City of Salem
FIRE DEPARTMENT
Salem, OR

February 2024

Emergency Medical Services

Valuation & Optimization Study

AP TRITON
VISION · INNOVATION · SOLUTIONS

Contents

Acknowledgments

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Our sincere appreciation is extended to each of you…

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…and each of the EMTs, Paramedics, Firefighters, officers, and support staff who daily serve the citizens and visitors of the City of Salem and the surrounding unincorporated areas of Marion County.

Executive Summary

AP Triton, LLC (Triton) was retained to conduct a comprehensive Emergency Medical Services Valuation and Optimization Study to establish actionable benchmarks with measurable outcomes. The subsequent goal was to propose tailored recommendations, explicitly addressing the options for sustainable ambulance transport within the City of Salem. This detailed analysis provides the City of Salem with invaluable insights into the cost implications, potential vulnerabilities, and associated risks linked to EMS services and ambulance transport within its jurisdiction.

In adherence to its customary approach, AP Triton executed this study with guidance from industry best practices and nationally recognized standards, prominently including NFPA 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations by Career Fire Departments*. This study was steered by the cumulative expertise and knowledge of our subject matter experts, all driven by the paramount interests of the City's residents, the SFD, and the dedicated departmental personnel.

In the detailed evaluation of the Salem Fire Department's EMS system, AP Triton recommends Option #2, the Ambulance Operator Model. This model capitalizes on the specialized skills of single-role paramedics and EMT Basics, thereby amplifying the efficiency and effectiveness of the EMS operations. It is noteworthy that Option #2 is projected to generate sustainable net revenue over expenses, facilitating further investments back into the EMS infrastructure.

Another strategic recommendation is incorporating the Ground Emergency Medical Transport (GEMT) program as any program that offers increased reimbursement prospects for services rendered to Medicaid patients, from which the Salem Fire Department already benefits. We advocate for an expanded application of GEMT funds to solidify this initiative's financial foundation to benefit Salem's residents and its municipal framework.

Furthermore, we suggest a revision of transport fees to optimize revenue collection. While private ambulance services often pursue aggressive collection strategies, public ambulance services must refine their policies accordingly. Nevertheless, the collection efforts should be balanced against the potential financial returns and political ramifications to ensure they contribute positively to the initiative's goals. The current private ambulance provider has proposed a 25% fee increase to enhance recruitment capabilities and fulfill the contract effectively. Financial data supports the increase in rates to strengthen the financial foundation of reintegrating EMS within the City of Salem and its Fire Department and ensures financial sustainability.

By adopting Option #2 and strategically managing revenue alongside GEMT funds, the system can demonstrate financial viability and success, ultimately serving the best interests of Salem's citizens and the City's fiscal health.

Section I:
EVALUATION OF THE EMS SYSTEM

Overview

City of Salem

Salem is the capital city of the U.S. state of Oregon and the county seat of Marion County. It is located in the picturesque Willamette Valley, approximately 47 miles southwest of Portland.

Salem serves as the state capital of Oregon and is the political and administrative center of the state. The Oregon State Capitol, an iconic building, houses the state's legislative branch and the governor's offices. The City plays a vital role in state governance and politics.

Salem was established in the 1840s and is one of Oregon's oldest communities. It was originally known as the "Oregon Institute" and later renamed "Salem," which means "peace" in Hebrew. The City has a rich history with ties to the Oregon Trail, early pioneer settlements, and statehood.

Salem is known for its cultural attractions, including the Hallie Ford Museum of Art, the Elsinore Theatre, and the Oregon State Hospital Museum of Mental Health. It is also home to Willamette University, the oldest university in the West and a significant educational and cultural institution.

The Willamette Valley surrounding Salem is renowned for its fertile soil and is a major agricultural region. The Valley produces a variety of crops, including fruits, vegetables, and berries. The region is also known for its wineries and vineyards, contributing to Oregon's reputation as a producer of high-quality wines.

Salem hosts the Oregon State Fair, a major annual event that showcases agriculture, livestock, entertainment, and various exhibits. It provides a significant economic and cultural boost to the region.

The Salem area offers ample outdoor activities, including hiking, biking, and water sports. Nearby Silver Falls State Park is famous for its stunning waterfalls and hiking trails.

Salem's economy is diverse, with government, healthcare, education, and agriculture playing key roles. The state government is a major employer, and the healthcare sector includes the Oregon State Hospital and Salem Health, a regional medical center.

Salem has access to major transportation routes, including Interstate 5, which connects it to Portland to the north and Eugene to the south. The City is also served by Amtrak and Greyhound, making it accessible by rail and bus.

Salem Fire Department

The Salem Fire Department in Salem, Oregon, has a history that spans over a century. Like many other towns in the United States, Salem relied on volunteer firefighting efforts in its early days. Volunteers formed local companies and used hand-pulled or horse-drawn fire engines and buckets to combat fires.

The Salem Fire Department was officially organized in 18657 marking the City's first official Fire Department. It started with a combination of volunteer and paid firefighters. As Salem continued to grow, there was a shift towards establishing a professional, paid fire department. The transition was gradual with volunteers and career firefighters working together to enhance fire protection in the City.

