



City of San Diego
California

EMS Optimization & Feasibility Study

Phase II

June 2024

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Executive Summary

The City of San Diego contracted AP Triton for a multiphase project to conduct a comprehensive study of the various components that comprise the Emergency Medical Services (EMS) delivery system of the San Diego Fire-Rescue Department. Phase 1 reviewed the ambulance transport system within the City and conducted an extensive review of the current contract, performance of the contractor, communications with Falck Ambulance Service, and options for contract amendments, or emergency actions to ensure continued public safety. This phase was completed in February 2023, and its report should be reviewed as part of the overall project.

After Phase 1 was completed, Falck Ambulance contacted the City stating they were unable to meet the requirements of their contract and were seeking modifications. It. They proposed a subcontracting or "alliance" model to the City. At the City's direction, AP Triton completed a preliminary analysis of how a subcontracting model would work in the City and produced an interim report titled "Phase IIA Subcontracting Model Analysis" in March 2023. This report should also be reviewed as part of the overall project.

From March 2023 through July 2023, AP Triton assisted the City in negotiating contract amendments with Falck to help stabilize the system in the City and maintain public safety. An additional provider was added to help meet needed unit hours. On October 1, 2023, the final amendment went into effect, transitioning the system to a subcontracting model. The City became the provider of record and started billing for service under their National Provider Identification (NPI) number. The ambulance providers are now being paid a unit hour price to serve the City.

System status reports and monitoring services were also provided to the City throughout the duration of this contract.

Phase II was placed on hold during the negotiations between the City and Falck on the contract amendments with AP Triton providing support in the negotiations process. AP Triton has now completed Phase II of the project, which includes an overview of San Diego Fire-Rescue operations and a cost revenue analysis of possible EMS models for ambulance transport services.

San Diego has experienced numerous private ambulance companies attempting to provide services to the communities. The last several ambulance companies and service models the City has employed have struggled to meet the desired level of service. Additionally, ambulance services have faced challenges since the pandemic. Colleges closed and reduced the number of paramedics and EMTs available. Many of the remaining personnel were unwilling to work in the existing conditions. As a result, providers have had to significantly increase wages and improve working conditions to be able to recruit and retain employees. These cost increases were a significant factor in Falck's request to amend the contract with the City. The amended contract has a one-year trial period of the alliance model, ending October 1, 2024. By that time, the City should have selected the next service model, determined system needs and deployment, and be prepared to release a Request for Proposals (RFP) for the next long-term provider.

The focus for the City is now determining the type of system that will best support the needs of the community and be sustainable. San Diego is uniquely positioned, having recent experience in the two most common system models: contracted and subcontracted. This direct experience will be invaluable as the City evaluates the available options for the next contract.

AP Triton believes that the challenges that led Falck to request changes to the contract, just over a year into the term, will remain after the one-year trial of the subcontracting amendment. Any plan to revert to a contract-for-service model must be meticulously planned and executed to ensure the community's needs are met and the system remains sustainable.

Regardless of the model the City chooses the best way to ensure service levels meet the City's requirements is to use multiple providers. San Diego, a large city with distinct areas, responds to over 150,000 ambulance incidents per year. The single-provider model has failed the City for years. Although past attempts at using two providers were not well planned or integrated, the current arrangement with Falck and AMR can help the City determine effective methodologies to utilizing multiple providers.

AP Triton's analysis shows that the system currently requires 1,008 unit hours per day to adequately serve the communities and maintain employee health and wellbeing. This report outlines five service model options for the next contract period, which include a mix of subcontracting and direct service provision with a variety of employee types. There also remains the option of returning to a direct contract for service. Of these six choices, AP Triton recommends the City remains the provider of record to receive the additional \$20 million in PP-GEMT revenue available to public providers. This revenue can stabilize the system and be reinvested to improve the EMS system. Returning to a contract for service model would forfeit the \$20 million in PP-GEMT revenue, impacting the fees the City would need to charge for ambulance services.

The startup costs for the City to fully provide the service directly would be substantial, exceeding \$20 million. However, the City could purchase a few ambulances, staff them with ambulance operators or firefighters, and provide surge protection or service hard-to-cover areas. This approach would allow the City to evaluate the benefits of providing the service directly and add an additional provider to the system.

The City becoming the provider of record marks a paradigm shift towards creating a well-orchestrated EMS system. The City has the ability to integrate fire, law enforcement, first responders, mental health teams, hospital coordination, and a state-of-the-art dispatch system, bringing San Diego EMS into a 21st century system. This level of coordination can only be achieved with a public provider. Additionally, since the City cannot be "for profit," all revenue from the system must be reinvested back into the system.

EMS systems in California and across the country are rapidly evolving to meet the growing demand for volume and types of services. The incorporation of Mobile Integrated Health Programs and outcome-based treatment modalities will continue to transform EMS and ambulance services for years to come. Systems are increasingly looking to reduce the number of ambulance transports, particularly to hospital emergency rooms. The integration of treat-and-release, alternate destinations, and referral programs is expected to grow significantly in the next few years.

Given the landscape, AP Triton believes that the City being the provider of record and managing these changes internally will best position San Diego to lead the way and ensure the highest quality service for its residents.

Section I: Evaluation of EMS Operations

Overview of the Community & Fire-Rescue Department

Introduction

The City of San Diego, a coastal gem in Southern California, exudes a vibrant blend of laid-back beach culture and bustling urban energy. San Diego boasts a rich tapestry of cultural diversity, evident in its eclectic neighborhoods, world-class cuisine, and vibrant arts scene. From the historic Gaslamp Quarter's bustling nightlife to the serene beauty of Balboa Park's lush gardens and museums. Covering 343 square miles with a population of 1.4 million, San Diego is the second largest city in California.

The City is governed by a mayor and a nine-member city council. In 2006, its government changed from a council-manager government to a strong mayor government, as decided by a citywide vote in 2004. The mayor is, in effect, the City's chief executive officer, while the council is the legislative body.

The San Diego Fire-Rescue Department (SDFD) is the guardian of public safety, embodying a legacy of professionalism, dedication, and service to the community. With a steadfast commitment to protecting life, property, and the environment, the department's highly skilled firefighters and paramedics are at the forefront of emergency response in the City. Through a network of strategically located fire stations, state-of-the-art equipment, and rigorous training programs, they swiftly mobilize to extinguish fires, provide medical aid, and mitigate hazardous situations with efficiency and compassion. Beyond emergency response, the department engages in proactive community outreach initiatives, fire prevention education, and disaster preparedness efforts, fostering resilience and unity across San Diego's diverse neighborhoods.

Staffing & Personnel

The San Diego Fire-Rescue Department has 1,349 full-time positions, including 1,014 uniformed firefighters and 118 lifeguards. There are 217 civilian positions, and during the summer season, they add additional part-time lifeguards. They respond from 52 fire stations located throughout the City.

Overview of the EMS System

The EMS Division of the department manages the San Diego EMS system. The Division is led by Deputy Chief Jodie Pierce, with a robust current staff of EMS professionals including:

- 1 Deputy Chief
- 2 Battalion Chief/PM

- 2 Captain IIs
- 5 Captain/PMs
- 1 Engineer/PM
- 1 Engineer
- 1 Firefighter/PM
- 1 Firefighter III/PM
- 10 Paramedics
- 1 EMT
- 2 Medical Doctors
- 2 Physician Assistants
- 1 Registered Nurse
- 1 DO
- 2 Administrative Assistants II
- 1 Administrative Assistant
- 1 HIPPA Compliance Officer
- 1 IT Data Analyst
- 4 Program Managers
- 2 QA/QI Educator /RNs

There is a blended EMS system in San Diego. First responders are fire department personnel, but private ambulances do most of the transport. Often, “dual response” means most go to most emergencies.

EMS Division Staff

The following comprises basic job descriptions for the San Diego EMS Division as it evaluates different ambulance transport models. It is not intended to be all-inclusive nor mirror the current job descriptions. The list of job descriptions describes what is potentially needed to manage a system the size of San Diego. These positions will ultimately have to be reviewed as the City continues to optimize its ambulance transport system. Several modifications were made to accommodate the new subcontracting model, and there will need to be additional if the department chooses to switch to an alternative model. Like all divisions the staffing needs are constantly evolving.

EMS Deputy Chief

- The EMS Deputy Chief is responsible for a vital portion of the fire department, with medical aids covering a large portion of the overall call volume.
- The role oversees multiple large contracts and manages dozen EMS Division personnel.
- An executive staff position is important in a system with the size and scope of San Diego, including a very large revenue stream with transport collections.

EMS Battalion Chief

- The individual(s) appointed to this position should be a currently licensed Paramedic with a preferred minimum of 10 years of experience providing prehospital emergency medical care and transport.
- The EMS Battalion Chief(s) (EMSBC) should report directly to the Deputy Chief, manage the division, and supervise all assigned staff.
- It will be necessary for the EMSBC(s) to actively assist staff with EMS quality management, Continuing Medical Education (CME), and other activities. In addition, the EMS BC(s) should mentor the EMS Nurse Specialist and other staff.
- Working with staff, the EMS Battalion Chief should plan and develop a 3—to 5-year EMS business plan based on industry trends and projections for rates and revenue adjustments to promote sustainability.
- The EMS Battalion Chief should actively engage in representing SDFD at both the local and state levels, including attending hospital meetings, the San Diego County Pre-hospital committee, the California State EMS Commission, the Emergency Medical Services Administrators' Association of California (EMSAAC), and the EMS Medical Directors Association of California (EMDAC).

Administrative Assistant

- The Division needs Administrative Assistants (AA) The AA(s) should be assigned to an assortment of administrative tasks that would include at least the following:
 - Entering and maintaining EMS training and CME records and EMT certifications.
 - Preparing Division reports and other documents related to quality management and other programs.
 - Assisting with training schedules and other meetings related to EMS.
 - Assisting with incident data records maintenance.

EMS Quality Assurance/Quality Improvement (QA/QI)

- The position of QA/QI is essential to the success of an EMS system. Typically, this position is held by a combination of Registered Nurses (RN) and field Paramedics.

EMS Training Captain

- The EMS Training Captain should be a full-time, 40-hour weekly day-time position.
- The minimum qualifications should be a licensed Paramedic with a minimum of six years of experience providing prehospital emergency medical care and transport.
- The primary role of this position would be to work with the ENS to deliver EMS training and CME, develop training schedules and curricula, and participate in EMS Quality Management.
- Provide supervision and assistance to the EMS Equipment Firefighter.
- Be available to respond to significant incidents as part of the command staff or assume roles as an EMS division group supervisor.
- Would perform the duties of an EMS shift supervisor when needed.

EMS Equipment Coordinator

- The EMS equipment coordinator is an essential position in the management of an ambulance transport system. The EMS Equipment Coordinator (EEC) should be a full-time 40-hour weekly day position.
- Minimum qualifications should be a licensed Paramedic.
- This position would be responsible for managing the inventories of capital medical equipment, durable EMS equipment, disposable EMS supplies and medications, and controlled substances.
- Ensures adequate maintenance of capital medical equipment (e.g., cardiac monitor/defibrillators, powered ambulance gurneys, AEDs, etc.).
- Responsible for managing inventory to reduce waste of expired medications and provide a realistic budget for each year based on trends and usage.
- Should include managing the distribution logistics and ensuring all stations are sufficiently supplied with the necessary EMS equipment and supplies, including delivering supplies, when necessary, to enable companies to remain within their response area.

EMS Coordinators (EMS Captain/RN)

- The EMS Coordinator is typically filled by either a Paramedic Captain or an RN. Their duties are:
 - Observe Paramedics in the field and identify trends, equipment needs, training needs, and other EMS Nurse Specialist and EMS Battalion Chief needs.
 - Monitor hospital status and facilitate steps to relieve SDFD rescue ambulances as appropriate.
 - Conduct a cursory review of all ePCRs written during a shift for patients transported by SDFD rescue ambulances. Reviews should only ensure the mandatory data fields and other information have been entered, not a detailed patient care analysis.
 - Act as liaison between the EMS Division and hospital staff when indicated.
 - Maintain an active role in EMS training and the development and delivery of EMS drills and CME during on-duty hours.
 - As necessary, assist the EMS Equipment Coordinator with medical supplies and equipment logistics.
- This position could be considered a career development position as the EMS Captains could assume the role of EMS Battalion Chief when the Chief is unavailable to carry out their duties (vacation, long-term illness, etc.).

EMS Division Support

As mentioned previously, because of its size, the volume of EMS incidents, the type of service provided, and the complexity of managing and supporting a fire department providing ALS-level medical first response and transport, additional funding and resources should be devoted to the San Diego Fire-Rescue Department's EMS Division.

- The Division should be provided with adequate office equipment, computer software applications, cell phones, and other supplies necessary to fulfill the EMS Division's mission effectively.
- The Division should be provided with sufficient funding to allow any necessary overtime pay for regular staff meetings and other relevant meetings.
- Provide sufficient staff vehicles necessary to enable the EMS Division to fulfill its mission.

Additional Positions

The San Diego EMS system currently staffs additional personnel, including multiple Medical Doctors and Physician Assistants. Although these positions are not essential for an ambulance transportation system, they play a pivotal role in other aspects of San Diego's system, including its MIH program.

State-Level EMS Administration

The State EMS agency ultimately controls all EMS providers in California. Prior to the EMS Act, there was no central state agency responsible for ensuring the development and coordination of EMS services and programs statewide. Under the EMS Act, the Emergency Medical Services Authority (EMSA) was created in 1980 to provide leadership in developing EMS systems throughout California and to develop standards for training and scope of practice for EMS personnel after 1980.

The State EMSA delegates its authority in each county to the Local EMS Authority (LEMSA). The San Diego County EMS Office, a division of San Diego County Fire and the Board of Supervisors-designated local EMS agency (LEMSA), has statutory responsibilities for the region's EMS delivery system, including quality assurance, quality improvement, and structural innovation. Board of Supervisors Policy K-12 currently designates the County EMS Office as the County entity with primary responsibility for the EMS system organization.

County EMS upholds the standards of the state's Emergency Medical Services Authority, which includes the organization and oversight of the EMS delivery system.¹

The organized San Diego County EMS delivery system is comprised of the following:

- More than 50 first responder EMS agencies
- 10,000 credentialed EMS professionals
- Numerous policies, procedures, and protocols
- Seven paramedic base hospitals
- 22 emergency departments
- Hospital-based specialty care programs (STEMI, stroke, and trauma)
- Responds to more than 250,000 EMS calls for service annually

Although the scope of practice and many other things dealing with the training, certification, and development of plans are coordinated by the State EMSA through the LEMSAs, the system's day-to-day operations in San Diego is run directly by the fire department.

Medical Direction

Medical direction for paramedics and EMTs providing service for the county of San Diego is supervised by a licensed physician. Dr. Kristi Koenig, MD, FACEP, FIFEM, FAEMS, is the Medical Director for the county of San Diego.

The Medical Director also integrates with other components of the system by consulting and communicating with the County's Trauma Medical Directors, participating in countywide disaster medical services planning activities, serving in an advisory role to the Public Health Officer and other County leaders regarding EMS issues, and collaborating and communicating with prehospital personnel and community groups.²

The department also employs an internal medical director, Dr. Christopher Kahn MD, MPH, FAEMS. The department's medical director is involved in continuing education and directly interacting with crews on responses and through the QA process.

Off-Line Medical Control

Off-line medical control is when Paramedics function within the parameters of standing protocols or orders developed by the State EMS Authority and administered by the LEMSA and SDFD EMS Division. Standing orders enable EMS providers to initiate immediate patient care without contacting their base station.³ For example, Paramedics will initiate life saving measures for patients whose condition requires cardiac intervention, stroke therapy, or trauma care. These standing orders are critical when San Diego's ALS resources arrive on scene prior to the ALS Ambulance.

Off-line medical control can also involve refining and developing quality improvement programs and other innovative aspects to improve an EMS delivery system.

Online Medical Control/Base Stations

Online medical control is provided to prehospital providers via voice communication from qualified base station hospital personnel such as Mobile Intensive Care Nurses (MICN) or Base Physicians. Patient information is communicated to the base hospital to notify the facility of a pending patient's arrival. SDFD's primary online medical control site is distributed through multiple San Diego County Base Hospitals.

Online medical control has evolved from every prehospital patient requiring a call to the base station to developing standing orders or protocols for use by EMS personnel. They developed the necessary protocols to enable EMS personnel to provide patient care to without directly contacting a base hospital for direction. These developed protocols have enabled immediate treatment without delay when contacting the base station for every patient. Base station notification is still required for the receiving hospital notifications on ALS transports, allowing for the efficient distribution of patients. This is critical for trauma, ST-Segment Elevation Myocardial Infarction (STEMI), or stroke patients, but can also extend to direction on Mass Casualty Incidents (MCI), pediatric calls, or other complicated presentations. Patients can be directly admitted with a diagnosed STEMI or developing stroke after notification to the receiving hospital.

Other Elements & Services of SDFD

Beyond providing all-risk fire rescue and EMS services to protect life, property, and the environment, the San Diego Fire-Rescue Department also provides several other services to the community. These include public education programs from fire safety to the Community Emergency Response Team (CERT) citizen volunteers that can become a vital link to safety in a disaster.

The Community Risk Reduction Division, headed by a Deputy Fire Chief/Fire Marshal, is one of the Department's most diverse in the various services it offers. It conducts more than 20,000 annual inspections, issues fire code permits, and develops safety policies and guidelines for residents and businesses.

Service Demand & Performance Overview

This section will give a general understanding of relevant response information. It is developed to identify recent performance and create a baseline performance expectation. The Department, City, and political leaders can then use this information to understand how their decisions, policies, and outside pressures affect performance.

Research Information

The information within this section was developed from dispatch data provided by the Emergency Command and Data Center's (ECDC's) computer-aided dispatch (CAD) system. Detailed information was provided between July 1, 2018, and August 31, 2023. Additional basic incident counts were provided by SDFD staff for 2013–2022. The CAD data included all dispatched and responding apparatus, regardless of agency. The CAD data had the private ambulance company dispatch information; the research completed here is from that data.

Statistics Discussion

Mathematical and technological methodologies must be used judiciously to evaluate something as complex as an emergency incident response. There are instances of incorrect evaluations leading to severe consequences, and agencies should use their best judgment in addition to solid data analytics when making operational decisions. Therefore, as this analysis is designed to quantify and analyze available information, the agency should use it as a starting place as they seek to improve performance or change services.

Statistical Tools

Various statistical analytical tools were employed to create this section. The fundamental tools were categorization, percentile, and regression analysis. This helps paint a picture of historical performance, with some inferences that may help leaders identify positive and negative performance trends.

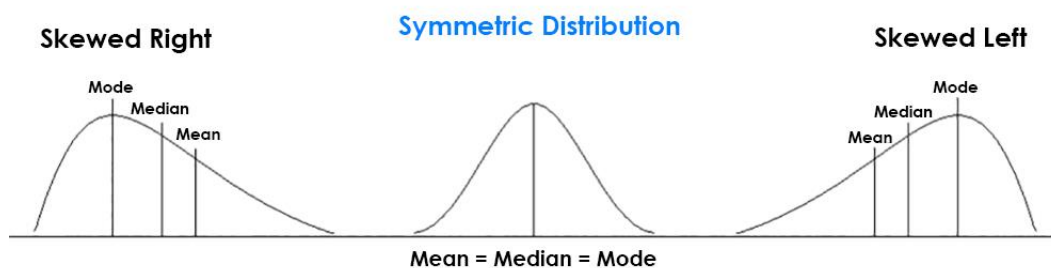
90th percentile

The time performance measures for this report are done using the 90th percentile measure. While discussing the mathematics behind this measure is outside this report's scope, it is helpful to understand why it is utilized.

The most common reason to use this measure is that it is the accepted industry standard. If a fire agency wishes to judge its performance against standards or other agencies, it must use the 90th percentile. For example, the National Fire Protection Association (NFPA) utilizes the 90th percentile measure in most of its standards. In addition, the Commission on Fire Accreditation International (CFAI) requires reporting performance measures at the 90th percentile. In addition to industry standards, the City of San Diego contract requires the third-party private ambulance company to comply with requirements monthly utilizing the 90th percentile.⁴

The statistical reason to use the measure is that it more fully captures performance and will identify trends in performance more quickly. Unfortunately, the time performance data used in this study has a skew, making other statistical measures less sensitive and representative. The following figure is a general example of data skew.

Figure 1: Data Skew⁵



In a symmetric distribution, the mean (average), median (middle of the data), and mode (the most frequent) are all equal. When the distribution skews, these three measures of the middle shift. Using the average, or mean, in left-skewed data would underrepresent the bulk of the performance. While the opposite is true when skewed right. SDFD data has a distinct right skew, typical of an emergency response agency, and is not particularly telling or essential for this evaluation. However, utilizing median statistics would over-represent the performance. In this case, using the 90th percentile will more consistently indicate actual performance.

Data Engineering Findings

The CAD data provided by the ECDC initially included two data sets with information from July 2018 through June 2022. These incident and unit data tables were blended to create a single data set and ensure all incidents were appropriately documented. An updated incident and unit data set was provided to extend the information through August 2023, and the electronic patient care reports (ePCR) were also combined to enhance the information for each incident.

Several steps enhanced the information by joining it with geographic information systems (GIS) data and expanding CAD codes and unit definitions. The data was tested and formatted for consistency, and duplicate or empty records were removed. Some of the data captured in the CAD previously identified by the ECDC staff as non-incident data was eliminated. For example, incidents with information that indicated it was a test, drill, information, or administrative or problematic data were removed utilizing the field provided in the data. After the extraction and transformation processes, there were 2,143,763 unit records in 1,095,475 incidents. This represents over 94% of the submitted information. This blending indicates that the data is structured well and has a high degree of usability.

Data Error Handling

Data collection within the various data sets has the potential for significant errors. Although there can be many reasons for incorrect information, these errors are typically a combination of human input and collection errors. Various methods exist to manage these errors, including statistical exclusion, real-time exclusion, formula manipulation, and logic testing.

For information within the SDFD data, the information required for this analysis had minimal error-prone data. Therefore, there was minimal statistical intervention. However, some data was excluded by formula or logic tests. The time segment math utilized a logic tree to eliminate negative and null sets. The response time was limited to a one-hour maximum, as this was the calculated travel time from 104 W. San Ysidro Blvd. and 17701 San Pasqual Valley Rd. These points represent two addresses at opposite ends of the city. The drive time was developed using a web-based open-source mapping software. These limitations still left over 80% of the records available for analysis.

System Demand & Performance

The first dimension of the analysis is the overall system call load. Because this is a simple count of ambulance incidents by type and location, no data was excluded after engineering.

Service Area Overview

The service area was defined as the City of San Diego boundaries. The City is divided into four emergency response zones. In addition, some performance data is also displayed in the councilmember districts. SDFD generally identifies the four zones as the Coastal Zone, Inland Zone, Southern Zone, and Central Zone. However, the Geographic Information System (GIS) data provided to AP Triton identified the four zones as Coastal, Inland, San Ysidro, and Metro. The San Ysidro Zone and Southern Zone are interchangeable along with the Metro Zone and Central Zone as used in this report. For clarity the SDFD zone naming convention versus the GIS naming convention follows:

- The SDFD Central Zone equates to the GIS Metro Zone
- The SDFD Southern Zone equates to the GIS San Ysidro Zone
- The Inland and Coastal Zone names remained consistent.

All zones are considered urban population density. All EMS incidents within the City of San Diego were captured regardless of the ambulance provider. However, mutual aid ambulance incidents outside the city limits were not captured and are outside the scope of this project. Special event coverage and response agreements were not evaluated separately, but any incidents resulting from these types of coverages would be captured.

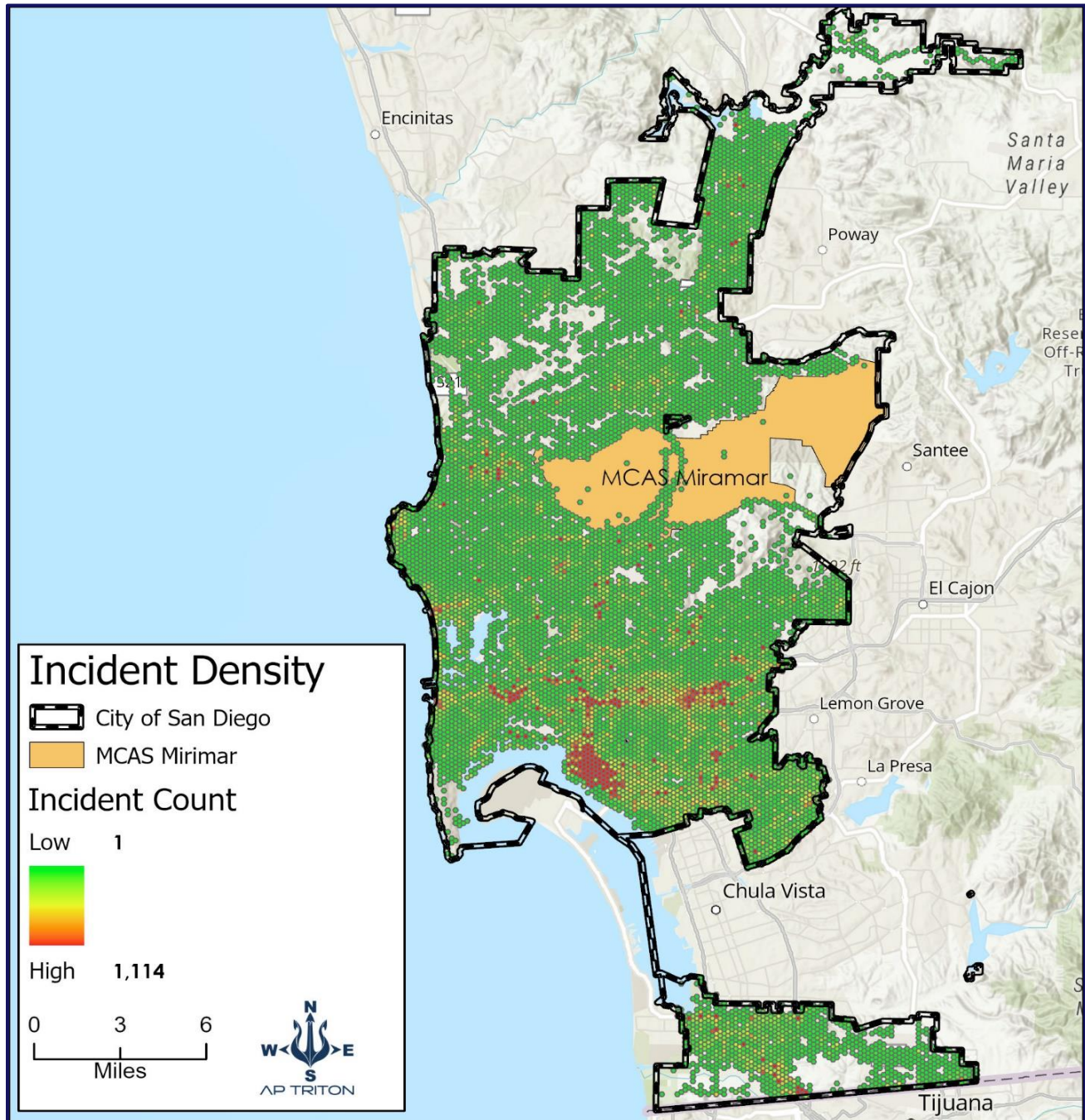
There are several military bases within the city limits including Marine Corps Air Station (MCAS) Miramar, Naval Base Point Loma, Naval Base Point Loma Annex, Naval Base San Diego, and Navy Reserve Center. MCAS Miramar is the largest by far at over 23,000 acres. However, incident responses for each of the bases are the responsibility of the base fire and rescue services and is not included in this study.

The SDFD responds to emergency medical incidents (EMS) and provides first-response advanced life support (ALS). The City contracts with a third-party private ambulance provider. During the study period, the service provider changed, which is apparent in the performance data.

Incident Volume

Viewing the overall incident density is helpful when evaluating the number of incidents within a system. The following figure shows the number of ambulances arriving on the scene of any given incident for the entire study period of July 2018 through August 2023.

Figure 2: Incident Density (2018–2023)



Each hexagon in the previous figure is approximately $\frac{1}{2}$ square miles in area. The incident counts in each zone are only incidents where an ambulance arrived. Not surprisingly, incident density is highest where the population density is highest. There is also some pronounced volume at the border with Mexico.

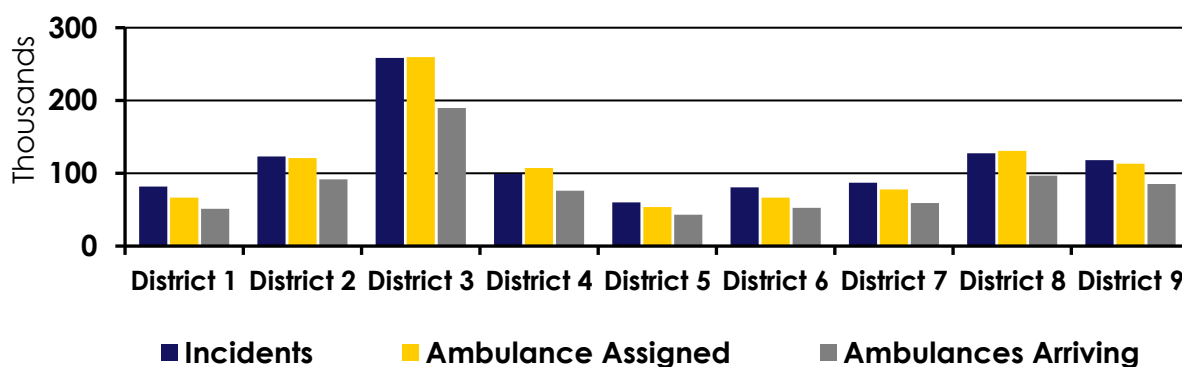
A simple volume analysis can indicate the number of incidents throughout all zones where an ambulance was dispatched during the study period. Having an ambulance assigned to an incident does not mean it arrived on the scene or provided any medical care, simply that an ambulance was included in the incident dispatch. For simplicity, the call types were grouped by CAD incident type into medical incidents, fire incidents, and all other incident categories. The following figure is a simple count of incidents where an ambulance was assigned.

Figure 3: Ambulance Assigned Incidents (2018–2023)

Zone	Medical	Fire	Other	Total
Coastal	131,992	1,283	1,852	135,127
Inland	128,740	1,296	2,096	132,132
Central	424,773	3,601	8,536	436,910
Southern	68,096	463	607	69,166
Total	753,601	6,643	13,091	773,335

One way to visualize the data is to evaluate volume by council member district. In this way, each council member can see what volume their constituents face. The following figure shows the incident volume, ambulances assigned, and arriving units for the entire study period.

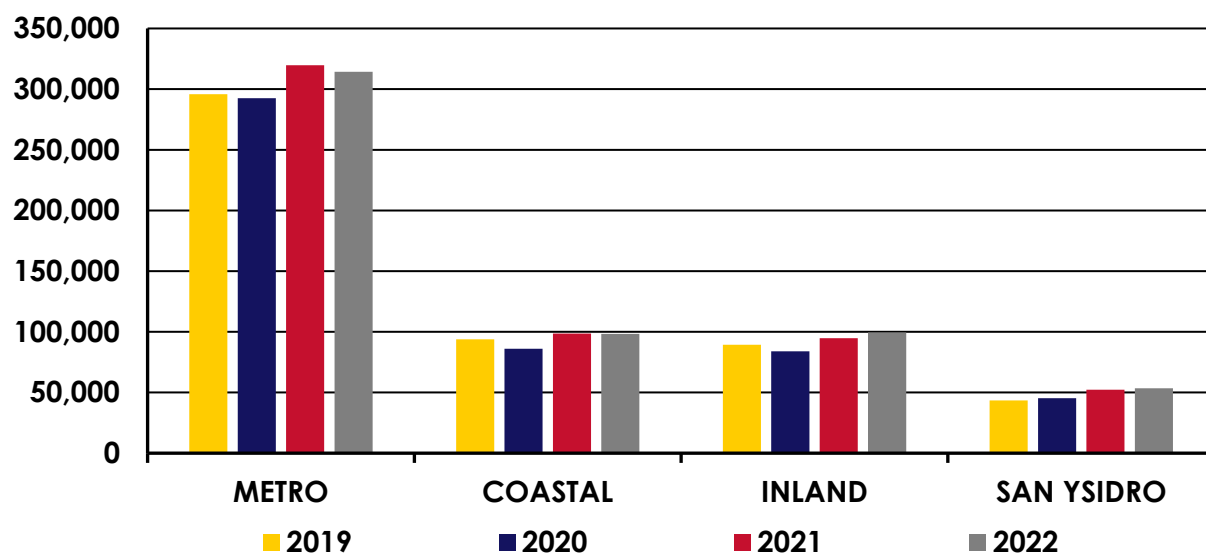
Figure 4: Ambulance Arrivals by Political District and Year (2018–2023)



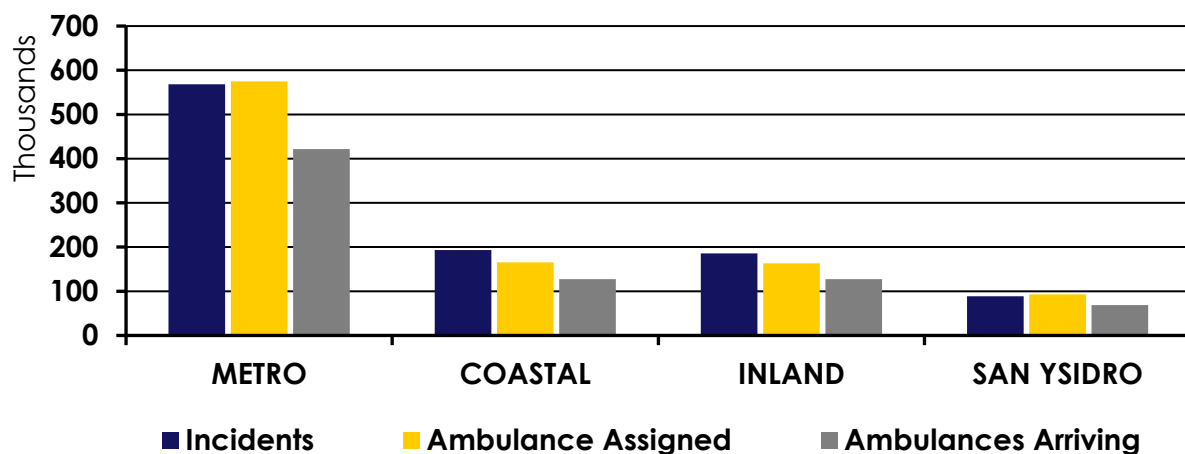
A full review of each zone is conducted later in this section. However, a comparative overview of the incident counts and ambulance needs can be helpful when analyzing system deployments. The remaining analysis will be completed using the emergency response zones. It should be noted that the performance of this system is monitored and maintained by the City. This analysis is not an official evaluation of the private-sector ambulance service. Instead, this is an analysis to help leaders evaluate what changes could be made and what assets those changes may require.

The first ambulance volume review is to understand service demand throughout the years. The data provided only included six months in 2018 and eight months in 2023. Therefore, when counts are presented by the years 2018 and 2023, they are excluded. The following chart shows the total number of ambulances arriving on scene within each emergency response zone by year.

