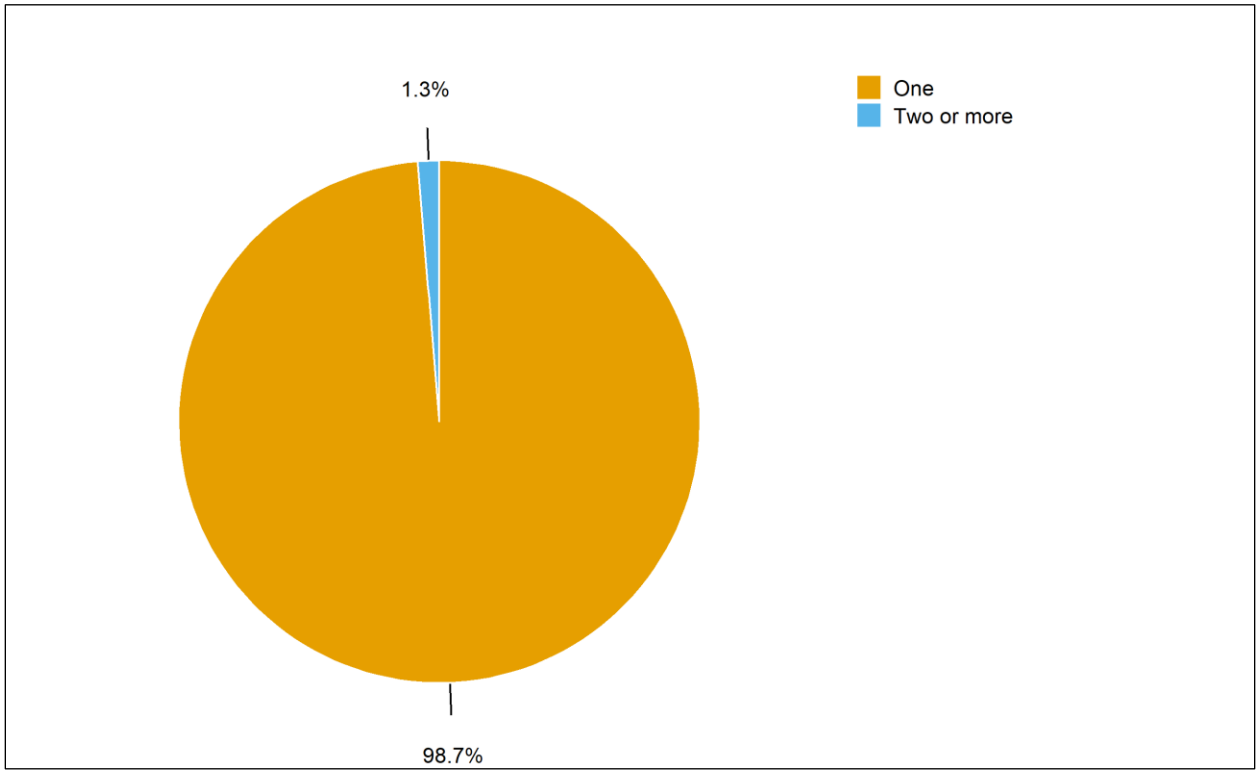
Arriving Units

Table 8-4, along with Figure 8-4, detail the number of calls with one and two or more units arriving to a call, broken down by call type. In this analysis, we limit ourselves to calls where a unit from AMR arrives. For this reason, there are fewer calls in Table 8-4 than in Table 8-2.

TABLE 8-4: Calls by Call Type and Number of Units Arriving

Call Type	Number of Units		Total Calls
	One	Two	
Breathing difficulty	780	7	787
Cardiac and stroke	848	4	852
Fall and injury	1,221	11	1,232
Illness and other	2,129	18	2,147
MVA	480	36	516
Overdose and psychiatric	227	4	231
Seizure and unconsciousness	818	7	825
EMS Total	**6,503**	**87**	**6,590**
Fire & FD assist	30	1	31
Total	**6,533**	**88**	**6,621**
Percentage	**98.7**	**1.3**	**100.0**

FIGURE 8-4: Calls by Number of Units Arriving



Observations:

- On average, 1.0 units arrived at all calls
- For 99 percent of calls, one unit arrived.
- For 1 percent of calls, two or three units arrived.

WORKLOAD: RUNS AND TOTAL TIME SPENT

The workload of each AMR units is measured in two ways: runs and deployed time. The deployed time of a run is measured from the time a unit is dispatched through the time the unit is cleared. Because multiple units respond to some calls, there are more runs than calls and the average deployed time per run varies from the total duration of calls.

Runs and Deployed Time – All Units

Deployed time is the total deployment time of all units deployed on all runs. Table 8-5 shows the total deployed time, both overall and broken down by type of run, for all units in 2019. Table 8-6 and Figure 8-5 present the average deployed minutes by hour of day.

TABLE 8-5: Annual Runs and Deployed Time by Run Type

Call Type	Deployed Minutes per Run	Annual Hours	Percent of Total Hours	Deployed Minutes per Day	Annual Runs	Runs per Day
Breathing difficulty	61.3	916.6	12.5	150.7	897	2.5
Cardiac and stroke	60.4	995.3	13.6	163.6	988	2.7
Fall and injury	54.7	1,342.3	18.3	220.7	1,472	4.0
Illness and other	50.8	2,395.0	32.6	393.7	2,826	7.7
MVA	35.8	480.6	6.6	79.0	805	2.2
Overdose and psychiatric	47.1	244.7	3.3	40.2	312	0.9
Seizure and unconsciousness	58.2	936.2	12.8	153.9	966	2.6
EMS Total	**53.1**	**7,310.7**	**99.7**	**1,201.8**	**8,266**	**22.6**
Fire & FD assist	18.9	25.1	0.3	4.1	80	0.2
Total	**52.7**	**7,335.9**	**100.0**	**1,205.9**	**8,346**	**22.9**

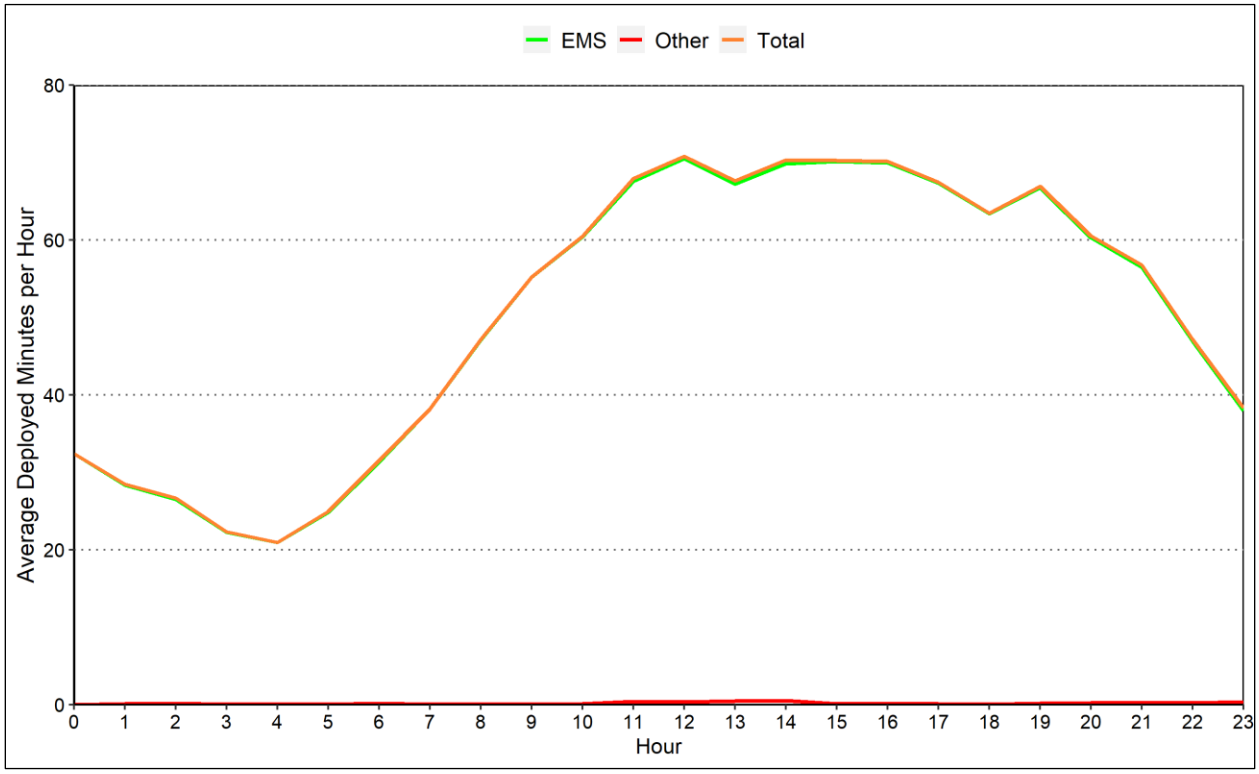
Observations:

- The total deployed time for the year was 7,335.9 hours. The daily average was 20.1 hours for all units combined.
- There were 8,346 runs. The daily average was 22.9 runs.
- The average deployed time for EMS runs was 53.1 minutes per run. The deployed time for all EMS runs averaged 20.0 hours per day.