Over the years, the City expanded its fire station facilities and equipment to accommodate the community's growing needs. New firehouses were built, and the Department acquired modern firefighting apparatus. The Salem Fire Department kept up with advancements in firefighting technology and equipment, transitioning from horse-drawn engines to motorized fire apparatus. It also improved its communication and alarm systems to respond more efficiently to emergencies.

Over time, the responsibilities of the Salem Fire Department expanded beyond firefighting to include emergency medical services, hazardous materials response, technical rescue, and public education.

The Department has remained deeply involved in the Salem community, conducting fire prevention and safety programs, providing public education, and participating in community events.

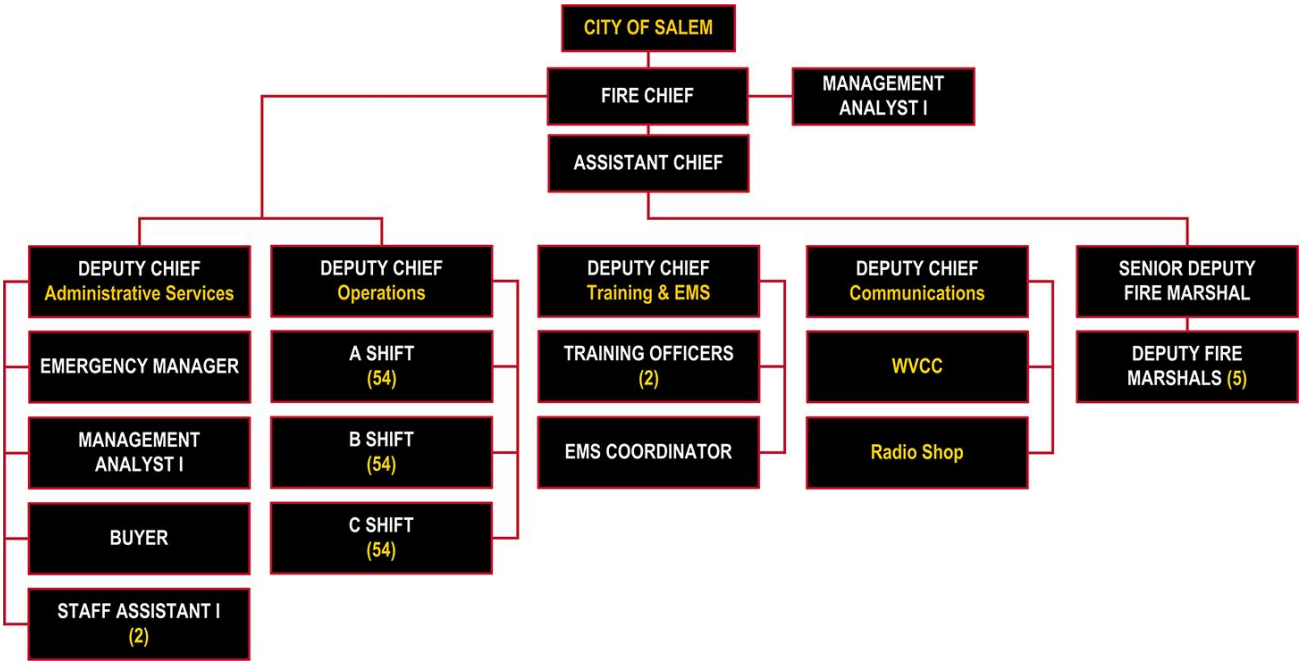
The Salem Fire Department collaborates with neighboring fire departments and emergency agencies to provide mutual aid and enhance emergency response capabilities in the region. In addition to traditional firefighting and rescue operations, the Salem Fire Department addresses modern challenges such as wildfires, hazardous materials incidents, and emergency medical services (EMS), which require advanced training and resources.

The Salem Fire Department (SFD) has evolved to meet the community's changing needs. It plays a vital role in ensuring Salem's residents' and visitors' safety and well-being.

Governing & Organizational Structure

SFD is a Department of the City of Salem. The City Manager, in accordance with the policies of the City of Salem, supervises the Fire Chief. The following figure illustrates the current SFD organizational chart.

Figure 1: SFD Organizational Chart (2022)



Emergency Operations

SFD deploys one full-time Advanced Life Support (ALS) medic unit (aka ambulances) 24 hours daily and one 12-hour ALS peak-demand unit. All fire apparatus (engines and trucks) are staffed with Paramedics and equipped to provide ALS medical first response (MFR).

SFD does not utilize a dynamic deployment model but instead utilizes fixed deployment from 11 facilities. The agency also contracts with Falck Ambulance Northwest, providing 14 ambulances throughout a 24-hour period with 10 units at peak hours. The ambulance company is utilizing system status management for deployment.

Staffing & Personnel Management

Managing personnel to achieve maximum efficiency, professionalism, and personal satisfaction is an art as much as a science. A contemporary fire department providing EMS first response and transport must have enough administrative resources to adequately provide operational support, logistical support, ongoing training, quality assurance, and improvement programs.

Several national organizations recommend standards to address staffing issues. The *Occupational Health & Safety Administration* (OSHA) *Respiratory Protection Standard* and the *National Fire Protection Association* (NFPA) Standard 1710 are frequently cited as authoritative documents.[1],[2] In addition, the *Center for Public Safety Excellence* (CPSE) publishes benchmarks for the number of personnel recommended on an emergency scene for various levels of risk (known as "Effective Response Force").