Figure 5: Ambulance Arrivals by Response Zone and Year (2019–2022)

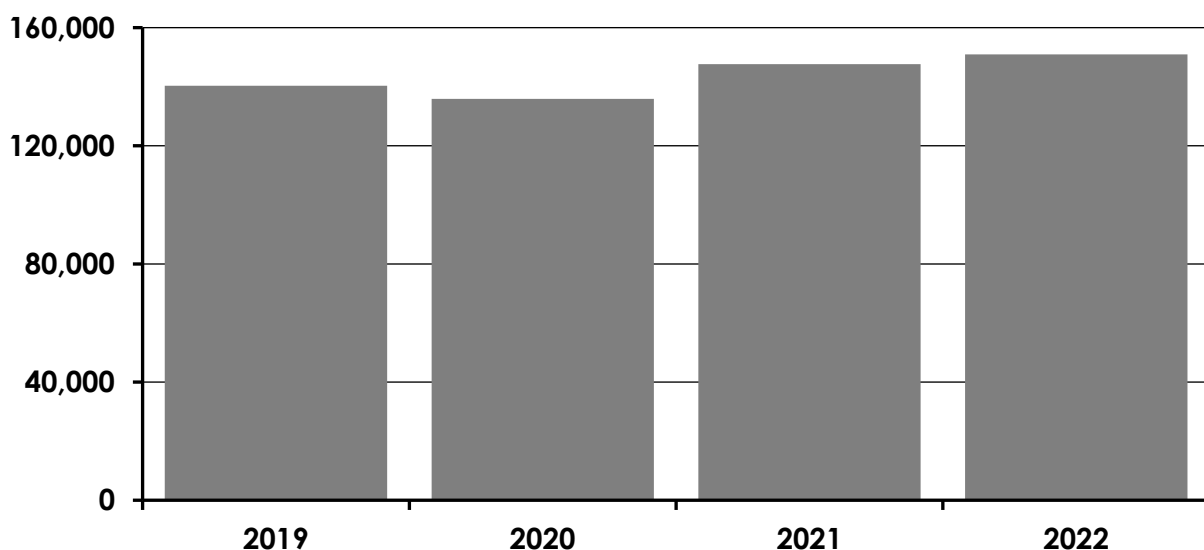


Another aspect of the volume analysis is evaluating what happens to the whole system. The chart in the following figure shows how many incidents were in each emergency response zone, how many ambulances were assigned to incidents, and how many arrived for all the years within the study period.

Figure 6: EOA Zone Number and Description (2018–2023)

Temporal Analysis

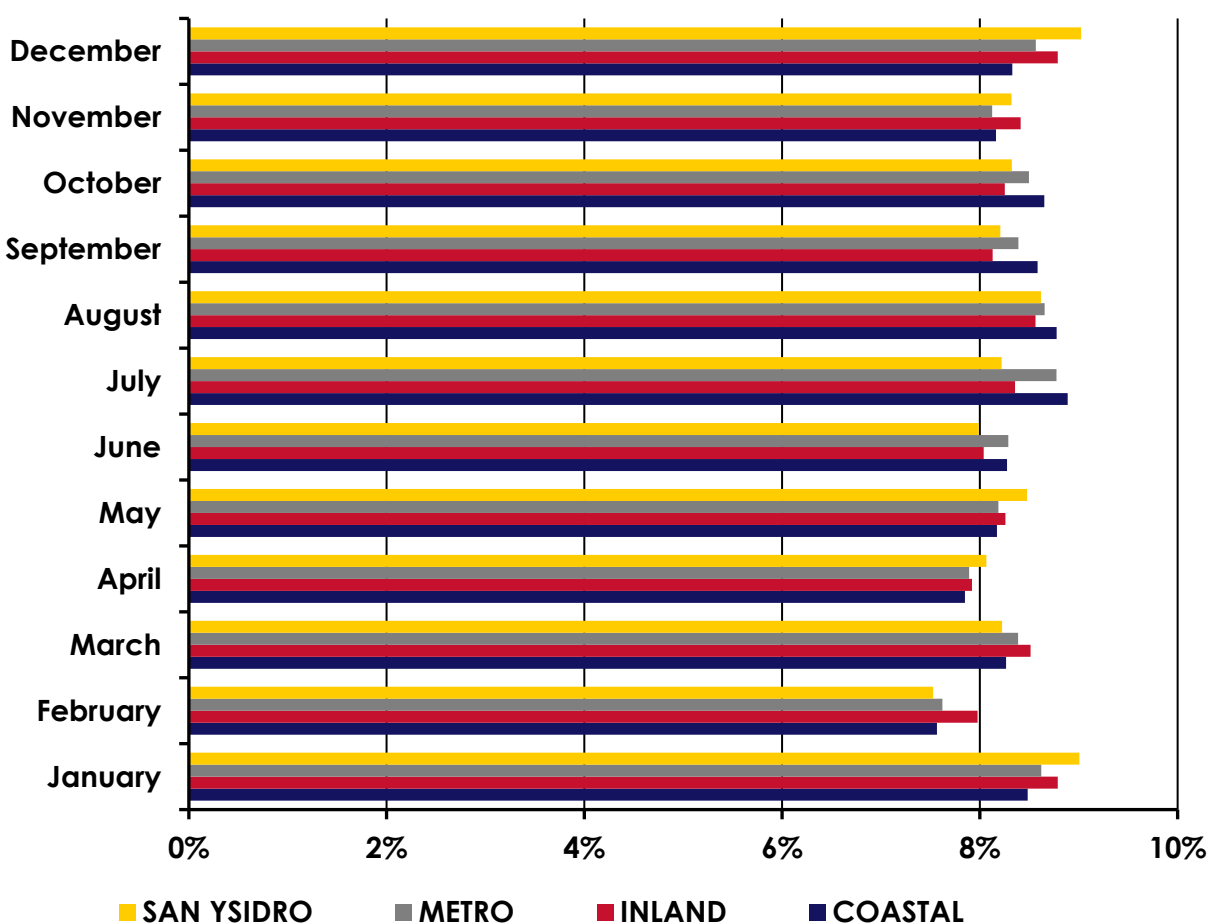
Understanding the temporal elements of incident volume is helpful for leaders to visualize. This allows them to plan for activities other than incidental, such as training, prevention, rest, and public events. Recognizing incident levels by month, day, and hour directly affects deployment. Visualizing annual trends may also help leadership understand the need to change the level of service. The following figure shows the total number of incidents where an ambulance was assigned by year.

Figure 7: Annual Incident Volume (2019–2022)

It appears the COVID-19 pandemic slowed incident volume in 2020. Incident volume rebounded in 2021 and seems to be moving toward average growth after 2020. The overall annual growth in ambulance arrivals was approximately 2.6%. However, there is a 3.2% decrease between 2019 and 2020, with rebounding growth of 8.6% between 2020 and 2022. This growth rate of 2.2% between 2021 and 2022 appears to match the overall incident growth from 2013 through 2022.

Monthly variations for the system are minor, less than +/- 1% of the expected changes due to the number of days in a month. This lack of variation indicates that the system sees little seasonality with incident demand. However, incident demand is noticeably lower from March to June, higher from July to September, and again in December and January. The data was limited to the full 12-month periods between July 2018 and June 2023. The following figure shows the monthly percentage of each incident throughout the study period.

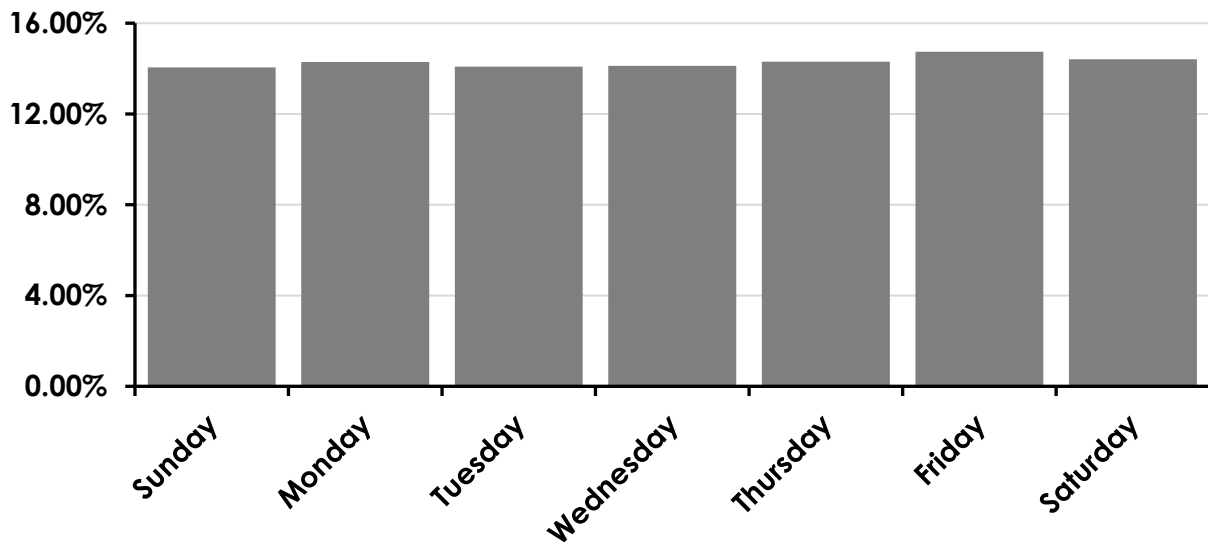
Figure 8: Monthly Ambulance Demand Variation (July 2018–June 2023)



The variation by month is not consistent across each zone. The Coastal and Central Zones see a more consistent rise in volume from June through October and decreases in other months. Meanwhile, the Inland and San Southern Zones see a decrease during the summer months through October, with a slight increase during the winter. However, the relatively small change in incidents does not appear to change the demand for the system overall.

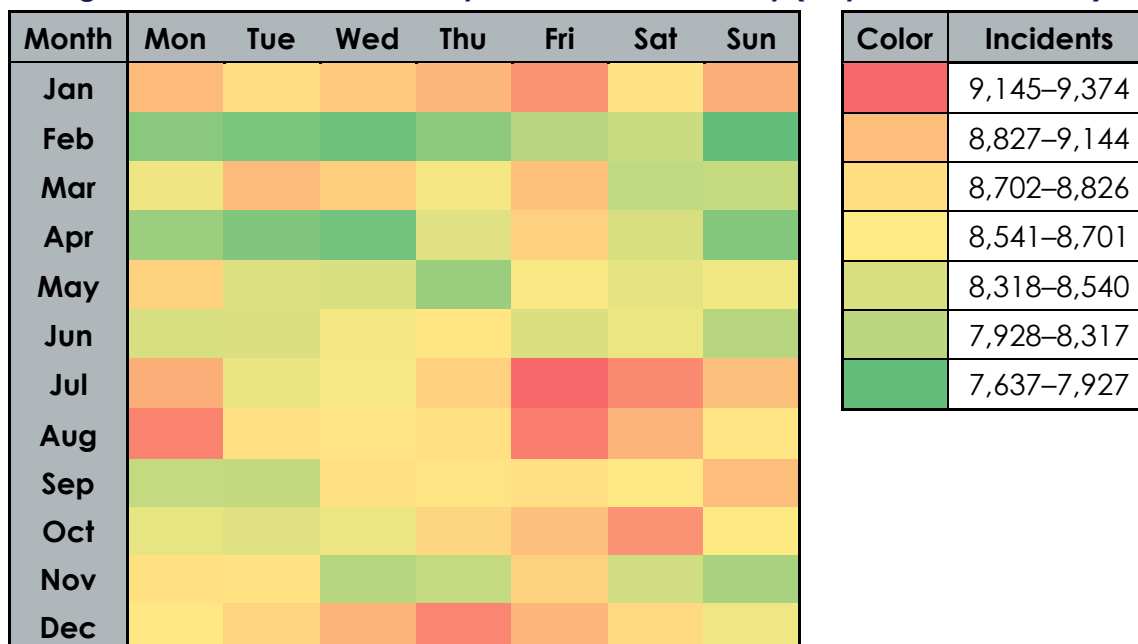
Daily variation is slight and less than +/- 1% expected. Sunday and Tuesday are slightly slower overall, and Friday is marginally higher than expected, but only -0.2% and 0.5%, respectively. The following chart shows the percentage of incidents that happen during the weekday.

Figure 9: Variation by Weekday (July 2018–June 2023)



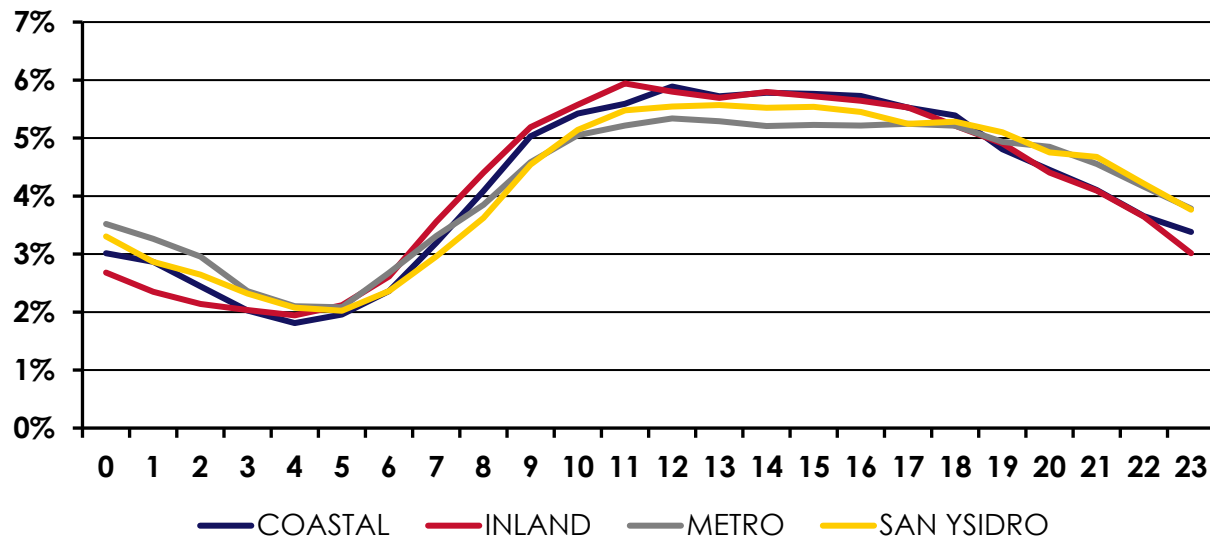
Often, evaluating the monthly and weekday volumes together can yield some clarity. The following chart shows the incident volume organized by month and weekday volumes throughout the study period.

Figure 10: Incident Volume by Month and Weekday (July 2018–June 2023)



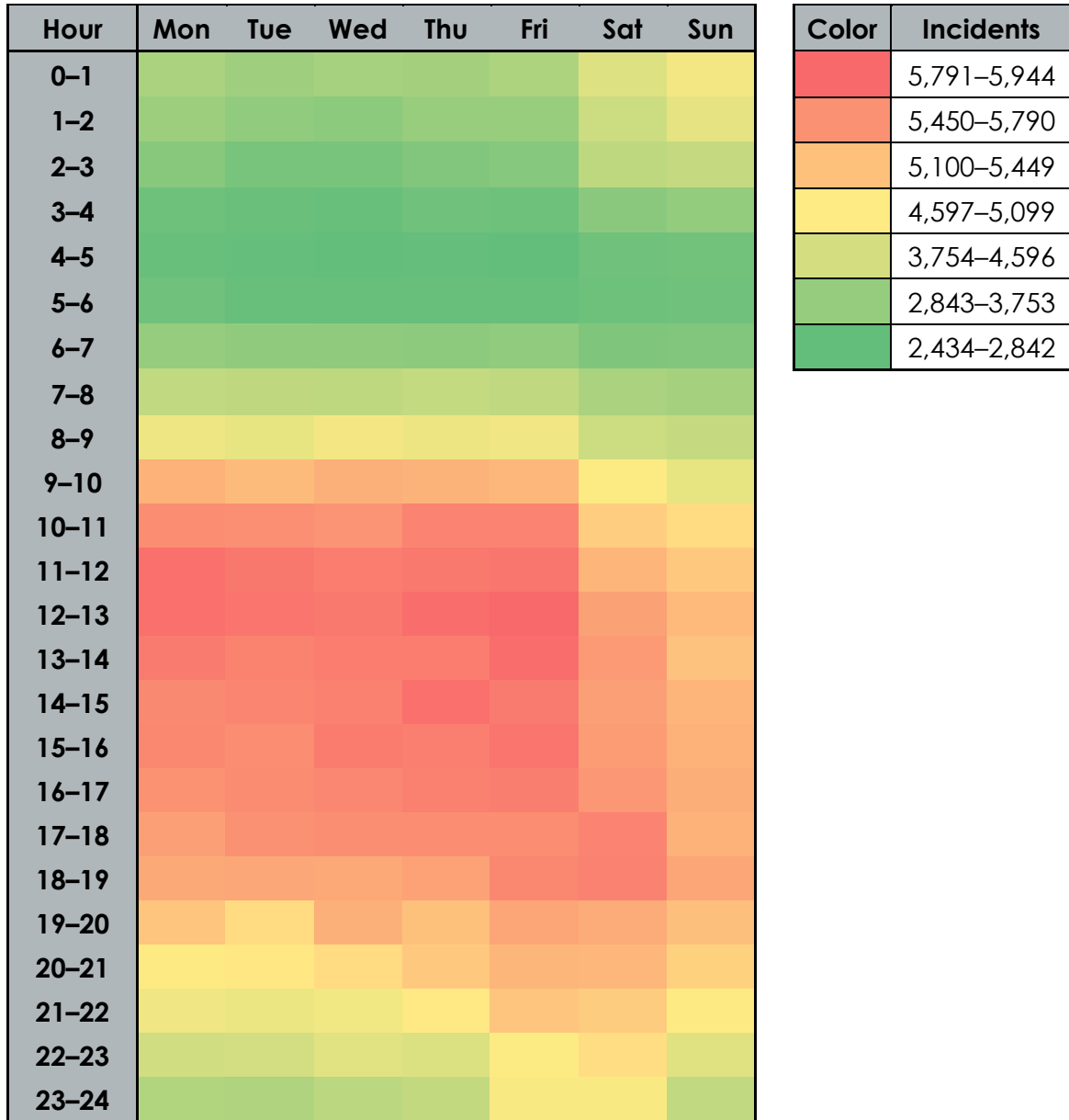
There is a notable increase overall on the weekends and notably in July and August, primarily driven by the Coastal and Central Zones. February and April are notably less active across all days. However, the February reduction is partially due to the fewer days in the month.

While there is a slight variation by month and weekday, there is a significant variation when evaluating the hour of the day. For example, incidents are distributed unequally throughout each system throughout the day. The daytime is typically more active than the evening, night, and early morning. The driving force behind this phenomenon is likely that people are awake and moving. This pattern is experienced by the ambulances in the San Diego system. This is no different than most systems. Over 62% of all incidents happen between the 12 hours of 9:00 AM to 9:00 PM. The following figure shows the percentage variation for each zone based on the hour the event starts.

Figure 11: Incident Volume Percent by Hour (July 2018–June 2023)

This curve is like many other agency hour curves. The figure shows that incidents become more frequent in the early morning, peaking in the early afternoon, and decreasing in the evening.

It is helpful to understand the incident volumes by weekday and hour. For example, some systems can show normal distribution during the week and then a shifted distribution during the weekend. The San Diego system remains consistent on each workday with a noticeable shift to later at night on Friday and Saturday evenings, lasting into the early morning hours of Sunday. This pattern is consistent with communities with a busy weekend nightlife and entertainment. The following figure shows the relationship between incident volume by hour and weekday throughout the study period.

Figure 12: Incident Demand by Hour and Day (2018–2022)

Unit Volume

A detailed evaluation of each unit within the system is outside the scope of this report.

With more than 70% of incidents being medical related, the average time committed to incidents is close to the average spent on medical incidents. The heart of this analysis is to evaluate the ambulance resources needed to address the incident volume faced in the system. Now that there is a known average commit time, estimating the number of units needed to address the frequency is possible.

Because determining the estimated ambulances required is based on two averages, the most recent 12-month data will be used. The September 2022 through August 2023 data was the most current and had the most significant volume of ambulances assigned to incidents. Because there were some reassignments in the data set, this count is limited to the average number of ambulances that arrived at the scene of an incident. Based on the median hour and day call volume for 12 months, the following chart indicates the estimated number of units needed by the hour and day.

Figure 13: Average Ambulances Needed by Hour and Day (SEP 2022–AUG 2023)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Incidents
0–1	12	13	12	12	12	17	18		25–26
1–2	12	12	10	13	13	16	17		23–24
2–3	10	10	10	11	10	14	15		20–22
3–4	10	9	9	9	8	12	11		18–19
4–5	8	9	10	9	8	10	11		16–17
5–6	8	9	9	8	8	10	9		12–15
6–7	12	11	12	12	13	11	11		08–11
7–8	15	15	14	16	15	15	13		
8–9	19	20	16	17	17	15	15		
9–10	21	22	21	23	21	19	17		
10–11	22	23	22	22	21	21	20		
11–12	24	22	24	25	23	21	20		
12–13	26	24	24	26	23	23	21		
13–14	23	24	25	24	25	21	20		
14–15	23	25	24	25	22	21	21		
15–16	22	23	25	22	25	22	22		
16–17	22	23	22	24	23	22	21		
17–18	21	22	22	24	21	22	21		
18–19	20	22	21	23	22	23	23		
19–20	19	20	20	19	21	21	19		
20–21	18	19	19	21	21	20	20		
21–22	18	19	17	19	20	20	18		
22–23	17	16	17	17	18	19	17		
23–24	14	14	13	13	19	17	15		

This chart will be reproduced for each emergency zone in San Diego later in this section. However, the goal is to determine the number of ambulances needed for the system. The following two steps require understanding how long an ambulance is committed to an incident and how many hours per shift an ambulance can be expected to be available.

Ambulances commit an average of 55 minutes to all incidents throughout the response data. This average helps predict the number of ambulances needed for the system and each operating zone. An evaluation by the emergency response zone saw a slight variation in the data, with the Coastal, Central, and Inland zones averaging around 55 minutes and the Southern zone averaging 61 minutes. The conservative average of 60 minutes will determine the number of ambulances required. This means the time factor for San Diego is a factor of one, or an ambulance assigned to an incident is expected to be committed for the whole hour in which the incident starts.

Time on Task

Time on task (ToT) is the ratio of hours a unit works versus the number of hours it is committed to an incident scene. This is typically displayed as a percentage or a decimal, but each shows the same thing. For example, a typical 24-hour unit is staffed for 8,760 hours a year. If that unit is committed to an incident scene for 2,628 hours a year, its ToT is said to be 30% or 0.30.

$$ToT = \frac{\sum Time\ Committed\ to\ a\ Scene}{\sum Time\ Unit\ is\ Staffed\ and\ In\ Service}$$

In a fully committed system where units go from one incident to another, the ToT would be 100%. While this would be the most efficient and perhaps profitable, it is not a realistic goal. Crews need downtime, and incidents do not usually happen in a way that allows for complete efficiency.

For units working a 24-hour shift, leadership needs to evaluate how many hours are required for non-response purposes including health, and safety. For example, a fire department ambulance crew working 24-hour shifts may be expected to attend an average of two hours of training per shift, one hour of physical fitness, and one hour of station, equipment, and apparatus maintenance. In addition, programs should allow for eight hours of rest or sleep and two hours of meals and other breaks for health and safety reasons. This means fire department crews may be expected to complete enough administrative work on a 24-hour shift to account for 58% of their day. In this case, expecting crews to average more than 42% ToT is unreasonable. This is further detailed in the Cost Revenue Section of this report. In addition, planning for some resiliency on average is advisable. Typically, for 24-hour fire department ambulances, it is not a good idea to plan on more than 35% ToT.

Using this same process, 12-hour ambulances that do not require on-duty training can be reasonably expected to spend a third of their time on administrative and rest or meals, two hours each. Therefore, planning for more than 67% ToT for crews is typically not advisable. A more conservative ToT estimate of 55% will factor in some resiliency and capacity for higher volume days. Therefore, based on the San Diego System's combination of 12- and 24-hour shiftwork and the assumption that little on-duty training is required, this study will use a 55% ToT for ambulance capacity estimations.

Knowing the average number of units needed on an average day and hour and the predicted ToT for each unit can help create the average number of units required. This is found by multiplying the average number of units needed each hour of the day by the time factor and dividing it by the ToT estimation. Using full Tot details is more accurate than only using the number of incidents, divided by the number of unit hours as in traditional Unit Hour Utilization (UHU) calculations. The following chart is the total number of units required within the San Diego system based on these averages.

Figure 14: Predicted Total Number of Units Needed by Hour and Day

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Units
0-1	22	24	22	22	22	31	33		43-48
1-2	22	22	19	24	24	30	31		38-42
2-3	19	19	19	20	19	26	28		34-37
3-4	19	17	17	17	15	22	20		30-33
4-5	15	17	19	17	15	19	20		24-29
5-6	15	17	17	15	15	19	17		20-23
6-7	22	20	22	22	24	20	20		15-19
7-8	28	28	26	30	28	28	24		
8-9	35	37	30	31	31	28	28		
9-10	39	40	39	42	39	35	31		
10-11	40	42	40	40	39	39	37		
11-12	44	40	44	46	42	39	37		
12-13	48	44	44	48	42	42	39		
13-14	42	44	46	44	46	39	37		
14-15	42	46	44	46	40	39	39		
15-16	40	42	46	40	46	40	40		
16-17	40	42	40	44	42	40	39		
17-18	39	40	40	44	39	40	39		
18-19	37	40	39	42	40	42	42		
19-20	35	37	37	35	39	39	35		
20-21	33	35	35	39	39	37	37		
21-22	33	35	31	35	37	37	33		
22-23	31	30	31	31	33	35	31		
23-24	26	26	24	24	35	31	28		

Each emergency response zone will be evaluated separately later in this section.

Performance Analysis

The final dimension of this analysis is the current performance analysis by the first due ambulance company. The response times are total time, the segment from the first ambulance notification until the first ambulance arrives on the scene. As identified previously in the "Error Handling" section, response times over one hour were removed to limit inaccurate data. The first ambulance notification time to the first ambulance arrival is measured, regardless of which unit was notified or arrived first. The following figure displays these performance expectations published by the City of San Diego in its 2020 request for proposal (RFP) for emergency ambulance services.⁶

Figure 15: Response Requirements

Priority Level	Standard	Outlier Response Time
Priority Level 1	12 Minutes	24 Minutes
Priority Level 2	15 Minutes	30 Minutes
Priority Level 3	25 Minutes	50 Minutes

It must be reiterated that this is not an assessment of contract performance, merely an attempt to place a response goal into context as currently expected. The contract administration and evaluation are wholly a function of the City of San Diego, and the incident information provided is complete but not adjusted in the same way as a formal evaluation.

CAD incident types were grouped using the priority response field to follow the response requirements as listed. The data did not include upgraded or downgraded responses as allowed by contract. Therefore, the report will only classify responses by the priority field and as a priority 1, 2, 3, or non-medical response.

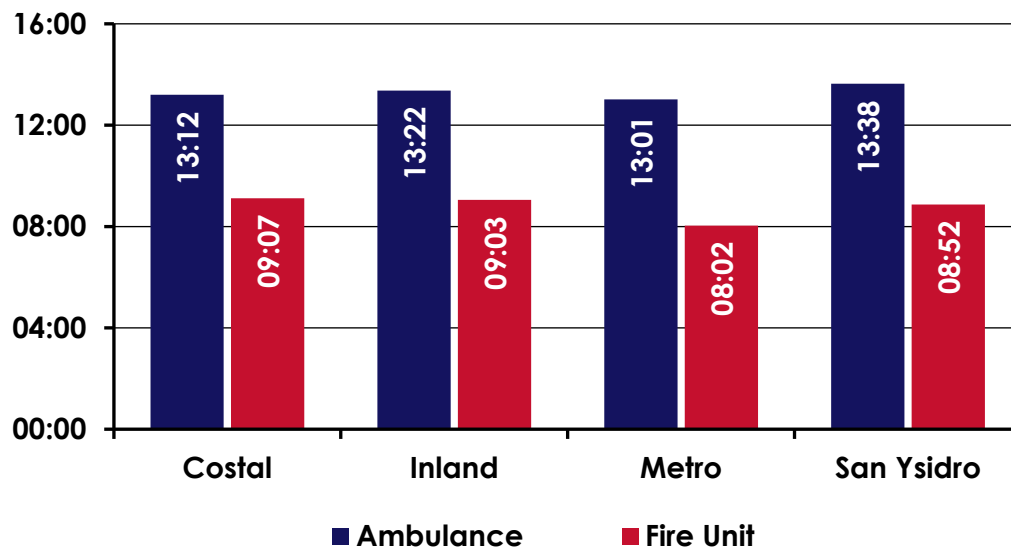
The response times are evaluated by priority, emergency response zone, year, and hour. Additionally, the response time of the first arriving fire unit is also included as a reference. Because the City is so large and the responses so numerous, a final evaluation of priority 1 incidents by councilmember district is also included.

The times are shown as the 90th percentile, in line with the current performance expectations. The overall ambulance performance for priority 1 incidents from July 31, 2022, through August 2023 was 13 minutes 36 seconds or faster 90% of the time. The following figure shows performance grouped by the classifications listed in the RFP.

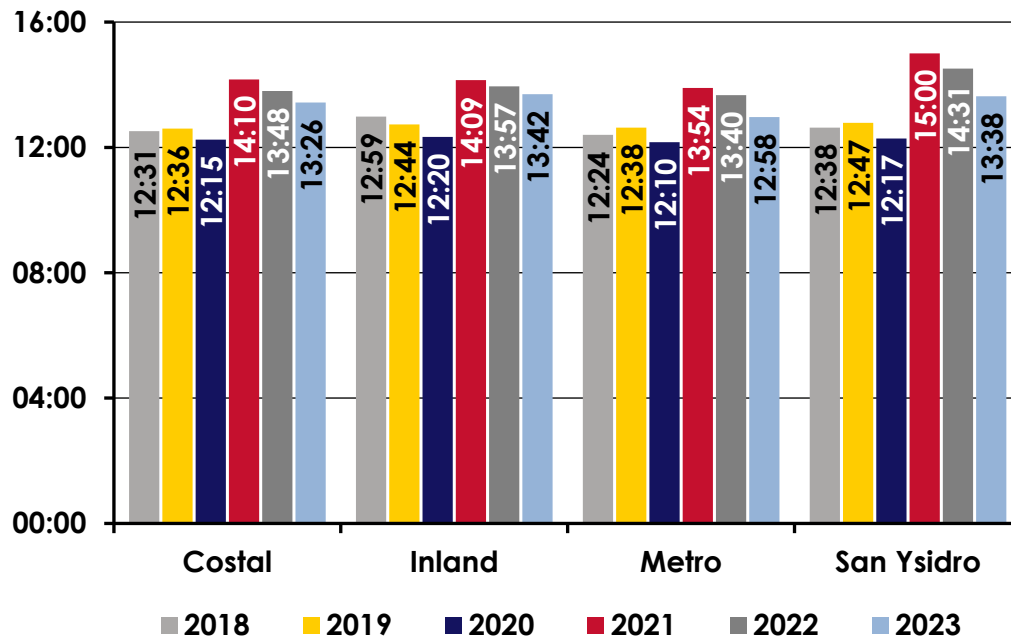
Figure 16: Overall Response by Priority (AUG 2022–AUG 2023)

Priority	Total Incidents	Performance Standard	Historic Performance	Outlier Standard	Outlier Incidents
Priority 1	131,871	12 Minutes	13:36	24 Min.	20,900
Priority 2	44,213	15 Minutes	15:12	30 Min.	4,515
Priority 3	26,012	25 Minutes	23:04	50 Min.	1,670
None	1,999	N/A	13:32	N/A	N/A

Priority 1 incidents are considered the highest priority and the most acute incidents for a patient. Effective response by appropriate medical care providers and often rapid transport can make a difference for these individuals. The SDFD provides ALS first response, starting patient care in many instances and providing an overall prompt experience. The following figure shows priority 1 (P1) incidents: first ambulance and first fire unit 90th percentile response times by emergency response zone.

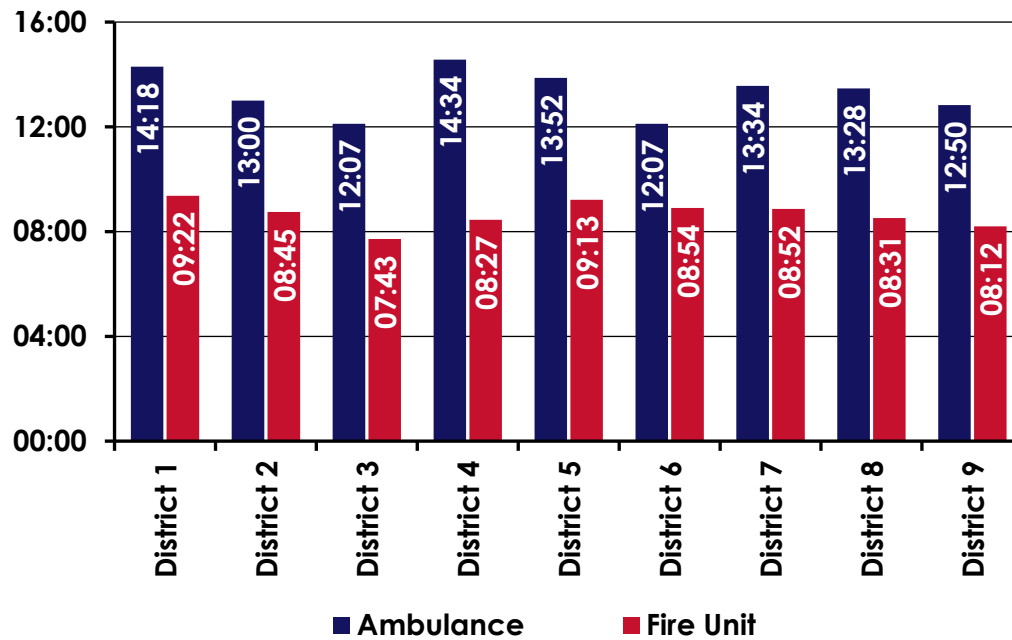
Figure 17: P1 Arrival by Emergency Response Zone, 90th Percentile (JUL 2018–AUG 2023)

The 90th percentile response times have changed over the years. From 2018 through 2020, the response times remained consistent at just above 12 minutes. These times increased significantly in 2021 but have reduced steadily from 2021 to 2023. The following figure shows the 90th percentile first-due ambulance response time from 2018 through 2023.