TABLE 8-6: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire & FD Assist	Total
0	32.4	0.0	32.4
1	28.4	0.1	28.5
2	26.5	0.2	26.7
3	22.3	0.0	22.3
4	20.9	0.0	21.0
5	24.8	0.1	24.9
6	31.4	0.2	31.5
7	38.2	0.0	38.2
8	47.1	0.0	47.1
9	55.2	0.0	55.2
10	60.4	0.1	60.4
11	67.5	0.4	67.9
12	70.5	0.3	70.8
13	67.2	0.5	67.7
14	69.8	0.5	70.3
15	70.1	0.1	70.2
16	69.9	0.2	70.1
17	67.3	0.1	67.4
18	63.4	0.1	63.5
19	66.7	0.2	66.9
20	60.3	0.2	60.5
21	56.5	0.3	56.8
22	46.9	0.2	47.2
23	38.0	0.3	38.3
Daily Avg.	**1,201.8**	**4.1**	**1,205.9**

FIGURE 8-5: Average Deployed Minutes by Hour of Day



Observations:

- Hourly deployed time was highest during the day from 9:00 a.m. to 9:00 p.m., averaging more than 65 minutes.
- Average deployed time peaked between noon and 1:00 p.m., averaging 70.8 minutes.
- Average deployed time was lowest between 4:00 a.m. and 5:00 a.m., averaging 21.0 minutes.

Workload by Unit

Tables 8-7 summarizes the overall workload of AMR's ambulances in 2019. Tables 8-8 and 8-9 provide a more detailed view of workload, showing each ambulance's runs broken out by run type (Table 8-8) and the resulting daily average deployed time broken out by run type (Table 8-9). Here, we grouped the ambulances by SA and SD types. SA ambulances primarily responded to general 9-1-1 medic calls and SD ambulances primarily responded to BLS calls. Additionally, we grouped together all SD ambulances that had less than seven total runs.

TABLE 8-1: Call Workload by Unit

Type	Unit	Deployed Minutes per Run	Total Hours	Total Pct.	Deployed Minutes per Day	Total Runs	Runs per Day
SA	AM254	24.1	11.6	0.2	1.9	29	0.1
	AM255	13.0	7.8	0.1	1.3	36	0.1
	AM256	82.4	30.2	0.4	5.0	22	0.1
	AM257	26.3	40.4	0.6	6.6	92	0.3
	AM401	57.6	98.9	1.3	16.3	103	0.3
	AM402	51.4	14.6	0.2	2.4	17	0.0
	AM411	53.0	210.4	2.9	34.6	238	0.7
	AM412	52.0	246.4	3.4	40.5	284	0.8
	AM413	38.7	87.0	1.2	14.3	135	0.4
	AM414	44.3	280.5	3.8	46.1	380	1.0
	AM415	48.3	286.4	3.9	47.1	356	1.0
	AM416	49.2	557.9	7.6	91.7	680	1.9
	AM417	54.1	2,218.3	30.2	364.7	2,460	6.7
	AM418	55.9	2,012.5	27.4	330.8	2,160	5.9
	AM419	49.3	109.3	1.5	18.0	133	0.4
	AM420	49.9	185.6	2.5	30.5	223	0.6
	AM492	45.6	49.4	0.7	8.1	65	0.2
	AM493	58.0	238.0	3.2	39.1	246	0.7
	AM494	82.0	5.5	0.1	0.9	4	0.0
	AM495	53.4	188.8	2.6	31.0	212	0.6
	AM496	56.8	225.5	3.1	37.1	238	0.7
	AM980	55.9	42.8	0.6	7.0	46	0.1
	AM985	55.9	24.2	0.3	4.0	26	0.1
	Total	**52.6**	**7,172.0**	**97.8**	**1,179.0**	**8,185**	**22.4**
SD	AM202	60.8	7.1	0.1	1.2	7	0.0
	AM205	81.2	10.8	0.1	1.8	8	0.0
	AM231	57.7	7.7	0.1	1.3	8	0.0
	AM239	37.2	4.3	0.1	0.7	7	0.0
	Other*	61.3	133.9	1.8	22.0	131	0.4
	Total	**61.1**	**163.9**	**2.2**	**26.9**	**161**	**0.4**
Total		**52.7**	**7,335.9**	**100.0**	**1,205.9**	**8,346**	**22.9**

Note: *"Other" is the group of SD ambulances that made less than seven total runs.

TABLE 8-8: Annual Runs by Run Type and Unit

Type	Unit	Breathing Difficulty	Cardiac and Stroke	Fall and Injury	Illness and Other	MVA	OD	Seizure and UNC	Fire & FD assist	Total
SA	AM254	2	4	3	11	4	2	3	0	29
	AM255	2	11	3	9	5	2	4	0	36
	AM256	2	4	3	9	2	1	1	0	22
	AM257	11	7	16	36	8	2	11	1	92
	AM401	0	2	1	12	1	0	1	0	17
	AM402	21	37	45	71	30	11	23	0	238
	AM411	22	27	51	90	39	9	41	5	284
	AM412	11	17	27	42	20	3	14	1	135
	AM413	36	52	65	124	44	12	47	0	380
	AM414	43	41	69	99	42	10	47	5	356
	AM415	76	79	118	213	65	21	102	6	680
	AM416	268	300	425	877	211	102	250	27	2,460
	AM417	267	259	387	687	214	74	250	22	2,160
	AM418	22	10	23	42	13	6	16	1	133
	AM419	28	25	35	75	20	9	28	3	223
	AM420	6	6	16	21	3	3	9	1	65
	AM492	15	33	47	76	28	7	39	1	246
	AM493	0	2	2	0	0	0	0	0	4
	AM494	21	22	41	69	20	7	29	3	212
	AM495	24	23	48	80	22	3	36	2	238
	AM496	4	9	14	11	4	0	4	0	46
	AM980	3	2	6	5	5	2	2	1	26
	AM985	2	10	10	68	1	8	3	1	103
	Total	**886**	**982**	**1,455**	**2,727**	**801**	**294**	**960**	**80**	**8,185**
SD	AM202	0	0	0	7	0	0	0	0	7
	AM205	0	0	1	7	0	0	0	0	8
	AM231	0	0	1	6	0	1	0	0	8
	AM239	2	0	1	2	1	1	0	0	7
	Other	9	6	14	77	3	16	6	0	131
	Total	**11**	**6**	**17**	**99**	**4**	**18**	**6**	**0**	**161**
Total		**897**	**988**	**1,472**	**2,826**	**805**	**312**	**966**	**80**	**8,346**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness; "Other" is the group of SD ambulances that made less than seven total runs.

TABLE 8-9: Average Deployed Minutes by Run Type and Unit

Type	Unit	Breathing Difficulty	Cardiac and Stroke	Fall and Injury	Illness and Other	MVA	OD	Seizure and UNC	Fire & FD assist	Total
SA	AM254	0.1	0.2	0.2	0.5	0.4	0.0	0.4	0.0	1.9
	AM255	0.2	0.8	0.0	0.2	0.0	0.0	0.0	0.0	1.3
	AM256	0.6	1.5	0.5	1.9	0.2	0.3	0.0	0.0	5.0
	AM257	1.3	0.1	1.1	2.2	0.8	0.2	1.0	0.0	6.6
	AM401	0.0	0.1	0.0	2.2	0.0	0.0	0.0	0.0	2.4
	AM402	3.6	6.3	6.5	8.6	3.6	1.9	4.1	0.0	34.6
	AM411	3.9	4.7	8.3	12.0	4.2	1.0	6.0	0.4	40.5
	AM412	1.1	2.3	3.3	3.8	1.4	0.2	2.1	0.0	14.3
	AM413	4.9	8.4	8.4	13.6	3.5	1.3	6.0	0.0	46.1
	AM414	6.6	7.3	10.2	11.8	4.5	0.8	5.9	0.0	47.1
	AM415	12.4	11.8	17.0	27.6	4.6	2.8	15.5	0.1	91.7
	AM416	46.3	50.1	66.7	123.5	21.9	12.6	41.8	1.7	364.7
	AM417	47.9	47.1	61.5	98.1	20.9	10.7	43.5	1.2	330.8
	AM418	4.7	1.4	2.4	4.8	0.9	1.0	2.9	0.0	18.0
	AM419	4.2	2.6	5.1	10.5	1.9	0.9	5.2	0.1	30.5
	AM420	0.9	0.6	2.0	3.2	0.1	0.3	1.0	0.0	8.1
	AM492	2.9	6.1	6.6	11.8	4.1	1.3	6.2	0.2	39.1
	AM493	0.0	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.9
	AM494	2.8	4.0	5.6	10.5	2.1	0.8	5.1	0.2	31.0
	AM495	4.4	4.7	7.8	11.7	2.2	0.4	5.8	0.0	37.1
	AM496	0.5	1.3	2.4	1.6	0.5	0.0	0.8	0.0	7.0
	AM980	0.5	0.5	0.9	0.9	0.9	0.2	0.2	0.0	4.0
	AM985	0.3	1.2	0.7	12.5	0.3	1.1	0.1	0.1	16.3
	Total	**150.1**	**163.4**	**217.8**	**373.6**	**78.9**	**37.7**	**153.5**	**4.1**	**1,179.0**
SD	AM202	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	1.2
	AM205	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	1.8
	AM231	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	1.3
	AM239	0.1	0.0	0.1	0.3	0.1	0.2	0.0	0.0	0.7
	Other	0.5	0.2	2.8	15.7	0.0	2.3	0.4	0.0	22.0
	Total	**0.6**	**0.2**	**2.9**	**20.1**	**0.1**	**2.6**	**0.4**	**0.0**	**26.9**
Total		**150.7**	**163.6**	**220.7**	**393.7**	**79.0**	**40.2**	**153.9**	**4.1**	**1,205.9**

Note: OD=Overdose and psychiatric; UNC=Unconsciousness; "Other" is the group of SD ambulances that made less than seven total runs.