Administrative & Support Staffing

In this section of the staffing analysis, the ratio of SFD administrative and support positions to total organizational staffing and mission responsibilities is compared to industry best practices. Analyzing the ratio of Administrative and Operations Supervisor and support positions can identify gaps and/or redundancies within the organization and suggest the necessary alterations and staff additions that may be required if the Department assumes Basic Life Support (BLS) and/or ALS transport services.

The SFD full-time uniformed Senior Leadership Team, or Administrative staff, includes a full-time Fire Chief, one Assistant Chief, four Deputy Chiefs (Administration, Operations, Communications, and one overseeing the Training Division and EMS Coordinator), and one Senior Deputy Fire Marshal. The following figure outlines SFD's administrative and support staff positions.

Figure 2: SFD Administrative & Support Staff by Budgeted Position (2023)

Administrative Staff Positions	No. of Staff
Fire Chief	1
Assistant Fire Chief	1
Deputy Chiefs	4
Senior Deputy Fire Marshal	1
Deputy Fire Marshal	5
Training Officer	2
EMS Coordinator	1
Emergency Manager	1
Management Analyst I	2
Staff Assistant	2
Buyer	1
Total FTEs:	**21**
Administration Staff to Total Staff Ratio:	**7.4%**

Administrative Staff Discussion

The Administration and support staffing level reflects approximately 7.4% of the workforce. This ratio of Administrative-to-Operations personnel should be viewed as low, given the overall size of the organization and the contemplated expansion of EMS services addressed in this study. AP Triton noted that this ratio is also impacted by the Department's responsibility for the operations of the Willamette Valley 911 Communications Center (WVCC), which has 85 staff.

During this study period, AP Triton learned that although SFD had designed a position titled Emergency Medical Analyst (Management Analyst I), it was never requested due to budgetary constraints. The primary responsibilities of the position would include EMS incident response and patient data analysis, quality improvement program development and support, develop and continually monitor key performance indicators (KPIs), review all significant EMS incidents for trends and necessary training enhancements, collaborate with other public health agencies, and provide surge capacity emergency medical response as necessary.

The Department plans to fund this position with revenue generated from an EMS Enterprise Fund. AP Triton recognizes that other City departments provide many necessary administrative and support functions and services (such as Information Technology, Finance, and Legal).

Emergency Response Staffing

Safe and effective emergency operations require rapidly deploying sufficient well-trained personnel and equipment. These resources must be strategically located to respond quickly while ensuring they can back up other response units that may be out of service in another emergency. This concept will be discussed in depth in this study's Service Delivery and Performance analysis section. The following figure lists the Department's career emergency response staffing.

Figure 3: SFD Career Emergency Response Staffing by Budgeted Position (2023)

Operations Staff Positions	No. of Staff
Battalion Chief	6
Captain	48
Driver/Engineer	48
Firefighter/Paramedic	63
Total Operations Personnel:	**165**
Operational Officers to Firefighters Ratio:	**32.7%**

All SFD Firefighters are trained and certified to the Oregon Emergency Medical Technician-Paramedic (EMT-P) level. The ratio of Officers to Firefighters is consistent with ratios found in similar-sized departments studied by AP Triton. However, at the time of this study, some budgeted Captains' positions are vacant due to attrition and have yet to be filled.

SFD Operations Scheduling

Fifty-seven SFD Operations personnel are assigned to each shift and work a rotating schedule of 24 hours on and 48 hours off. The Department schedules additional shifts to reduce the average workweek from 56 to 50.38 hours, or approximately 2,627 hours annually. AP Triton understands that starting in July 2024, the Department will implement a new shift schedule on a trial basis, reducing the weekly average work hours to 49.1 or approximately 2,562 hours annually.

The trial shift schedule will redeploy "floater" personnel from each (A, B, C) shift that is currently used to backfill for scheduled and unscheduled leaves and use them to form a fourth shift (D) that will rotate with the existing three shifts using the following rotation: 24-hours on, 72 hours off.

All Operations employees will be scheduled to work an additional 24-hour shift, called a "debit shift," every 24th day for 15 debit shifts per year. During the trial period, personnel cannot exchange accrued vacation time for their owed debit time. A and B shifts will have six floaters, and C and D shifts will have 5 floaters for scheduled and unscheduled leave backfill.

Operations employees receive a bank of 144 hours of sick leave annually, with no maximum limit on the number of hours that can be "banked." Vacation accrual for Operations assigned personnel is based on Department seniority in the following configuration:

- 0 months through 48 months—13.17 shifts
- 49 months through 108 months—13.5 shifts
- 109 months through 168 months—15.5 shifts
- 169 months through 228 months—16.5 shifts
- 229 months through 288 months—17.16 shifts.
- Over 289 months—18.16 shifts

Daily Staffing

Currently, the minimum daily staffing on each shift is 43 personnel. Each Engine is staffed with a Captain, Driver/Engineer, and Firefighter/Paramedic. The Ladder Trucks are staffed with a Captain, Driver/Engineer, and Firefighter/Paramedics. However, minimum staffing is routinely reduced by one on each truck to cover unscheduled leave usage as needed. Up to six employees can be off on scheduled leave (vacation and Kelly Day) on any given shift, and the Department plans for up to three additional personnel on unscheduled leave on any given shift.