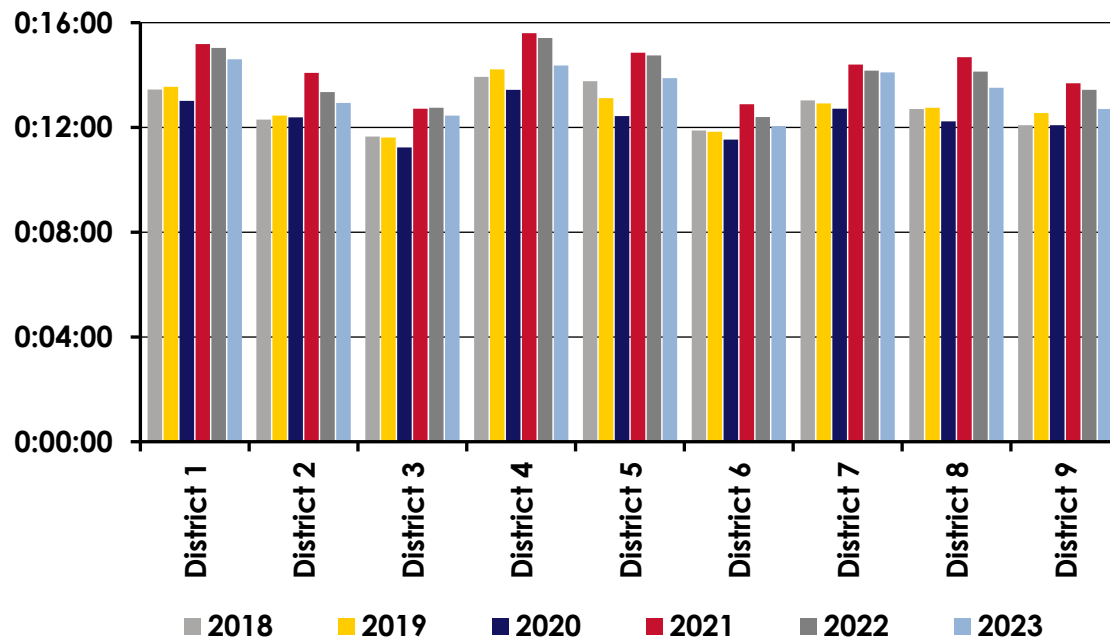
Figure 18: P1 Annual First Due Ambulance Performance (JUL 2018–AUG 2023)

The performance by hour shows a predominantly consistent first-due ambulance performance by the emergency response zone. Two notable exceptions are evident when evaluating this detail of information. All zones' response times increased during the late afternoon, previously identified as a heavy volume of incidents. In addition, the Southern response times decrease from 7:00 AM until 3:00 PM, then elevate throughout the evening.

Another way to view the first due performance is by councilmember district. Each district has different response times due to the volume of incidents and travel times. Still, it remains like the overall first response performance. The following figure shows the 90th percentile first arriving ambulance and fire performance by council district for all the data within the data.

Figure 19: P1 First Arrival by Council District, 90th Percentile (JUL 2018–AUG 2023)

Each district follows the same annual pattern and citywide data. The following figure shows the priority 1 annual first-due ambulance arrival by the council district.

Figure 20: P1 Annual Ambulance First Arrival by District (JUL 2018–AUG 2023)

The other two priority levels within the performance standard are potentially less severe needs than a priority 1 incident but are nevertheless part of the standard. Priority 2 and priority 3 incidents each have a more extended response time standard. The following figures show the priority 2 (P2) and priority 3 (P3) first arriving ambulance and fire units by emergency response zone.

Figure 21: P2 Arrival by Emergency Response Zone, 90th Percentile (JUL 2018–AUG 2023)

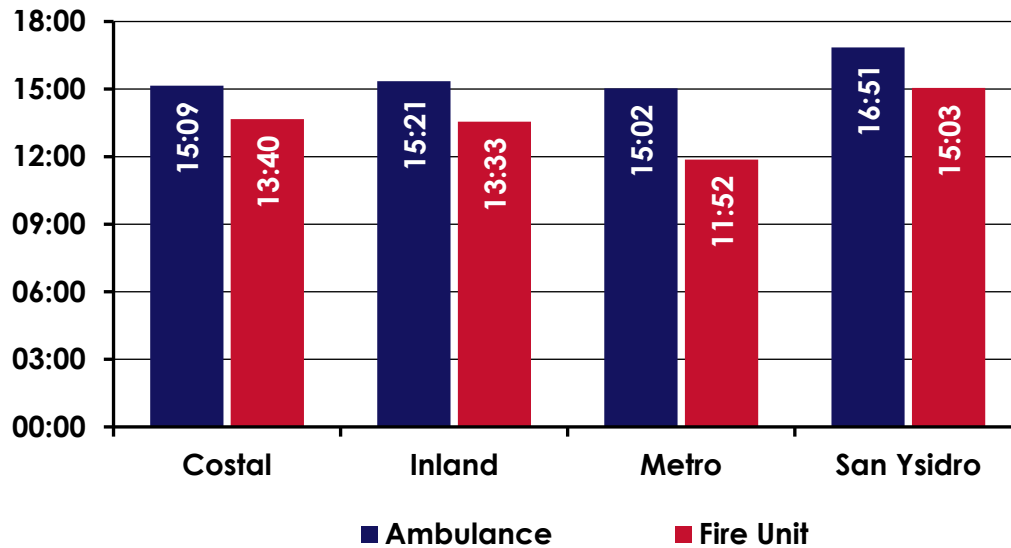
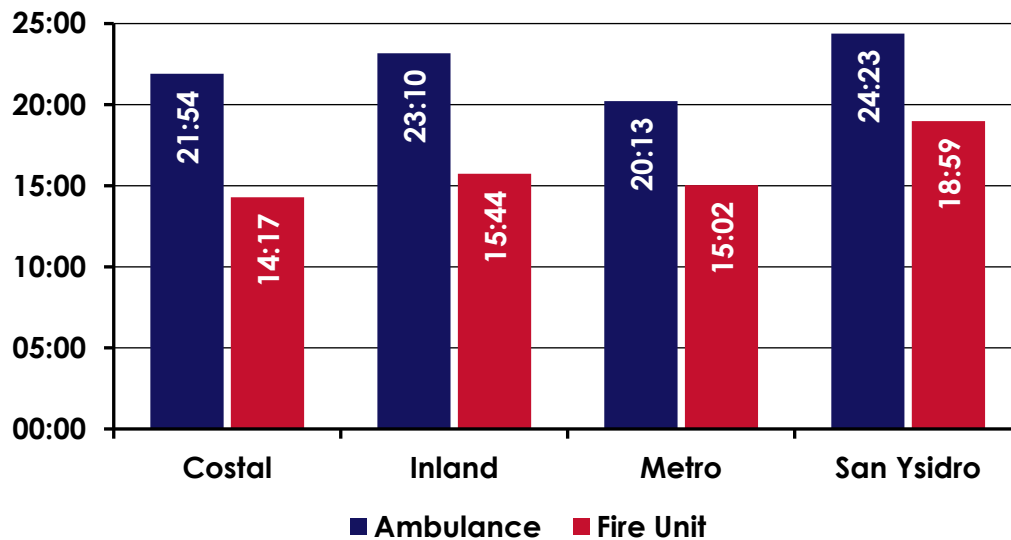


Figure 22: P3 Arrival by Emergency Response Zone, 90th Percentile (JUL 2018–AUG 2023)

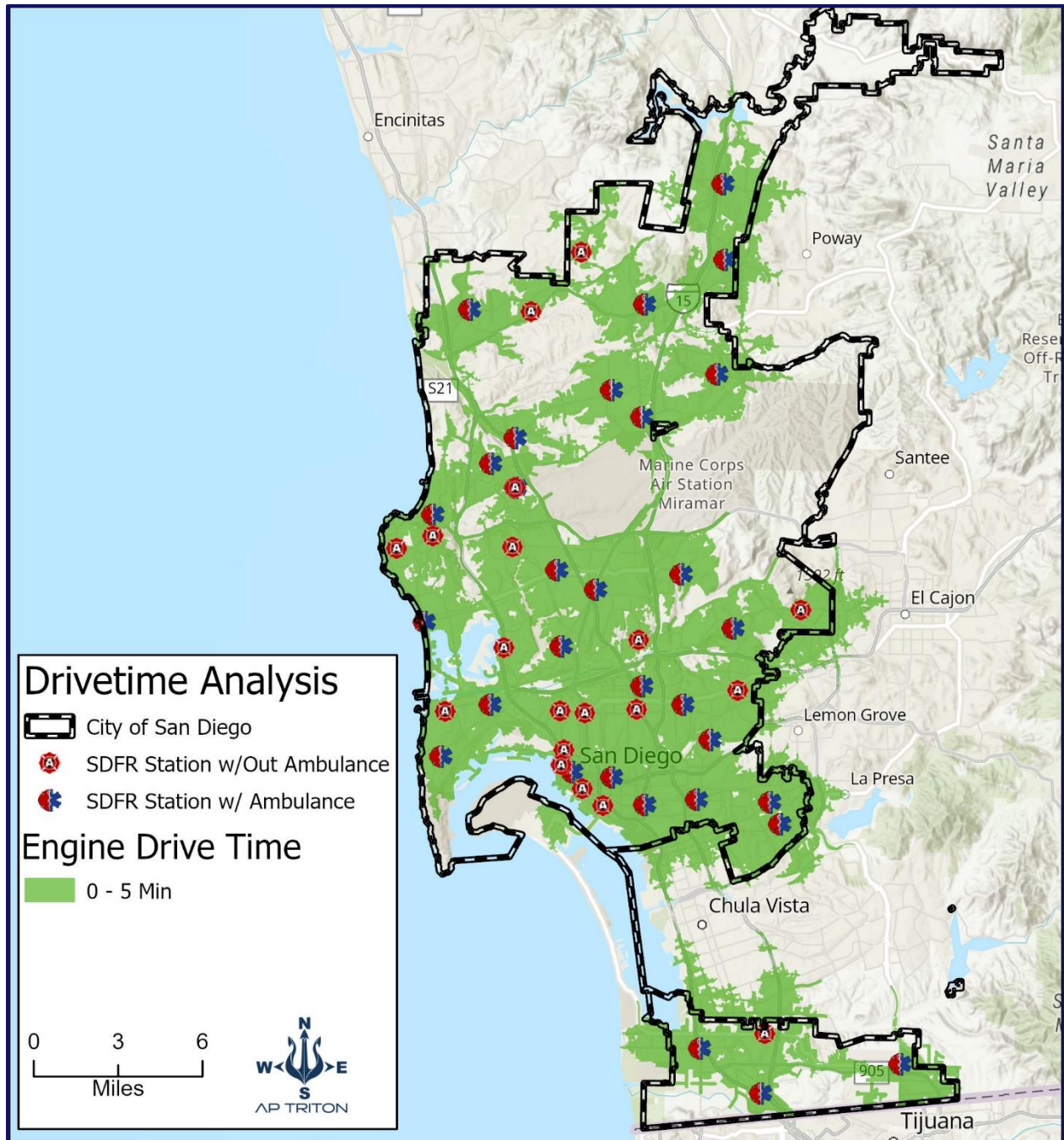


Three primary steps must be completed quickly for a crew to arrive. The first step is the call processing time, or the time it takes for the communications center to get the incident logged, prioritized, and sent to the responding units. The second step is for the responding crews to staff their apparatus and begin to travel, which is known as turnout time. Finally, there is the travel time, which is the amount of time it takes the apparatus to move from where it was stationed to where the incident is. It is outside the scope of this report to evaluate the historic performance in each step. However, station locations and travel time can be analyzed utilizing models.

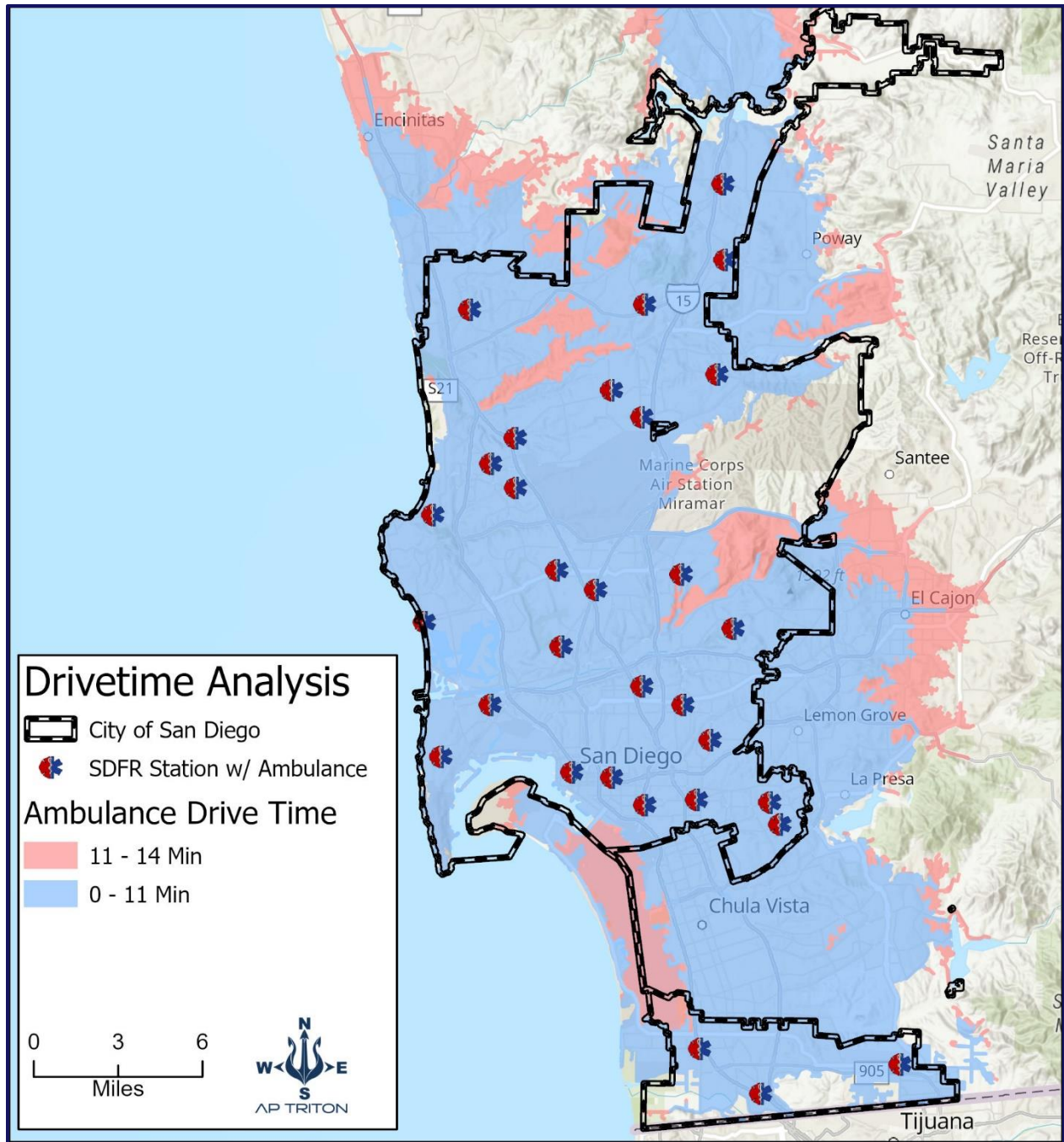
There is one fire department location and two ambulance types that were provided. Fire equipment responds from fixed locations throughout the city. These stations may or may not have an ambulance assigned. The first type of ambulance location is a fire station where ambulances are co-located with fire apparatus. These two station types were used for a drive time analysis. However, other ambulance location types, the EMS posting locations, were not evaluated as they did not appear to be permanent posts. These locations appeared to be move-up posting locations as other ambulances were committed to incidents. This type of move-up is beneficial to maintaining centralized ambulance coverage.

To conduct the drive time analysis a street network was provided by the county. The street network provided speed limits, which were used to determine the driving time on each road segment. The meta data definition of the speed limits indicated that the speed is based on road segment class and published as part of an agreement between San Diego Fire-Rescue, the San Diego County Sheriff's Department, and SanGIS. This agreement limited the average speed to that based on heavy fire vehicles and may not represent the posted speed limit. This speed limit was used for the time segments. No traffic data or time of day speed analysis was conducted.

The goal for first responding fire apparatus on emergency incidents was stated as 6 minutes. Using the National Fire Protection Association's turnout time for career departments on EMS incidents at 1 minute, the drive time analysis was done from each station from 0–5 minutes. The following figure is the 0–5-minute travel time coverage model for all fire stations.

Figure 23: 0–5 Minute Drive Time from Fire Station Model

The subsequent analysis was for the ambulance drive times from those stations with ambulances co-located. The time groups were based on the response time priority of 12 minutes and allowed for the same 1-minute turnout time. The following figure shows the 0- to 11-minute and the additional 11- to 14-minute drive time analysis from each fire station with an ambulance.

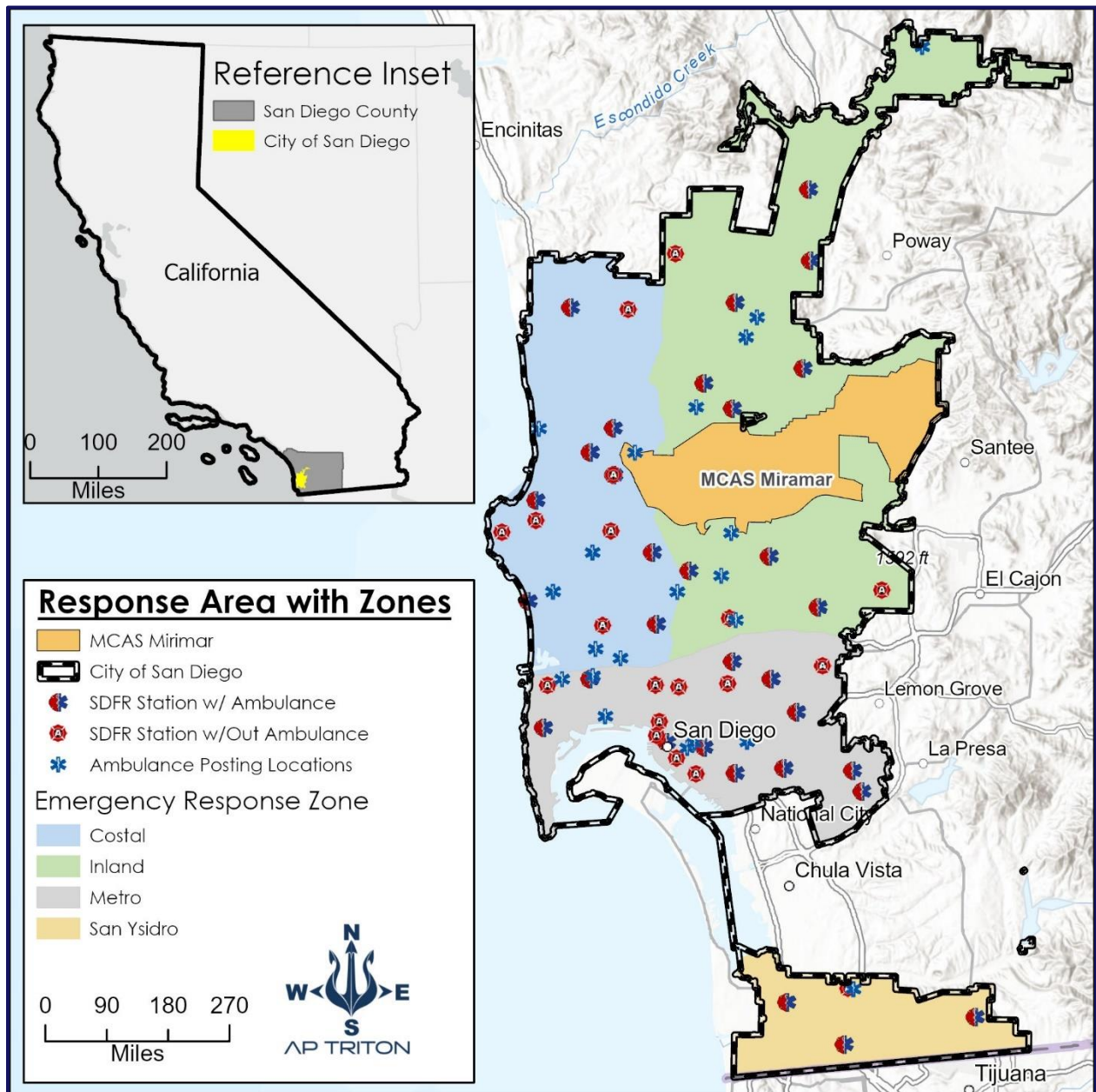
Figure 24: City-wide 11- and 14-minute Drive Time from Stations

As the preceding figures illustrate, the overall citywide coverage is good from the locations chosen for ambulances and fire apparatus. The areas that appear to have extended travel times all have limited access roads or, in some cases, no access. The MCAS Miramar is not included in the placement of City assets as it is protected by the base fire service.

Emergency Operations Area Performance Structure

The final segment of this evaluation is to review each emergency response zone structure from a performance need and system perspective. Travel time models from each fire station, fire stations with ambulances, ambulance requirements, and population will be discussed for each zone.

Figure 25: Response Area with Zones



Coastal Emergency Response Zone

The Coastal Response Zone is in the northwest portion of the city. It is bounded by the coast on the west, Highway 8 in the south, and the city border on the north. The east boundary is roughly Highway 163 from the southern boundary to Highway 205, then generally north at the south border of MCAS Miramar. Like most response zones, the area is densely populated and considered urban. The zone contains the University of California San Diego and some large parks such as Torrey Pines State Natural Reserve, Mission Bay Park, and parts of the Los Penasquitos Canyon. The following figure shows the population density focused on the Coastal Zone.

Figure 26: Costal ERZ Population Density

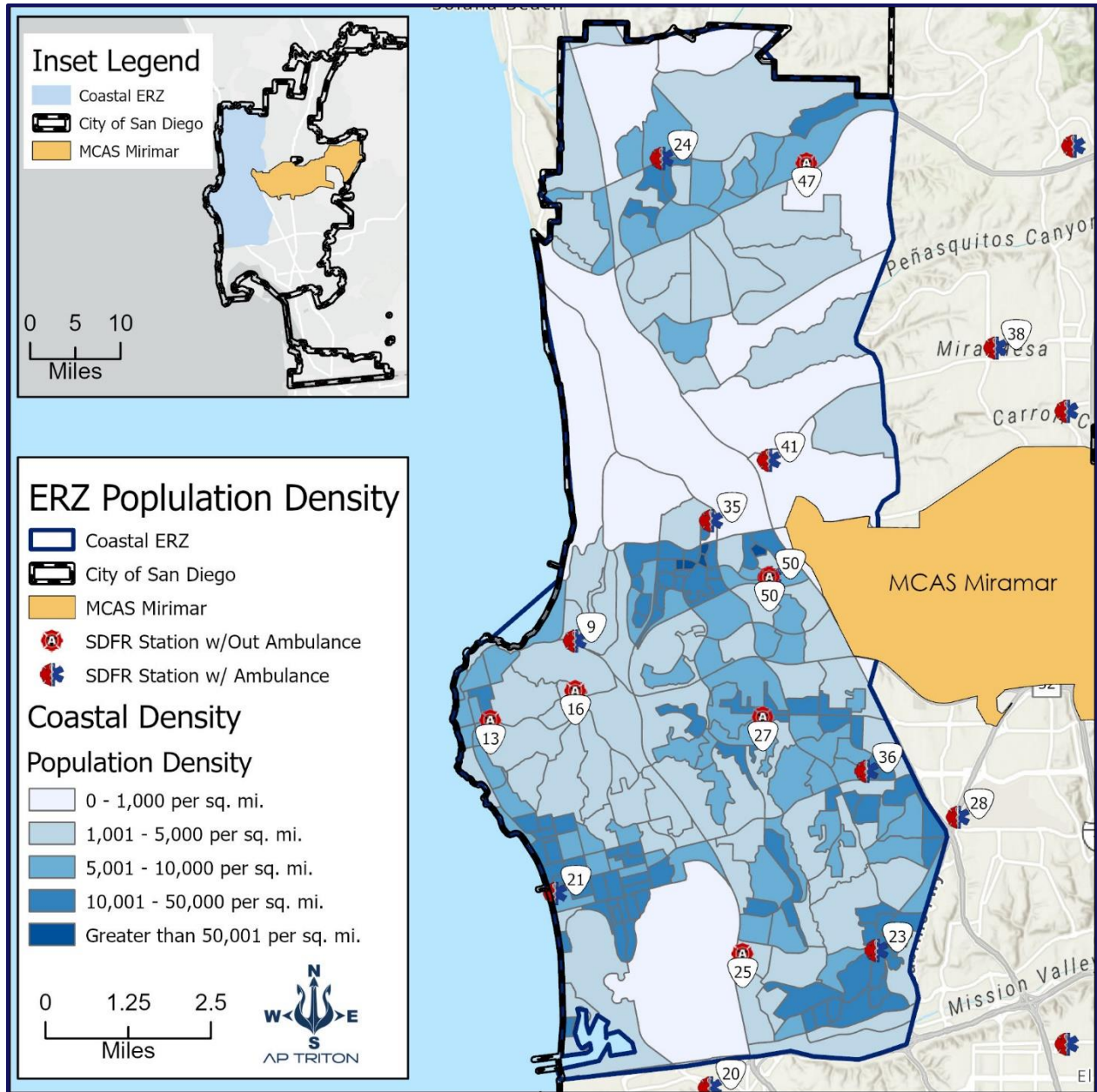
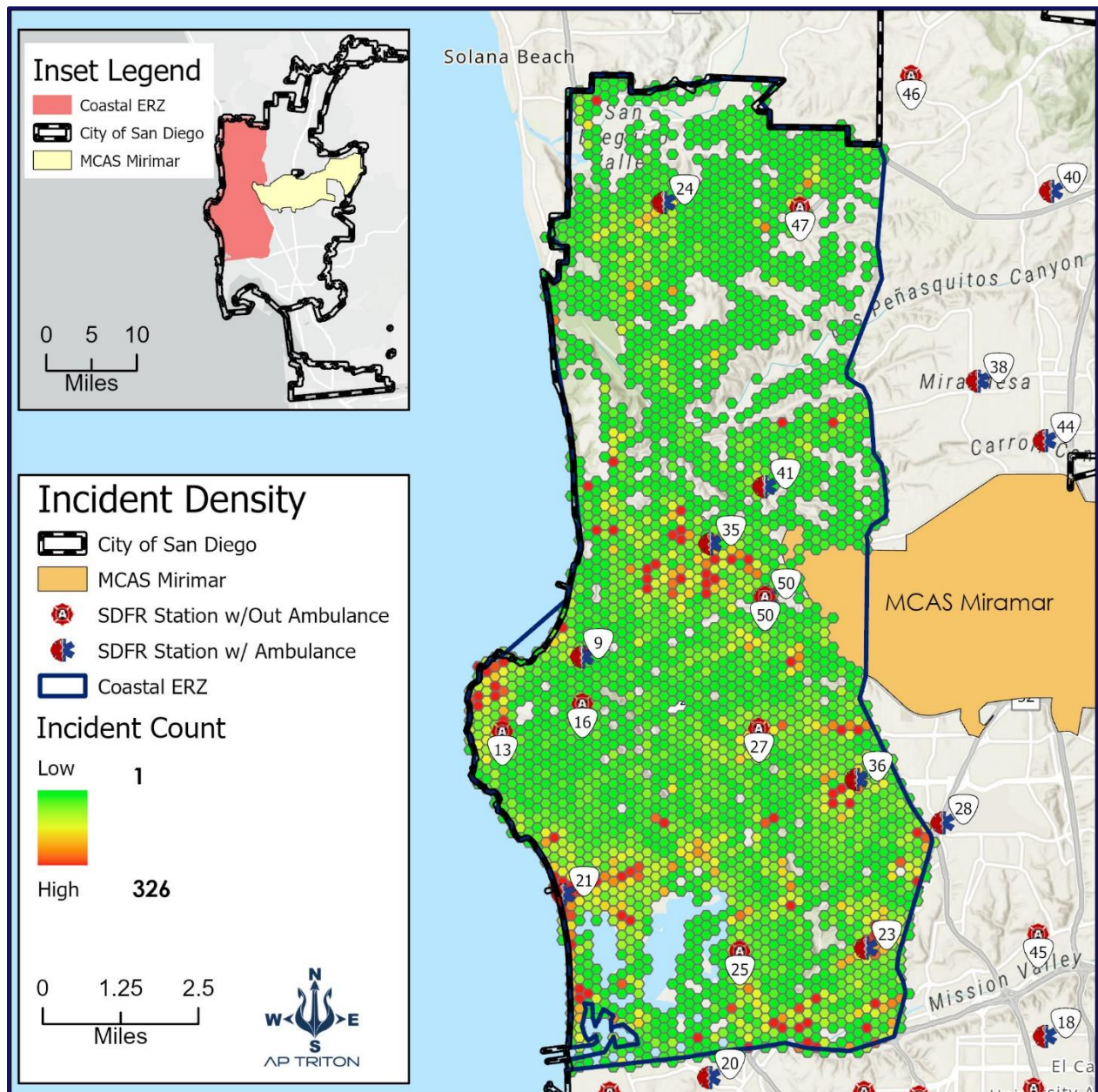
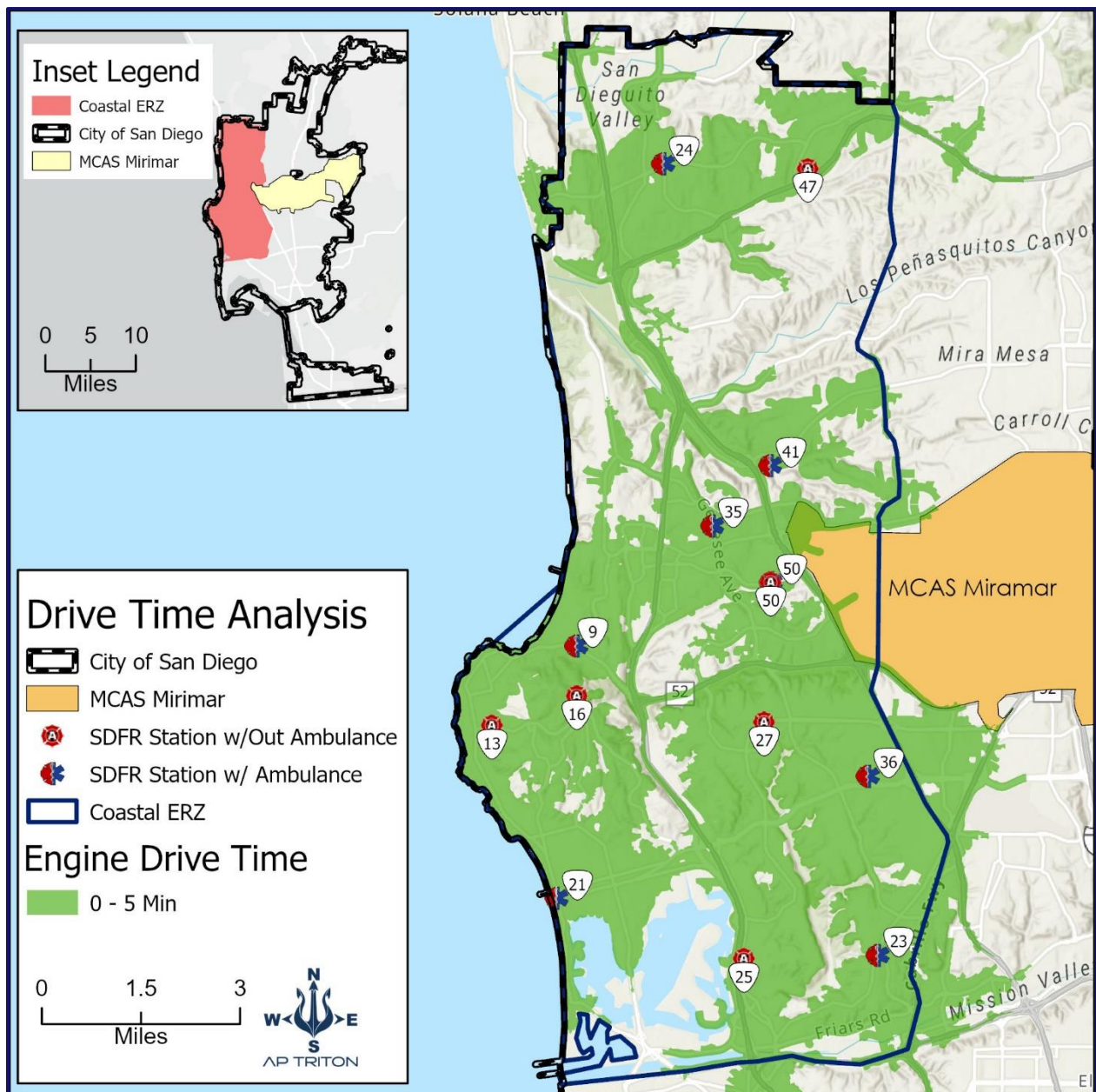


Figure 27: Incident Density Coastal Zone



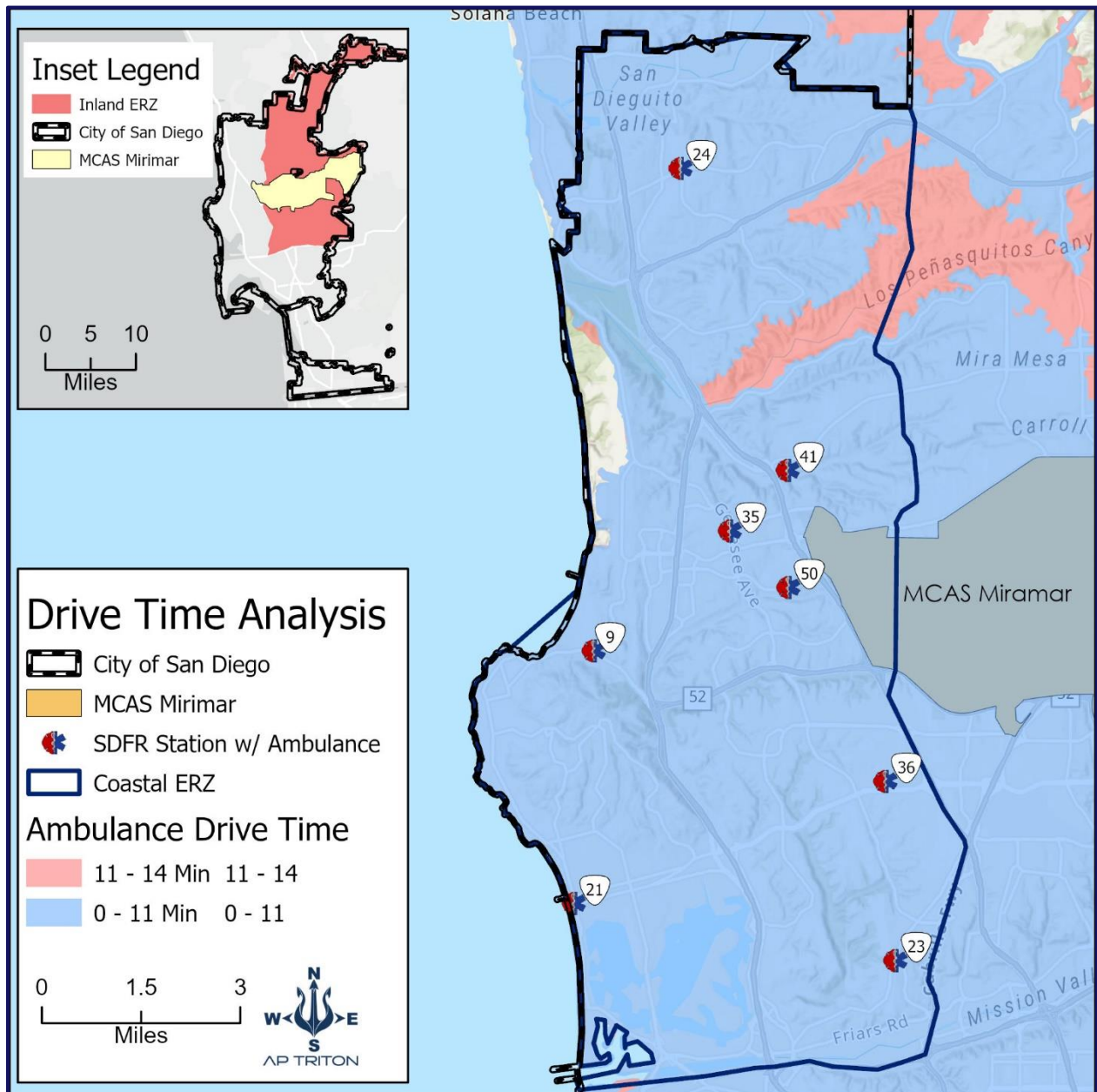
There are 13 fire stations within the Coastal Zone. Overall, the 0 to 5-minute drive time coverage is suitable for populated areas. There are also seven stations immediately adjacent to the zone for other City assets to provide coverage. The following figure shows the 5-minute drive time, the fire department's first due arrival goal, in the Coastal Zone for stations within the zone.