Observations:

- SA ambulances made 8,185 runs (22.4 runs per day) and had 7,172.0 hours of annual deployed time (19.6 hours per day).
- SD ambulances made 161 runs (0.4 runs per day) and had 163.9 hours of annual deployed time (26.9 minutes per day).
- Ambulance AM417 made the most runs (2,460, or an average of 6.7 runs per day) and had the highest total annual deployed time (2,218.3 hours or an average of 6.1 hours per day).
- Ambulance AM418 made the second most runs (2,160, or an average of 5.9 runs per day) and had the second highest total annual deployed time (2,012.5 hours or an average of 5.5 hours per day).

Workload by District

The following table breaks down AMR's annual workload by the service district of each NCFD fire station.

TABLE 8-10: Annual Workload by NCFD Station Service District

NCFD Station	Calls	Pct. Annual Calls	Runs	Runs Per Day	Deployed Minutes Per Run	Annual Hours	Pct. Annual Work	Deployed Minutes Per Day
31	3,350	45.7	3,785	10.4	55.1	3,477.3	47.4	571.6
34	3,978	54.3	4,561	12.5	50.8	3,858.5	52.6	634.3
Total	**7,328**	**100.0**	**8,346**	**22.9**	**52.7**	**7,335.9**	**100.0**	**1205.9**

Observations:

NCFD Station 31

- There were 3,350 calls, or 46 percent of the total calls.
- There were 3,785 runs. The daily average was 10.4 runs.
- Total deployed time for the year was 3,477.3 hours or 47 percent of the total annual workload. The daily average was 9.5 hours for all units combined.

NCFD Station 34

- There were 3,978 calls, or 54 percent of the total calls.
- There were 4,561 runs. The daily average was 12.5 runs.
- Total deployed time for the year was 3,858.5 hours or 53 percent of the total annual workload. The daily average was 10.6 hours for all units combined.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 8-11 shows the number of hours in the year in which there were zero to five or more calls during the hour. Table 8-12 shows the 10 one-hour intervals which had the most calls that AMR responded during the year. Table 8-13 examines the number of times a call overlapped with another call within the National City fire district.

TABLE 8-11: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	3,928	44.8
1	3,025	34.5
2	1,266	14.5
3	419	4.8
4	101	1.2
5+	21	0.2
Total	**8,760**	**100.0**

TABLE 8-12: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
11/15/2019, 2:00 p.m. to 3:00 p.m.	6	12	8.1
8/27/2019, 10:00 a.m. to 11:00 a.m.	6	7	9.0
6/21/2019, 5:00 p.m. to 6:00 p.m.	6	7	5.5
4/12/2019, 2:00 p.m. to 3:00 p.m.	6	6	6.7
3/10/2019, 4:00 p.m. to 5:00 p.m.	6	6	4.2
3/20/2019, 8:00 p.m. to 9:00 p.m.	5	7	9.4
4/23/2019, 5:00 p.m. to 6:00 p.m.	5	7	5.9
10/22/2019, 3:00 p.m. to 4:00 p.m.	5	6	12.0
5/28/2019, 5:00 p.m. to 6:00 p.m.	5	6	6.7
7/18/2019, 11:00 p.m. to midnight	5	6	5.9

Note: Total deployed hours is a measure of the total time spent responding to calls received in the hour. The deployed time from these calls may extend into the next hour or hours. The number of runs and deployed hours includes all AMR units.

TABLE 8-13: Frequency of Overlapping Calls

Scenario	Number of Calls	Percent of All Calls	Total Hours
No overlapped call	3,064	41.8	2,977.7
Overlapped with one call	2,540	34.7	1,274.6
Overlapped with two calls	1,177	16.1	390.3
Overlapped with three calls	393	5.4	98.8
Overlapped with four calls	123	1.7	22.7
Overlapped with five calls	24	0.3	4.3
Overlapped with six calls	5	0.1	1.3
Overlapped with seven calls	2	0.0	0.2

Observations:

- During 21 hours (0.2 percent of all hours), five or more calls occurred; in other words, AMR responded to five or more calls in an hour roughly once every 17 days.
  - The highest number of calls to occur in an hour was six, which happened five times.

RESPONSE TIME

In this part of the analysis, we present response time statistics for different call types. We separate response time into its identifiable components. *Dispatch time* is the difference between the time when AMR received a call and the earliest time an ambulance is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. *Turnout time* is the difference between the earliest dispatch time and the earliest time an ambulance is en route to a call's location. *Travel time* is the difference between the earliest en route time and the earliest arrival time. *Response time* is the total time elapsed between receiving a call to arriving on scene.

In this analysis, with all calls that were responded by AMR within the National City fire district, we excluded the fire & PD assist calls. In addition, calls with a total response time of more than 30 minutes were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time.

Based on the methodology above, we excluded 73 fire & PD calls, four non-emergency calls, 659 calls where no units recorded a valid on-scene time, 30 calls where the first arriving unit's response time was greater than 30 minutes, and 14 calls where one or more segments of the first arriving unit's response time could not be calculated due to missing or faulty data. As a result, the analysis in this section included 6,548 calls for 2019. Using the same method, we obtained 6,214 calls for the same analysis for 2020. 2020's response time analysis is compared with that of 2019 in Attachment I.

Response Time by Type of Call

Table 8-14 breaks down the average dispatch, turnout, travel, and total response times by call type for all calls that AMR responded within the National City fire district, and Table 8-15 does the same for 90th percentile response times. A 90th percentile response time means that 90 percent of calls had response times at or below that number. For example, Table 8-15 shows a 90th percentile response time of 13.2 minutes, which means that 90 percent of the time, a call had a response time of no more than 13.2 minutes. Figure 8-6 illustrates the components of the average response time.

TABLE 8-14: Average Response Time of First Arriving Unit, by Call Type

Call Type	Time in Minutes				Number of Calls
	Dispatch	Turnout	Travel	Total	
Breathing difficulty	0.7	0.8	5.9	7.4	786
Cardiac and stroke	0.8	0.8	6.2	7.7	851
Fall and injury	0.9	0.7	6.4	8.0	1,227
Illness and other	1.0	0.8	6.7	8.6	2,125
MVA	1.0	0.8	6.2	8.0	508
Overdose and psychiatric	1.0	0.9	6.7	8.6	225
Seizure and unconsciousness	0.8	0.8	6.1	7.7	826
Total	**0.9**	**0.8**	**6.4**	**8.0**	**6,548**

FIGURE 8-6: Average Response Time of First Arriving Unit, by Call Type

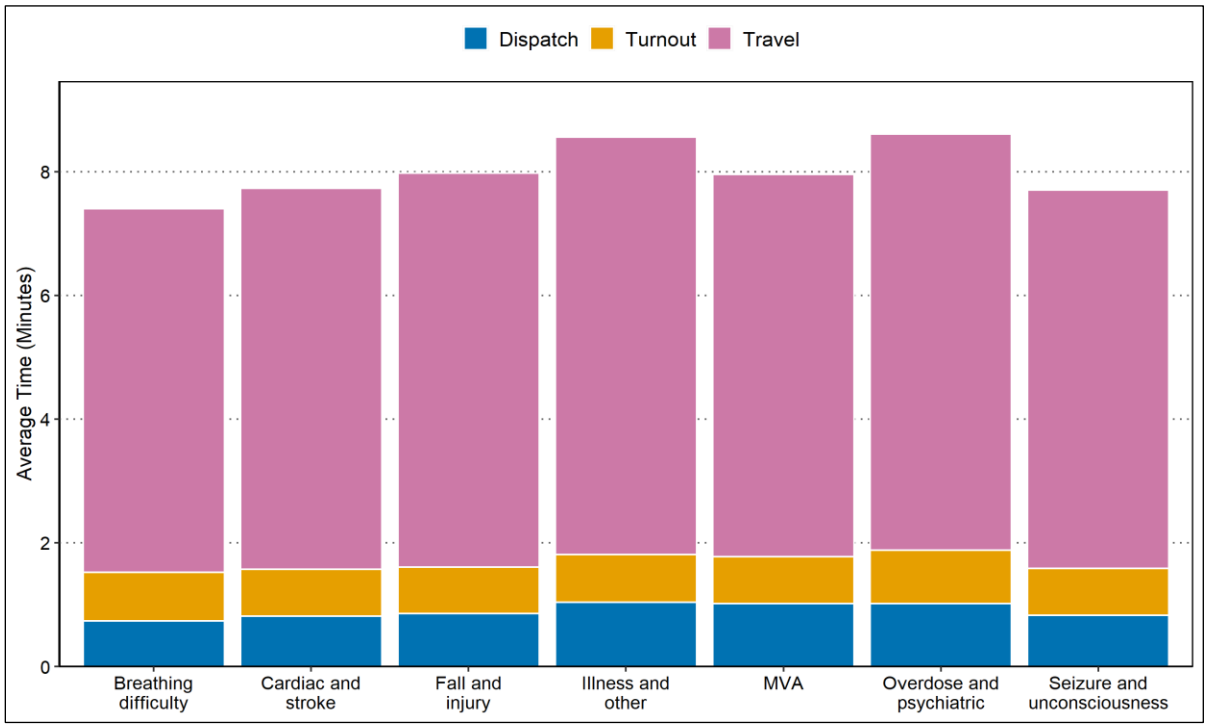


TABLE 8-15: 90th Percentile Response Time of First Arriving Unit, by Call Type

Call Type	Time in Minutes				Number of Calls
	Dispatch	Turnout	Travel	Total	
Breathing difficulty	1.6	1.8	10.1	11.6	786
Cardiac and stroke	2.0	1.8	10.7	12.6	851
Fall and injury	2.1	1.8	10.8	12.8	1,227
Illness and other	3.1	1.8	11.6	14.9	2,125
MVA	2.4	1.7	10.9	12.8	508
Overdose and psychiatric	3.1	2.0	11.7	14.2	225
Seizure and unconsciousness	2.0	1.7	10.4	12.2	826
Total	**2.4**	**1.8**	**10.9**	**13.2**	**6,548**

Observations:

- The average dispatch time was 0.9 minutes.
- The average turnout time was 0.8 minutes.
- The average travel time was 6.4 minutes.
- The average total response time was 8.0 minutes.
- The 90th percentile dispatch time was 2.4 minutes.
- The 90th percentile turnout time was 1.8 minutes.
- The 90th percentile travel time was 10.9 minutes.
- The 90th percentile total response time was 13.2 minutes.