If additional employees are on leave, the positions are backfilled with an employee on overtime and/or reassigning Ladder Truck assigned personnel. The shift Battalion Chief performs unscheduled leave and overtime replacement scheduling using the CrewSense® web-based scheduling software.

Vacation shifts are scheduled by shift seniority in 24-hour increments in three rounds by mid-February of the preceding fiscal year, as follows:

- Rounds 1 & 2: Select 0, 1, or more consecutive shifts;
- Round 3: Schedule remaining shifts throughout the year or bank shifts into their Short-Term Leave or Retirement Banks.

No more than six Captains and one Battalion Chief on their assigned shift can schedule vacation leave on the same day.

Employees can trade shifts consistent with Department policy and the Collective Bargaining Agreement (CBA), and there is no limit on the number of consecutive hours an employee can work.

Operations Scheduling Discussion

AP Triton noted that Department policy does not identify a cap on the maximum number of consecutive hours that can be worked because of shift trades.

The 24-hour shift, followed by at least 24 hours off duty, remains the predominant schedule for fire departments in the Western United States, and SFD's rotating schedule of 24 hours on and 48 hours off is very common.

If an EMS Treatment and Transport program is reintroduced into the SFD, three schedules could be realistically contemplated:

- Maintain the current three-shift rotation schedule, by adding more cross-trained Firefighter/Paramedics. This would appear to be the most seamless approach, allowing more scheduling flexibility and overall effective response force improvements. However, it adds significantly more salary and benefits costs than other options.
- Add single-role Paramedics who work the same shift rotation as the Fire Operations Division. AP Triton cautions that as single-role providers, the Fair Labor Standards Act Section 207 (K) overtime exemption would not apply, and the employees would have to be compensated at 1.5 times their base salary rate for all hours worked over 40 hours per week.

- Add single-role Paramedics who work a separate shift rotation schedule that equates to an average 40-hour per week work cycle. Several shift work schedule variations could be used in this approach, as noted in the following examples. Note: The following are examples of work schedules used by companies and industries that maintain 24-hour daily operations. Other schedules may be more suitable/applicable to SFD's operation.[3]
  - **2-2 3-2 2-3 Rotating Shifts:** This schedule uses 4 crews and 2 twelve-hour shifts in a schedule consisting of a 4-week cycle where each crew works 2 consecutive day shifts, followed by 2 days off duty, works 3 consecutive day shifts, followed by 2 days off duty, works 2 consecutive day shifts, followed by 3 days off duty, 2 consecutive night shifts, followed by 2 days off duty, works 3 consecutive night shifts, followed by 2 days off duty, works 2 consecutive night shifts, followed by 3 days off duty. Personnel work an average of 42 hours per week, two hours of which would have to be compensated at 1.5 times salary.
  - **4-2 4-3 4-3 Ten-Hour Rotating Shift:** This schedule uses five crews and 3 overlapping ten-hour shifts to provide 24/7 coverage. It consists of a 20-day cycle where each crew works four consecutive 10-hour first shifts, followed by 2 days off duty, four consecutive 10-hour third shifts, followed by 3 days off duty, and four consecutive 10-hour second shifts, followed by 3 days off duty. The overlapping shifts provide extra staffing during high-activity periods. This plan requires 5 rotational crews (a minimum of 5 employees), with three crews on duty and two off duty on any given day.
  - **DuPont Shift Schedule | 24/7 Rotating Shift Pattern:** The DuPont 12-hour rotating shift pattern uses 4 crews and 2 twelve-hour shifts to provide 24/7 coverage. The schedule consists of a 4-week cycle where each team works 4 consecutive night shifts, followed by 3 days off duty, works 3 consecutive day shifts, followed by 1 day off duty, works 3 consecutive night shifts, followed by 3 days off duty, work 4 consecutive day shift, then have 7 consecutive days off duty. Personnel work an average of 42 hours per week, two hours of which would have to be compensated at 1.5 times salary.
  - **Pitman Shift Schedule | 24/7 Shift Pattern:** The Pitman Shift is a fixed schedule that uses 4 crews and 2 twelve-hour shifts to provide 24/7 coverage. It consists of a 2-week cycle where each crew works 2 consecutive shifts, 2 days off duty, 3 consecutive shifts, 2 days off duty, 2 consecutive shifts, and 3 days off duty.

Two crews are assigned day shifts, while the other two are assigned night shifts. On any given day, one crew is on the day shift, one is on the night shift, and two are off duty. Personnel are assigned to either day or night shifts for the 2-week cycle and work an average of 42 hours per week. Personnel work an average of 42 hours per week, two hours of which would have to be compensated at 1.5 times salary.

Staff Relief Analysis

In evaluating the level and availability of SFD Operations staff, AP Triton analyzed and compared the minimum number of employees required to be on-shift, the total number of Operations shift-assigned employees in the organization, and the average amount of leave used by these employees to determine how many personnel the Department theoretically needs to meet the minimum number of total staff required daily. This is commonly referred to as a "Staffing Relief Factor (SRF)."

In the following figure, AP Triton used historical employee leave usage data provided by SFD to identify the theoretical minimum number of employees required to staff operations 24 hours daily.