Figure 28: Coastal Zone 5-Minute Drive Time



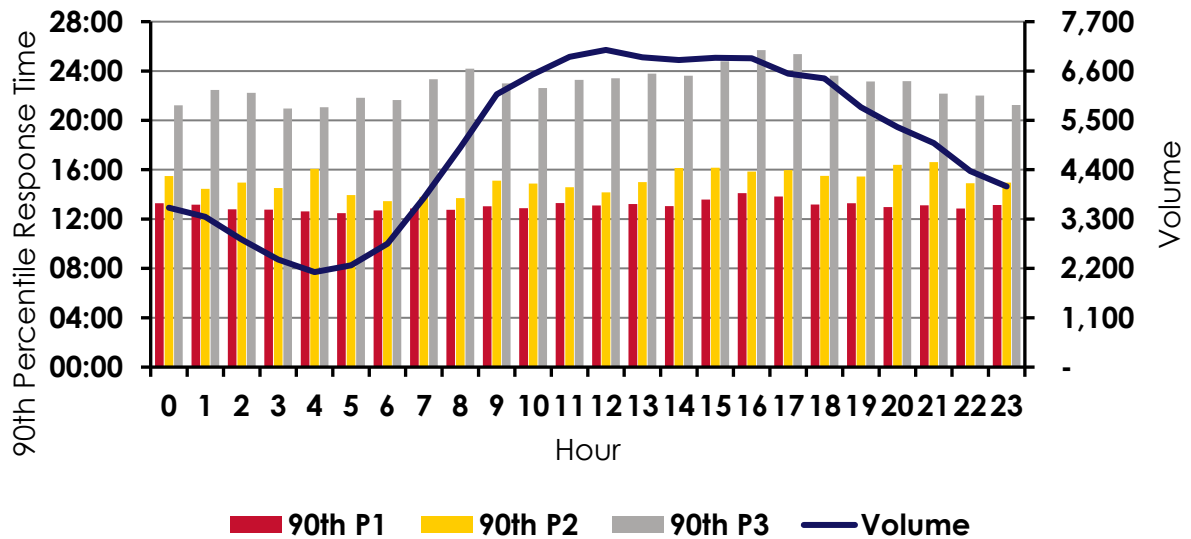
There are eight fire stations with ambulances co-located. These locations provide good overall drivetime coverage for the 11- and 14-minute cutoff points. The following figure shows the 0 to 11 and 11 to 14-minute drivetime models.

Figure 29: Coastal Zone 8- & 10-Minute Drive Time



Ambulance response times for the zone remain consistent throughout the day while the volume nearly triples from 4:00 AM to noon. The following figure shows each priority first due ambulance time by hour with an incident volume line for reference.

Figure 30: Coastal Hourly Ambulance First Due Performance (JUL 2018–AUG 2023)



Ambulance usage in the Coastal Zone is like the Inland Zone. The minimum number of ambulance responses is one an hour, with a maximum of five. The following figure shows the September 2022 through August 2023 average ambulance responses by hour and day.

Figure 31: Coastal Zone Average Ambulance Responses by Hour (SEP 2022–AUG 2023)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Incidents
0–1	2	2	2	2	2	3	3		5
1–2	2	2	2	2	2	3	3		4
2–3	2	2	1	2	1	2	2		3
3–4	2	1	1	1	1	2	2		2
4–5	1	1	1	1	1	2	2		1
5–6	1	1	1	1	1	2	2		
6–7	2	2	2	2	2	2	2		
7–8	2	2	2	2	3	3	2		
8–9	3	4	3	3	3	3	3		
9–10	4	4	4	4	4	3	3		
10–11	4	4	4	3	4	4	4		
11–12	4	4	4	5	4	4	4		
12–13	5	5	4	5	4	4	4		
13–14	4	4	5	4	5	4	4		
14–15	4	5	4	4	4	4	4		
15–16	5	4	4	4	5	4	4		
16–17	4	4	4	4	5	4	4		
17–18	4	4	4	5	4	4	4		
18–19	4	4	3	4	4	4	4		
19–20	3	3	3	3	3	4	3		
20–21	3	3	3	3	3	4	4		
21–22	3	3	2	3	4	3	3		
22–23	3	2	3	3	3	3	2		
23–24	2	2	2	2	3	3	3		

This zone's average unit commit time is 55 minutes, and the assumed ToT is 55%. This can be utilized in the estimation methodology mentioned earlier in this section to create an ambulance need. It should be noted that this estimation is for illustrative purposes only, as each zone works in conjunction with other zones, and ambulances from different emergency response zones may provide coverage or assistance in the Coastal Zone. The following figure estimates the units needed to provide adequate coverage in this zone.

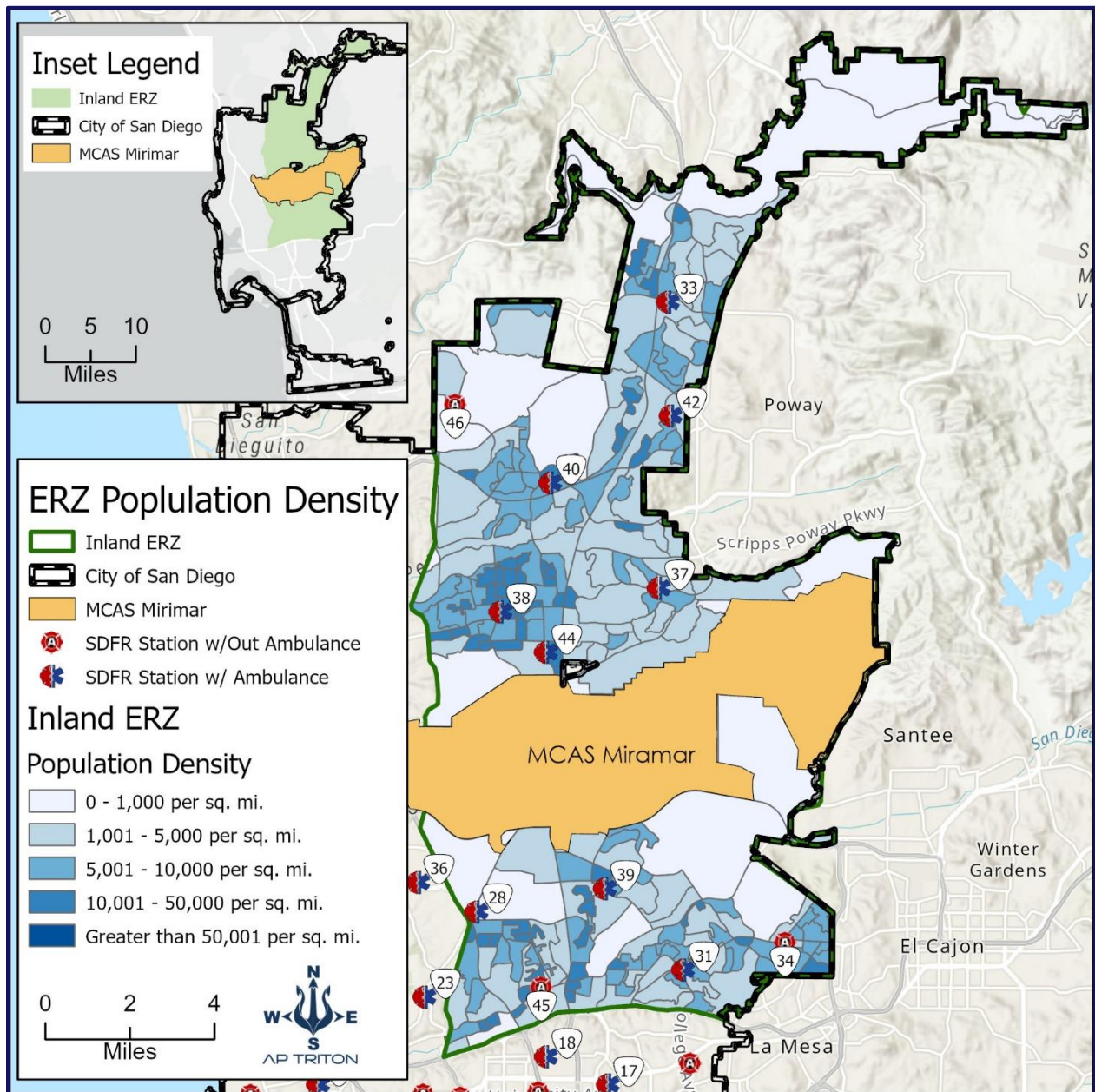
Figure 32: Coastal Zone Ambulances Needed

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Units
0-1	4	4	4	4	4	5	5		9
1-2	4	4	4	4	4	5	5		7-8
2-3	4	4	2	4	2	4	4		5-6
3-4	4	2	2	2	2	4	4		4
4-5	2	2	2	2	2	4	4		2-3
5-6	2	2	2	2	2	4	4		
6-7	4	4	4	4	4	4	4		
7-8	4	4	4	4	5	5	4		
8-9	5	7	5	5	5	5	5		
9-10	7	7	7	7	7	5	5		
10-11	7	7	7	5	7	7	7		
11-12	7	7	7	9	7	7	7		
12-13	9	9	7	9	7	7	7		
13-14	7	7	9	7	9	7	7		
14-15	7	9	7	7	7	7	7		
15-16	9	7	7	7	9	7	7		
16-17	7	7	7	7	9	7	7		
17-18	7	7	7	9	7	7	7		
18-19	7	7	5	7	7	7	7		
19-20	5	5	5	5	5	7	5		
20-21	5	5	5	5	5	7	7		
21-22	5	5	4	5	7	5	5		
22-23	5	4	5	5	5	5	4		
23-24	4	4	4	4	5	5	5		

Inland Emergency Response Zone

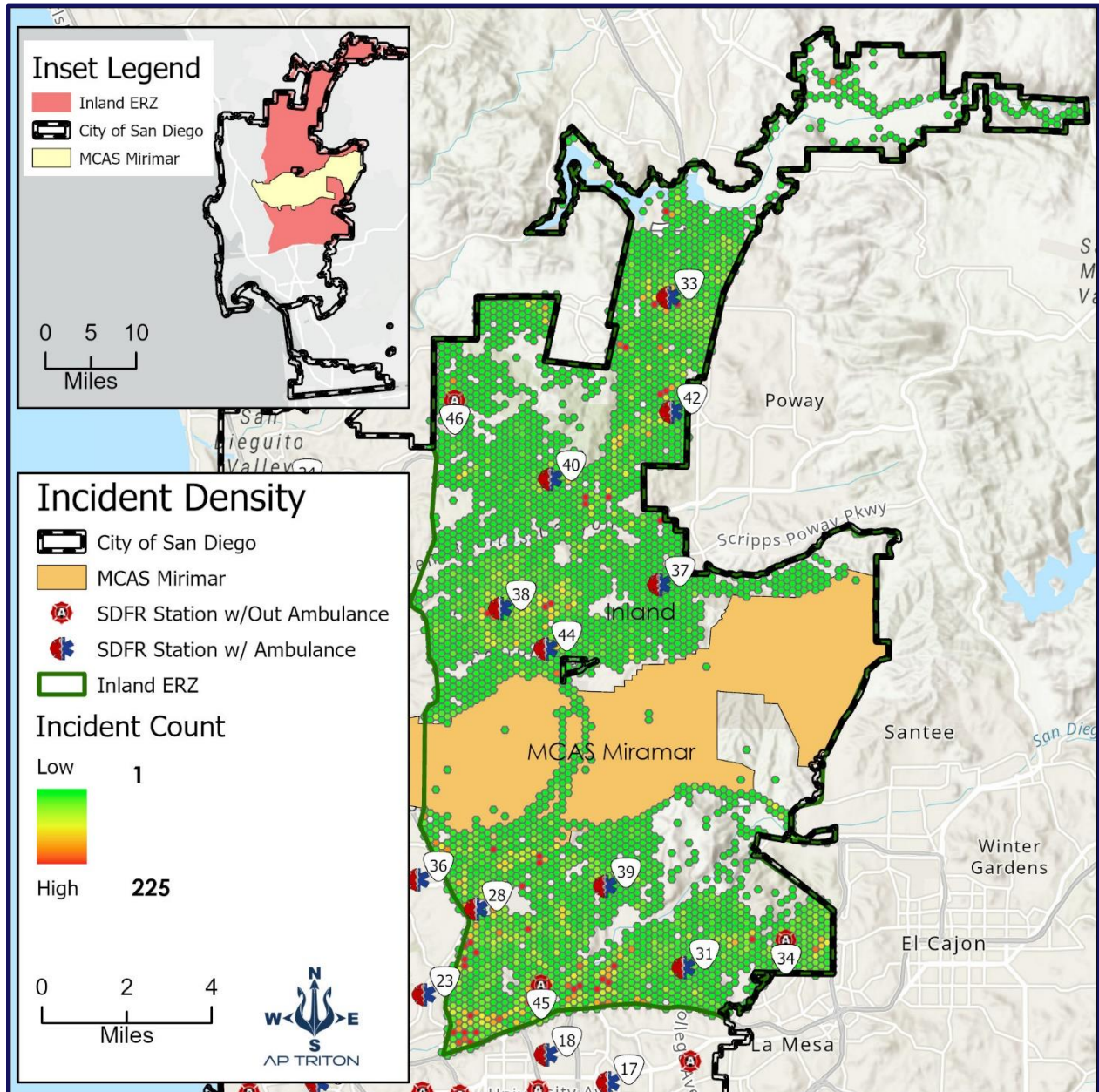
The Inland Response Zone is in the northeast portion of the City. It is bounded by the Coastal Zone on the west, Highway 8 in the south, and the city border on the north and east. Like most response zones, the area is densely populated and considered urban. The zone is bifurcated by MCAS Miramar. The zone contains an executive airport, parks, and open spaces like Mission Trails and Black Mountain. The following is the population density focused on the Inland Zone.

Figure 33: Inland ERZ Population Density



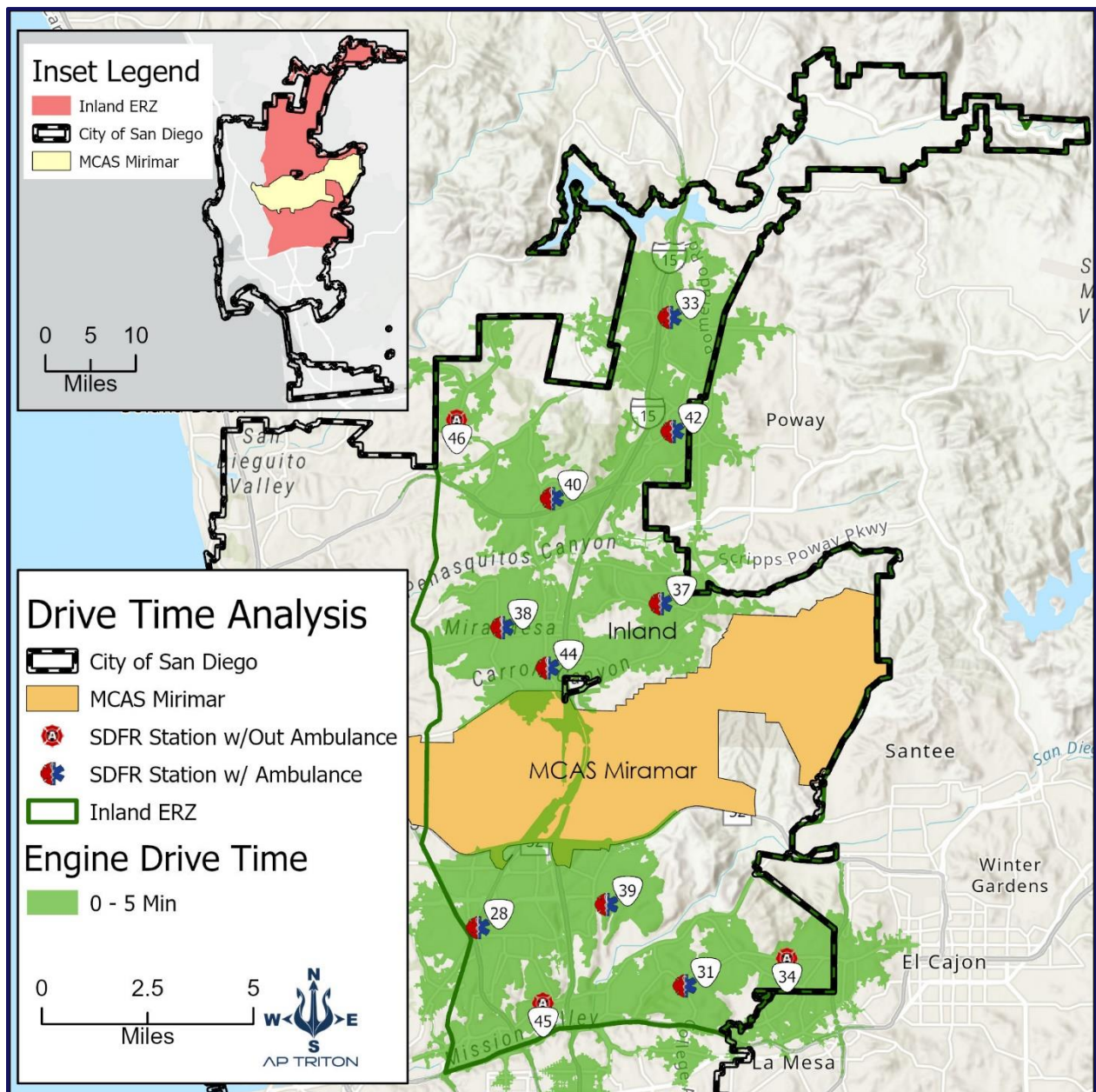
Incidents are spread throughout the Inland Zone. There are pockets of higher density scattered throughout, but they appear close to fire stations and along Highway 8. The following figure shows the incident density identified for the Inland Zone.

Figure 34: Incident Density Inland Zone



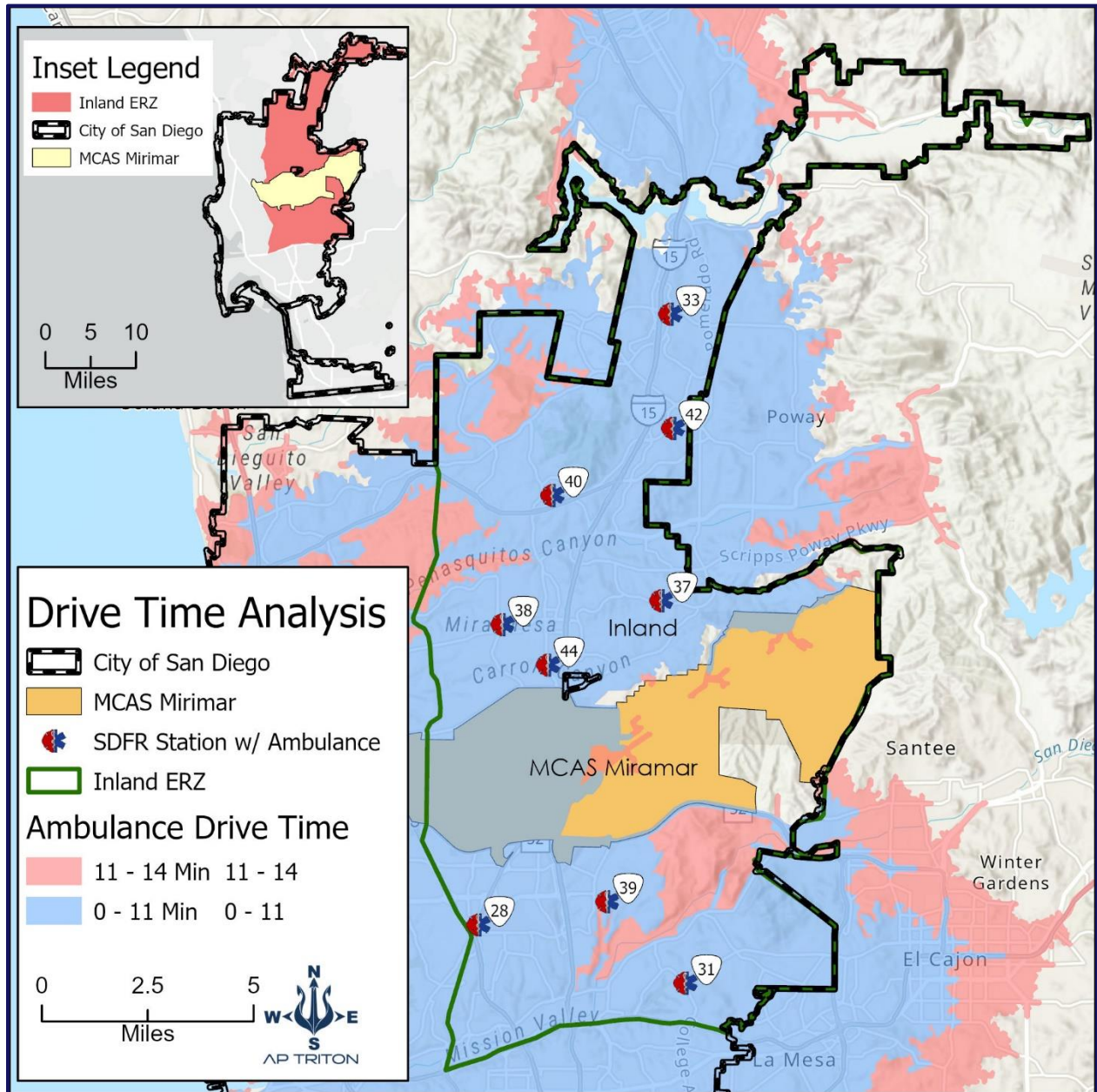
There are 12 fire stations within the Inland Zone. Overall, the 0 to 5-minute drive time coverage is suitable for populated areas. There are also 10 stations immediately adjacent to the zone for other City assets to provide coverage. The following figure shows the 5-minute drive time, the fire department's first due arrival goal, in the Inland Zone for stations within the zone.

Figure 35: Inland Zone 5-Minute Drive Time



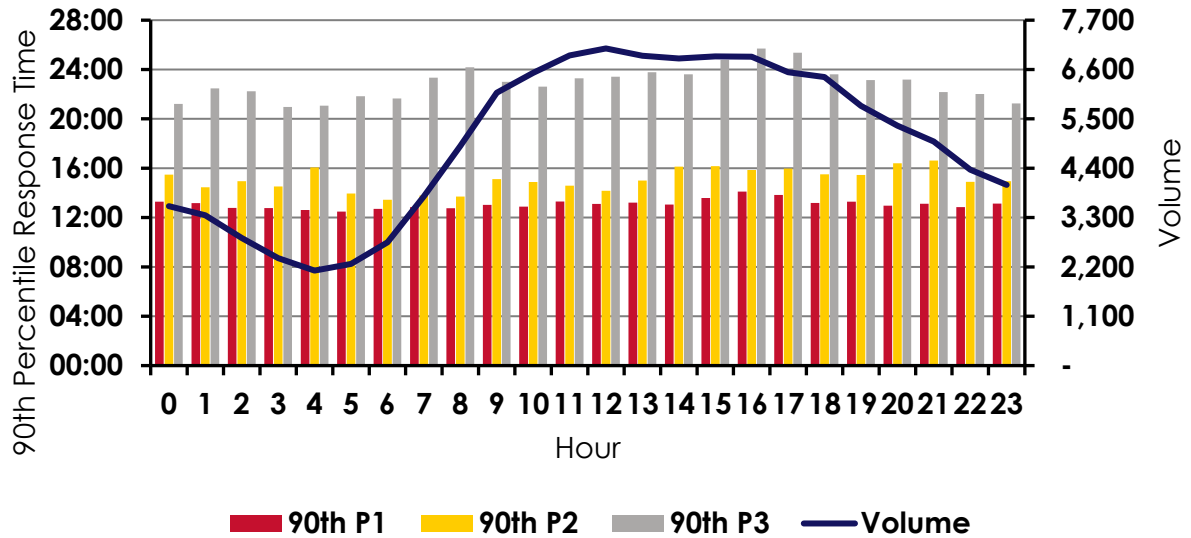
There are nine fire stations with ambulances co-located. These locations provide good overall drivetime coverage for the 11- and 14-minute cutoff points. The following figure shows the 0 to 11 and 11 to 14-minute drivetime models.

Figure 36: Inland Zone 8- & 10-Minute Drive Time



Ambulance response times for the zone remain consistent for priority 1 and priority 2 incidents throughout the day while the volume nearly triples from 4:00 AM to noon. Response times to priority 3 incidents are within the standard but extend from 7:00 AM to 5:00 PM. The following figure shows each priority first due ambulance time by hour with an incident volume line for reference.

Figure 37: Inland Hourly Ambulance First Due Performance (JUL 2018–AUG 2023)



Ambulance usage in the Inland Zone is like the Coastal Zone. The minimum number of ambulance responses is one an hour, with a maximum of six. The following figure shows the September 2022 through August 2023 average ambulance responses by hour and day.

Figure 38: Inland Zone Average Ambulance Responses by Hour (SEP 2022–AUG 2023)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Incidents
0–1	2	2	2	2	1	2	3		6
1–2	2	2	1	2	2	2	2		5
2–3	1	1	2	2	2	2	2		4
3–4	2	2	2	1	1	2	1		3
4–5	1	2	2	2	1	2	2		2
5–6	1	2	2	1	1	2	1		1
6–7	2	2	2	2	3	2	2		
7–8	3	3	3	3	3	2	2		
8–9	4	4	3	3	4	3	3		
9–10	4	5	4	5	4	4	3		
10–11	4	5	4	5	4	4	4		
11–12	5	4	5	5	5	4	4		
12–13	5	5	5	6	5	4	4		
13–14	5	5	5	5	5	4	3		
14–15	5	5	5	5	4	4	4		
15–16	4	5	5	4	5	4	4		
16–17	4	5	4	5	5	4	4		
17–18	3	4	4	5	4	4	4		
18–19	3	4	4	4	4	4	4		
19–20	3	4	4	3	4	4	3		
20–21	3	3	3	4	4	3	3		
21–22	3	3	3	3	3	3	3		
22–23	3	3	3	3	3	3	3		
23–24	3	2	2	2	3	2	2		

This zone's average unit commit time is 55 minutes, and the assumed ToT is 55%. This can be utilized in the estimation methodology mentioned earlier in this section to create an ambulance need. It should be noted that this estimation is for illustrative purposes only, as each zone works in conjunction with other zones, and ambulances from different emergency response zones may provide coverage or assistance in the Inland Zone. The following figure estimates the units needed to provide adequate coverage in this zone.

Figure 39: Inland Zone Ambulances Needed

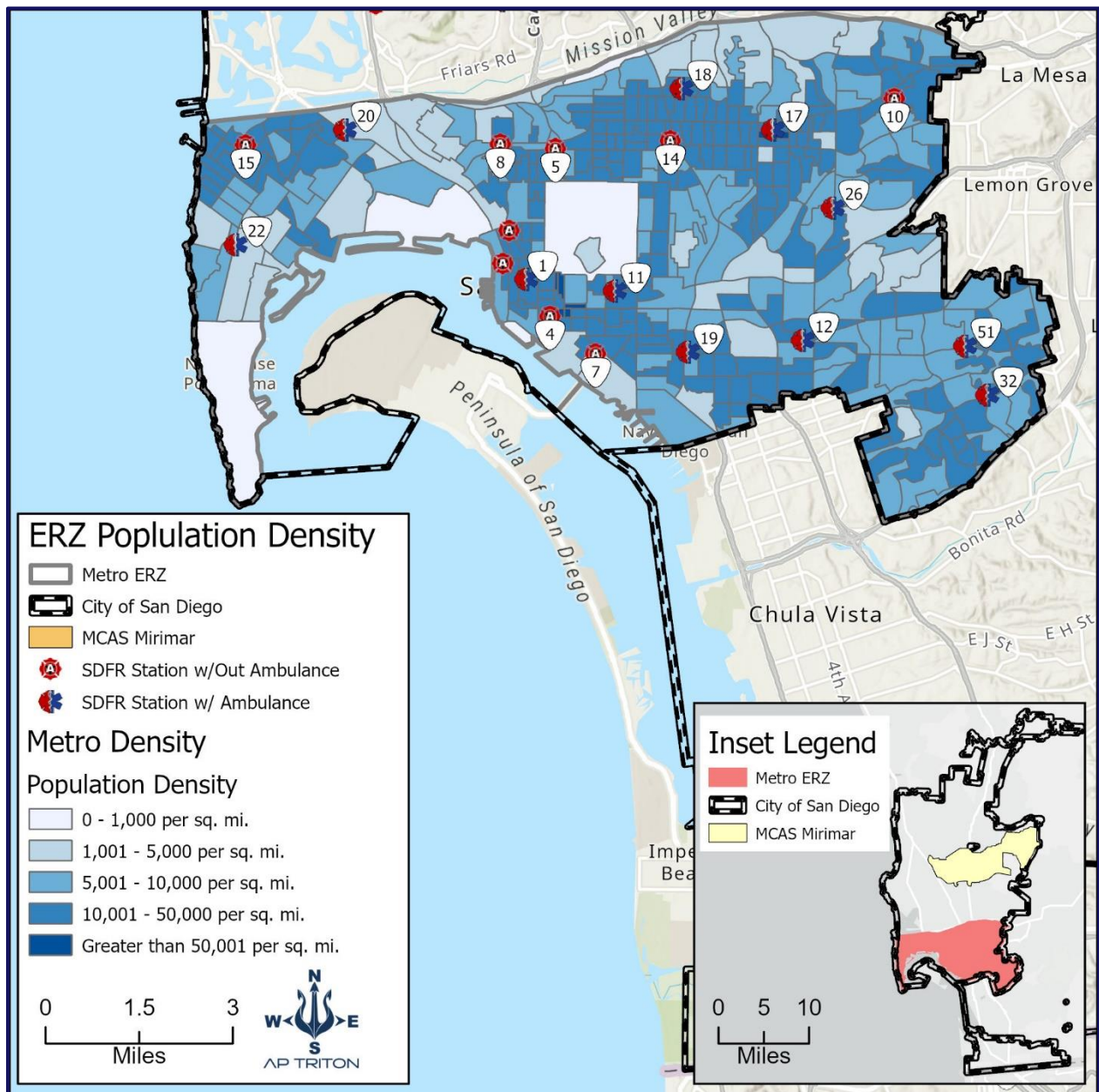
Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
0-1	4	4	4	4	2	4	6
1-2	4	4	2	4	4	4	4
2-3	2	2	4	4	4	4	4
3-4	4	4	4	2	2	4	2
4-5	2	4	4	4	2	4	4
5-6	2	4	4	2	2	4	2
6-7	4	4	4	4	6	4	4
7-8	6	6	6	6	6	4	4
8-9	8	8	6	6	8	6	6
9-10	8	10	8	10	8	8	6
10-11	8	10	8	10	8	8	8
11-12	10	8	10	10	10	8	8
12-13	10	10	10	12	10	8	8
13-14	10	10	10	10	10	8	6
14-15	10	10	10	10	8	8	8
15-16	8	10	10	8	10	8	8
16-17	8	10	8	10	10	8	8
17-18	6	8	8	10	8	8	8
18-19	6	8	8	8	8	8	8
19-20	6	8	8	6	8	8	6
20-21	6	6	6	8	8	6	6
21-22	6	6	6	6	6	6	6
22-23	6	6	6	6	6	6	6
23-24	6	4	4	4	6	4	4

Color	Units
	10-12
	8-9
	6-7
	4-5
	2-3

Central (Metro) Emergency Response Zone

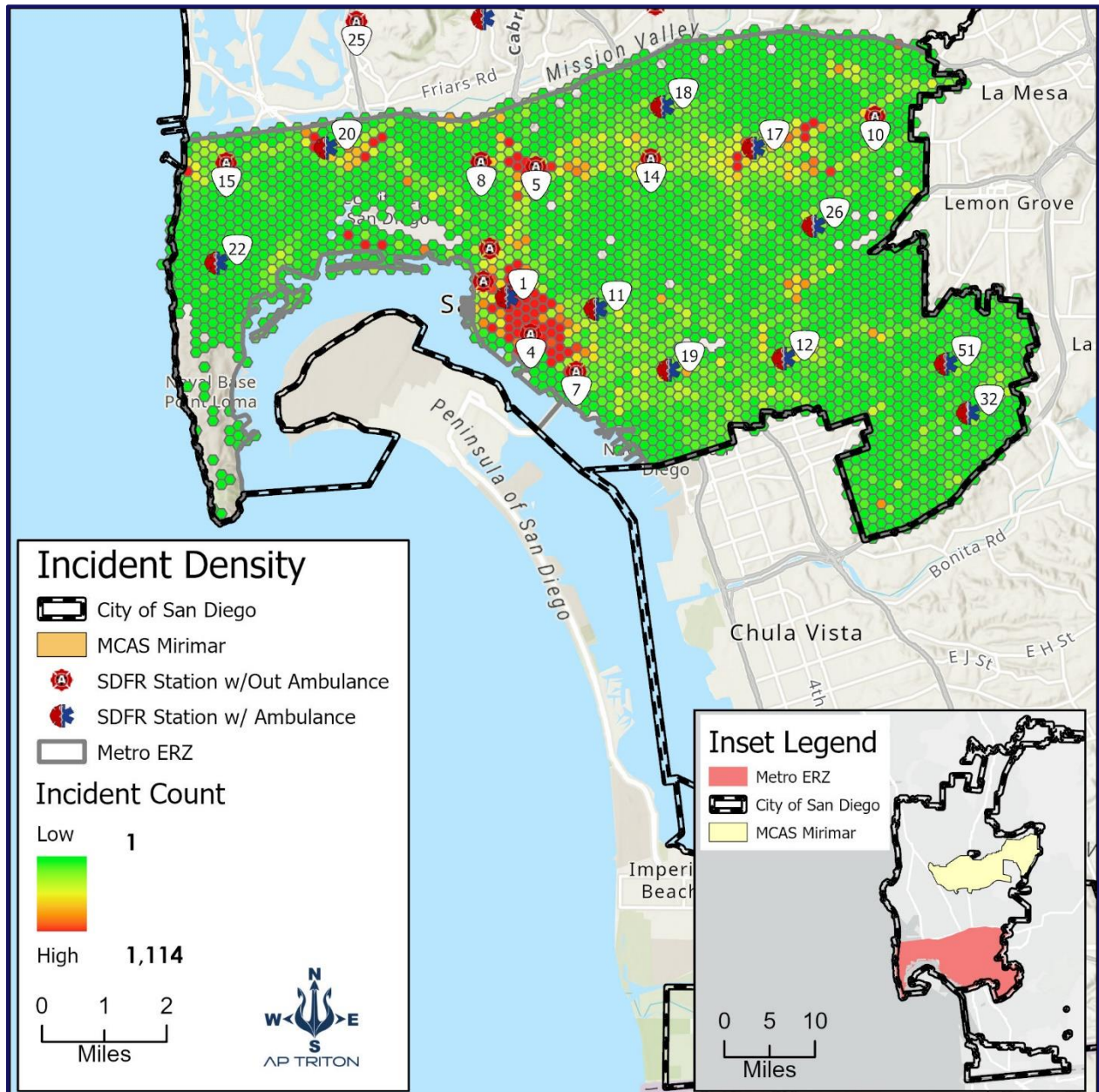
The Central Response Zone is in the approximate center of the city. It is bounded by Highway 8 to the north and the city border elsewhere. Like most response zones, the area is densely populated and considered urban. It is the most densely populated zone with the most significant incident volume. The zone contains the San Diego International Airport but, except for Balboa Park, has fewer larger open spaces. It also includes the Naval Base Point Loma and parts of Naval Base San Diego. The following figure shows population density focused on the Metro Zone.