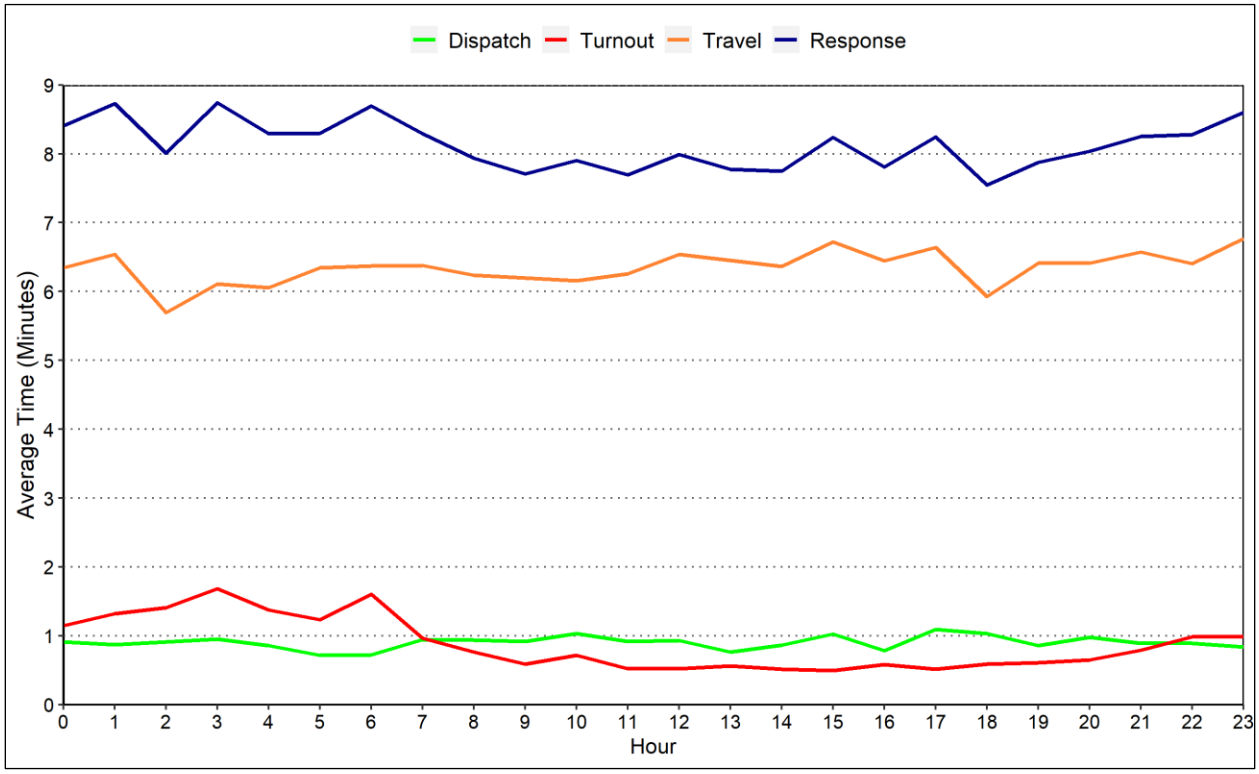
Response Time by Hour

The components of average response time by the time of day are shown in Table 8-16. The table also shows the 90th percentile response time. Figure 8-7 shows the same information.

TABLE 8-16: Average and 90th Percentile Response Time of First Arriving Unit, by Time of Day

Hour	Time in Minutes				90th Percentile Response Time	Number of Calls
	Dispatch	Turnout	Travel	Response Time		
0	0.9	1.1	6.3	8.4	13.5	168
1	0.9	1.3	6.5	8.7	14.3	160
2	0.9	1.4	5.7	8.0	13.3	153
3	1.0	1.7	6.1	8.7	13.4	130
4	0.9	1.4	6.1	8.3	13.5	130
5	0.7	1.2	6.3	8.3	12.6	155
6	0.7	1.6	6.4	8.7	14.3	188
7	0.9	1.0	6.4	8.3	13.6	232
8	0.9	0.8	6.2	7.9	13.5	312
9	0.9	0.6	6.2	7.7	12.1	303
10	1.0	0.7	6.2	7.9	13.2	350
11	0.9	0.5	6.3	7.7	12.3	369
12	0.9	0.5	6.5	8.0	13.3	357
13	0.8	0.6	6.5	7.8	12.8	363
14	0.9	0.5	6.4	7.7	12.5	367
15	1.0	0.5	6.7	8.2	12.4	363
16	0.8	0.6	6.4	7.8	12.5	358
17	1.1	0.5	6.6	8.2	14.1	354
18	1.0	0.6	5.9	7.6	12.4	338
19	0.9	0.6	6.4	7.9	13.0	344
20	1.0	0.6	6.4	8.0	12.8	323
21	0.9	0.8	6.6	8.3	13.6	291
22	0.9	1.0	6.4	8.3	13.5	223
23	**0.8**	**1.0**	**6.8**	**8.6**	**13.3**	**217**
Total	**0.9**	**0.8**	**6.4**	**8.0**	**13.2**	**6,548**

FIGURE 8-7: Average Response Time of First Arriving Unit, by Hour of Day



Observations:

- Average dispatch time was between 0.7 minutes (5:00 a.m. to 6:00 a.m.) and 1.1 minutes (5:00 p.m. to 6:00 p.m.).
- Average turnout time was between 0.5 minutes (3:00 p.m. to 4:00 p.m.) and 1.7 minutes (3:00 a.m. to 4:00 a.m.).
- Average travel time was between 5.7 minutes (2:00 a.m. to 3:00 a.m.) and 6.8 minutes (11:00 p.m. to midnight).
- Average response time was between 7.6 minutes (6:00 p.m. to 7:00 p.m.) and 8.7 minutes (3:00 a.m. to 4:00 a.m.).
- The 90th percentile response time was between 12.1 minutes (9:00 a.m. to 10:00 a.m.) and 14.3 minutes (1:00 a.m. to 2:00 a.m.).

Response Time Distribution

Here, we present a more detailed look at how response times to calls are distributed. The cumulative distribution of total response time for the first arriving unit is shown in Figure 8-8 and Table 8-17. Figure 8-8 shows response times for the first arriving unit as a frequency distribution in whole-minute increments.

The cumulative percentages here are read in the same way as a percentile. In Figure 8-8, the 90th percentile of 13.2 minutes means that 90 percent of calls had a response time of 13.2 minutes or less. In Table 8-17, the cumulative percentage of 61.8 means that 61.8 percent of calls had a response time under 8 minutes.