Figure 4: Elements Used to Calculate SFD Staffing Relief Factor (FY 2021–2023)

Shift Schedule	Annual Hours	Average Workweek	Average Sick Leave	Average Vacation Leave	Average Other Leaves[1]
24 hours	2,626	50.38	91.9	235.4	88.3 hours

[1]Includes FMLA, Long/Short Term Disability, Funeral, Military Leaves.

AP Triton calculated the theoretical number of SFD employees required to meet the various average types of leave used by employees from Fiscal Year (FY) 2021 through 2023 and compared the results to the current number of Operations FTE employees (165) at the time of this study. This calculation compared the average available scheduled weekly work hours (50.38) (including the hours reduction from scheduled Kelly Days) per employee, subtracted the average leave usage based on the past three full years of historical leave use data, and calculated the SRF. Based on the FY 2021–2023 average leave usage and work schedule, AP Triton calculated an SRF of 1.24.

AP Triton then multiplied the number of personnel needed to cover a single position at 24 hours per day with the relief factor to determine the total number of employees *theoretically* required to meet daily minimum staffing by using the following formula to calculate the theoretical total number of employees needed to staff each station minimally and provide relief coverage for scheduled and unscheduled leaves.

1.24 SRF x 43 (minimum number of positions per day) x 3 (3, 8-hour shifts) = Total number of employees needed to provide 24/7 coverage

The following figure compares the theoretical number of total positions needed to maintain minimum daily FTE staffing (43 positions) with the current total number of employees assigned to the Operations work schedule without using an inordinate number of employees hired back on overtime to fill vacancies.

Figure 5: Calculated Operational Staff Shortage/Overage

Shift Coverage Required	Calculated Total Personnel Required	Current No. Employees	Staff Shortage/Overage
Vacation, Sick, Holiday, FMLA, Military, etc.	178	165	**-13**

SFD Staffing Discussion

The 2023 staffing analysis theoretically indicates a shortage of thirteen personnel (4.33 FTEs per shift) needed to cover employee leave shifts. As previously noted, the Department has several Operations FTE vacancies that need to be filled, as noted here:

- 3—Captains
- 3—Engineers
- 11—Firefighter/Paramedics

These vacancies comprise 6% of the current overall Operations assigned workforce and undoubtedly have a significant negative impact on crew scheduling, reduction in Ladder Truck staffing, overtime usage, and situations where off-going personnel are forced ("mandated") to work additional hours/shifts due to inability to find relief coverage.

In anticipation of implementing the new FY 2024 shift schedule and the workweek hours reduction, AP Triton recalculated the SRF using the July 2024 hours reduction, a planned reduction of daily minimum staffing to 41 personnel and used the same historical leave usage information to calculate a theoretical SRF.

Based on the mid-2024 workweek reduction, the SRF increased slightly to 1.25.

Figure 6: Calculated Operational Staff Shortage/Overage (2024)

Shift Coverage Required	Calculated Total Personnel Required	Current No. Employees	Staff Shortage/Overage
Vacation, Sick, Holiday, FMLA, Military, etc.	175	168	**-7**

The planned reduction in minimum staffing and the recent addition of three personnel to help mitigate the impact of the FY 2024 hours reduction significantly reduce the theoretical overall staff shortage.

The cost of adding employees to ensure adequate staffing versus simply paying current employees overtime to provide relief coverage must be carefully balanced due to the additional cost of employee benefits, which is, on average, over 50% of the total cost of SFD employee salaries and benefits. This additional cost is not factored into overtime expenses, making overtime expenditure more cost-effective. However, if the total number of available employees is significantly diminished, requiring a substantially higher use of overtime backfill to meet minimum daily staffing levels, it may result in employee "burnout" and inability to meet minimum daily staffing requirements.

During this study, AP Triton was informed that the Department had hired 12 lateral Firefighters, who will be assigned to the Operations schedule after completing their training academy in March 2024. While AP Triton suspects this will positively impact the previously required overtime coverage, the new Trial Shift schedule may impact overtime usage and must be monitored throughout the trial period.

Additionally, the new Trial Shift schedule will likely result in the need to modify some Administrative and training schedules and tasks, as the week day availability of shift personnel to Administrative staff will be less during the traditional administrative workweek.

Staff Salaries & Benefits

AP Triton evaluated the salaries, benefits, and compensation for the various employee classifications, excluding Fire Prevention and WVCC non-uniformed Operations personnel, as this study focuses on EMS service.

The primary purpose of this analysis was to assist in forecasting future expenditure impacts related to recommended future Administrative and Operations staff changes resulting from recommended changes in the EMS system. The following figures summarize the FY 2023–2024 average salaries for each FTE position.

Figure 7: Administrative Uniformed & Civilian FTE Salaries

Administrative Staff Positions	Average Salary
Fire Chief	$248,098
Assistant Fire Chief	$199,316
Deputy Chief	$188,094
Administrative Captain	$140,161
Emergency Manager	$111,831
Management Analyst	$86,864
Buyer	$66,820
Administrative Assistant	$52,728

The following figure summarizes the uniformed Operations assigned staff salaries.

Figure 8: Operations FTE Salaries

Operations Staff Positions	Average Salary
Battalion Chief	$135,059
Captain	$119,348
Driver/Engineer	$101,614
Firefighter/Paramedic	$95,950

In addition, qualified employees receive specialty pay based on a percentage of their salary, as noted in the following figure.