Figure 40: Population Density Central Zone



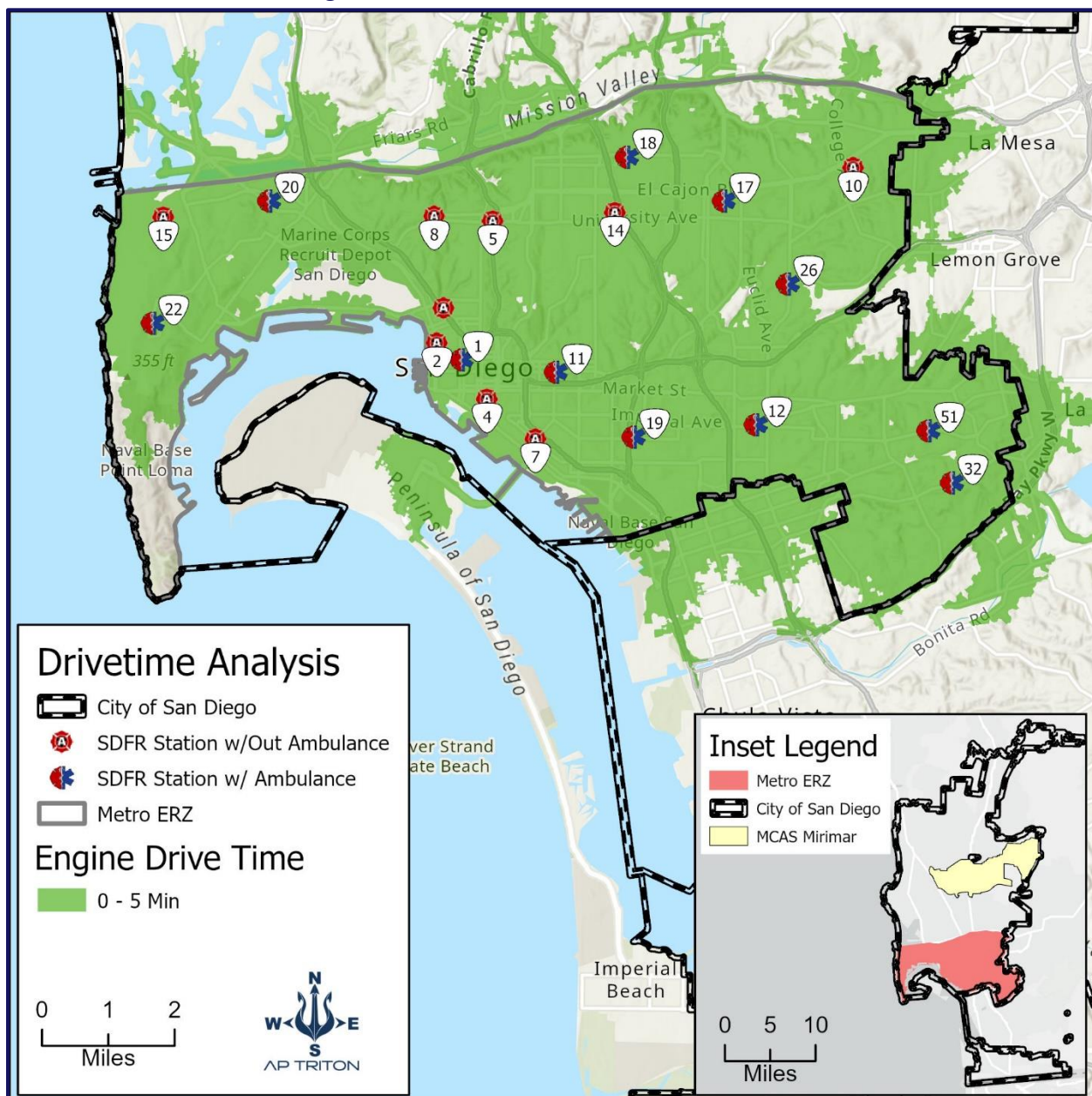
Incidents are spread throughout the Central Zone. There are pockets of much higher density scattered throughout. However, they are mostly concentrated in the downtown high-rise and low-rise building areas and the older parts of the town. The following figure shows the incident density identified for the Central Zone.

Figure 41: Incident Density Central Zone



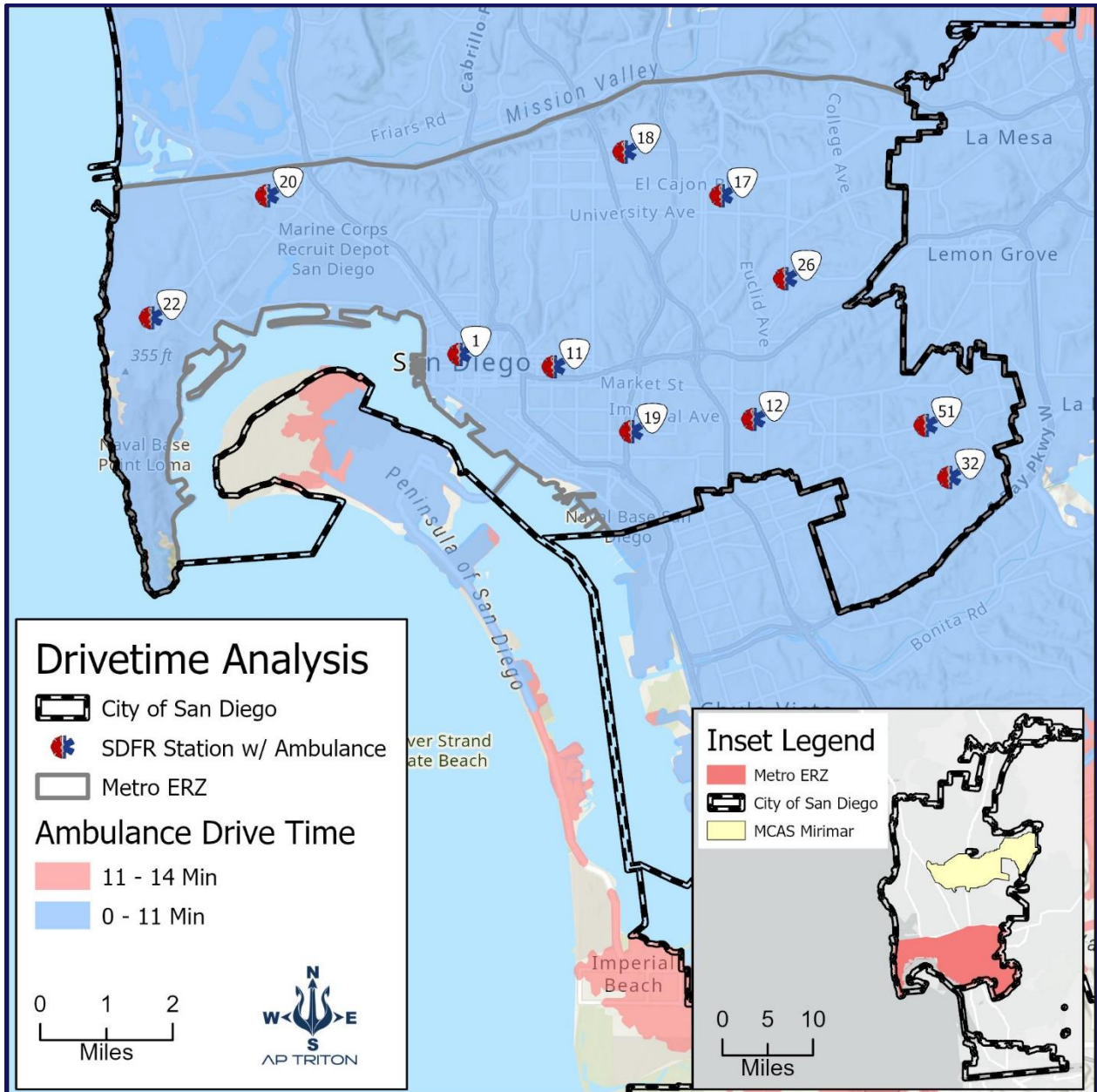
There are 20 fire stations within the Central Zone. Overall, the 0 to 5-minute drive time coverage suits the area. Four stations are immediately adjacent to the zone's north for other City assets to provide coverage. The following figure shows the 5-minute drive time, the fire department's first due arrival goal, in the Central Zone for stations within the zone.

Figure 42: Central Zone 5-Minute Drive Time



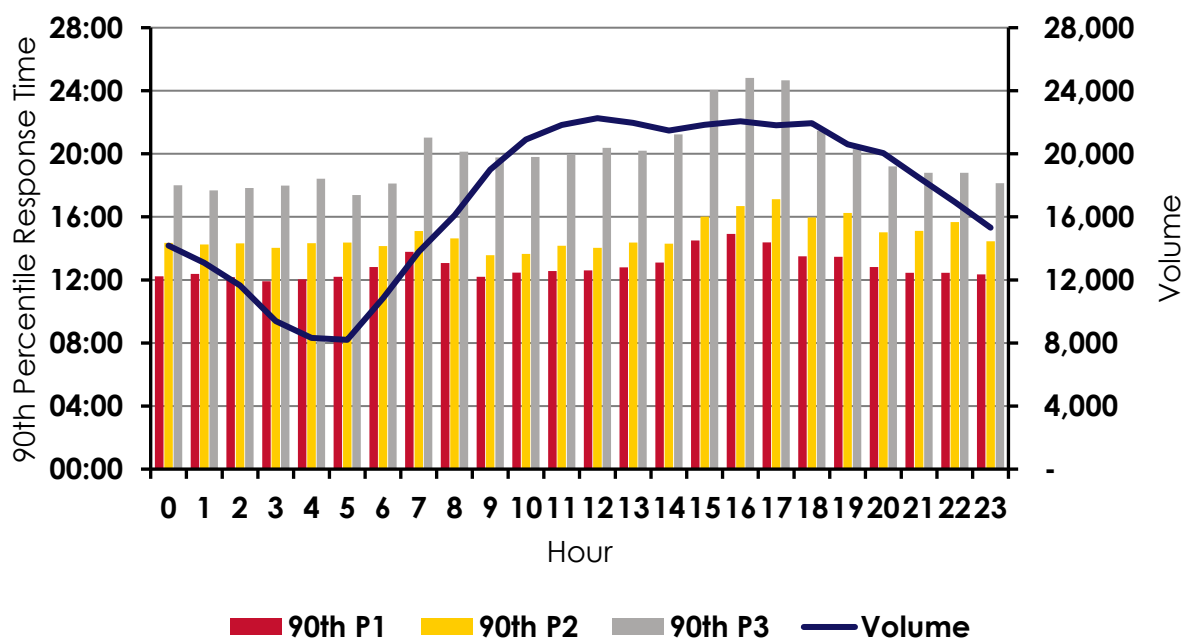
There are 11 fire stations with ambulances co-located. These locations provide good overall drivetime coverage for the 11- and 14-minute cutoff points. The following figure is the 0 to 11 and 11 to 14-minute drivetime models.

Figure 43: Central Zone 8- & 10-Minute Drive Time



Ambulance response times fluctuate throughout the day. Priority 1 and priority 2 incident response times extend slightly around what might be considered higher traffic times, 7:00 AM to 8:00 AM and 3:00 PM to 6:00 PM. Response times to priority 3 incidents are within the standard but increase from 3:00 PM to 6:00 PM. Volume more than doubles between 5:00 AM and 10:00 AM. In addition, volumes remain elevated longer in this zone than in the others. The following figure shows each priority first due ambulance time by hour with an incident volume line for reference.

Figure 44: Central Hourly Ambulance First Due Performance (JUL 2018–AUG 2023)



Ambulance usage in the Central Zone is the most intense. The minimum number of ambulance responses is five an hour, with a maximum of 14. The following figure shows the September 2022 through August 2023 average ambulance responses by hour and day.

Figure 45: Central Zone Average Ambulance Responses by Hour (SEP 2022–AUG 2023)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
0–1	7	7	7	7	8	11	10
1–2	7	7	6	8	8	10	10
2–3	6	6	6	6	6	9	10
3–4	5	5	5	6	5	7	7
4–5	5	5	6	5	5	5	6
5–6	5	5	5	5	5	5	5
6–7	7	6	7	7	7	6	6
7–8	9	9	8	9	8	8	8
8–9	10	10	9	9	9	8	8
9–10	11	11	11	12	11	10	10
10–11	12	12	12	12	11	11	10
11–12	13	12	13	13	12	11	10
12–13	14	12	13	12	12	13	11
13–14	12	12	13	12	13	11	11
14–15	12	12	12	14	12	11	11
15–16	11	12	13	12	12	11	12
16–17	12	12	12	13	11	12	11
17–18	12	12	12	12	11	12	11
18–19	11	11	12	13	12	13	13
19–20	11	11	11	11	12	11	11
20–21	10	11	11	12	12	11	11
21–22	10	11	10	11	11	12	10
22–23	9	9	10	9	10	11	10
23–24	8	8	8	8	11	10	9

Color	Incidents
	14
	12-13
	11
	9-10
	7-8
	5-6

This zone's average unit commit time is 55 minutes, and the assumed ToT is 55%. This can be utilized in the estimation methodology mentioned earlier in this section to create an ambulance need. It should be noted that this estimation is for illustrative purposes only, as each zone works in conjunction with other zones, and ambulances from different emergency response zones may provide coverage or assistance in the Central Zone. The following figure estimates the units needed to provide adequate coverage in this zone.

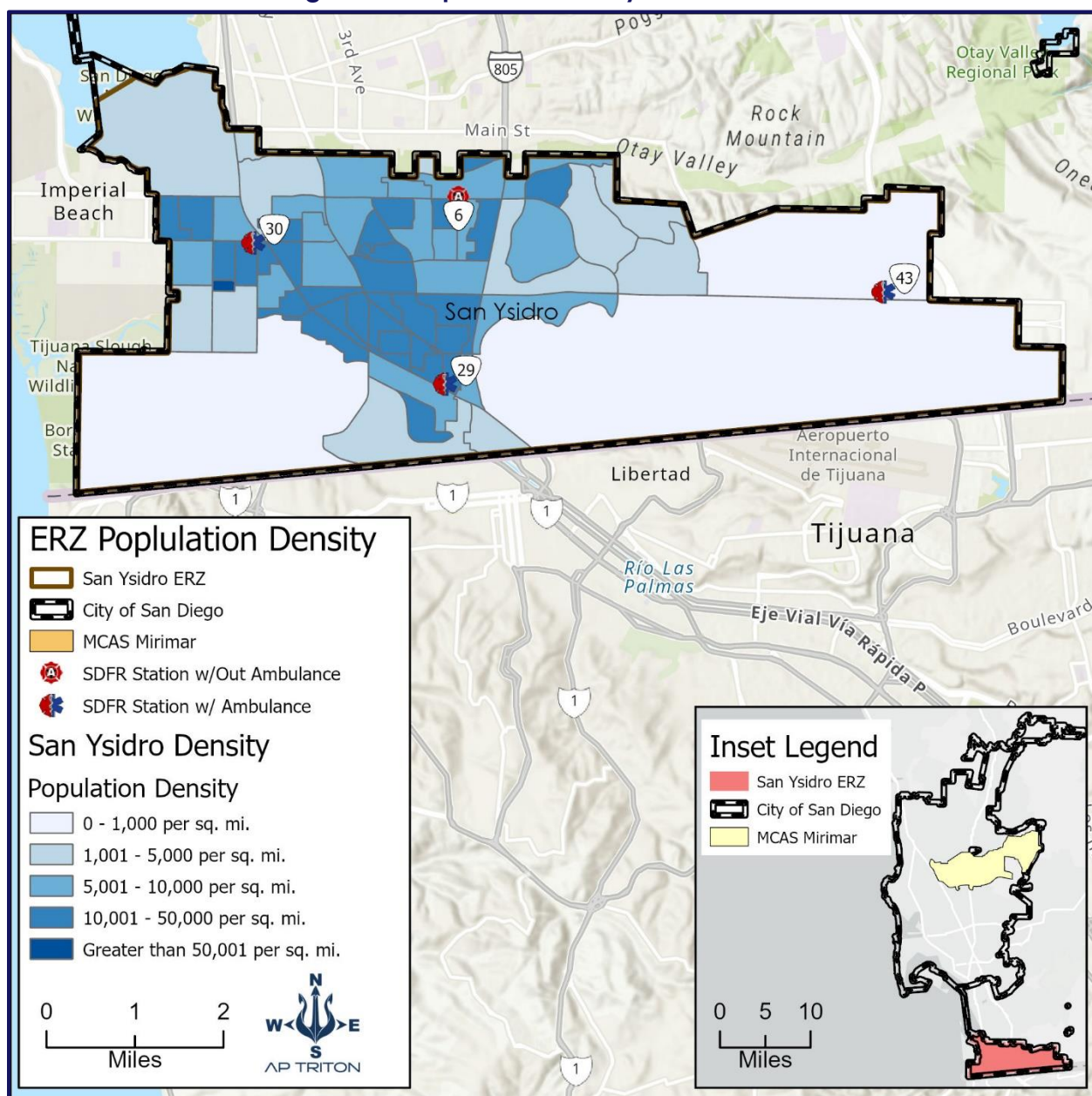
Figure 46: Central Zone Ambulances Needed

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Units
0-1	13	13	13	13	15	21	19		25-26
1-2	13	13	12	15	15	19	19		23-24
2-3	12	12	12	12	12	17	19		20-22
3-4	10	10	10	12	10	13	13		17-19
4-5	10	10	12	10	10	10	12		14-16
5-6	10	10	10	10	10	10	10		10-13
6-7	13	12	13	13	13	12	12		
7-8	17	17	15	17	15	15	15		
8-9	19	19	17	17	17	15	15		
9-10	21	21	21	23	21	19	19		
10-11	23	23	23	23	21	21	19		
11-12	25	23	25	25	23	21	19		
12-13	26	23	25	23	23	25	21		
13-14	23	23	25	23	25	21	21		
14-15	23	23	23	26	23	21	21		
15-16	21	23	25	23	23	21	23		
16-17	23	23	23	25	21	23	21		
17-18	23	23	23	23	21	23	21		
18-19	21	21	23	25	23	25	25		
19-20	21	21	21	21	23	21	21		
20-21	19	21	21	23	23	21	21		
21-22	19	21	19	21	21	23	19		
22-23	17	17	19	17	19	21	19		
23-24	15	15	15	15	21	19	17		

Southern (San Ysidro) Emergency Response Zone

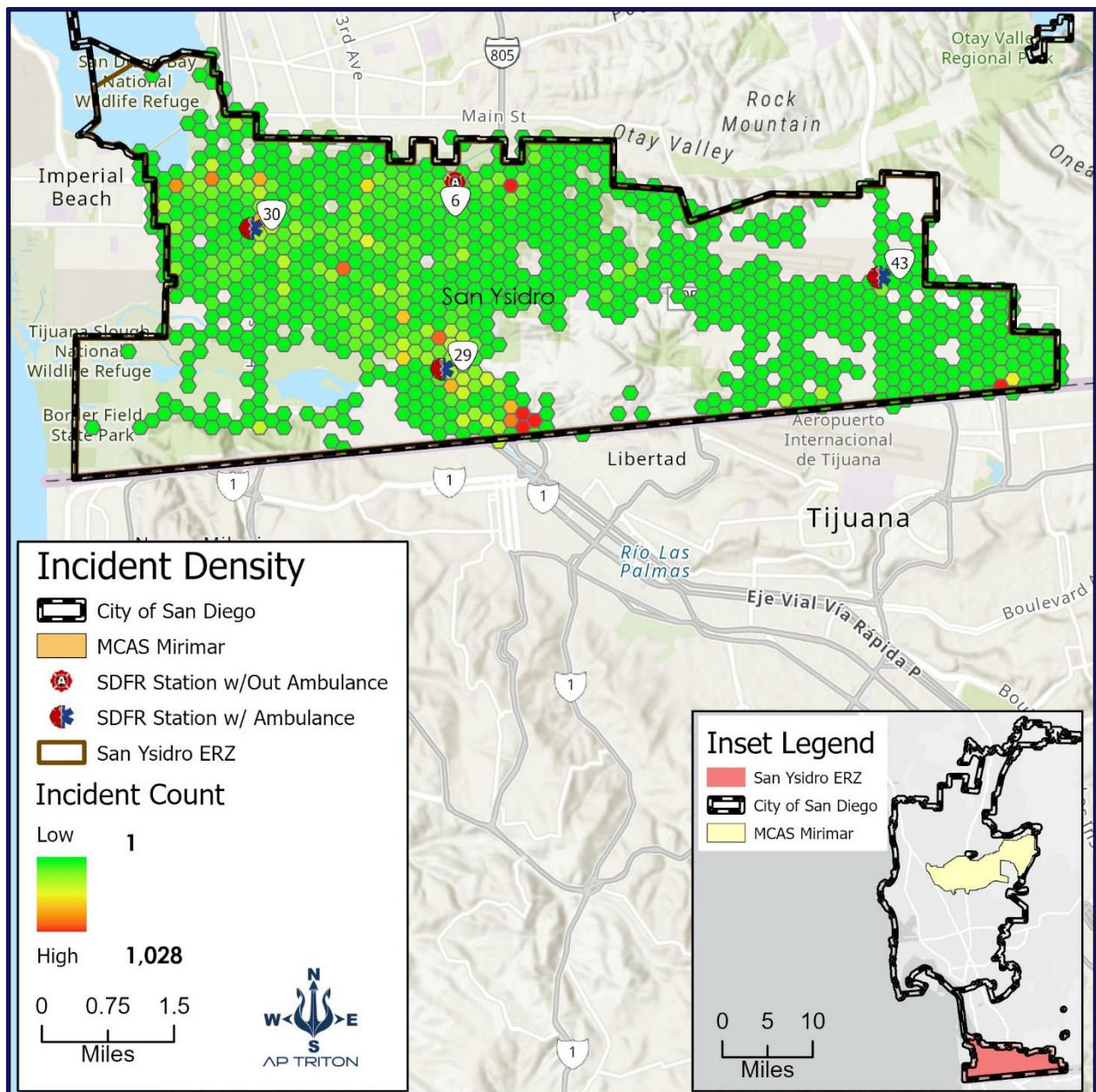
The Southern Response Zone is located approximately five miles south of the Central Zone and does not border any other emergency response zones. It is bounded by the City's border. It is the least densely populated zone with the least intense incident volume. The zone contains the Brown Field Municipal Airport and extended industrial areas. The zone includes large undeveloped areas, the Tijuana River County Open Space Preserve, Furby North County Preserve, Beyer Park, and Otay Mitigation Site. The following is the population density focused on the Southern Zone.

Figure 47: Population Density Southern Zone



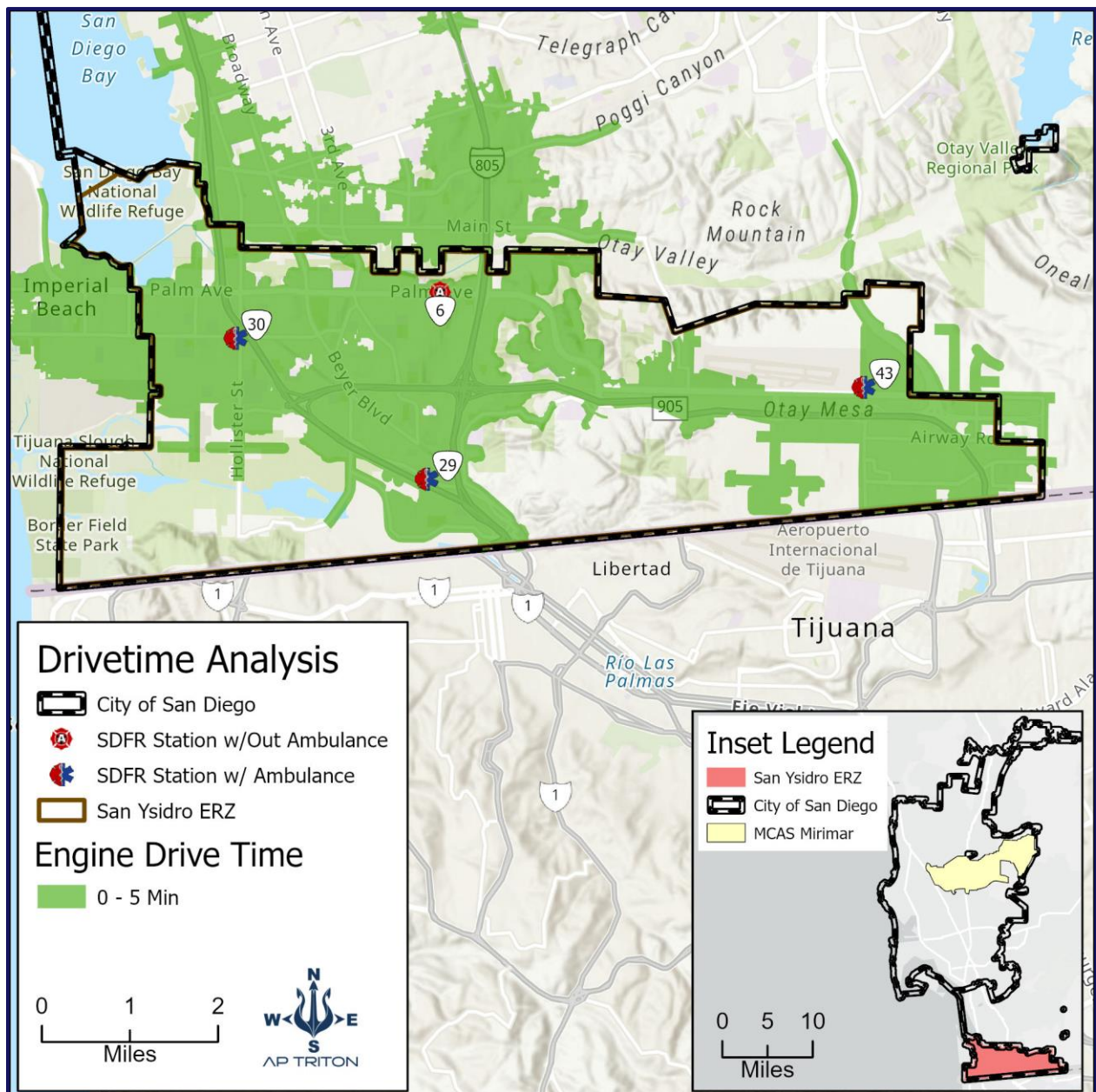
Incidents are spread throughout the Southern Zone. There are pockets of higher density scattered in a few locations. However, they are most concentrated near the Otay and San Ysidro border crossings. An additional hot spot focuses on the Kaiser facilities near Highway 805 and Palm Avenue. The following figure shows the incident density identified for the Inland Zone.

Figure 48: Incident Density Southern Zone



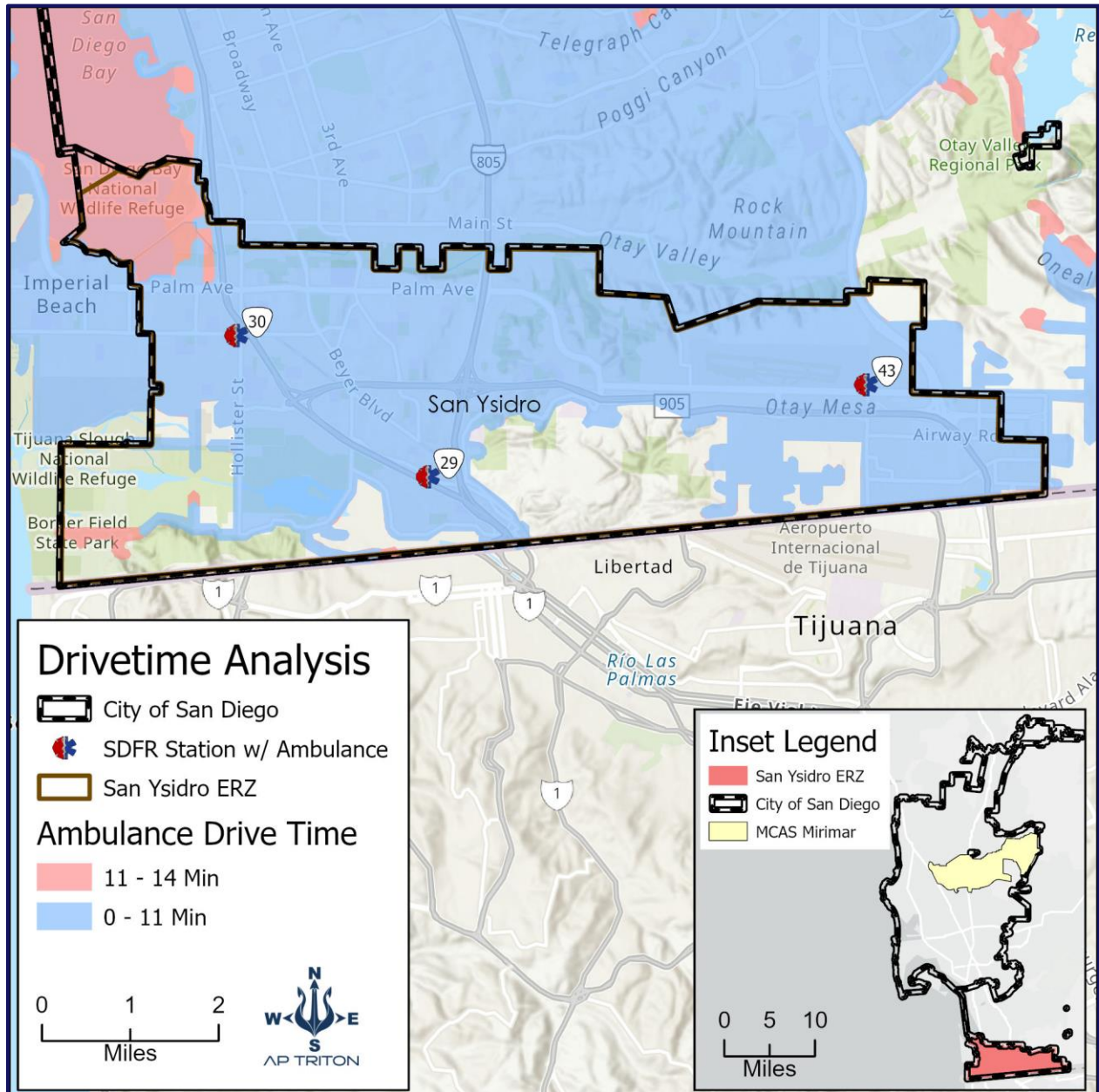
There are four fire stations within the Southern Zone. Overall, the 0 to 5-minute drive time coverage meets the zone's built-up area needs. However, there are no adjacent SDFD stations to this zone, and the closest stations appear to be the Chula Vista and Imperial Beach fire departments. The following figure shows the 5-minute drive time, the fire department's first due arrival goal, in the Southern Zone for stations within the zone.

Figure 49: Southern Zone 5-Minute Drive Time



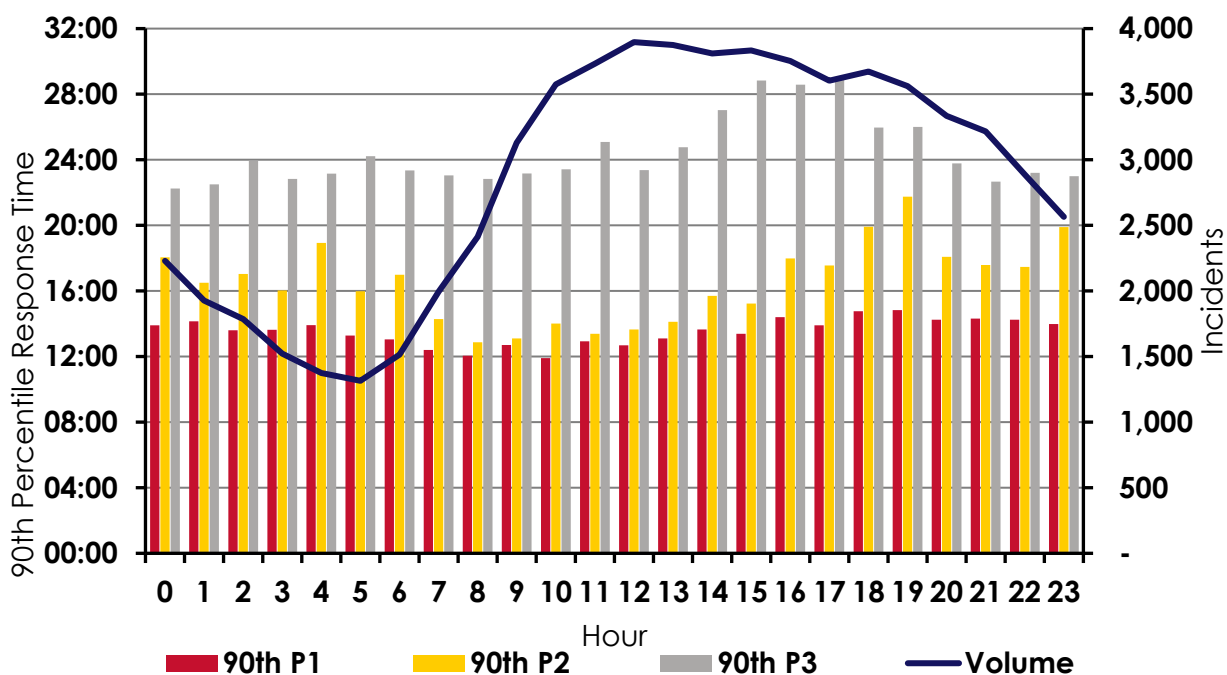
There are three fire stations with ambulances co-located. These locations provide good overall drivetime coverage for the 11- and 14-minute cutoff points. The following figure is the 0 to 11 and 11 to 14-minute drivetime models.