FIGURE 8-8: Cumulative Distribution of Response Time – First Arriving Unit

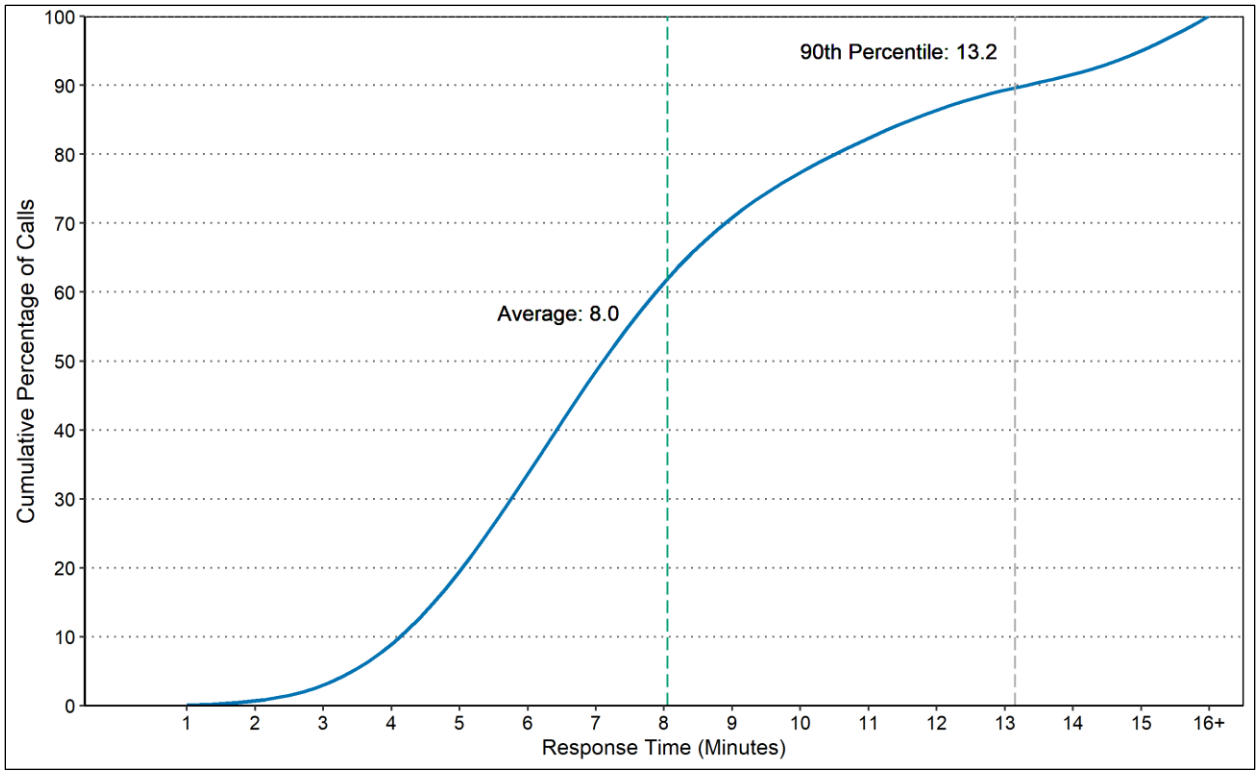


TABLE 8-17: Cumulative Distribution of Response Time – First Arriving Unit

Response Time (minute)	Frequency	Cumulative Percentage
1	13	0.2
2	33	0.7
3	150	3.0
4	360	8.5
5	721	19.5
6	918	33.5
7	990	48.6
8	863	61.8
9	586	70.8
10	430	77.3
11	315	82.1
12	272	86.3
13	221	89.7
14	152	92.0
15	118	93.8
16+	406	100.0

Observations:

- For 62 percent of calls, the response time of the first arriving unit was less than 8 minutes.

TRANSPORT CALL ANALYSIS

In this section, we present an analysis for unit activity that involved transporting patients, the variations by hour of day, and the average time for each stage of transport service. We identified transport calls by requiring that at least one responding unit had recorded both a "beginning to transport" time and an "arriving at the hospital" time. Based on these criteria, we note that eight non-EMS (fire & FD assist) calls that resulted in transports are included in this analysis.

Transport Calls by Type

Table 8-18 shows the number of calls by call type broken out by transport and non-transport calls.

TABLE 8-18: Transport Calls by Call Type

Call Type	Number of Calls			Conversion Rate
	Non-transport	Transport	Total	
Breathing difficulty	167	648	815	79.5
Cardiac and stroke	183	698	881	79.2
Fall and injury	458	838	1,296	64.7
Illness and other	846	1,607	2,453	65.5
MVA	422	255	677	37.7
Overdose and psychiatric	116	150	266	56.4
Seizure and unconsciousness	232	635	867	73.2
EMS Total	**2,424**	**4,831**	**7,255**	**66.6**
Fire & FD assist	65	8	73	11.0
Total	**2,489**	**4,839**	**7,328**	**66.0**

Observations:

- 67 percent of EMS calls involved transporting one or more patients
- On average, 13 EMS calls per day involved transporting one or more patients.

Average Transport Calls per Hour

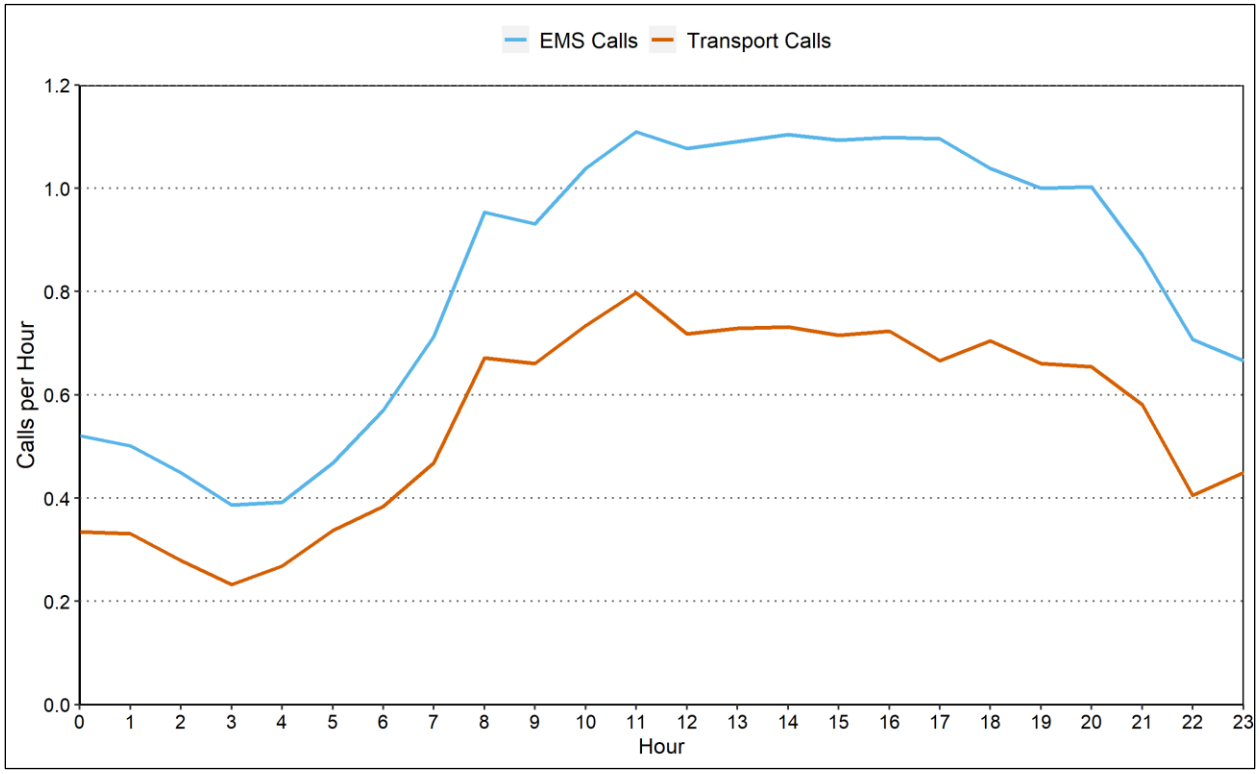
Table 8-19 and Figure 8-9 show the average number of EMS calls received each hour of the day during 2019. In the table the conversion rate measures the percent of EMS calls in which one or more patients was transported.

TABLE 8-19: EMS Transport Calls per Hour, by Time of Day

Hour	EMS Calls	Transport	EMS Calls per Day	Transports per Day	Conversion Rate
0	190	122	0.5	0.3	64.2
1	183	121	0.5	0.3	66.1
2	164	102	0.4	0.3	62.2
3	141	85	0.4	0.2	60.3
4	143	98	0.4	0.3	68.5
5	171	123	0.5	0.3	71.9
6	208	140	0.6	0.4	67.3
7	260	171	0.7	0.5	65.8
8	348	245	1.0	0.7	70.4
9	340	241	0.9	0.7	70.9
10	379	268	1.0	0.7	70.7
11	405	291	1.1	0.8	71.9
12	393	262	1.1	0.7	66.7
13	398	266	1.1	0.7	66.8
14	403	267	1.1	0.7	66.3
15	399	261	1.1	0.7	65.4
16	401	264	1.1	0.7	65.8
17	400	243	1.1	0.7	60.8
18	379	257	1.0	0.7	67.8
19	365	241	1.0	0.7	66.0
20	366	239	1.0	0.7	65.3
21	318	212	0.9	0.6	66.7
22	258	148	0.7	0.4	57.4
23	243	164	0.7	0.4	67.5
Total	**7,255**	**4,831**	**19.9**	**13.2**	**66.6**

Note: The conversion rate is measured by dividing the number of EMS transports by the number of EMS calls. For example, between midnight and 1:00 a.m., there were 122 EMS transports out of 190 EMS calls. This gives a conversion rate of 122 / 190 = 0.642, or 64.2 percent.

FIGURE 8-9: Average Transport Calls by Hour of Day



Observations:

- Hourly EMS calls per day were highest during the day from 8:00 a.m. to 9:00 p.m., averaging between 0.9 and 1.1 calls per day.
- Average hourly EMS calls per day peaked between 11:00 a.m. and noon, averaging 1.1 calls per day.
- Average hourly EMS calls per day was lowest between 3:00 a.m. and 4:00 a.m., averaging 0.4 calls per day.
- Hourly transport calls per day were highest during the day from 8:00 a.m. to 8:00 p.m., averaging between 0.7 calls per day and 0.8 calls per day.
- Average hourly transport calls per day peaked between 11:00 a.m. and noon, averaging 0.8 calls per day.
- Average hourly transport calls per day was lowest between 3:00 a.m. and 4:00 a.m., averaging 0.2 calls per day.
- Average hourly transport conversion rates per day peaked between 5:00 a.m. and 6:00 a.m., averaging 72 percent per day.
- Average hourly transport conversion rates per day was lowest between 10:00 p.m. and 11:00 p.m., averaging 57 percent per day.

Calls by Type and Duration

The following table shows the average duration of transport and non-transport EMS calls by call type.