Figure 9: Specialty Pays

Operations Staff Positions	Percentage pay
Hazardous Materials Technician	4%
Paramedic Certification	10%
SCBA Technician	2%
Specialty Teams	1%
SWAT Medic	4%

The cost of benefits for SFD Operations assigned personnel is estimated at approximately 105% of salary. Benefits include Workers' Compensation, Social Security, Oregon Public Service Retirement System (OPSRS) pension, tuition reimbursement, life insurance, short/long term disability, and medical/vision/dental insurance.

Personnel Management

Effective and efficient personnel management is critical to any organization's success. While there are several key components that AP Triton typically addresses in performing an overall organizational assessment, given the narrow scope in assessing the feasibility of expanding EMS services within SFD, this section focuses on only the formal collective bargaining relationship with the Firefighter's union, new hire practices, and promotional processes. These key components would likely be significantly impacted if the Department's role in EMS was expanded.

New Hire Process

SFD Firefighter/Paramedic employee candidates must meet the following pre-requisites to take the entry-level Firefighter/Paramedic Civil Service examination:

- Must be at least 18 years of age.
- Must pass a pre-employment drug test (including marijuana).
- Must pass a pre-employment background check.
- Must possess an Associates college degree or higher.

- Possess and maintain a valid Oregon Class C Driver's License or out-of-state equivalent with a good driving record.
- Possess an Oregon, National Registry, or another state EMT/P certification that qualifies for State of Oregon reciprocity.

Firefighter/Paramedic candidates working for other fire agencies can apply for Lateral Firefighter/Paramedic positions if the meet the preceding listed qualifications, plus the following additional requirements:

- Possess NFPA Firefighter I and II certifications.
- Possesses HazMat Operations certification.
- Must be employed as a full-time Firefighter/Paramedic with at least three years of Firefighter/Paramedic experience.

SFD may give preference to candidates who possess NFPA Drivers certification, National Wildfire Coordinating Group (NWCG) Wildland Firefighter Type 2 credentials, and/or bilingual skills.

The City uses the National Testing Network (NTN), a third-party Human Resources vendor, to vet and test qualified candidates. Candidates must pass an administered proprietary (FireTeam) written examination and the IAFC/IAFF Candidate Physical Ability Test (CPAT), a physical agility test. Candidates who complete these steps must complete a personal history questionnaire and pass an EMT/P skills assessment and a panel interview.

Candidates will then be ranked on an active Civil Service register list for twelve months. When an opening(s) occurs, the names of the top candidates on the register are sent to the SFD Administration for a Chief's interviews and conditional employment testing, which includes a full medical physical (based on NFPA 1582 Standard), drug testing, background check, and psychological assessment.

Performance Evaluations

SFD employees receive annual performance evaluations that are administered based on their hire date.

Promotion Process

The Operations Division promotion process is supervised by the City's Human Resources Department and Civil Service Commission, and each promotional assessment process varies depending on the promotional positions, as noted in the following figure.

Figure 10: Operations Division Promotional Testing Process

Promotional Position	Assessment Component & Weighting
Battalion Chief	Oral Interview (25%), Skill Assessment (25%), Tactical Simulation Exercise (50%)
Captain	Written Exam (10%), Oral Interview (20%), Role Play Exercise (35%), Tactical Simulation Exercise (35%)
Driver/Engineer	Written Exam (20%), Driving Skills Exercise (40%), Engine Pumping Skills Exercise (40%)

Candidates must pass each assessment component with a minimum score of 70% to be placed on a promotional eligibility list.

Including an Assessment Center component in promotional testing is considered a best practice and can be a very effective method of identifying future competent leaders in the organization, as it places candidates in realistic situations they may encounter as an officer and evaluates their performance in ways that cannot be assessed through the administration of a written test alone, especially as it relates to interpersonal communication skills and handling stressful and complex situations.

Representation, Compensation & Retention

The SFD uniformed employees belong to the Salem Professional Firefighters-Local 314, affiliated with the International Association of Firefighters (IAFF). The Association has a direct role in negotiating working conditions, pay, or benefits and deals with disciplinary matters. The employees and the City are subject to binding arbitration. The current collective bargaining agreement expires in July 2026.

Financial Analysis

Description of the District

Salem Fire Department (SFD) provides 24-hour fire suppression, rescue, special hazard mitigation, emergency management, and emergency medical response services. Services are delivered from 11 fire stations within the service area, and mutual aid agreements with neighboring communities increase response capacity during peak demand.

SFD includes the Willamette Valley Communications Center (WVCC), which provides 9-1-1 call answering and dispatch services for the service areas of Marion, Polk, and Lincoln counties.

Financial Review

The City's General Fund is the primary funding source for Salem Fire Department emergency operations. The FY 2024 General Fund expense budget covers personnel, materials, and capital outlay for 184.0 staff and 31 program areas. Separately, the Emergency Services Fund covers ambulance transport and on-scene patient treatment administration, the City Services Fund covers radio communications, and the Willamette Valley Communication Center Fund contains the revenue and expense budget for 78.6 staff responsible for public safety call-taking and dispatch. In the following figure, FY 2024 budget numbers shown are citywide totals whereby the SFD is allotted staffing funding from each Fund annually.