Figure 50: Southern Zone 8- & 10-Minute Drive Time



Ambulance response times fluctuate throughout the day. Priority 1 incidents remain between 12 and 15 minutes 90% of the time or faster throughout the day. There is a marked increase in priority 2 and 3 responses between 4:00 and 6:00 PM. This zone is the only one with priority 3 incident response standards not consistently met. Volume more than doubles between 5:00 AM and noon. The following figure shows each priority first due ambulance time by hour with an incident volume line for reference.

Figure 51: Southern Zone Hourly Ambulance First Due Performance (JUL 2018–AUG 2023)



Ambulance usage in the Southern Zone is the lowest throughout the city. The minimum number of ambulance responses is one an hour, with a maximum of three, and there were no hours within the analysis dates when an ambulance was not needed. The following figure shows the September 2022 through August 2023 average ambulance responses by hour and day.

Figure 52: Southern Zone Average Ambulance Responses by Hour (SEP 2022–AUG 2023)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Color	Incidents
0–1	2	4	2	2	2	2	4		5–6
1–2	2	2	2	2	2	2	4		3–4
2–3	2	2	2	2	2	2	2		1–2
3–4	2	2	2	2	2	2	2		
4–5	2	2	2	2	2	2	2		
5–6	2	2	2	2	2	2	2		
6–7	2	2	2	2	2	2	2		
7–8	2	2	2	4	2	4	2		
8–9	4	4	2	4	2	2	2		
9–10	4	4	4	4	4	4	2		
10–11	4	4	4	4	4	4	4		
11–12	4	4	4	4	4	4	4		
12–13	4	4	4	6	4	4	4		
13–14	4	6	4	6	4	4	4		
14–15	4	6	6	4	4	4	4		
15–16	4	4	6	4	6	6	4		
16–17	4	4	4	4	4	4	4		
17–18	4	4	4	4	4	4	4		
18–19	4	6	4	4	4	4	4		
19–20	4	4	4	4	4	4	4		
20–21	4	4	4	4	4	4	4		
21–22	4	4	4	4	4	4	4		
22–23	4	4	2	4	4	4	4		
23–24	2	4	2	2	4	4	2		

This zone's average unit commit time is 61 minutes, and the assumed ToT is 55%. This can be utilized in the estimation methodology mentioned earlier in this section to create an ambulance need. This zone's ambulance needs are more likely to reflect actual needs, as it is more difficult for the other zones to support the Southern Zone. The following figure estimates the units needed to provide adequate coverage in this zone.

Figure 53: Southern Zone Ambulances Needed

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
0-1	2	4	2	2	2	2	4
1-2	2	2	2	2	2	2	4
2-3	2	2	2	2	2	2	2
3-4	2	2	2	2	2	2	2
4-5	2	2	2	2	2	2	2
5-6	2	2	2	2	2	2	2
6-7	2	2	2	2	2	2	2
7-8	2	2	2	4	2	4	2
8-9	4	4	2	4	2	2	2
9-10	4	4	4	4	4	4	2
10-11	4	4	4	4	4	4	4
11-12	4	4	4	4	4	4	4
12-13	4	4	4	6	4	4	4
13-14	4	6	4	6	4	4	4
14-15	4	6	6	4	4	4	4
15-16	4	4	6	4	6	6	4
16-17	4	4	4	4	4	4	4
17-18	4	4	4	4	4	4	4
18-19	4	6	4	4	4	4	4
19-20	4	4	4	4	4	4	4
20-21	4	4	4	4	4	4	4
21-22	4	4	4	4	4	4	4
22-23	4	4	2	4	4	4	4
23-24	2	4	2	2	4	4	2

Color	Units
	6
	4-5
	2-3

Population Growth Projections & Future Service Demand

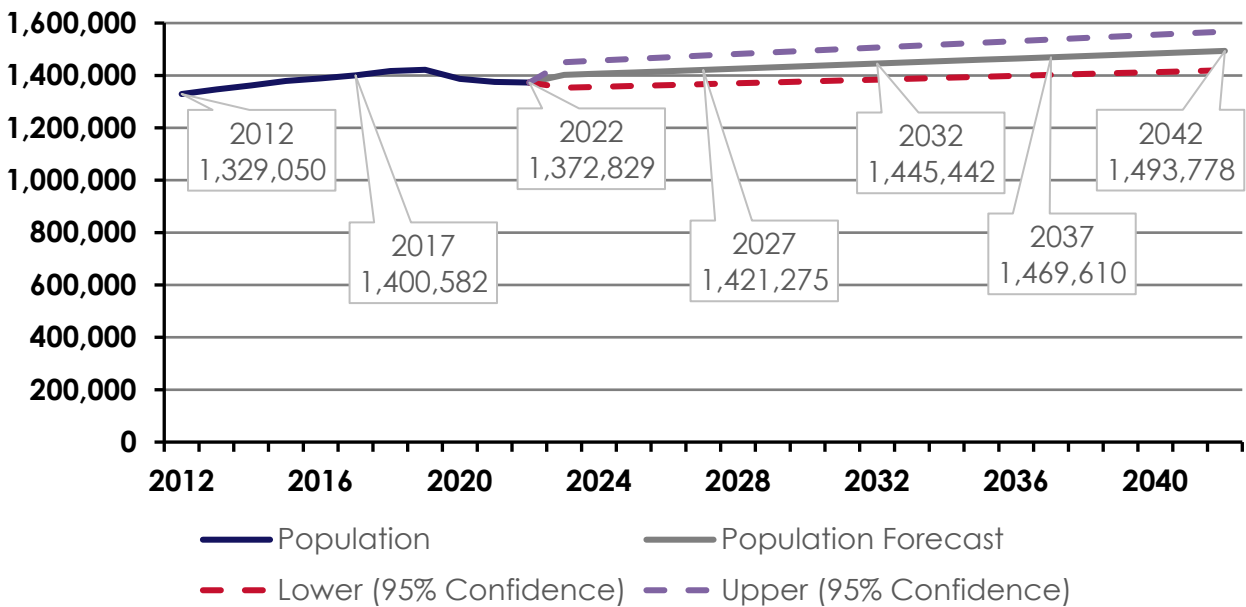
Service demand is generally driven by population. Without people, there is very little need for emergency services. However, the relationship between general population, population density, population growth, and demographic distribution is poorly understood. Therefore, this analysis provides information for leadership to determine appropriate resources and distribution.

Population Growth

Estimating the population is challenging for most statisticians, and most forecasting models have significant variability. For example, the US Census Bureau's population estimate for 2017, as reported by the City's economic development website, was 1,419,516.⁷ At the same time, the California Department of Finance (CADOFF) estimated the population at 1,400,582 in 2017 and 1,416,959 in 2018.⁸ The only conclusion for the 2017 population is somewhere near 1.4 million people. With such variability in the current population estimates, it is no wonder that population forecasting is complicated.

The population estimate for 2020 from the City's economic development site was 1.54 million.⁹ However, the US Census decennial count was only 1,386,960, with an annual community survey in 2022 of 1,381,162, a reduction of 0.4%.¹⁰ The CADOFF used the US Census numbers for 2020 but estimated a population of 1,372,829.¹¹ Another agency that applies forecasting models is the San Diego Association of Governments (SANDAG). Admittedly, SANDAG's methods are more robust than AP Triton's. However, they also started with a base population for 2016 that was higher than the US Census and CADOFF. This analysis also does not account for the population reductions reported by the US Census in 2020. It may show a much higher forecast estimate as a result.

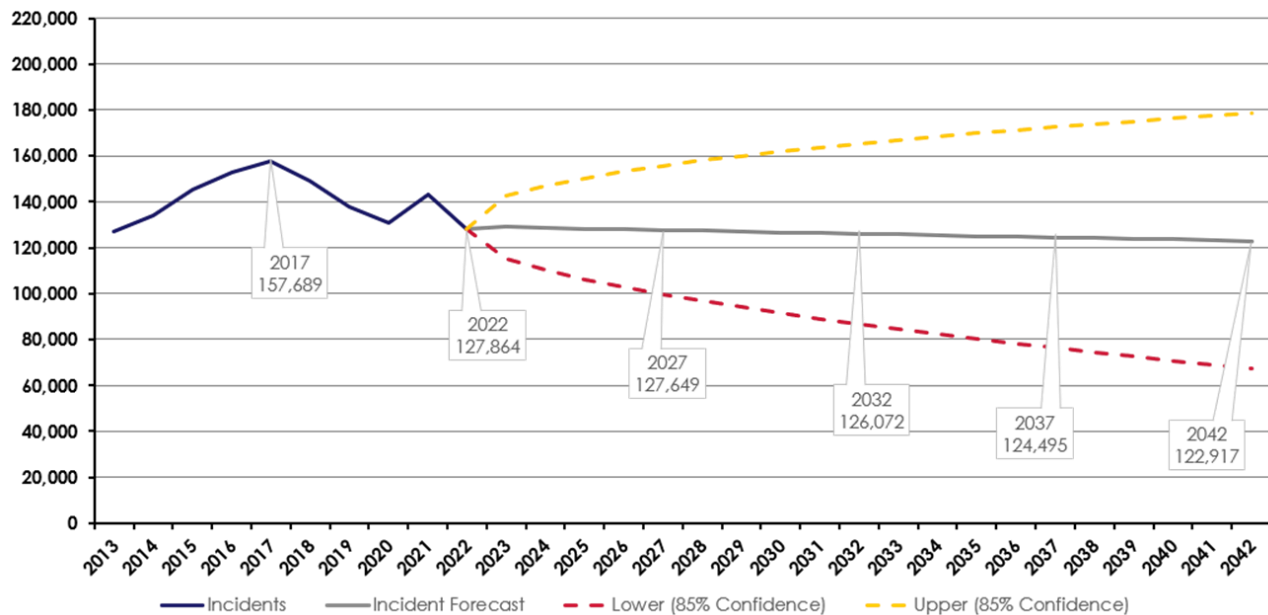
AP Triton used several regression analysis methodologies using the 10 years of data available from the CADOFF. The model that returned the best fit appeared to be a linear analysis with exponential smoothing for time series (ETS forecast). The following figure shows the population estimate until 2042 using this model and the CADOFF estimates. The upper confidence band closely follows the SANDAG estimates.

Figure 54: Population History 2012–2022 & Forecast Estimate to 2042

SDFD Incident Forecast

The San Diego Fire-Rescue Department provided AP Triton with a count of incidents from 2013 through 2022. These incident counts are for those incidents the department responded to. While this information is likely an accurate representation of response volume, the data provided challenges with a forecasting model. Several models were attempted, including logarithmic, 2- and 3-factor polynomial, linear, and exponential regressions. None of the models produced a very reliable result. The model's reliability is measured using the R^2 methodology, where a 1 indicates a perfect historical fit for the data. Typical incident data will return an R^2 value of between 0.7 and 0.9. However, none of the models run on the SDFD returned a reliability higher than 0.18, and most were below 0.1, indicating an inferior fit.

The reason for this analysis difficulty is the high variability in the data points. The data shows a 30 thousand incident increase in incidents, or almost 20%, from 2013 to 2017 and a similar decrease from 2017 to 2022. This makes for a 40% swing in the data and again makes forecasting difficult. After the traditional models failed to return good results, a similar model of population growth was used. However, the confidence bands of this data were reduced to 85% to indicate a more reasonable swing in data. The following figure shows the SDFD estimated incident response forecast from 2023 through 2042 based on historical data from 2012 through 2022.

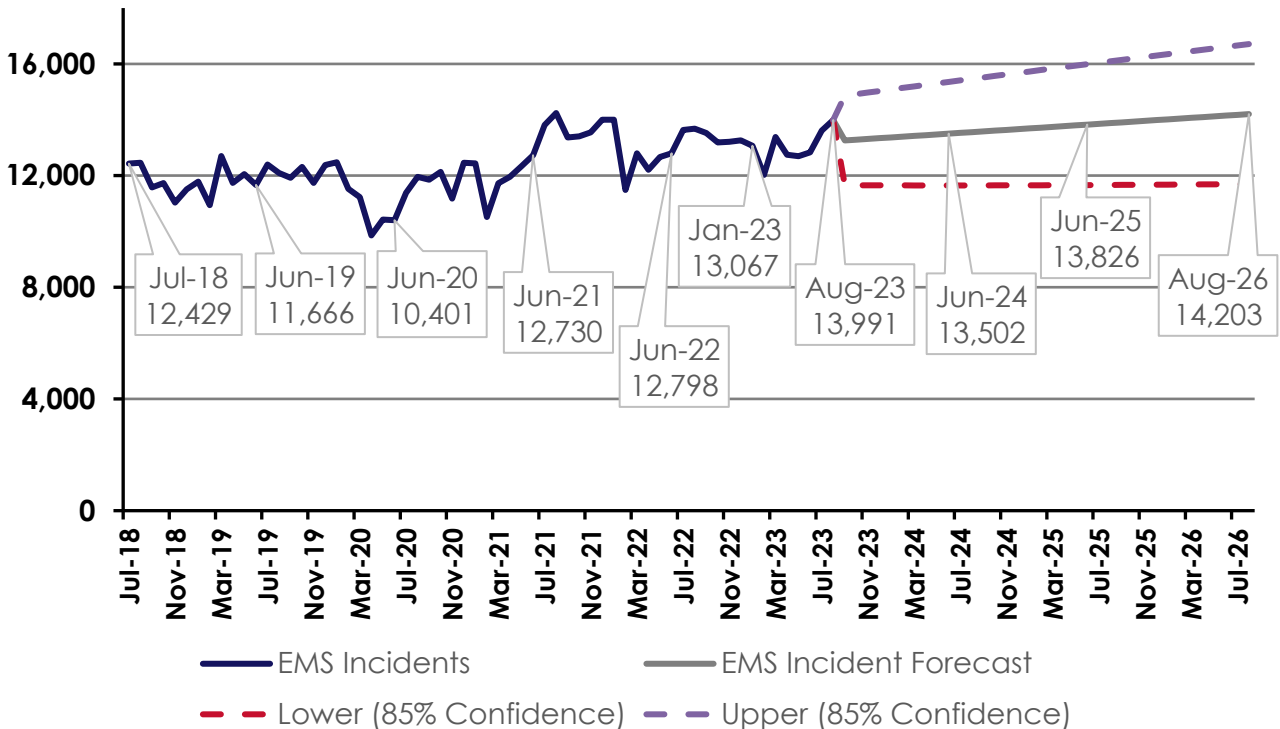
Figure 55: San Diego Fire-Rescue Incident Growth Forecast

While this is informative for the contracting agency, it does not necessarily show the estimated medical incidents. The fire department does not respond to all medical incidents within the City. That information was found in the dispatch data provided.

EMS System Growth Forecast

This report's computer-aided dispatch (CAD) data was between July 2018 and August 2023. With such a small sample of data, an annual evaluation did not provide any insight. However, by evaluating the volume by month and only those incidents that were classified as EMS with a priority by dispatch, a reasonable 30-month forecast could be made. The following figure shows the EMS incidents within the City of San Diego response area (excluding the military base) by month forecast to August 2026.

Figure 56: EMS Monthly Incident Forecast



Unlike the overall fire department responses, EMS incidents are expected to continue to increase. By the end of 2025, ambulance incident demand should be between 11,600 and 16,300 a month.

Summary

The response data shows a very busy system and that the current provider struggled to meet staffing and response time performance targets, especially through the COVID-19 pandemic. There does appear to be improvement beginning in mid-2023. Past challenges are detailed in AP Triton's phase 1 report dated February 2023 and our ongoing system monitoring reports. The purpose of this report is to look forward and build a response model that can meet the needs and expectations of the community.

Figure 14 shows the total units needed to meet the identified requirements for each hour of the week. This figure identifies that the minimum unit hours are between 765 and 798 per day. However, we cannot staff for every single hour of the day, so staffing must be smoothed to meet the highest need at peak times and go as low as possible during slow times. This process results in AP Triton recommending an average of 1,008-unit hours per day. This is the full system need and includes both ALS and BLS hours.

Section II:

EMS Cost/Revenue Analysis

Costs of the System

Determine the Number of Unit Hours Needed

Determining the unit hours needed in the system is a major step in determining the cost of providing the service to that system. As described in Section I, the total unit hours are derived from taking a detailed look at the current system, analyzing the time on task of all the resources, travel times, detailed analysis of GIS data, additional needs for specific areas of the City, and availability of resources. AP Triton took the raw data from San Diego and completed an analysis using an advanced modeling program to determine the system's needs. This model, along with the experience of previous deployments, will give San Diego the information needed to make appropriate decisions on future deployments.

Time on Task (ToT)

As described earlier, understanding what ToT looks like at the field level is the first step to developing a system that meets the demands of the San Diego workforce. Allowing enough time for essential day-to-day operations is critical when managing a transport system. The private industry utilizes a system of status management that heavily emphasizes making enough units available to service the demand of the emergency system. This is crucial to reduce the potential response times for critical and non-critical calls. A solid and realistic deployment model will allow San Diego to utilize its resources without burdening the personnel.

Many agencies use some of these terms with different meanings, for the purpose of this report, ToT is the total time an ambulance crew is committed to an incident. To determine the needed unit hours, we subtract the essential daily operations time to determine the time available to handle incidents. This number is multiplied by the time needed each hour of the day for incidents and then dividing it by the ToT estimation. The following figure is a chart describing how a ToT is developed. In this example, the crew working a 24-hour unit has about 14 hours per day of essential duties. This considers all the non-emergency things that a crew must do each day, including unit/equipment check-outs, food breaks, fitness/training, and sleep. That leaves the unit 10 hours or 42% (0.42) of the day to handle emergency calls. The total committed time should never exceed 90% for the health and wellbeing of the employees. This example is how a desired ToT is determined. Each system's needs can be different, the table below describes a methodology to account for the items taken into consideration for the ToT used. During the modeling section of this report, different ToT percentages will be used depending on whether the model is staffing Firefighters or Single-Role personnel.

Figure 57: Figure 1: Determining Adequate ToT 24/12-hours

Daily Operations	Count	Count
Hours in the shift	24 Hours	12 Hours
Unit/Equipment Maintenance	1.0	0.5
Food Breaks	2	2
Fitness/Training	3	1
Sleep	6	0
Other	0	0
Wall Time (APOT)	2	1.5
Hours Used in Normal Day	14.0	5.0
Standing Time Commitment	0.58	0.42
Maximum Recommended ToT	0.42	0.58
Standard ToT		
Firefighter Ambulance	0.33–0.42	0.40–0.55
Single Role or Private	0.45–0.55	0.50–0.70

Current System Deployment and Unit Hours

The current ambulance provider completed a thorough system analysis in 2021 and determined system needs. The units are distributed in the four zones: Central, Coastal, Inland, and Southern. Over the course of the contract and transition to a Unit Hour model, the distribution of units has changed slightly. Below is the current distribution of resources:

Metro Zone

M01, M02, M03, M04, M05, M06, M07, M08, M10, M11, M12, M15, M17, M18, M19, M20, M22, M23, M28, M32, M34, M51, BLS02, BLS03, BLS04, BLS05, BLS06, BLS07, BLS10, BLS31, Sup 73

Coastal Zone

M09, M21, M236, M24, M35, M36, M41, M50, Sup 72

Inland

M244, M31, M33, M37, M38, M39, M40, M42, M44, BLS01, Sup 71

San Ysidro

M30, M43, M29, M243, M229, BLS29, Sup 74

The current deployment also consists of 72 hours of ALS coverage from American Medical Response (AMR) to supplement the coverage. This total deployment results in 924-unit hours per day, with the current contract requiring between 972 and 1,008 per day. As detailed in the Phase 1 report of this project, the current provider has struggled to meet this deployment, especially through the COVID-19 pandemic. AP Triton believes that when fully staffed, this deployment meets the City's goals through the 2024 incident volume.

Needed Unit Hours

To meet the City's expectations while prioritizing the well-being of the workforce, AP Triton has developed a deployment plan for 2024 using all available data. This plan is centered around anticipated call and transport volumes. Specifically, it heavily relies on a 24-hour ambulance deployment and a total unit hour deployment of 888 ALS hours daily, based on the annual Time on Task. However, it's important to note that this deployment plan does not cover all aspects comprehensively, nor does it delve deeply into the comparison between 24-hour and 12-hour staffing deployments. The current plan incorporates both 24-hour and 12-hour units, strategically deploying peak activity units during the busiest times of the day. As San Diego progresses, both these deployment methods should be thoroughly evaluated. The figure below illustrates the expected ambulance requirements of the system based on the modeling.

Figure 58: 2024 Predicted Ambulance Needs

ERZ	2024 Predicted Call Volume	2024 Predicted Transport Volume	Minimum 24hr. Ambulance Needs	Current 24hr. Ambulance Staffing	Current 12hr. Ambulance Staffing
Central	94,572	63,840	21 Ambulances	11 Ambulances	9 Ambulances
Coastal	27,494	18,256	6 Ambulances	7 Ambulances	1 Ambulance
Inland	27,825	18,480	6 Ambulances	7 Ambulances	1 Ambulance
Southern	15,734	11,424	4 Ambulances	3 Ambulance	4 Ambulances
TOTAL	165,625	112,000	37 Ambulances	28 Ambulances	15 Ambulances
TOTAL UNIT HOUR DEPLOYMENT			888 Hours	672 Hours	180 Hours

In a system as vast and intricate as San Diego, addressing additional staffing requirements is crucial. This includes implementing 12-hour peak staffing units to act as surge protection and accommodate the daily and hourly fluctuations in call volumes. Presently, this deployment is executed using Basic Life Support (BLS) units to match the current demands. These units are presently allocated across various day and night shifts, operating in a BLS configuration akin to the existing deployment. As San Diego administers the system under the Alliance model, it must meticulously assess the system's needs for potential future modifications. The analysis conducted by AP Triton does not distinguish between ALS/BLS unit hours, as there are far too many changing variables to identify in this report. The following figure delineates the additional units necessary for comprehensive coverage within the system.

Figure 59: 2024 Predicted Ambulance Partial Shift Needed

ERZ	2024 Call Volume	2024 Transport Volume	Minimum 12hr. Ambulance Needs	Current 12hr. Ambulance Staffing
Central	94,572	63,840	5 Ambulances	8 Ambulances
Coastal	27,494	18,256	2 Ambulances	0 Ambulances
Inland	27,825	18,480	2 Ambulances	1 Ambulances
Southern	15,734	11,424	1 Ambulance	1 Ambulances
TOTAL	165,625	112,000	10 Ambulances	10 Ambulances
TOTAL UNIT HOUR DEPLOYMENT			120 Hours	120 Hours

This model is built on more 24-hour units than the current deployment and depending on the use of 12-hour or 24-hour shifts to staff these units, the ToT may have to be adjusted as described in the ToT section. The predictive value of the models sets up a structure that allows for fluctuations in the field. However, a thorough understanding of ambulance movements and call volume will need to occur continuously in a system the size of San Diego.

The 2024 predicted deployment puts 1,008 ambulance hours in the system daily. For consistency, the deployment is broken down to 888 daily ALS Unit Hours and 120 BLS hours for the deployment. While this is very close to the current deployment plan, the current provider has struggled to meet their response times consistently. As call volumes increase and types of calls fluctuate, the ALS/BLS ratio might need to be adjusted. The continuation of Mobile Integrated Health (MIH) components in San Diego may impact the number of ambulance transports in the system, this must be accounted for in future deployment plans. A comprehensive move-up and cover strategy must be maintained, and the system must be reevaluated regularly.

Determining the Costs of the System

Knowing the number of ambulances needed to meet the needs of the system allows the costs to be determined. The full cost of the system is detailed in Section III for each model outlined. This includes personnel, administration, overhead, and indirect costs for each model. Costs will vary widely depending on the type of staffing used, but the unit hours will remain very similar. If applicable, start-up costs for each model are also shown.

Billing Services

There are two choices for ambulance billing: in-house or contracted out. AP Triton recommends that San Diego utilize a contracted model. Currently, the standard rate charged in California is 3%–4% of net collections. Using that percentage with the projected cost recovery in the system puts an additional cost for running the system of \$3.6–\$4.0 million per year.

Cost Recovery

Cost Recovery

AP Triton has completed a cost recovery analysis for San Diego over multiple studies, and the projected recovery has continued to increase with reimbursement from various payer mixes and an increase in the average cost per transport established in October 2023.

The recovery of costs in an EMS and ambulance transport system is not complicated. There are well-developed costs for providing the services that most fire departments have provided for decades. Things like a First Responder program and, more recently, the Federal Public Provider Ground Emergency Medical Transport (PP-GEMT) program have allowed public agencies in California and other states to start to recover some of the costs of providing Pre-Hospital Emergency Medical Services (PHEMS).

Cost Recovery Strategies

The City-contracted ambulance provider transports all patients to the hospital and performed billing up to October 1, 2023, when the City changed to a subcontracting model and started billing. This practice is standard in many counties and allows the City to recoup some pass-through service costs. San Diego Fire-Rescue Department responds to all EMS

rescue responses and higher-level medical aid incidents in the City. Still, the response receives no cost recovery if patients are not transported. All patients that are transported receive a bill, and there is a net collection, usually based on the specific payer mix.



This practice of only receiving fees when transport services have been provided is only encountered in the PHEMS system. Imagine going to a doctor's appointment and only paying if the doctor prescribed a medication or performed a procedure; that would be an unsustainable system. Healthcare generally reimburses at the licensure level of the practitioner providing the service. When a physician sees a patient in the emergency department, the charge is based on the medical doctor's (MD) rates. The same applies to nurse practitioners (NP), as those charges are based on NP rates. When an MD has evaluated a patient, and the patient's condition has been determined not to need the services of an MD, that patient may be handed off to an NP for treatment. However, the MD is reimbursed at the MD rate, not the NP rate.

This scenario is nearly identical to the EMS system. The Fire Department responds to all rescues and higher-level EMS incidents. Upon arrival, the patient is assessed by firefighters at the ALS (Paramedic) level. Firefighters can determine if ALS intervention is needed, and if so, the paramedic provides ALS care utilizing an emergency ambulance for transport. If the paramedics assessed the patient and determined not to need ALS intervention, in that case, the patient would still receive a BLS/ALS level of assessment, and the City of San Diego would still incur the cost of providing that service. However, it would only be reimbursed at the BLS rate if the patient is transported. The result is that the cost of sending ALS first response services is incurred regardless of the patient's condition, but no expenses or costs are reimbursed to the City.

As stated above, the actual cost of providing PHEMS can be prohibitive, and in nearly all cases, the City will never recover the cost of PHEMS on a fee-for-service basis. In the most straightforward methodology, we can divide the City's EMS budget by the total number of EMS incidents, transport, and non-transport to arrive at an actual per-incident cost. This is important because, with Proposition 26, we must ensure service rates are based on actual costs.¹² If a first response rate structure is established in the City, the cost should be based on estimated costs for providing ALS coverage.

Funding

Funding for an Emergency Transport system is dependent on the transportation of patients, as discussed. That funding is based on seven factors: Billing Policy, Collection Policy, Transport Rates, Documentation, Biller's Level of Effort, Payer Mix, and Number of Transports.

Billing Policy

A billing policy is integral for a provider to get the most monetary value from the system. When a service is provided, there is an assumption that there will be a charge. Numerous factors will determine what is included in the patient billing policy—the more aggressive the billing policy, the more potential to collect the highest revenues. There are, however, areas with a fixed monetary rate attached, which will create a fixed reimbursement cap on the maximum potential collection of transport receivables available within the system.

For the most part, there will be a set number of calls for service in any given period. Unilaterally adding ambulances to a given system, with disregard to demand justification, does not equate to being able to make more calls. The presumption that “transporting more patients means accumulating more revenue” is far from the truth. Another falsehood is that all the patients who request to be transported or whose medical condition requires it will be transported. This unfortunate assumption can often lead to revenue shortfalls and avoidable staff reductions.

Call volumes will fluctuate, but significant or seasonal changes in call volume are somewhat predictable. Calculated deployment levels should be based on historical facts, not assumptions. Call volume dictates deployment capacity, not revenue goals. The closer you adhere to quantitative and proven research, the less financial risk and consequence a community needs to regard.

Collection Policy

The collection policy significantly affects the cost recovery. Federal regulations that control billing require that every patient receive a bill for services rendered to prevent what is known as “cherry picking,” where only specific groups of patients are billed. More specifically, the federal government ensures that not only are those who can pay for the service billed for service, but also that the entire populace who is transported is issued a service invoice or bill to ensure an accurate accounting of the system usage. How aggressive an agency is in collecting those bills is a matter of organizational or business philosophy. Any entity's passive or aggressive approach to collection will innately carry negative or positive consequences depending on whether the entity is private or public.

While most private ambulance companies (and hospitals) have aggressive collection policies, many public ambulance providers' policies are less forceful. This is because private ambulance companies are in the business of generating revenue or profit.

Conversely, public sector-based transport entities carry political considerations and public relations consequences since most patients will also be taxpayers. A simple formula to consider is this: once the collection effort reaches a point where the return in either money or political consequences is less than the monetary gain, the collection process should cease.

As San Diego reviews the options for ambulance services, it must also review the options for billing. Whether the department will use a collections agency could play a role in potential cost recovery.

Transport Rate

Determining the transport rates is a key factor for any provider. Most systems in California are governed by their Local Emergency Management Agency (LEMSA) which sets the maximum rates in their jurisdiction. As a public agency, San Diego is not bound by those rates as the private providers in the system are. San Diego should review the LEMSAs rates but set their rates to create a sustainable system. The following figure shows the current charges approved by San Diego, with increases to cover the next two years. These are estimated average charges including the base rate, average mileage, and supplemental charges.

Figure 60: San Diego Scheduled Rate Increases

Type of Charge	October 2023	July 2024	January 2025
ALS Rate	\$3,164.96	\$3,386.51	\$3,623.56
BLS Rate	\$2,661.78	\$2,848.10	\$3,047.47

The percentage of transports to total responses also directly impacts the transport revenue receivables. Fewer transports result in less revenue. In the private sector, it is in the employees' best interest to maintain an acceptable transport rate since it is directly related to the success of their employer and, subsequently, their employment. When a patient is not transported due to the advice or insistence of the paramedic or Emergency Medical Technician (EMT), revenue loss results from these actions.

For example, if two ambulances in the system facilitate one non-transport for various reasons each shift, this equates to 730 non-transports per year. Using Medicare rates without a co-pay (\$480) results in over \$350,000 per year in lost income. There will always be a percentage of calls that will not result in transport—this is to be expected and can be projected as a percentage of the overall call volume.

Transport cost recovery is a large part of managing an efficient and cost-effective system but is not typically in an organization's core values. The revenue accumulated by transport should be secondary to the responder's sound judgment and trained expertise. The pressures of "wanting" or "not wanting" to transport, based on anything other than health needs, can create public distrust if organizational transparency is questioned.

Documentation

Documentation using an electronic patient care reporting (ePCR) system also significantly affects the collection rate a provider can achieve. Unfortunately, many transport agencies do not prioritize training on proper documentation as forcefully as needed to record patient assessment activities and the treatment paramedics provide accurately.

Appropriate documentation also captures the correct reimbursement rate and supplies used for billing. Reimbursement, mainly through Medicare and Medi-Cal, is based upon the patient's needs and is not reimbursed because a patient desires transport to the hospital. In other words, too many calls that should have been billed for and paid at an ALS rate are often reimbursed at the much lower BLS rate. Accurate documentation can, and often does, result in a substantial increase in revenue where ALS service is already being provided. To illustrate, if only one ePCR per day was properly documented that was otherwise denied due to improper documentation, the provider could realize from \$150,000 to \$300,000 of additional revenue annually. While this may be a relatively small increase compared to the overall revenue collected, this amount alone would cover the cost of at least one full-time paramedic. With the introduction of the electronic patient care report, billing companies can have instant access to patient records, and billing can be streamlined in ways that were not possible 10 years ago.

With an ePCR, paramedics complete and upload patient reports into the system while still in the field. This seamless and timely process enables third-party billers or provider staff to access billing information immediately. Given the importance of documentation, San Diego must utilize and refine its documentation compliance program as the service model is updated and modernized. AP Triton strongly advises the City to consider the importance of maintaining a full-time or part-time position to oversee the administrative responsibilities for all EMS billing activities, including:

- ePCR quality assurance reviews.
- Ensure compliance with billing policies.
- Public Provider-Ground Emergency Transport (PP-GEMT) program.

Biller's Level of Effort

The billing contractor or office plays a significant role in the collection rate. Wittman, LLC is the City of San Diego billing contractor. The billing provider's effort directly correlates to the number of collections received, and for the billing company to perform its job, it depends on several factors—the most significant being the billing policy.

A relaxed or vague billing and collection policy results in less revenue collected. Most billing companies base their fees on a percentage of the amount collected. Suppose the provider has a billing and collection policy for reduced amounts collected. In that case, the biller will likely charge a higher rate to meet its desired profit margin. Wittman has a standard Bill of Work for each of its clients. Understanding their procedures and how they determine how to bill transports is important as San Diego continues to improve and refine their system.

Even though a fixed and finite amount of money is available for San Diego to collect, numerous variables influence a provider's ability to collect that revenue. Establishing policies, training personnel, and closely monitoring the delivery system will invariably yield a higher revenue collection rate.

Payer Mix

Details of the payer mix are included in the Phase 1 report (February 2023) and the Phase 2A report (March 2023). There has been little change to the payer mix recently, but this metric does change over time. Current reimbursements for each of the major payer types are detailed in the following sections. There are other payer types, but their numbers are insignificant.

Medicare

Currently, 40.54% of transports. The maximum allowed reimbursement for Medicare transport is \$648.00. Typical payment is 80% of the allowed reimbursement, or \$518.40, and this amount is used. The remaining \$129.61 can often be billed as a co-pay, and we use a conservative 30% collection rate on that amount. No additional balance billing is allowed. With San Diego's rates, this equals an 18% collection rate on Medicare.

Medi-Cal

Currently, 36.42% of transports. When a public agency is the provider of record by owning or operating the system, they are eligible for additional federal financing. This program is called Public Provider Ground Emergency Medical Transport (PP-GEMT), and the current reimbursement is \$1,065.12, increasing to \$1,158.10 on January 1, 2024. Medi-Cal allows no additional co-pay or balance billing. There is a non-federal share and fees that are currently \$365.00 and will increase to an estimated \$414.92 per transport on January 1, 2024. This net reimbursement is significantly larger than what is available to private providers and is outlined later in this report. The public provider reimbursement amount is used in this report.

Commercial Insurance

Currently, 16.71% of transports. An 80% collection rate for all commercial insurance is used. This includes all co-pays and deductibles.

Private Pay

Currently, 6.33% of transports. A 5% collection rate is used for those with no medical coverage.

Number of Transports

The number of ambulance transports used in this study is our predicted rate of 112,000 per year for 2024. Other than the ratio between responses and transports discussed above, the City has no control over the number of transports.

Additional Federal Financing for Public Providers of Medi-Cal Transports

There are two general ways to receive additional funds from the Federal Government to treat Medi-Cal patients: an Intergovernmental Transfer (IGT) and Certified Public Expenditure (CPE). Both programs require the "Government Provider of Healthcare with Taxing Authority" to show or prove there is a loss for providing the service to a Medi-Cal patient. Standard reimbursement for transporting a Medi-Cal patient is about \$118.00, regardless of the amount charged. These programs allow the transport authority the opportunity to obtain additional cost recovery.