TABLE 8-20: Transport Call Duration by Call Type

Call Type	Non-transport		Transport	
	Average Duration	Number of Calls	Average Duration	Number of Calls
Breathing difficulty	34.4	167	75.2	648
Cardiac and stroke	33.6	183	76.2	698
Fall and injury	29.0	458	79.2	838
Illness and other	23.2	846	76.3	1,607
MVA	16.2	422	78.6	255
Overdose and psychiatric	28.3	116	74.7	150
Seizure and unconsciousness	31.1	232	76.8	635
EMS Total	**25.6**	**2,424**	**76.8**	**4,831**
Fire & FD assist	12.0	65	82.2	8
Total	**25.3**	**2,489**	**76.8**	**4,839**

Note: Duration of a call is defined as the longest deployed time of any of the units responding to the same call.

Observations:

- The average duration was 25.6 minutes for non-transport EMS calls.
- The average duration was 76.8 minutes for EMS calls where one or more patients were transported to a hospital.

Transport Time Components

Table 8-21 gives the average deployed time for an ambulance on a transport call, along with three major components of the deployed time: on-scene time, travel to hospital time, and at-hospital time.

The on-scene time is the interval from the unit arriving on-scene time through the time the unit departs the scene for the hospital. Travel to hospital time is the interval from the time the unit departs the scene to travel to the hospital through the time the unit arrives at the hospital. At-hospital time is the time it takes for patient turnover at the hospital.

This table analyzes times by run. Normally, the number of runs will exceed the number of calls as a call may have multiple runs. In addition, average times may differ slightly from similar averages measured per call.

TABLE 8-21: Time Component Analysis for Ambulance Transport Runs by Call Type

Call Type	Average Minutes Spent per Run				Number of Runs
	On Scene	Traveling to Hospital	At Hospital	Deployed	
Breathing difficulty	16.0	13.4	39.0	74.9	649
Cardiac and stroke	16.0	13.7	38.7	75.3	698
Fall and injury	17.9	15.3	38.1	78.5	842
Illness and other	16.5	13.8	37.9	75.8	1,612
MVA	13.8	16.1	39.4	76.6	279
Overdose and psychiatric	15.8	11.2	39.4	73.4	151
Seizure and unconsciousness	15.9	13.2	40.4	76.5	637
EMS Total	**16.4**	**14.0**	**38.6**	**76.1**	**4,868**
Fire & Other Total	17.0	16.8	42.8	82.0	8
Total	**16.4**	**14.0**	**38.7**	**76.1**	**4,876**

Note: Average unit deployed time per run is lower than average call duration for some call types because call duration is based on the longest deployed time of any of the units responding to the same call, which may include an engine or ladder. Total deployed time is greater than the combination of on-scene, transport, and hospital wait times as it includes turnout, initial travel, and hospital return times.

Observations:

- The average time spent on-scene for a transport EMS call was 16.4 minutes.
- The average travel time from the scene of the EMS call to the hospital was 14.0 minutes.
- The average deployed time spent on transport EMS calls was 76.1 minutes.
- The average deployed time at the hospital was 38.6 minutes, which accounts for approximately 51 percent of the average total deployed time for a transport EMS call.

ATTACHMENT I: 2019 & 2020 COMPARISON

In this analysis, we compare portions of the previous analysis with similar records for 2020. We compare calls by type, unit workload, response time, and transport workload over the two years.

Call Volume by Year

Table 8-22 shows the number of calls by call type for both 2019 and 2020. Figure 8-10 shows the monthly variation in the average daily number of calls in two years. Similarly, Figure 8-11 illustrates the average number of calls received each hour of the day in two years.

TABLE 8-22: Calls by Call Type and Year

Call Type	Number of Calls		Calls per Day	
	2019	2020	2019	2020
Breathing difficulty	815	758	2.2	2.1
Cardiac and stroke	881	864	2.4	2.4
Fall and injury	1,296	1,229	3.6	3.4
Illness and other	2,453	2,421	6.7	6.6
MVA	677	589	1.9	1.6
Overdose and psychiatric	266	286	0.7	0.8
Seizure and unconsciousness	867	726	2.4	2.0
EMS Total	**7,255**	**6,873**	**19.9**	**18.8**
Fire & FD assist	73	72	0.2	0.2
Total	**7,328**	**6,945**	**20.1**	**19.0**

Observations:

- The call volume decreased five percent, from 7,328 in 2019 to 6,945 in 2020.

FIGURE 8-10: Calls per Day by Month and Year

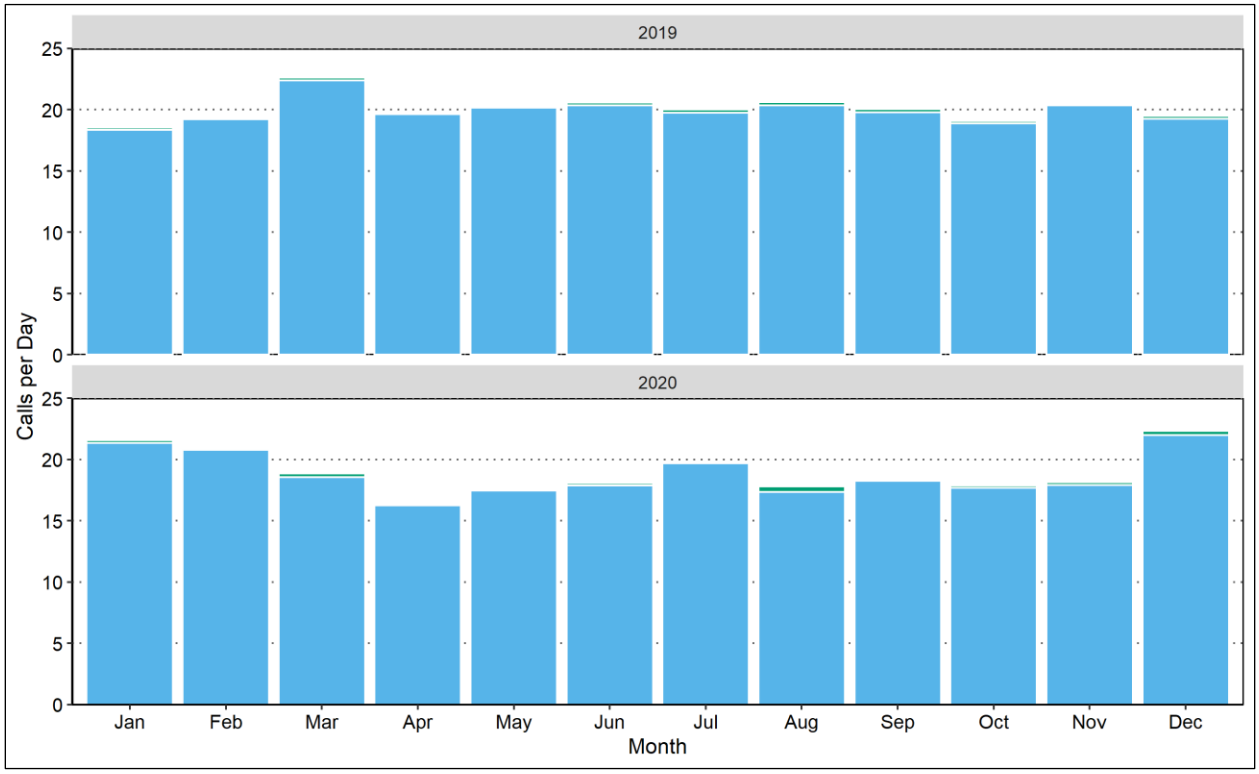
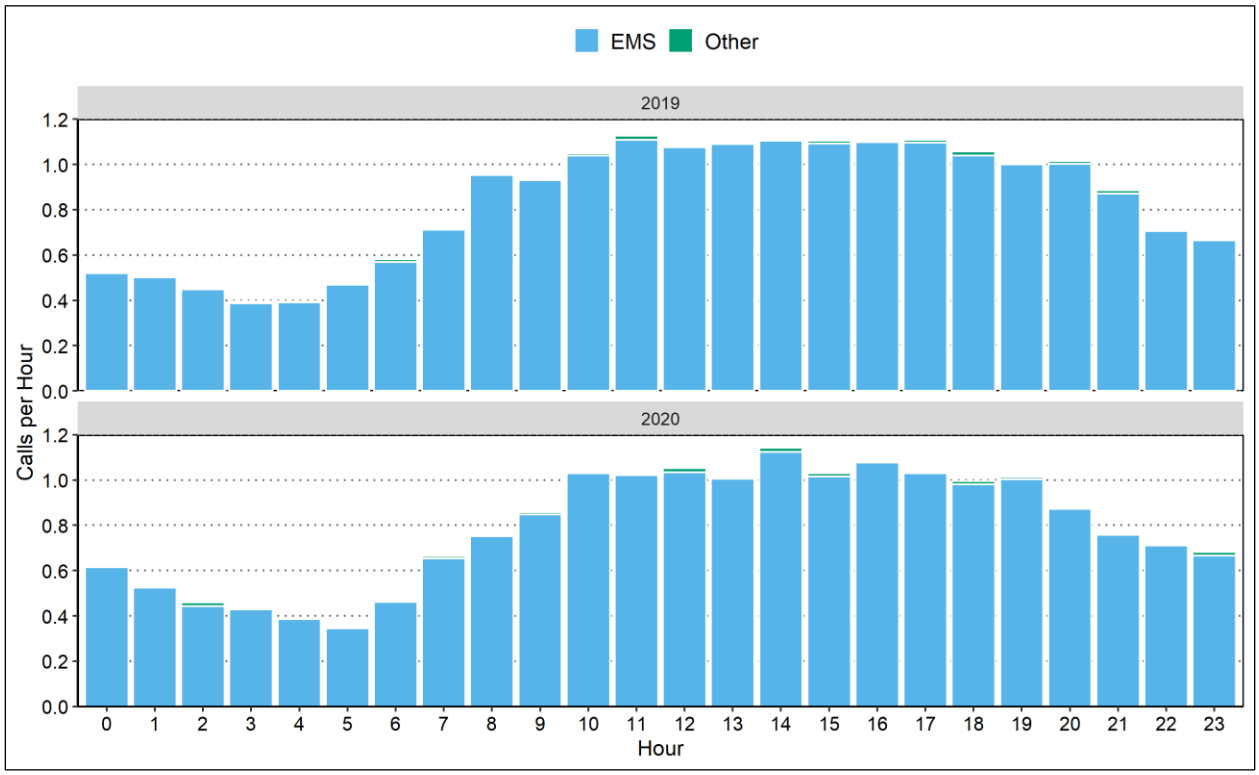


FIGURE 8-11: Calls per Hour by Time of Day and Year



Workload by Year

Table 8-23 compares the runs and workload for AMR units in 2019 and 2020. In the table, all SD type units are grouped. Figure 8-12 compares the average deployed minutes by the hour of the day in 2019 and 2020.