Figure 11: Salem Fire Department FY 2024 Staff and Budget by Fund

Fund	Staff	FY 2024 Budget
General Fund	184.0	$48,697,150
Emergency Services Fund	2.0	$5,983,950
City Services Fund	4.0	$2,018,520
Willamette Valley Communication Center Fund	78.6	$16,148,830
Totals:	**268.8**	**$72,848,450**

The Emergency Medical Services Fund provides resources for the ambulance service operating budget. Increased Fund revenue results from increased ambulance service revenue, balanced by a commensurate increase in expense reflective of increased transfer expense as SFD provides more transport activity than previously.

Aside from these Funds, in 2022, a comprehensive $300 million bond was approved by voters. Within the proposed projects for these monies is a new Fire Department fleet, which will serve the community for the entirety of the five-year forecast.

A review of prior years' budget-to-actual expense performance indicates sound budget management within the Department. Each year since FY 2021, the Department has come in under its General Fund expense budget by at least 0.5%.

Underspending has been across the board in each category: personnel spending, materials and services spending, and capital expense. In FY 2023, under-collection in state reimbursement revenue ultimately tipped the net of actuals to budget to the negative.

Figure 12: Salem Fire Department EOD FY 2021–2023 General Fund Performance

Spending Category	2021	2022	2023
Total Non-GF Revenue:	**($3,350,284)**	**($4,134,428)**	**($4,817,076)**
Salaries & Benefits:	33,186,169	35,397,861	39,169,654
Materials & Service:	4,672,852	5,082,010	5,604,258
Non-Recurring (Capital):	25,756	—	244,640
Total Expenses:	**$37,884,776**	**$40,142,201**	**$45,017,552**
Net against Budget:	936,128	470,207	(70,056)

One piece to note for future years: budget-to-actual performance in Bad Debt Write-Off, Figure 13, accounts (5377x) is quite variable, though in FY 2023, across all write-off accounts, the actual expense was a total of $780,000 under what had been budgeted. In comparing this to the yearly EMS analysis, this write-off figure would appear to be adequately budgeted at this time. Further analysis of this function would be recommended for out-years.

Figure 13: Emergency Medical Services Fund Bad Debt Write-Off

Fiscal Year	Bad Debt Write-Off Under/(Over)
2021	(10,813)
2022	(353,055)
2023	259,648

This debt write-off may need to be revisited as the FY 2023 EMS Yearly Analysis reflects a negative receivables amount, indicating greater payments and write-offs.

Figure 14: Emergency Medical Services Fund Net Receivables

Fiscal Year	Total Charges	Write-Offs	Payments	Receivables
July 1, 2021—June 30, 2022	2,186,097	768,480	477,215	940,402
July 1, 2022—June 30, 2023	3,894,479	2,667,512	1,396,904	(169,938)
July 1, 2023—Sept 30, 2024	1,391,048	447,950	213,370	729,728

Current year projections as of the most recent EMS Yearly Analysis (updated through September 2023) project the monthly average Total Charges on a straight-line basis. In reviewing the data, there is no discernible seasonality to available prior-year information pointing to employing a different methodology for this calculation. The straight-line projection puts Total Charges for FY 2023–24 at $5.56 million.

This is in line with Salem's projections of $5.66 million. Though this appears to be a marked difference from Total Charges in FY 2022–23, the Department is currently working with an augmented 2.0x crew compared to last year's 1.5x response.

Increased revenue directly correlates to increased expense; the total burden cost for current-year operations is projected at $2.3 million compared to last year's $1.4 million. To review year over year more directly, cost and receivables per transport provide a better assessment of service to expense. Except for FY 2023, in which significant write-off amounts detrimentally affected total receivables, receivables per transfer covered the cost per transfer. Figure 15 is a summary of these costs.

Figure 15: SFD Cost per Transport

Fiscal Year	Total Transfers	Burden Cost	Cost per Transfer	Receivables per Transfer
July 1, 2021—June 30, 2022	1,597	666,995.35	417.66	588.86
July 1, 2022—June 30, 2023	2,203	1,403,918.12	637.23	(77.14)
July 1, 2023—Sept 30, 2024	683	563,165.85	824.55	1,068.42

As mentioned, in FY 2023, collections rates were quite skewed toward write-off amounts for Medicare and Medicaid. Utilizing the information in Figure 15, Salem's collection rate against its total charges has been 65%, 32%, and 68%, respectively. Medicare and Medicaid will always make achieving a 100% collection rate impossible.

However, in expanding the service area, it would be wise to review the collection rates of Falck Ambulance Northwest (FANW) in the geographic locations currently served by their transports. If FANW is currently serving areas, it is more likely to have those carrying private insurance, assuming their current service areas will likely improve SFD's collection rates.

Capital Facilities, Vehicles, & Equipment

Apparatus and other vehicles, trained personnel, firefighting and emergency medical equipment, and fire stations are the essential capital resources necessary for a fire department to carry out its mission. No matter how competent or numerous the firefighters are, if appropriate capital equipment is unavailable for operations personnel, it would be impossible for the Salem Fire Department to perform its responsibilities effectively.

The essential capital assets for emergency operations are facilities, apparatus, and other emergency response vehicles. This report section assesses SFD's fire stations, frontline apparatus, and medic units.