Certified Public Expenditure (CPE)

To participate in a CPE program, the City must prove a loss for providing the service. It proves its loss by providing a written explanation that certifies the loss. The document shows the total loss for providing service divided by the number of Medi-Cal transports. This is like completing a yearly tax return using the "long form." The State then takes the form and submits it to the Federal Government to prove the loss; the Federal government matches those funds up to 50% and then passes them back down to the State. There are fees paid along the route, and everyone takes their share in managing the program. When the transfer and the management are complete, the Provider of Record receives the extra funds. The original GEMT program was a CPE program, and effective January of 2023, this program is no longer in place for public agencies due to the implementation of the Public Provider Ground Emergency Medical Transport Program (PP-GEMT).

Intergovernmental Transfer (IGT)

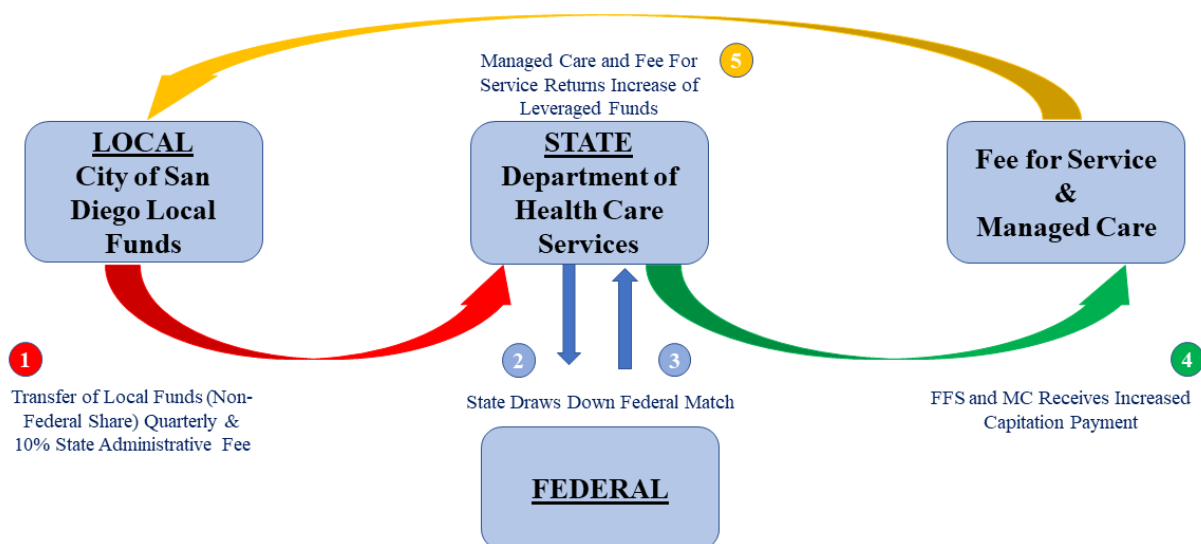
The second type of program to prove the loss of a public agency is an IGT. To participate in an IGT program, the City proves its loss by giving funds to the State. The State takes those funds and draws down matching funds from the Federal Government. There are fees paid along the route, and everyone takes their share in managing the program. When the transfer and the management are complete, the Provider of Record receives the extra funds.

PP-GEMT

Until January of 2023, most public agencies participated in the GEMT and Quality Assurance Fee (QAF) programs to enhance the cost recovery from Medi-Cal patients. In 2016, the initial designers of the GEMT program went to the State to clarify the terms of the program so that fire departments, using EMTs and other first responders on medical aids, could use those personnel in the Certified Cost Reports (CPEs). After years of lobbying, AB1705 was adopted. It took Public Providers (PP) out of the GEMT and QAF programs and put them in a separate program called the Public Provider Ground Emergency Medical Transport (PP-GEMT).¹³ This new program is a hybrid IGT, which took effect on January 1, 2023. The previous CPE reports from all the agencies in the State are used to produce an enhanced fee paid to each agency based on the number of Medi-Cal patients they transport. The enhancement is \$1,065.00, compared to the previous \$339.00 per transport. The program requires a quarterly payment of the non-federal share, about \$330 per Medi-Cal transport, and an additional 10% fee for program management. These numbers are set to increase over the next year with a reimbursement of \$1,158.10 and a payment of \$349.00.

Figure 61: PP-GEMT Program

Program Steps and Cycle



Sustainability of the Program

One aspect of the new program is that all Public Providers receive enhanced reimbursement on their billing of Medi-Cal patients, sometimes increasing their cost recovery by millions per year. Although the program mandates that all agencies receive the enhancement, it cannot mandate the quarterly payments. The program also cannot impact the State's General Fund, so it could be dismantled if agencies fail to pay their share. With several large agencies in the state participating and receiving millions in additional revenue, the incentive to continue the program is substantial. If San Diego chooses a model that allows for transportation billing, the sustainability of the PP-GEMT program will be vital for enhanced cost recovery.

Additional Medi-Cal Revenue for Private Providers

QAF

The QAF is the Quality Assurance Fee collected by The Department of Health Care Services (DHCS).¹⁴ All private providers (public providers do not participate) pay into the fund; they receive an enhanced amount on every Medi-Cal transport. The private provider pays \$34.00 for each transport. The State then pools that money into the Federal Government and draws matching funds. All managers take their share in managing the program and re-distribute the remaining funds back to each provider based on the number of Medi-Cal transports. The enhancement can increase the amount received by \$220.80 per Medi-Cal transport. However, since the fee is paid on all transports, agencies with a low percentage of Medi-Cal transports will see less net revenue.

Medi-Cal Revenue Summary

These four programs fall under a CPE, IGT, or a combination of both. The PP-GEMT program is the current program in place for public agencies and has increased the cost recovery in the system by a significant amount. QAF is the current program for private providers. The following figure shows an estimation of the PP-GEMT enhancement that San Diego could see if they continue to be the provider of records for the transportation system.

Figure 62: PP-GEMT Cost/Cost Recovery Estimations 2024

Provider	Projected Medi-Cal Transports	Potential Total Enhancement	Estimated IGT	Estimated Fee	Cost Recovery
Public	40,790	\$1,065.12	\$330.00*	10%	\$30,355,318
Private	40,790	\$339.00	\$34.00**	N/A	\$9,639,146

Cost Recovery Summary

As detailed, numerous factors impact the value of an EMS system. The monetary value of the system essentially refers to how much revenue can be recognized from the given number of transports in the system. There are no special or secret methods for collecting payment from an EMS system. A fixed amount of money is available to all providers regardless of their public or private status; this is often referred to as the cap. There is some disparity in the revenue collected amongst various providers because of two main areas: billing and collections. Some agencies are better at procuring monies in these areas than others. Often, an agency bases its success on its collection rate. However, this is an inaccurate method for evaluating success since collection rates are just one aspect of the successful management of a system.

As described, the value of San Diego's system is based on several items the City controls and a few items they do not. The City can control and manage the following items dealing with system valuation:

- Billing Policy
- Collection Rate
- Transport Rates
- Documentation
- Billing Collector's Level of Effort

The City does not have control over the main items that make up the total value of the system:

- Number of Transports
- Payer Mix

AP Triton has considered all seven items when determining the system's total valuation. A question commonly asked is, "Can the system's value be changed or increased?" The answer to this question is yes. Maximizing the things San Diego can control can significantly increase the cost recovery available in the system. For example, if San Diego increases the average transport charge in the system by 5%, it could translate into \$2.5 million in additional cost recovery at the end of the year.

Total Cost Recovery Available

Setting the transport rate is critical to setting up any ambulance transport system. San Diego has set a transport rate for the next three years. This rate structure is important as it is part of the valuation of the system. Below are the estimated average transport fees for ALS and BLS transports and corresponding projected cost recovery. The average fees include the base rate, average mileage, and supplemental charges. This projection is before any payments the City will make in the system and assumes a full 12 months of collections with PP-GEMT.

Figure 63: ALS/BLS Rate Structure

Fiscal Year	ALS Rates	BLS Rates	Percent % Increase	Projected Cost Recovery
2023–2024	\$3,164.96	\$2,661.78	—	\$114,283,862
2024–2025	\$3,386.51	\$2,848.10	7%	\$123,490,663
2025–2026	\$3,623.56	\$3,047.47	7%	\$129,329,252

AP Triton encourages the provider of record (San Diego) to continue setting a rate structure that will sustain the designed system. Understanding the payer mix is essential to understand how the rate structure will affect cost recovery.

Additional Fees and Taxes

As discussed in a previous phase of this study, charging the patient for the PHEMS response to all calls is vital to establishing a sustainable system. Setting up additional taxes is not part of this EMS valuation study and would need to be evaluated if San Diego chooses that direction.

Collection Rates

The collection rate is important, but the quality of the collections is more important. Any system can guarantee a 90%–100% collection rate if the service rate is low enough. Consider the rate for transport at \$500.00 and the total number of transports at 20,000 per year. At this charge, San Diego would collect nearly 100% of what is being charged, but even at a 90% collection, it would put the total charges at \$10,000,000 and the cost recovery at about \$9,000,000. Using the same number of transports, a rate for transport of \$2,000, and a 40% collection rate, the cost recovery jumps to yearly cost recovery to \$16,000,000. Not only has the cost recovery in the system almost doubled, but the impact on the residents is minimal.

A 25%–35% collection rate is typical for an ambulance transport system. If the collection rate is lower, the rates are considered too high; if the collection rate is higher, the rate is typically too low. Many more factors are involved in the collection rate, including the specific payers involved. The AP Triton estimates for 2024 include billing over \$370 million and collections before any costs of over \$123 million, resulting in a collection rate of 33%. If San Diego continues to be the provider of record in their system, they should maintain a rate structure that allows them to collect 25%–35% of what is billed.

Summary

The unit hour needs and a deployment plan are the largest factors in determining system costs. However, there are significant differences in staffing costs based on the type of employee (firefighter, single role, subcontracted) used. Because of these differences, system costs are in section three for each model reviewed. For cost recovery, it should be noted that the approved rate increases of 7% per year result in an increase of approximately 4.5% in revenue. This difference is caused by the large number of transports that have a cap on the amount the City can receive. AP Triton recommends that in any model, the City must watch inflationary pressure on employee costs and other parts of the system to ensure the rates keep pace with costs.

Section III: Recommendations & Strategies for Sustainability

EMS Division Opportunities

EMS Transport Service Models Overview

AP Triton has evaluated multiple EMS delivery models and provides five for evaluation by the City of San Diego. The following models will allow San Diego to assess the EMS service delivery and governance options for its consideration and ultimate success. We will provide a comprehensive overview of each option so that San Diego can arrive at the best option to provide the City's residents, businesses, and visitors with the highest service levels. Five primary service delivery options will be presented in this section to provide emergency ambulance services:

- Provide the services in-house with sworn fire personnel.
- Provide the services in-house with non-sworn fire personnel.
- Provide the services with a hybrid of sworn and non-sworn fire personnel.
- Subcontract the service to a private provider.
- Provide the services with a hybrid of in-house, non-sworn fire personnel and subcontracting.

The ambulance transport models are developed using known San Diego costs and costs derived from industry standards surrounding fire/private ambulance transport systems. Although these costs are thorough and detailed from existing systems using these models, they are only somewhat encompassing. Prices vary for items listed, such as cardiac monitors, radios, gurney systems, overtime required, etc. Private provider salaries are based on industry standards in San Diego's current system. They could be raised or lowered based on decisions made in the implementation process. AP Triton also encourages San Diego to keep an enterprise fund that can roll over yearly until a fund balance reaches a desired amount. This has been established at 10% of the model operating costs in this study. This fund will help reduce fluctuations in cost recovery due to call volume and payer mix changes and can help with possible service increases if needed.

There is a difference between fire-based ambulance staffing and private-based ambulance staffing. The fire-based systems typically utilize 24-hour units with 12-hour partial shifts to cover peak volume needs. The private-based system leans towards an A/B shift model with one crew working 0700–1900 and the next working 1900–0700 or similar split shifts. This 12-hour model allows the private system to increase the ToT of each unit, not pay for additional built-in overtime, decrease long-shift fatigue, and reduce station needs. It also requires 33% more personnel to staff, as well as a robust part-time contingent. The fire-based systems typically utilize the 24-hour model to reduce the full-time employee count, reduce shift change inefficiency, and mirror training schedules.

During the evaluation of the system, AP Triton determined that a transportation model servicing the City of San Diego would require thirty-seven 24-hour ambulances and ten 12-hour day cars to cover surge needs during peak activity. This breakdown uses existing call data, including time of day, call concurrence, and the current model history over the last two years. As a system is implemented, adjustments might have to be made to accommodate “real world” dynamics, such as APOT, training needs, and surge protection. When San Diego picks a specific model, a strategy can be developed to determine the practical deployment of ambulances in the system. Each model will also vary slightly in the deployment of resources; for instance, the Firefighter model has an increased number of 24-hour ambulances due to the typical FF schedule, and the 12-hour shift will only be used as an overtime position for the firefighter model due to regular working schedules.

The Single-Role Model

Utilizing single-role ambulance operators is not a new concept in the fire service, but it is a trending model. This class of employees presents many benefits and some challenges. With a system as diverse as San Diego, there are opportunities to expand the training of other emergency workers for the AO position. Huntington Beach Fire Department is positioned at the cutting edge of this new paradigm. They are incorporating their lifeguards, police cadets, CRR cadets, and ambulance operators into a class that can be trained in multiple disciplines and fill in for possible staffing gaps in specific sections. If San Diego adopted the single-role model, they should investigate all options to enhance their ability to maintain constant staffing.

Model System Costs

All the models offer diverse benefits, and all come with a multitude of challenges. Developing the needed fleet, equipment, and personnel for a system the size of San Diego might be a multiple-phase roll-out. Four options call for San Diego to hire personnel and purchase equipment, which could cause delays in a system plagued by “supply chain” issues and long lead times for vehicles. Our analysis will present these different staffing and deployment models with ambulance employee costs and other EMS system costs broken down by unit hour and system total. These costs will be itemized in tables to detail the needs of each design. In the description of the sub-contracting model, itemized costs are also listed, along with a total unit hour cost for the entire system.

These system costs include additional personnel for overhead, finance, mechanics, quality assurance, training, and field supervision. In addition, the costs for risk management, fuel, ambulance maintenance, data connection, medical supplies, ambulance and equipment replacement, and billing are added to the total. These costs will vary significantly depending on the deployment model San Diego chooses. Sub-contracting has been the most efficient and cost-effective manner of providing ambulance transport over the last few years. However, as unit hour prices have increased, in-house service has become a viable solution again. If San Diego provides all ambulance transport directly, these costs will be lower than contracting at a higher rate per unit hour.

The following figures detail how AP Triton's cost estimates were developed. Although intended to be as inclusive as possible these estimates are not designed to be the final budget for the chosen deployment model. There will be significant variables to any deployment model and the final equipment chosen. These estimates are designed to identify the expected cost centers and be used to compare relative costs between models. The amortization is based on a five-year turnover of vehicles and equipment. Although the five-year life span does cover the total span of the equipment's practical use, most equipment, such as radios and gurneys, may have a much longer use span. Each item in the cost center will also have a unit hour cost directly related to the number of ambulance hours needed in the system.

In a previous financial review, AP Triton put together cost estimates for the San Diego system, considering all known information. The estimate included many items listed in the figures below, but others are generally not included in cost estimates for these models. All items in the previous cost review will also be included in model summaries to ensure that all data is considered. All models and estimates will portray 2024–2025 projected revenue and costs.

Figure 64: Estimated Additional Costs When Providing Transport Directly

Cost Center–Per Ambulance	Years of Amortization	Annual Cost–Per Ambulance	Unit Hour Cost
Operating Expenses Depreciated			
Ambulance Replacement	5-Years	\$40,000	\$7.18
Cardiac Monitor	5-Years	\$8,000	\$1.44
Make-Ready Equipment	5-Years	\$5,000	\$0.90
Data Tablet	3-Years	\$1,000	\$0.18
Power Gurney	5-Years	\$5,600	\$1.00
Ambulance Setup	5-Years	\$3,000	\$0.54
Lucas Device	5-Years	\$4,000	\$0.72
Operating Expenses			
Ambulance Insurance	Yearly	\$2,571	\$0.46
Fuel/Maintenance/Mechanic/License	Yearly	\$41,000	\$7.35
Data Connection	Yearly	\$1,200	\$0.22
Training	Yearly	\$6,000–\$13,000	\$1.44
Medical Supplies	Yearly	\$14,000	\$4.30

The estimated costs in the above figure demonstrate general costs from operating depreciation and operating expenses. If a model that includes the purchasing of ambulances and equipment is chosen, a detailed analysis of the City's costs will need to be completed. Appendix B outlines additional information about the operating depreciation and operating expenses.

Administrative

Administrative costs consist of multiple items. Outsourcing the billing process, a margin or reserve account that will help regulate the year-to-year transport and payer mix fluctuations, and a start-up cost for the initial hiring of personnel. These costs are consistent for any model that hires personnel and manages the transport system. For Option #4: *Subcontracting Model*, the start-up costs are not included as the subcontractor will absorb those costs.

Figure 65: Administrative Costs

Administrative Cost Center–Ambulance	Total Annual Cost
Billing (3.25 % of Net Collections)	\$4,013,447
Margin/Reserve Account (2% of Net Costs)	\$1,522,227–\$1,764,222
Five-Year Startup Cost Recovery (Model Dependent) *	\$24,485,915

*These start-up costs deal with the ramping up of cost recovery; the amount is not lost but delayed.

Assistant Chief/EMS

For a system, the size and scope of San Diego City, AP Triton recommend a minimum of an Assistant/Deputy Chief position responsible for the full system oversight and planning. Deputy Chief Pierce holds the current position in San Diego, but to keep costs consistent between each model, the Deputy Chief's salary is used to show a true comparison. This section or division will introduce an estimated \$117 million into the department and manage over 350 new employees or a contract costing millions.

BC Operations Manager/EMS

The EMS BC would be responsible for the program's daily operations, including deployment of resources, required unit hours, response times, and reporting requirements. They would Monitor First Watch and dispatch for system status. The system calls for multiple supervisors in the field to manage the system, and the daily staffed BC would supervise the daily operations. If sub-contracting, the BC would be the point of contact for contractors for daily staffing, deployment, or response issues. They would also coordinate with contractors' supervisors for disaster responses, hospital issues, or other major incidents.

Captain Logistics Coordinator/EMS

The responsibilities and number of employees in this position will vary. The level of overhead staffing needed will depend on the model that San Diego chooses. If a Single-Role model is adopted, there is an increased need for hiring, training, and education as the personnel turnover is higher. If a model that includes purchasing and maintaining ambulances is chosen, multiple positions must be in place to manage the extra rolling stock. Each configuration also considers daily supervision. AP Triton's algorithm requires at least one supervisor in the field per eight ambulances in service. This number can fluctuate based on the suppression fire units will provide and the area covered by the units.

Contract Compliance Officer

Responsible for reporting requirements and documentation for contractors and LEMSA. Provide clinical training, CQI review, and training for contractors as needed. Acts as liaison between fire and contractor field personnel. Provides training and education for ePCR compliance. Represents the City on EMS committees as needed. Coordinates supplies, narcotics, bio waste, and other services as needed. Monitors trends in the system like ToT, APOT, changing protocols, and other issues to assist in long-term planning.

Billing Oversight–Staff Analyst

Provides billing oversight and support for both the contractor and billing provider. Ensures ePCR data is transferred to the billing provider as required and coordinates with the Contract Compliance Officer if there are issues. Monitors billing and collections and identifies any trends or issues. Monitors unit hours, provides monthly reports, and reconciles with the billing contractor to ensure they match. Monitors enterprise funds to ensure they operate as required and within budget. Coordinates compassionate billing program for those unable to pay.

Additional Personnel

Although AP Triton's evaluation is thorough and covers the main personnel involved in each model, taking on the ambulance operations in the City is a significant undertaking. Once the exact model is chosen, San Diego will need further evaluation to identify system needs. An existing fire department is in a unique position because there is already existing supervision on the scene of each emergency and at each fire station. This factor can be leveraged to cover the much-needed daily supervision without adding many people to supervise the program.

Public-Private Partnership

The State of California has implemented the Public Provider Ground Emergency Transport (PP-GEMT) program to enhance the benefits paid for Medi-Cal patients. These enhancements for the additional cost recovery in the system will be discussed in the cost recovery section of this study. There is also a cost for the program estimated at \$360.00 per Medi-Cal transport. The cost analysis for each deployment model does not include the current PP-GEMT agreement's cost, estimated at **\$16.8 million**, in FY2025. This additional cost must be considered when comparing these models to the current or future system designs.

Facilities

The cost analysis for each deployment model also does not include the cost of facilities. In the ambulance business, the remote facilities where day and night crews rest are called "Comfort Stations." The assumption is that the ambulances would be housed in existing fire facilities (comfort stations) at no additional cost for each fire-based model described or included in the subcontract rate for subcontracting models. These costs can be discussed in the future depending on the path taken.

Deployment Models

Option 1: Firefighter Transport Model

Option 1 for consideration by the City of San Diego is a sworn firefighter/paramedic and sworn firefighter/EMT staffing model for delivering all emergency ambulance services. Our compiled data indicates that a maximum of 0.35–0.45 ToT is recommended for transport units with sworn personnel; this basis will be provided in each transport option utilizing sworn personnel. Each option provides a slightly different deployment option to account for the difference in personnel. Firefighters do not typically work 12-hour shifts, so the deployment uses more 24-hour units. Each model's total unit hours are the same to keep consistent system needs. For the sworn option, forty 24-hour staffed ALS Units are recommended, with four 12-hour flex BLS units staffed to ensure call volume coverage during the peak load demand. These units will ensure availability during anticipated system demand, built on the premise of 7,056 hours a week or an average of 1,008 hours a day to meet response time requirements. Staffing of surge units can be accomplished with overtime personnel or utilizing personnel from existing fire apparatus during peak activity. The following figure outlines the staffing and employee costs for the sworn model detailed in Option 1, with an additional 120 Firefighters/Paramedics and 120 Firefighters/EMTs, including salary and benefits.

Figure 66: Option #1 Firefighter Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
120 Full-Time	Firefighter Paramedic Salaries		\$18,133,800
120 Full-Time	Firefighter Paramedic Benefits		\$11,559,840
120 Full-Time	Firefighter EMT Salaries		\$16,190,880
120 Full-Time	Firefighter EMT Benefits		\$11,559,840
144-hour Average	Constant Staffing–Overtime		\$2,546,061
Staffing Cost		\$163.05	\$59,990,421

Along with the costs above, the system cost-center figures will be added to create total system costs. There are 24-hour and 12-hour shifts added to each model for consistency and each unit hour calculation. For example, forty 24-hour ambulances equate to 350,400 hours yearly; the additional four 12-hour ambulances add 17,520 hours for a total of 367,920 hours.

Figure 67: Option #1 Firefighter Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	\$59,990,421
Operating Depreciation	\$4,395,600
Operating Costs	\$5,759,179
Administration Costs	\$5,966,153
Other Expenses	\$10,305,458
Option #1 Total Operational Costs	\$86,416,811
12-Hour OT Shifts for Peak Staffing	\$2,435,305
Margin/Roll-Over Account/Fund	\$1,522,227
Billing (3.25% Net Collections)	\$4,013,447
PP-GEMT Payments	\$16,884,044
Option #1 Total Administrative Costs	\$24,855,022
Total Revenue	\$123,490,663
Total Option #1 Costs	\$111,271,833
Total System Cost per Unit Hour	\$302.43
Option #1 NET Cost Recovery (Loss)	\$12,218,830
Cost per Firefighter Recruit Academy	\$2,042,341

Benefits/Challenges—Option #1

In previous years, the option to provide ambulance service with sworn personnel would not have been an option based on the financial burden. Private providers' increased cost per unit hour has made the option more viable.

To provide this option, San Diego must consider several benefits and challenges before its implementation. The most notable benefit is the increase in overall sworn personnel staffing. Adding 240 personnel to the department could significantly increase the flexibility needed to manage a modern-day fire department. Although the initial start-up of this model would include onboarding academies longer than other models, the payoff would be a significantly more stable workforce.

The challenges of this model are numerous; primarily, the difficulties with hiring significant numbers of sworn personnel may pose a roadblock to quickly getting service levels up to meet the service demands of the system. There are considerable overtime costs involved with staffing in this option as all vacancies (sick leave, vacation) and flex car deployments are predicated on overtime provided by the sworn personnel. Adding 120 new paramedics to the department could cause turnover problems as firefighters/paramedics try to get off the ambulance, requiring more personnel to be sent to school. Purchasing fire apparatus, including ambulances, is significantly delayed compared to previous years and could add to start-up timelines.

The cost of staffing and putting new recruits through a multiple-month fire academy is also a real dynamic that San Diego must consider. According to data provided by San Diego, the average cost per firefighter to put is \$56,732. Introducing 240 Firefighters would cost over \$13 million dollars over multiple academies. Although this would not be considered a yearly operating cost, it must be considered when weighing the cost of each option.

Lastly, as this option is one of the costliest presented, net revenues (cost recovery) are considerably less and would impact the continued re-investment into the EMS system overall. These challenges must be reviewed thoroughly before San Diego chooses its preferred option. *Note: AP Triton considered a 40-hour training course for each model and did not calculate the costs of the firefighter academy.*

Option 2: Ambulance Operator Model

Option 2 is a model using non-sworn (Single-Role) personnel. Non-sworn EMTs and paramedics would staff all the ambulances in the system. This model has become popular amongst fire departments transitioning into servicing emergency transports. The model can be flexible in its personnel staffing, using 24-hour units and 12-hour flex shifts more easily than sworn models. Staffing the identified 7,056 hours weekly would require 156 new EMTs and 108 new paramedics working 24-hour shifts. This model also has a notorious turnover of personnel requiring a robust part-time number of employees. The task of onboarding 264 new employees and the constantly high turnover rate expected for this class of employees is a significant undertaking. This model tends to be the most cost-effective and removes any role confusion between firefighters and non-sworn EMS personnel. The following figures outline the costs of Option 2 for consideration. The prices are for salary and benefits, using a standard benefits package, as there are no current San Diego single-role personnel.

The average EMT/PM hourly rates are taken from Falck's current rates for personnel working in the San Diego system. The model is based on a 40-hour system as these employees are not FLSA-exempt. It considers 1,920 hours of straight time and 917 hours of built-in overtime each year. There are multiple ways to manage this model, including more 12-hour shifts to reduce overtime and employee fatigue. Some options require more personnel, which should be considered as it would change the overall cost.

Figure 68: Option #2 Ambulance Operator Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
108 Full-Time	Single-Role Paramedics Salaries		\$10,235,904
108 Full-Time	Single-Role Paramedics Benefits		\$5,741,604
156 Full-Time	Single-Role EMTs Salaries		\$10,640,922
156 Full-Time	Single-Role EMTs Benefits		\$8,293,428
48 Full-Time 12-hr	Single-Role Paramedics/EMTs	Combined Above	
120-Hour Average	Constant Staffing–Overtime		\$960,919
Staffing Cost		\$97.50	\$35,872,777

Benefits/Challenges—Option #2

There are many benefits to an Ambulance Operator model; it would increase the number of fire personnel on duty across the City but will not increase the number of sworn personnel. It would give San Diego complete control over their system to increase staff and units without permission from a private contractor. The Ambulance Operator model also benefits from training and vetting the next generation of firefighters in San Diego. Single-role employees are vetted in stations and emergencies before they are hired as full-time firefighters. Multiple departments around Southern California are using this model as a hiring pool for future firefighters.

There are additional challenges as the City hires and trains an entirely new class of employees. The system's costs must outline the number of part-time employees needed for this model; even though they are only paid when working, a constant hiring process will tax the City on human resources and training. Due to the high turnover rate, the part-time ambulance operators cover shifts when needed, staff additional units, and efficiently fill shifts. Although this option has its challenges, it can generate significant net cost recovery over direct expenses to reinvest into the EMS system.

Each main section is outlined in the figure below, listing model personnel, depreciation, operating, and administrative costs. There are also additional costs, such as peak staffing units, margin accounts, and billing. The total net cost recovery in the system is determined by taking the projected revenue minus the total operating costs. For Option #2, the projected net revenue is **\$38,617,294**.

Figure 69: Option #2 Ambulance Operator Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	\$35,872,777
Operating Depreciation	\$4,795,200
Operating Costs	\$5,983,930
Administration Costs	\$5,966,153
Total Other Expenses	\$10,305,458
Option #2 Additional Model Costs	\$62,923,517
12-Hour OT Shifts for Peak Staffing	N/A
Margin/Roll-Over Account/Fund	\$1,052,361
Billing (3.25% Net Collections)	\$4,013,447
PP-GEMT Payment	\$16,884,044
Option #2 Total Administrative Costs	\$21,949,852
Total Revenue	\$123,490,663
Total Option #2 Costs	\$84,873,369
Total System Cost per Unit Hour	\$230.68
Option #2 NET Cost Recovery (Loss)	\$38,617,294

Option 3: Hybrid Sworn/Non-Sworn

Option 3 offers ambulances staffed with sworn (Firefighters) and non-sworn (Single-Role) personnel in a hybrid model to provide all emergency ambulance transportation. There would be a combination of EMTs and paramedics in safety and non-safety positions. This model has inherent flexibility, and 24-hour and flex units can be deployed. However, 96 EMTs and paramedics are needed from the sworn ranks and 168 EMTs and paramedics are needed from the non-sworn ranks to provide all required system coverage. With the flexible staffing options of the single-role personnel, all 12-hour surge units in this model will be staffed with non-sworn personnel.

There are many ways to split the safety and non-safety staffing; the model presented has sixteen 24-hour firefighter-staffed units, twenty 24-hour single-role-staffed units, and twelve BLS single-role units. If this model is chosen, AP Triton can design a configuration that more closely meets the department's needs. The following figure outlines the staffing costs and system needs using non-sworn and sworn staff as Option 3 for consideration.

Figure 70: Option #3 Hybrid Sworn/Non-Sworn Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
48 Full-Time 24-hr	Firefighter PM Salaries		\$7,253,520
48 Full-Time	Firefighter PM Benefits		\$4,623,936
48 Full-Time	Firefighter EMT Salaries		\$6,476,352
48 Full-Time	Firefighter EMT Benefits		\$4,623,936
144-Hour Average	Constant Staffing—Overtime		\$629,443
60 Full-Time 24-hr	Single-Role PM Salaries		\$5,568,807
60 Full-Time	Single-Role PM Benefits		\$3,189,780
108 Full-Time	Single -Role EMT Salaries		\$6,848,371
108 Full-Time	Single -Role EMT Benefits		\$5,741,604
48 Full-Time 12-hr	Single-Role Paramedics/EMTs		Built-in above
120-Hour Average	Constant Staffing—Overtime		\$533,844
Staffing Cost		\$123.64	\$45,489,592

Figure 71: Option #3 Hybrid Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	\$45,489,592
Operating Depreciation	\$4,795,200
Operating Costs	\$6,077,621
Administration Costs	\$5,966,153
Total Other Expenses	\$10,305,458
Option #3 Additional Model Costs	\$72,634,024
12-Hour OT Shifts for Peak Staffing	N/A
Margin/Roll-Over Account/Fund	\$1,246,571
Billing (3.25% Net Collections)	\$4,013,447
PP-GEMT Payment	\$16,884,044
Option #3 Total Administrative Costs	\$22,144,062
Total Revenue	\$123,490,663
Total Option #3 Costs	\$94,778,086
Total System Cost per Unit Hour	\$257.61
Option #3 NET Revenue	\$28,712,577

Benefits/Challenges—Option #3

A combination of firefighters and nonfirefighters working on the ambulances creates a very flexible system to staff any surge units necessary. The City of San Diego may find turnover a detriment to the long-term staffing needs of the AO side of this hybrid model. It may also consider the commitment to the new employee hiring, recruitment, and benefits workload, along with the recruitment challenges of hiring several new sworn employees simultaneously, a significant hurdle. Additionally, this model costing does not take into consideration a multiple-month fire academy at a cost of over \$56,000 per firefighter. Along with Option #5, this model could be used as a transition to ensure coverage in the system while moving to a new model.

Option 4: Private Subcontracting

Option 4 presents San Diego with a subcontracting model for all emergency ambulance services from a private provider. This is the model that San Diego is currently working under as they prepare for a new Request for Proposal. San Diego would partner with a private company to provide the service while maintaining the provider of record status and participating in Federal reimbursement programs. This method has shown great success and has been the option of choice in Contra Costa County for the past seven years and in many other California-based systems. It has been called the "Alliance Model" or "Unit Hour Model."

With this option, there would be no need to use San Diego City personnel to provide deployment hours. San Diego is the Provider of Record, providing all administrative oversight for delivering EMS transport services. The department would contract all necessary billing services and facilitate the system's revenue and expenditure needs.

The following figure outlines the Subcontracting Model's estimated costs, including hourly rate, unit hours needed, annual contract, estimated additional system costs, and revenues after expenses. The model used to estimate the system's costs does not consider the changing costs of a split year. To estimate the cost, AP Triton used an average of \$233 and \$244 that the City is expected to pay for ALS services and an average of \$199 and \$208 for BLS services. Administrative costs were also added to this model to be consistent with other options.

Figure 72: Option #4 Subcontracting Model Costs

Cost Center	Hourly Rate	Hours Needed	Annual Cost
Subcontract ALS Costs	\$238.83	315,360 hours	\$75,317,429
Subcontract BLS Costs	\$203.98	52,560 hours	\$10,721,189
Total Cost			\$86,038,618

Figure 73: Option #4 Subcontracting Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	\$86,038,618
Operating Depreciation	N/A
Operating Costs	<i>Built into Sub-Contracting Cost</i>
Administration Costs	\$358,072
Total Other Expenses	\$10,305,458
Option #4 Additional Model Costs	\$96,702,148
12-Hour OT Shifts for Peak Staffing	<i>Built into Sub-Contracting Cost</i>
Margin/Roll-Over Account/Fund	\$1,764,222
Billing (3.25% Net Collections)	\$4,013,447
PP-GEMT Payment	\$16,884,044
Option #4 Total Administrative Costs	\$22,661,713
Total Revenue	\$123,490,663
Total Option #4 Costs	\$119,363,861
Total System Cost per Unit Hour	\$324.43
Option #4 Net Cost Recovery (Loss)	\$4,126,802

Benefits/Challenges—Option #4

There are several advantages to San Diego with the Subcontracting Model:

- Potential to leverage a partnership with a private subcontractor to better meet the needs of the community and each agency involved.
- Can generate net cost recovery to reinvest into the EMS system.
- Leaves all hiring and staffing considerations to the subcontracted provider.
- Leaves ambulance and equipment purchasing to the subcontractor.
- Cost-effective staffing option to provide this service.
- Eliminates role confusion between sworn and non-sworn.

With the Subcontracting Option, San Diego must be made aware of the additional workload during start-up for this Option to begin operations. Points to consider are as follows:

- Requires San Diego to develop and coordinate an RFP for a private ambulance provider to be the subcontractor.
- The selected contracted private provider must be chosen, the contract signed, and all San Diego City administrative regulations followed for a competitive bid.
- It may not be easy to find suitable private ambulance subcontractors because the industry only has a few capable private providers.
- The subcontracting unit hour cost can sometimes be unpredictable and subject to vast differences between counties.