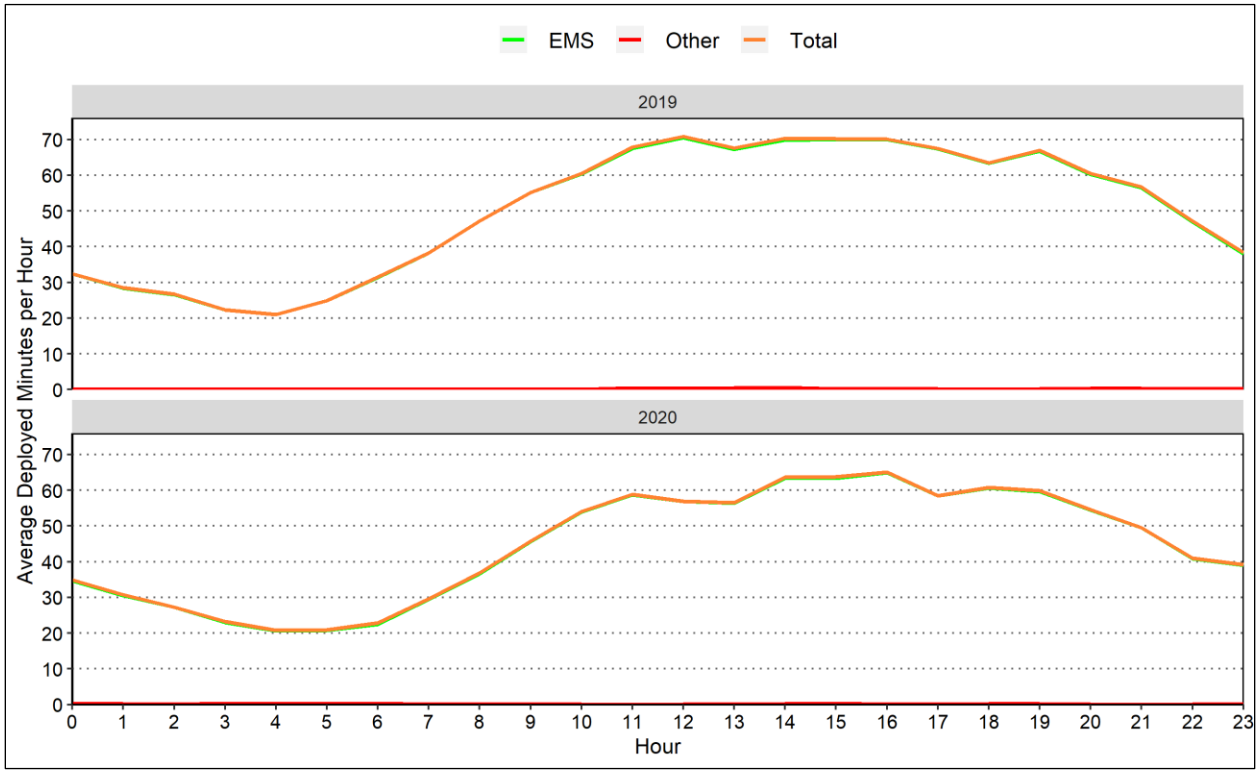
TABLE 8-23: Workload by Unit and Year

Type	Unit	Total Runs		Runs per Day		Total Hours		Deployed Minutes per Day	
		2019	2020	2019	2020	2019	2020	2019	2020
SA	AM254	29	49	0.1	0.1	11.6	26.4	1.9	4.3
	AM255	36	35	0.1	0.1	7.8	14.8	1.3	2.4
	AM256	22	19	0.1	0.1	30.2	28.5	5.0	4.7
	AM257	92	113	0.3	0.3	40.4	66.4	6.6	10.9
	AM401	103	78	0.3	0.2	98.9	84.5	16.3	13.8
	AM402	17	16	0.0	0.0	14.6	15.4	2.4	2.5
	AM411	238	189	0.7	0.5	210.4	171.6	34.6	28.1
	AM412	284	232	0.8	0.6	246.4	182.2	40.5	29.9
	AM413	135	187	0.4	0.5	87.0	117.3	14.3	19.2
	AM414	380	396	1.0	1.1	280.5	301.0	46.1	49.3
	AM415	356	326	1.0	0.9	286.4	266.3	47.1	43.7
	AM416	680	641	1.9	1.8	557.9	514.0	91.7	84.3
	AM417	2,460	2,352	6.7	6.4	2,218.3	1,983.9	364.7	325.2
	AM418	2,160	2,097	5.9	5.7	2,012.5	1,713.1	330.8	280.8
	AM419	133	280	0.4	0.8	109.3	221.1	18.0	36.3
	AM420	223	267	0.6	0.7	185.6	191.1	30.5	31.3
	AM492	65	56	0.2	0.2	49.4	38.7	8.1	6.3
	AM493	246	166	0.7	0.5	238.0	141.7	39.1	23.2
	AM494	4	16	0.0	0.0	5.5	10.9	0.9	1.8
	AM495	212	99	0.6	0.3	188.8	87.1	31.0	14.3
	AM496	238	175	0.7	0.5	225.5	164.6	37.1	27.0
	AM980	46	14	0.1	0.0	42.8	10.1	7.0	1.7
	AM985	26	0	0.1	0.0	24.2	0.0	4.0	0.0
	Total	**8,185**	**7,803**	**22.4**	**21.3**	**7,172.0**	**6,350.7**	**1,179.0**	**1,018.8**
SD	**Total**	**161**	**208**	**0.4**	**0.6**	**163.9**	**211.2**	**26.9**	**34.6**
Total		**8,346**	**8,011**	**22.9**	**21.9**	**7,335.9**	**6,561.9**	**1,205.9**	**1,075.7**

Observations:

- The total runs decreased 4 percent from 8,346 in 2019 to 8,011 in 2020.
- The total work hours decreased 11 percent from 7,335.9 hours in 2019 to 6,561.9 hours in 2020.

FIGURE 8-12: Average Deployed Minutes by Hour of Day in 2019 and 2020



Response Time Comparison by Year

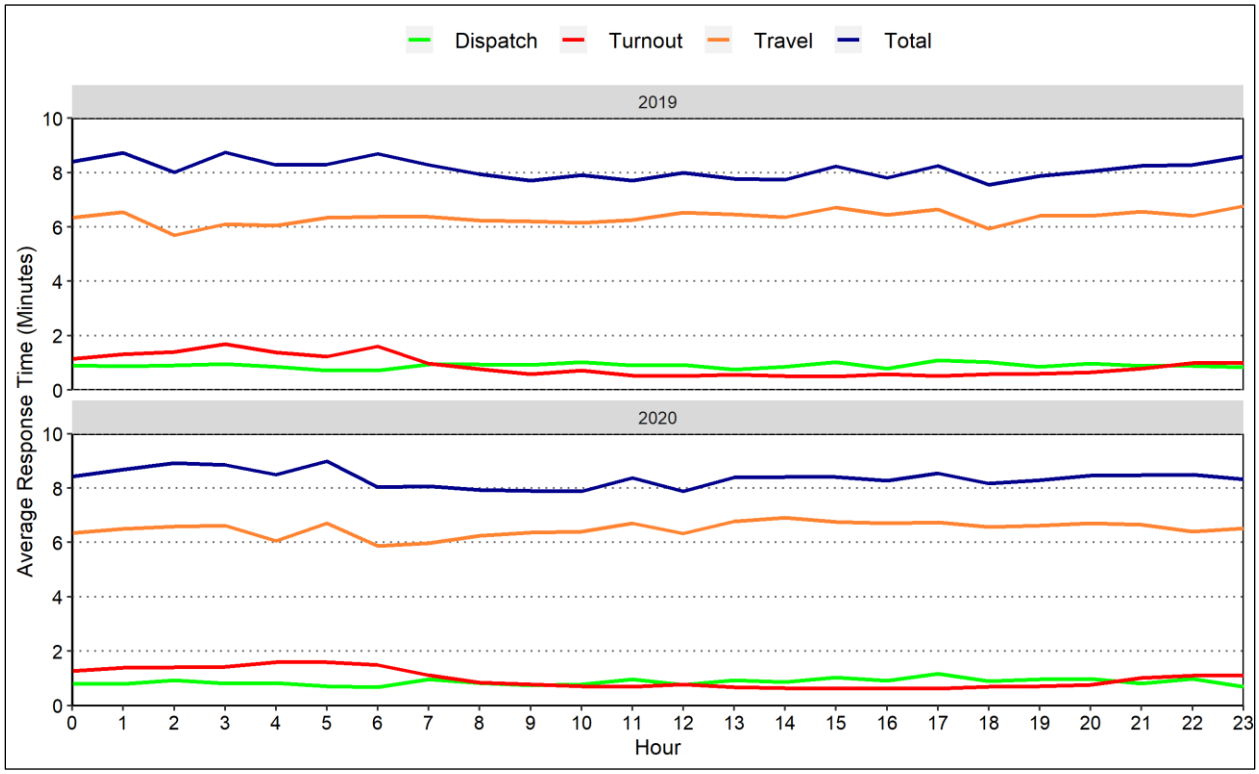
Tables 8-24 compares the average and 90th percentile response times broken out by call type and year. Figure 8-13 compares 2019's and 2020's average response time by hour of day.

TABLE 8-24: Average Response Time of First Arriving Unit by Call Type and Year

Call Type	2019			2020		
	Average	90th Percentile	Calls	Average	90th Percentile	Calls
Breathing difficulty	7.4	11.6	786	7.8	12.6	727
Cardiac and stroke	7.7	12.6	851	7.8	13.1	825
Fall and injury	8.0	12.8	1,227	8.2	13.1	1,131
Illness and other	8.6	14.9	2,125	8.9	14.8	2,145
MVA	8.0	12.8	508	8.1	13.1	454
OD	8.6	14.2	225	9.1	14.8	257
Seizure and UNC	7.7	12.2	826	7.8	12.3	675
Total	**8.0**	**13.2**	**6,548**	**8.3**	**13.5**	**6,214**

Note: OD= Overdose and psychiatric; UNC=Unconsciousness.

FIGURE 8-13: Average Response Time of First Arriving Unit, by Hour of Day and Year



Observations:

- The response times in two years did not change significantly.

TRANSPORT COMPARISON BY YEAR

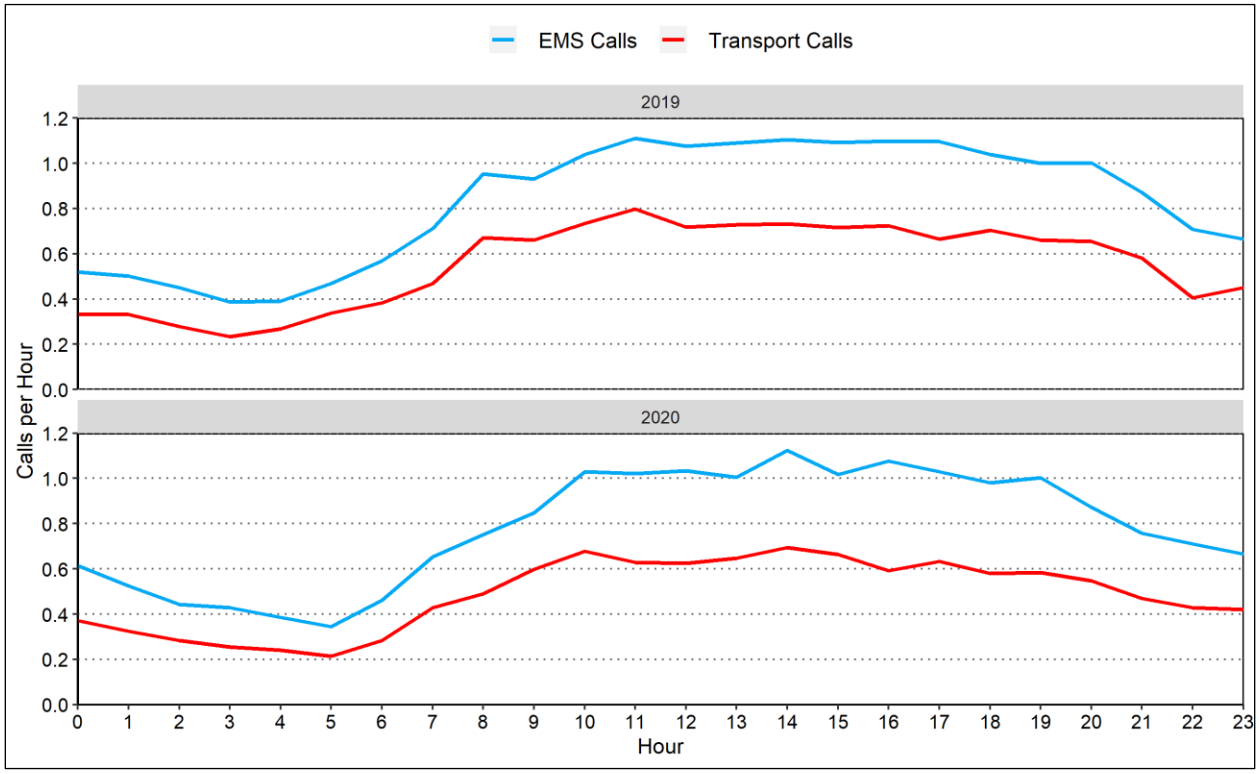
Table 8-25 compares the transport calls and workload in 2019 and 2020. Figure 8-14 compares the average number of EMS and transport EMS calls received each hour of the day over the two-year period.

TABLE 8-25: Transport Calls and Workload by Call Type and Year

Call Type	2019			2020		
	Calls	Runs	Average Call Duration (Minutes)	Calls	Runs	Average Call Duration (Minutes)
Breathing difficulty	648	649	75.2	569	569	72.2
Cardiac and stroke	698	698	76.2	625	626	71.7
Fall and injury	838	842	79.2	701	704	73.8
Illness and other	1,607	1,612	76.3	1,516	1,522	75.8
MVA	255	279	78.6	206	232	74.4
OD	150	151	74.7	166	167	72.4
Seizure and UNC	635	637	76.8	493	493	72.1
EMS Total	**4,831**	**4,868**	**76.8**	**4,276**	**4,313**	**73.8**
Fire & FD assist	**8**	**8**	**82.2**	**4**	**6**	**66.2**
Total	**4,839**	**4,876**	**76.8**	**4,280**	**4,317**	**73.7**

Note: OD= Overdose and psychiatric; UNC=Unconsciousness

FIGURE 8-14: Average Transport Calls by Hour and Year



ATTACHMENT II: CALL TYPE IDENTIFICATION

TABLE 8-26: Call Type by CAD Problem Description

Call Type	Problem	Frequency	
		2019	2020
Breathing Difficulty	Breathing Problems	781	723
	Choking	34	35
Cardiac and Stroke	Cardiac / Respiratory Arrest	110	142
	Chest Pain	485	465
	Heart Problems	112	114
	Stroke	174	143
Fire & PD Assist	Burns / Explosion	7	4
	.Nat Gas Leak Broken/Blowing	0	1
	.Natural Gas Odor - Outside	0	1
	AID - MEDIC	1	0
	Assist PD	3	2
	Carbon Monoxide Alarm	12	6
	Electrical Short	1	1
	Extinguished Fire	1	0
	Fuel Spill	4	4
	HazMat	1	0
	HazMat 1st Alarm	0	1
	HazMat Single Engine	3	2
	Illegal Burn	2	0
	Investigate	1	0
	Knocked Off Hydrant	1	0
	Lift Assist	1	0
	Lock in/out	3	2
	Odor of Chemical	0	1
	Oven Fire	1	0
	Ringing Alarm Highrise	0	1
	Rubbish Fire	1	2
	Safe Surrender	0	1
	SNAKE REMOVAL	1	0
	Special Service	2	1
	Structure Collapse	1	2
	Structure Fire - Comm / Apt	8	21
	Structure Highrise/Hospital	0	1
	Structure Residential	10	11
	Vegetation Initial Attack	1	2
	Vehicle Fire	4	1
	Vehicle Fire Freeway	2	4
	Wires down	1	0

Call Type	Problem	Frequency	
		2019	2020
Fall and Injury	Assault/Rape	227	238
	Drowning/Diving Accident	1	1
	Electrocution	4	1
	Falls / Back Inj	855	787
	Stabbing/Gunshot	34	36
	Traumatic Injuries, Spec	175	166
Illness and Other	Abdominal Pain/Problems	209	222
	Allergy/Hives/Med Rx/Stng	43	48
	Animal Bites/ Attacks	14	13
	Back Pain	75	67
	C O / Inhalation/ Haz Mat*	3	4
	Diabetic Problems	151	139
	Elevator Rescue	12	9
	Eye Problems / Injuries	3	8
	Headache	61	43
	Heat / Cold Exposure	6	6
	Hemorrhage / Lacerations	227	237
	Industrial Rescue	0	1
	Lift Assist*	1	1
	Medical Aid	7	4
	Medical Alert Alarm	95	76
	Miscellaneous Rescue	0	1
	NC Medical Aid	53	51
	Poison Control	2	1
	Preg/Birth/Miscarriage	29	29
	Sick Person	1,246	1,158
	Special Service*	0	3
	Suspected COVID19	0	108
	Unknown Problem*	189	162
	Vehicle vs. Pedestrian*	5	7
	Vehicle Rescue	22	22
	Water Rescue 3	0	1
MVA	Traffic Accident	589	529
	Traffic Accident FWY	74	50
	Vehicle vs Structure	13	9
	Vehicle vs. Pedestrian	1	1
Overdose and Psychiatric	OD/Ingestion/Poisonings	123	113
	Psych / Suicide Attempt	143	173
Seizure and UNC	Convulsions / Seizures	285	227
	Unc/Fainting	582	499
Total		**7,328**	**6,945**

Note: *NRIFS incident type code is 321; UNC = Unconsciousness.

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