The Subcontracting Model works because the private provider is contracted for all emergency response deployment demands at a fixed unit-hour cost. This cost is negotiated, covers all needed expenditures, depreciation, and equipment renewal for the contracted service period, and includes an agreed-upon profit level to the subcontractor. Responsibilities for San Diego in the Subcontracting Model include the following:

- San Diego has operational control of the system and will hold the subcontractor directly accountable for failure to meet the contract's requirements at any time.
- San Diego is the Provider of Record and performs/subcontracts all billing services for transport in this option.
- As the Provider of Record, San Diego would also access additional Federal funding through the PP-GEMT program.

Option 5: Hybrid Subcontracting

Option 5 is a hybrid model that emphasizes the advantages of several previous models; it directly provides some of the transport capacity and subcontracts with a private provider to perform the remaining transports. The breakdown between fire-based and private-based transport could be divided by area, patient acuity, or split evenly.

Although multiple scenarios and options exist to share the transport responsibility, the estimates below display a split of twenty 24-hour AO staffed units, sixteen 24-hour Contracted units, and twelve 12-hour BLS contracted units to start the deployment. If this model is chosen, AP Triton could build a specific cost structure that fits San Diego's needs.

Figure 74: Option #5 Hybrid Subcontracting Staffing Costs

Employee Count / Hours	Classification	Hourly Costs	Total Annual Cost
60 Full-Time	Single-Role PM Salaries		\$5,686,613
60 Full-Time	Single-Role PM Benefits		\$3,189,780
108 Full-Time	Single-Role EMT Salaries		\$8,317,845
108 Full-Time	Single-Role EMT Benefits		\$5,741,604
	Constant Staffing—Overtime		\$725,306
140,160 hours	ALS Subcontracting Costs	\$238.83	\$33,474,413
52,560 Hours	BLS Subcontracting Costs	\$203.98	\$10,721,189
Staffing Cost			\$67,856,750

Figure 75: Hybrid Subcontracting Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	\$67,856,750
Operating Depreciation	\$1,998,000
Operating Costs	\$2,826,869
Administration Costs	\$3,635,105
Total Other Expenses	\$10,305,458
Option #5 Additional Model Costs	\$86,622,182
12-Hour OT Shifts for Peak Staffing	N/A
Margin/Roll-Over Account/Fund	\$1,511,828
Billing (3.25% Net Collections)	\$4,013,447
PP-GEMT Payments	\$16,884,044
Option #5 Total Administrative Costs	\$22,409,319
Total Revenue	\$123,490,663
Total Option #5 Costs	\$109,031,501
Total System Cost per Unit Hour	\$296.35
Option #5 NET Revenue	\$14,459,162

Benefits/Challenges—Option #5

This model could dampen some of the downsides of previous models, like the start-up costs, hiring, and turnover of new employees, while emphasizing the benefits. With supply chain issues and the large lift of starting a new program, a stair-step approach could lower the entry burden. Multiple ways exist to split the services between San Diego and a private provider. Additional federal financing (PP-GEMT) could also be available with San Diego as the Provider of Record.

Governance Structure

A critical element of any EMS system in California is the collaboration with the State Emergency Medical Services Authority (EMSA) and the Local Emergency Medical Services Authority (LEMSA). San Diego falls under the California Health and Safety Code regulation and will continue to follow LEMSAs policies and procedures dealing with the safe transportation of patients in San Diego. AP Triton encourages the City to coordinate with the city attorney to determine how the City's 1797.201 status affects the regulations dealing with ambulance operations if options 1, 2, 3, or 5 are chosen.

Startup Costs

If San Diego chooses options 1, 2, or 3, there will be significant startup costs, including ambulance purchasing, equipment purchasing, hiring, orientation and training, overhead, and billing setup. The funding method should be determined before acting toward these options. The deployment plans within this report include a cost center to recover the startup costs in five years. With Option #4, the Subcontracting Model, startup costs would be significantly less than the other options. The Subcontracting Model would only require overhead costs and establishing a billing system that AP Triton would recommend contracting out to a specialty provider. Option 5 could start with minimal start-up cost as a hybrid model, relying heavily on the subcontracting portion and transitioning to the ambulance operator model as time, resources, funding, and personnel are available.

Ambulance Purchase and Setup

Options 1, 2, or 3 would require purchasing and setting up a minimum of 72 ambulances for 911 transport service to maintain an effective fleet, not including interfacility or critical care transports. As with the start-up costs, utilizing Options 4 or 5 would reduce the need for ambulance purchase and setup.

If options 1, 2, or 3 are chosen, AP Triton can work with San Diego on navigating the potential supply chain issues dealing with ambulance and equipment purchases.

The cost of ambulances is worked into the structure of each model's system. These costs could be built into the model or paid for as one-time costs. The following figure shows the estimated cost of an ambulance and further detail is in Appendix B:

Figure 76: Projected Ambulance Costs

Cost Center	Cost
Base Vehicle	\$200,000
Cardiac Monitor	\$40,000
Make Ready Equipment	\$25,000
Data Tablet	\$3,000
Power Gurney	\$28,000
Set-up	\$15,000
Lucas Device	\$4,000
Cost Each	\$311,000
Number of Ambulances Needed	66–72 Units
TOTAL COST	\$20,526,000–\$22,392,000
Amortized Yearly Costs	\$4,395,600–\$4,795,200

Hiring and Orientation

Additionally, if San Diego chooses Options 1, 2, or 3, the following figures outline the initial hiring costs for both sworn and non-sworn personnel.

Figure 77: Estimated Hiring Costs for Non-Sworn Employees

Cost Center	Cost Each	Total
Recruiting	\$30.00	\$7,920
Testing	\$40.00	\$15,840
Prints/DOJ	\$49.00	\$19,404
Background	\$240.00	\$95,040
Medical	\$600.00	\$237,600
HR Processing	\$150.00	\$59,400
PM Orientation Hours	Hourly * 40 hours	\$117,806
EMT Orientation Hours	Hourly * 40 hours	\$95,731
Orientation/Training Facility	\$8000.00	\$8,000
Safety Gear	\$350.00	\$92,400
Supplies	\$200.00	\$52,800
TOTAL		\$801,942

Figure 78: Estimated Hiring Costs for Sworn Firefighters

Cost Center	Cost Each	Total
Recruiting	\$20.00	\$4,800
Testing	\$40.00	\$9,600
Prints/DOJ	\$49.00	\$11,760
Background	\$1,200.00	\$288,000
Medical	\$600.00	\$144,000
HR Processing	\$150.00	\$36,000
PM Orientation Hours	Hourly * 40 hours	\$249,091
EMT Orientation Hours	Hourly * 40 hours	\$222,402
Orientation/Training Facility	\$8000.00	\$8,000
Safety Gear	\$3,500.00	\$840,000
Supplies	\$200.00	\$48,000
TOTAL		\$1,861,653

Summary of Transportation Models

All models presented show a positive net cost recovery for the City. The subcontracting model uses a \$238/ALS unit hour price point. This price point is approaching the top amount the City could pay with the current configuration. Although all models show a positive net cost recovery, the benefits and challenges of each option represent large differences in the system's sustainability.

Figure 79: Ambulance Transport Model Summary

Model Costs/Revenues	Firefighter Model	Ambulance Operator Model	Firefighter/AO Hybrid Model	Subcontracting Model	AO Subcontracting Hybrid Model
Personnel/Staffing Costs	\$59,990,421	\$35,872,777	\$45,489,592	\$86,038,618	\$67,856,750
Operating Depreciation	\$4,395,600	\$4,795,200	\$4,795,200	N/A	\$1,998,000
Operating Costs	\$5,759,179	\$5,983,930	\$6,077,621	<i>Built into Sub-Contracting Cost</i>	\$2,826,869
Administration Costs	\$5,966,153	\$5,966,153	\$5,966,153	\$358,072	\$3,635,105
Total Other Expenses	\$10,305,458	\$10,305,458	\$10,305,458	\$10,305,458	\$10,305,458
Additional Model Costs	\$86,416,811	\$62,923,517	\$72,634,024	\$96,702,148	\$86,622,182
12-Hour OT Shifts for Peak Staffing	\$2,435,305	N/A	N/A	<i>Built into Sub-Contracting Cost</i>	N/A
Margin/Roll-Over Account/Fund	\$1,522,227	\$1,052,361	\$1,246,571	\$1,764,222	\$1,511,828
Billing (3.25% Net Collections)	\$4,013,447	\$4,013,447	\$4,013,447	\$4,013,447	\$4,013,447
PP-GEMT Payment	\$16,884,044	\$16,884,044	\$16,884,044	\$16,884,044	\$16,884,044
Total Administrative Costs	\$24,855,022	\$21,949,852	\$22,144,062	\$22,661,713	\$22,409,319
Total Revenue	\$123,490,663	\$123,490,663	\$123,490,663	\$123,490,663	\$123,490,663
Total Option Costs	\$111,271,833	\$84,873,369	\$94,778,086	\$119,363,861	\$109,031,501
Total System Cost per Unit Hour	\$302.43	\$230.68	\$257.61	\$324.43	\$296.35
Net Cost Recovery (Loss)	\$12,218,830	\$38,617,294	\$28,712,577	\$4,126,802	\$14,459,162

Figure 80: Ambulance Transport Model Net Recovery Summary

Ambulance Transport Models	Unit Hour Cost	Net Cost Recovery
Option #1—Firefighter Model	\$302.43	\$12,218,830
Option #2—Ambulance Operator Model	\$230.68	\$38,617,294
Option #3—Hybrid FF/AO Model	\$257.61	\$28,712,577
Option #4—Subcontracting Model	\$324.43	\$4,126,802
Option #5—Hybrid AO/Subcontracting Model	\$296.35	\$14,459,162

*The subcontracting model is set at a \$238.83 unit hour price for the private provider; the additional \$90.53 represents additional costs to the City itemized in the cost analysis.

Mobile Integrated Healthcare Program

San Diego is a leader in the State in its efforts towards Mobile Integrated Healthcare (MIH). During the roll-out of pilot programs dealing with alternate destinations, SDFD was one of the first departments to participate. The following section covers a broad list of MIH options, including San Diego's current and potential options.

Mobile Integrated Healthcare is an alternative approach to handling low-acuity calls. It is on the leading edge of fire-based EMS and should be considered the future of Emergency Medical Services. The need for alternative treatment modalities and transport options is apparent with rising call volumes. Fire departments across the U.S. have risen to lead public safety efforts during the COVID-19 pandemic and in the years since to address those needs. In an open letter to the California State Medical Director, the Ambulance Association of California listed six items that are causing poor performance in some of their contracted areas: Ambulance Patient Off-Load Time (APOT), Ambulance age requirements, tiered response, Telehealth, expanded licensing, and approval of more training programs. Three of them could see a significant relief with an MIH model. California is seeing a rise in the need for alternative, better, and innovative ways to respond to and treat low-acuity patients.

The motivation to explore the use of MIH would be to reduce the number of low-acuity medical aids that did not result in transport to the hospital. Many departments in California routinely have a non-transport rate of 25%–50% on EMS calls. While there is no direct correlation between non-transports and the potential number of patients that an MIH program might see, it is reasonable to assume that a modest percentage of these patients could benefit from an alternate response.

MIH Programs

AP Triton will discuss three avenues with viable solutions for integrating mobile healthcare into a system in California and, specifically, San Diego City. Fire departments nationwide are experiencing a drastic increase in response to patients experiencing homelessness and psychiatric (behavioral) emergencies. Although these call types are not explicitly considered MIH, there are potential options that can assist in addressing this growing demographic.

Although several variations of provider-led responses exist, the following three programs in California and surrounding states have proven to be successful options: Community Paramedicine, Advanced Practice Provider Care Units, and Responder-led Telemedicine. Each of these programs has unique qualities that can serve the residents of San Diego in different ways while maintaining excellent patient care, flexibility, and sustainability. The following is a brief description of each model and an example of current programs with working programs.

Community Paramedicine

A Community Paramedicine (CP) program would free up emergency response units to be available for higher-level calls while addressing the community's needs. CP programs should be considered the next step in delivering patient-centered care cost-effectively and efficiently.

The concept is straightforward—utilize current paramedics working in the field, train them on the safe treatment and care of patients with non-acute illnesses or injuries, and develop strategies to get them to the most appropriate receiving center for their condition (e.g., Urgent Care Facility, Behavioral Health evaluation facility, etc.).

Nationwide Community Paramedicine is on the leading edge, with legislation being developed collaboratively with state, county, and local EMS professionals. In California, EMSA has been working on Community Paramedicine since 2014.

The Affordable Care Act (ACA) was designed to reform the health care system with expanded eligibility for coverage, reduced out-of-pocket costs for health plan consumers with lower incomes, and coverage with essential benefits that include no- or low-cost preventive care. A key principle of the ACA is the so-called “triple aim” framework developed by the Institute for Healthcare Improvement, which determined that healthcare managers should:

- *Improve overall patient care, quality, and satisfaction*
- *Enhance the health of populations*
- *Reduce per capita health care costs*

Recognizing that the spiraling cost of health care needed to translate to better patient outcomes and that a well-trained workforce was available to provide more effective care in the community, the California EMS Authority launched the California Paramedicine Pilot Project in 2014. The objective was to evaluate the feasibility of

paramedics expanding their roles beyond emergency response. In all, 53 California cities received a variety of nontraditional services from community paramedics, including hospice support, post-discharge care, direct observation of daily tuberculosis treatment, and transportation to alternative non-emergency sites such as sobering centers, urgent care centers, and psychiatric facilities. The Healthforce Center at UCSF analyzed the project and concluded that community paramedics collaborated effectively with numerous healthcare partners, provided services safely and efficiently, reduced medically unnecessary transports to hospital emergency departments, and saved more than \$3 million during a short time span.¹⁵

Community Paramedicine Toolkit

Version 2.0 of the Community Paramedicine Toolkit was released in December 2022.¹⁶ This toolkit is a collaborative effort by all the major contributors in California and led by the Acting Director of EMSA, Elizabeth Basnett. The main purpose of the toolkit is to assist local LEMSAs and their community partners in the creation of Community Paramedicine (CP) programs to:

- Reduce the burden on individual partners to create programs from scratch,
- Decrease duplication of effort across the State, and
- Enhance CP program participation and approval efficiency.

This toolkit has produced a starting point for new programs to get started in CP and existing programs to align with new Assembly Bill (AB) 1544 regulations.

The toolkit is broken down into eight steps to bring the provider and the LEMSA in alignment in the development of a program:

Step 1—The Planning Process

Step 2—Identification of the Community need and Recommended Solutions

Step 3—Program Medical Protocols and Policies

Step 4—Service Provider Approval

Step 5—Collaboration with Public Health or Community Resource Entities

Step 6—Curriculum for Program-Focused Training

Step 7—Program Review & Approval Process

Step 8—How to Evaluate the Program

AP Triton believes that San Diego should evaluate the future enhancements of its services in the fire department and include a LEMSA-approved Community Paramedic program.

Advanced Practice Provider Care Unit

Advanced Practice Provider (APP) Care Units have shown to be a viable and successful alternative in several California Fire Departments, including but not limited to Anaheim, Beverly Hills, and Los Angeles City. These programs combine Advanced Practice Providers (Nurse Practitioners or Physician Assistants) with first responders to low-acuity medical aids to “treat and release” or “treat and refer” the patients.

A significant difference between an Advanced Care provider unit and a Community Paramedic unit is the ability to make physician-level decisions in the field, such as writing prescriptions, referrals to other physicians, referrals to alternate destinations, and completing follow-up visits when necessary. An APP could respond to a low-acuity injury, suture the patient, prescribe antibiotics, leave the patient with care instructions, and make a follow-up appointment to remove the sutures in five days. All of this could be done without having the patient leave their house. These programs have successfully treated various low-acuity medical aids without transporting the patient to the hospital. Beverly Hills Fire Department, for example, is one of several departments leveraging the APP model and taking patient-centered care to the next level.

The City of Beverly Hills Fire Department (BHFD) is proud to announce the launch of its Nurse Practitioner Program. The program is a unique and innovative Emergency Medical Service (EMS) model designed to deliver advanced, efficient, and effective healthcare in the pre-hospital setting.

BHFD's vehicle, 'Nurse Practitioner 1' (NP1), will respond to calls for service in the field. Staffed with a Nurse Practitioner and Firefighter Paramedic with oversight from a board-certified Emergency Medicine physician, NP1 is equipped with various medications, select laboratory diagnostics, and technical medical equipment.

Whether responding to 911 calls or following up on 'In home' patient referrals, NP1 will provide mobile urgent care as well as collaborate with primary care providers in order to optimize greater long-term health and wellness within our community.

With a focus on improving patient outcomes and connecting healthcare resources to patients' specific needs, the program defines the future of Mobile Integrated Health.¹⁷

Using Beverly Hills FD as an example, at the time of dispatch, calls are screened by a trained Emergency Medical Dispatcher (EMD) to identify non-emergency patients who meet the classification of an “Alpha or Bravo” call (low acuity). Clinically appropriate, legally compliant, pre-determined dispatch protocols created in collaboration with the department’s Medical Director would be followed.

If applicable, the APP Unit will then be dispatched to the patient location to provide on-site evaluation, treatment, and coordination of care and referral. A paramedic-level response can be assessed whenever the APP Unit crew determines the patient would benefit from transport to the emergency department. Conversely, the AP crew, as an option, could be called by an emergency unit on the scene if, after a paramedic assessment, the paramedic determined the patient is a good candidate for treatment by the Advanced Practice provider unit.

An Advanced Practice Provider response dramatically benefits the community and offers a practical, appropriate alternative in addressing low acuity calls for service. This unique response model aims to reduce total costs to the overall healthcare system and deliver relevant and timely healthcare service on the scene, thereby preventing costly transport to the emergency department.

With an unlimited supply of funding, programs like an APP program could provide added value and service to the department, yet rarely is funding unlimited or un-measured. An APP has the unique quality of utilizing Nurse Practitioners or Physician Assistants, who can bill for their services, regardless of transportation. There is also a possibility of a partnership with local hospitals to share personnel, and residents released in San Diego could be followed up on to prevent potential re-admits.

First Responder Telemedicine

First Responder-led Telemedicine is a newer option that became popular in multiple agencies during the COVID-19 pandemic. Under specific guidelines, after the initial assessment, the patient could be allowed a Telemedicine appointment with an NP or doctor in an emergency dispatch center or contracted as an on-call service. As the nation has adapted to virtual meetings (e.g., Zoom, Teams, and other video conferencing mediums), talking to a medical professional on an iPad or similar device does not seem as foreign as it would have been three years ago. The passage of Assembly Bill 292 in 2015 allowed Nevada to expand telehealth services, improving access to this progressive and innovative technology.

In this model, the evaluation of the patient begins in the emergency dispatch center and first contact. A patient is triaged using EMD protocols, and the closest and most appropriate resources are dispatched. As units are delivered and are en route, a trained dispatcher gives pre-arrival medical instructions until first responders arrive on the scene and take over patient care.

Upon arrival, firefighter/EMTs and firefighter/paramedics begin immediate treatment, and after determining the patient's status, expedited transport to the nearest, most appropriate receiving center. However, as is often the case, some patient's conditions do not require immediate treatment and transportation to a local area hospital emergency department (ED). Once determined by first responders, if the patient does not warrant transport to a local area hospital ED, the Telemedicine program could become the most appropriate treatment for a patient. This program positively affects the system by allowing the first response and evaluation and then pivoting the call, when appropriate, to a dedicated telemedicine option to better serve the patient's needs. The paramedics or EMTs would remain on the scene to relay pertinent medical conditions and findings to the Physician/NP/PA. The Telemedicine Physician will then be able to engage the patient directly to determine the best treatment plan to provide the best outcome.

After a thorough telemedicine interview and patient assessment are conducted, the medical professional and patient will determine the next steps as one of the following: the patient is transported to the hospital via ambulance, the patient is referred to a clinic or urgent care center for treatment, they are advised to contact their physician, or the patient may determine on their own after a consultation that they will remain at home and monitor themselves. In addition to the final resolution, the Telemedicine Physician can prescribe medications to the patient's pharmacy, provide detailed care records to the patient's physician, or reassure the patient and provide a care plan. These calls are typically triaged in the emergency dispatch center at an Alpha or Omega dispatch level.

The Contra Costa County (California) Fire-EMS Alliance with American Medical Response contracted with a new Tele911 company in November of 2021 to help deliver a unique and innovative solution to the growing needs in the field.

CCCFPD is working with Tele911 to help make the system more efficient and increase readiness for emergency calls. To accomplish this goal, Tele911 integrates telemedicine and patient navigation into the EMS system to better serve Contra Costa County patients and place much-needed resources back into the system.¹⁸

Although Telemedicine typically uses existing ALS resources and equipment to administer the program, so costs are low, the overall system could be impacted. Having an ALS unit stay on the scene while a physician group is contacted and a thorough medical exam is completed could delay additional responses in the system. This and other factors need to be evaluated if a Telemedicine program were to be initiated.

Behavioral Health Response Unit

Behavioral Health units are being used in multiple areas in California and surrounding states. Most units are associated with police departments and are used to curb the overuse of police resources for psychiatric and homeless calls. There are many variations of this model, including the CAHOOTS (Crisis Assistance Helping Out On The Streets) model being used in Eugene, Oregon,



CAHOOTS provides support for EPD personnel by taking on many of the social service type calls for service to include crisis counseling. CAHOOTS personnel often provide initial contact and transport for people who are intoxicated, mentally ill, or disoriented, as well as transport for necessary non-emergency medical care.¹⁹

Other models have various connections to public and private organizations in the local areas they serve: P.E.R.T (Psychiatric Emergency Response Team), used in Orange County, and Be Well, a private organization working with cities to deploy mental health professionals to deal with the overwhelming number of psychiatric emergencies encountered by police and fire units.

The Be Well OC Mobile Crisis Response Team is composed of two crisis intervention specialists who provide in-community assessment and crisis stabilization services to individuals experiencing mental health or substance use challenges. The mobile response team provides information, referrals, transportation and additional follow-up support and case management. The mobile crisis response program helps improve outcomes for those in need while also supporting law enforcement and EMS so they can focus on calls where they are needed most urgently. The net result is improved mental health care for Orange County residents, at a lower overall cost to the community.²⁰



These units are typically dispatched by the Primary Safety Answering Point (PSAP) and respond to non-medical patients experiencing homelessness or psychiatric issues. The units evaluate the situation and offer resources and potential transport to psychiatric facilities or homeless outreach centers. Often, the programs are a public/private partnership that does not require additional fire personnel and would supplement the three response models discussed earlier. There is a large amount of federal grant funding available for programs dealing with people experiencing homelessness. If San Diego were to choose this model, this should be thoroughly explored.

Overview

In response to the evolving healthcare landscape, it has become increasingly necessary for departments to adapt to a new paradigm in EMS. Traditional approaches are being challenged, and alternative methods are sought to address emerging needs. One promising solution that fills this gap is the implementation of Behavioral Health Units within EMS systems. These specialized units provide comprehensive care and support for individuals experiencing behavioral health crises. These units aim to deliver more targeted and effective assistance to those in need by integrating mental health professionals alongside emergency responders. As addressing behavioral health issues becomes more recognized, these units are expected to gain mainstream acceptance and become a standard component of EMS services.

Recognizing the urgency of addressing the challenges posed by homelessness, the federal government has made substantial grant funding available for programs to tackle this complex issue. These grants present a valuable opportunity for communities like San Diego to develop and enhance initiatives that address the healthcare needs of the homeless population. By exploring the incorporation of Behavioral Health Units into its EMS system, San Diego can tap into these funding resources and maximize their impact on improving the well-being and overall outcomes of individuals experiencing homelessness. Thoroughly investigating and strategically utilizing the available federal grants can empower San Diego to establish comprehensive and innovative programs that address the multifaceted healthcare needs of the homeless population, ultimately leading to positive and sustainable change within the community.

Implementation

The current challenges are that most of the current programs operate with grant funding and pilot programs with no long-term funding or protocols in place. Any implementation plan for San Diego highly depends on whether the State of California continues to move forward with Community Paramedicine programs and if funding sources are instituted. Without available funding, the costs of these programs are usually unsustainable. Regardless of the path forward, the City should continue changing the paradigm and leading in this field. If additional programs are started or current models continued in San Diego, the City must evaluate and balance the impact on the number of ambulance transports and revenue with the cost, revenue, and system implications of a CP program.

Section IV: Observations & Recommendations

Observations

Key Objectives

All recommendations are based on meeting as many key objectives as possible while providing the best service to the community. These include:

- Excellence in patient care and overall operational effectiveness
- Flexibility to maintain effective service based on current and projected demographics
- Sustainability—recommended changes to the current delivery model must provide for long-term sustainability and resiliency
- Provide for hiring, retention, training, and succession planning
- Provide for continued excellence in core all-risk duties of SDFD
- Any recommendations will be based on clinical effectiveness and the potential for improving patient outcomes
- Any other changes or alternatives to improve EMS delivery, patient care, and patient outcomes

Observations

AP Triton identified the following service demand and performance indicators of the EMS system:

- High incident volume—especially in the Metro Zone
- Fire units respond nearly 5 minutes faster than ambulances to priority 1 incidents
- SDFD is well-staffed and station placement is good
- Ambulance system needs 48 peak and 15 minimum units (1,008 UH per day)
- Deployment may change based on type of staffing
- Management will be dependent on model chosen
- The use of ALS versus BLS is evolving and changing
- Use of Medical Priority Dispatch System (MPDS) should be consistently monitored and adjusted
- Incident volume is expected to continue to grow substantially

By the end of the one-year contract amendment under the subcontracting model, the City will have a comprehensive understanding of the system's revenue. This knowledge will enable the City to structure the next RFP with full awareness of the costs and revenue involved. Additionally, the City will be better positioned to evaluate rates and billing policies to effectively meet the needs of the system and the community.

Managing the system will also provide the City with better insights into potential changes in the payer mix and number of transports. By being the provider of record, the City will be better equipped to manage the Impacts of MIH programs and other changes to the system.

Recommendations

As noted previously, recommendations are based on meeting as many identified key objectives as possible while providing the best service to the community.

AP Triton recommends that the City use this year to evaluate deployment, response times, subcontractor responsiveness to the City's needs, revenue, payer mix, and overall system changes. This information, along with this report, will enable the City to determine the best path forward for the next long-term contract.

AP Triton recommends that the City maintain its status as the provider of record and manage the system. While the startup costs to run the system directly would be significant and delays in the ability to purchase ambulances would be difficult to overcome, the City should still consider purchasing a few ambulances over the course of the next contract. These ambulances could be used as surge protection or to serve areas that are difficult for the subcontractor to cover. They could be staffed by ambulance operators, firefighters, or through cross-staffing. A hybrid model like this could enhance service quality and save the City money by utilizing existing city infrastructure to support the additional units.

Key items:

- **Ambulance Transport Fees:** Fees must support the system design and deployment. Fees would need to be significantly higher if the City does not participate in PP-GEMT.
- **ALS vs. BLS Response and Units:** The use of BLS units is only slightly cheaper, and the desire to increase their use has been driven by the shortage of paramedics, rather than changing dynamics. AP Triton recommends continuing the use of BLS units but emphasizes that expanding the usage must not impact the availability of ALS units for ALS incidents.
- **MPDS Use and Response Criteria:** The use of MPDS to determine the appropriate track for each patient - from Nurse Navigation, BLS, ALS, Code 2 or 3 response, to response time expectation - must be continually evaluated and updated.
- **Other Fees for Service:** Fees that are available to the City, including those for first response, traffic accidents, and treat-and-release, should be evaluated as part of the overall system.

- **Quality of Service:** Response times are becoming less of a system focus. Quality of service will be determined by getting patients suitable care at an appropriate facility in a reasonable time.
- **Deployment Based on Model and Staffing Type:** Once a deployment model is chosen, the desired UHU can be determined, and the needed unit hours calculated.

The City should continue to lead in Mobile Integrated Health (MIH) initiatives and other improvements to the overall system. Efforts to reduce the number of transports to emergency rooms will persist across the state, and San Diego should actively participate in these initiatives.

- **Nurse Navigation:** Nurse navigation is a component of MIH. The expectation is that low acuity patients are identified and provided with alternatives to a traditional response. Nurse navigators must be RNs trained as navigators and certified as Emergency Medical Dispatchers.
- **On-Scene Assessment:** Upon arrival, attempts are made to divert low acuity patients not managed at the dispatch level to alternatives to ED transport. These alternatives include utilizing telemedicine, treat- and-refer, treat in place, alternate destinations, etc.
- **Cost Reduction and Sustainability:** The goal is to reduce overall costs of the system while ensuring patients reach the most appropriate facility. However, there is currently no funding available for these MIH programs and the City must ensure the system remains sustainable.

Implementation Plan

With the current Falck contract amendment providing a one-year trial of the alliance model, this plan focuses on preparations for implementing a new contract. The first step is to develop a timeline with objectives for the RFP release and to determine the type of service that will be requested. AP Triton has provided a basic plan for the City to build upon.

First 3 Months:

- **Monitor System Performance:** Closely monitor system performance by zone to evaluate unit hour needs.
- **Revenue and Payer Mix:** Monitor revenue and payer mix for trends.
- **Stakeholder Interviews:** Conduct interviews to identify needs and expectations within the system.
- **City-Provided Transports:** Decide if the City will provide any transports directly. If yes, begin the equipment purchase process immediately.
- **Consultant Decision:** Determine if an outside consultant will be used to assist in the RFP process.

Months 4 to 6:

- **Service Model and Deployment Plan:** Finalize the service model and deployment plan for the next contract.
- **System Objectives and Standards:** Finalize system objectives and standards in the contract, including:
 - ALS vs. BLS responses
 - Dispatch objectives and MPDS response criteria
 - Response time objectives
 - Fees needed to support the system
 - MIH impacts on the system and revenue
- **Provider Decision:** Determine if single or multiple providers will be solicited.
- **RFP Timeline:** Finalize the RFP timeline.
- **Proposal Evaluation:** Determine proposal scoring parameters and evaluation panel.
- **RFP Preparation:** Prepare RFP for release (legal, procurement, etc.).

Months 7 to 9:

- Release RFP: Release the RFP.
- Evaluate Proposals: Evaluate proposals and send notice of intent to award to top proposer(s).
- Contract Negotiation: Negotiate the final contract with the contractor(s).
- Transition Planning: Set the transition date (for the current or new provider) and prepare for the new contract.

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Appendix B: Modeling Costs

Ambulance Modeling Dashboard

Cost to Outfit 1 Ambulance - Ambulance					
QTY	UNIT	DESCRIPTION	PRICE	TOTAL COST	SOURCE
1	Each	Ambulance	\$200,000	\$200,000	Republic
1	Each	Power Gurney	\$28,000	\$28,000	Stryker/Ferno

Cost to Outfit 1 Ambulance - Make Ready Equipment					
QTY	UNIT	DESCRIPTION	PRICE	TOTAL COST	SOURCE
1	Each	Mobile radios	\$8,000	\$8,000	Motorola
1	Each	Portable chargers	\$311	\$311	Motorola
1	Each	Portable radios	\$8,000	\$8,000	Motorola
2	Each	Reflective Vests	\$40	\$80	511 Tactical
1	Each	Surface pro case	\$25	\$25	Amazon
1	Each	Surface pro (MDT)	\$1,000	\$1,000	IT Dept
2	Each	Body armor	\$413	\$827	Galls
1	Each	Cradle point w/ Antenna	\$1,300	\$1,300	911 Vehicle
1	Each	Opticom/GPS	\$3,500	\$3,500	
2	Each	511 Tactical Jacket	\$177	\$354	Galls
2	Each	Nomex Brush Coat	\$194	\$389	All Star
1	Set	Re-usable splints	\$845	\$845	Boundtree
2	Each	Flashlights	\$30	\$60	Amazon
1	Set	Black back up bins	\$240	\$240	Amazon
1	Each	Radio Slings	\$88	\$88	Dalesio
1	Each	Supra Box for KNOX key	\$45	\$45	Amazon
		Total:		\$25,062.84	

Cost to Outfit 1 Ambulance - Cardiac Monitor					
QTY	UNIT	DESCRIPTION	PRICE	TOTAL COST	SOURCE
1	Each	Cardiac Monitor	\$40,000	\$40,000	Zoll/Life Pack/Philips

Cost to Outfit 1 Ambulance - Data Tablets					
QTY	UNIT	DESCRIPTION	PRICE	TOTAL COST	SOURCE
3	Each	iPads/Surface Pros	\$1,000	\$3,000	Zoll/Stryker/Philips

Cost to Outfit 1 Ambulance - CPR Devices					
QTY	UNIT	DESCRIPTION	PRICE	TOTAL COST	SOURCE
1	Each	Lucas CPR Device	\$20,000	\$20,000	Stryker/Zoll/Ferno

Ambulance Modeling Dashboard

Operating Costs Explanation		
Academy Training Costs - This cost item takes the hourly cost of each category of employee (PM/EMT) multiplied by 40 hours.		Varies
Station Dues - Station dues will come into play if a private provider is living in the stations and the company must pay for station dues. Only if not included in Unit Hour Price.		N/A
Ambulance Insurance - Insurance costs for an ambulance will vary from system to system, the cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	2,571
Fuel/Maint/Mech/License - These costs for a City or County are usually estimated on a per vehicle basis. This can vary depending on the type of vehicle and usually does not change if the vehicle drives 1,000 miles vs 20,000 miles per year. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	41,000
Data Connections - There are typical data connections for each ambulance that can vary per system. This includes wireless connections for ePCR devices, cell phones, and other wireless systems. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	1,200.00
BLS Supplies - Each ambulance is stocked with a set of BLS supplies. This list of supplies can vary from County to County. Once the ambulance is stocked with supplies, the operating costs covers the constant resupply. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	13,000
ALS Supplies - Each ambulance is stocked with a set of ALS supplies. This list of supplies can vary from County to County. Once the ambulance is stocked with supplies, the operating costs covers the constant resupply. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	11,000
Training Costs - Training is typically done on-duty throughout the year. The training costs gives an estimate for the year to pay for extra training outside normal work hours.	\$	12,000
Uniforms - The cost of uniforms covers basic uniform needs per year, per ambulance. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	720
Certifications - The certification covers the basic costs of EMT and PM certifications. The cost used is an estimation and taken from existing systems staffing ambulances for a city.	\$	200

Appendix C: References

- ¹ <https://www.sandiegocounty.gov/content/sdc/ems/AboutLEMSA.html>.
- ² https://www.sandiegocounty.gov/content/sdc/ems/medical_director.html#:~:text=Medical%20Director%20Kristi%20L.,Koenig%2C%20MD%2C%20FACEP%2C%20FIFEM%2C%20FAEMS
- ³ Offline medical control definition, Law Insider.
- ⁴ The City of San Diego, (2020). *Request for Proposal (RFP) for Emergency Ambulance Service, 9-1-1 Response, Advanced Life Support Transport, and Standby Service* (Section 4.12).
- ⁵ This Photo by Unknown Author is licensed under CC BY-SA-NC, creativecommons.org/licenses/by-nc-sa/3.0/.
- ⁶ The City of San Diego (2020) *Request for Proposal (RFP) for Emergency Ambulance Service, 9-1-1 Response, Advanced Life Support, Transport, and Standby Service* (P. 32).
- ⁷ sandiego.gov/economic-development/sandiego/population.
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- ²⁰ <https://www.bewelloc.org/bewell-mobile-response/>.