Fire Station Features

Fire stations play an integral role in delivering emergency services for several reasons. To a large degree, a station's location will dictate response times to emergencies. A poorly located station can mean the difference between confining a fire to a single room and losing the structure or survival from sudden cardiac arrest. Fire stations also need to be designed to house equipment and apparatus adequately and meet the needs of the organization and its personnel.

Fire station activities should be closely examined to ensure the structure is adequate in size and function. Examples of these functions can include the following:

- Kitchen facilities, appliances, and storage
- Residential living space and sleeping quarters for on-duty personnel (all genders)
- Bathrooms and showers (all genders)
- Training, classroom, and library areas
- Firefighter fitness area
- The housing and cleaning of apparatus and equipment, including decontamination and disposal of biohazards
- Administrative and management offices, computer stations, and office facilities
- Public meeting space

In gathering information from SFD, AP Triton asked the Department to rate the condition of its fire stations using the criteria from the next figure. The results are shown in the figures that follow.

Figure 16: Criteria Utilized to Determine Fire Station Condition

Excellent	Like new condition. No visible structural defects. The facility is clean and well-maintained. The interior layout is conducive to function with no unnecessary impediments to the apparatus bays or offices. No significant defect history. Building design and construction match the building's purposes. Age is typically less than ten years.
Good	The exterior has a good appearance with minor or no defects. Clean lines, good workflow design, and only minor wear on the building interior. Roof and apparatus apron are in good working order, absent any significant full-thickness cracks, crumbling of the apron surface, or visible roof patches or leaks. Building design and construction match the building's purposes. Age is typically less than 20 years.
Fair	The building appears structurally sound with a weathered appearance and minor to moderate non-structural defects. The interior condition shows normal wear and tear but flows effectively to the apparatus bay or offices. Mechanical systems are in working order. Building design and construction may not match the building's purposes well. Shows increasing age-related maintenance but with no critical defects. Age is typically 30 years or more.
Poor	The building appears cosmetically weathered and worn with potential structural defects, although not imminently dangerous or unsafe. Large, multiple full-thickness cracks and crumbling concrete on the apron may exist. The roof has evidence of leaking and multiple repairs. The interior is poorly maintained or showing signs of advanced deterioration with moderate to significant non-structural defects. Problematic age-related maintenance and major defects are evident. It may not be well-suited to its intended purpose. Age is typically greater than 40 years.

Salem Fire Stations

The next figures outline the basic features and components of each Salem Fire Department's fire station.

Figure 17: SFD Fire Station 1

Address/Physical Location:	370 Trade Street SE					
	**General Description:** Built in 1971, this owned facility provides seismic protection, auxiliary power, and is in "Fair" condition. It features four drive-through vehicle bays, no back-in bays, and a total area of 11,788 sq ft. The station is equipped with five sleeping quarters, exercise facilities, kitchen, and office stations, but lacks a station sprinkler and vehicle exhaust system.					
Structure						
Date of Original Construction	1971					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	4	Back-in Bays	0		
Total Square Footage	11,788					
Facilities Available						
Sleeping Quarters	5	Bedrooms	5	Beds	0	Dorm Beds
Maximum Staffing Capability	5					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 18: SFD Fire Station 2

Address/Physical Location:	875 Madison Street NE

General Description:
Constructed in 1977 and owned by the SFD, this station offers seismic protection and auxiliary power. It is in "Fair" condition, with three vehicle bays (two drive-through, one back-in) and is 5,841 sq ft. It staffs up to eight, and has kitchen and exercise areas, but does not have a station sprinkler or vehicle exhaust system.

Structure						
Date of Original Construction	1977					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	2	Back-in Bays	1		
Total Square Footage	5,841					
Facilities Available						
Sleeping Quarters	5	Bedrooms	5	Beds	3	Dorm Beds
Maximum Staffing Capability	8					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 19: SFD Fire Station 3

Address/Physical Location:	1884 Lansing Avenue NE

General Description:
This owned facility, built in 1970, is equipped with seismic protection, auxiliary power, and is rated as "Fair." It has two drive-through vehicle bays, a total area of 4,094 sq ft, and four sleeping quarters. The station includes exercise and kitchen facilities but lacks a station sprinkler and vehicle exhaust system.

Structure						
Date of Original Construction	1970					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	2	Back-in Bays	0		
Total Square Footage	4,094					
Facilities Available						
Sleeping Quarters	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 20: SFD Fire Station 4

Address/Physical Location:	200 Alive Avenue S

General Description:
Built in 1974 and owned by the agency, this station has seismic protection, auxiliary power, and is in "Fair" condition. It features three vehicle bays (two drive-through, one back-in) and a total space of 6,326 sq ft. The station sleeps 9 and possesses amenities like a kitchen and exercise facilities, but does not have a station sprinkler and vehicle exhaust system.

Structure						
Date of Original Construction	1974					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	2	Back-in Bays	1		
Total Square Footage	6,326					
Facilities Available						
Sleeping Quarters	4	Bedrooms	1	Beds	8	Dorm Beds
Maximum Staffing Capability	9					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 21: SFD Fire Station 5

Address/Physical Location:	1520 Glen Creek Road NW

General Description:
Built in 2008, this owned station is in "Good" condition, offering seismic protection and auxiliary power. It has four drive-through bays, no back-in bays, and spans 13,874 sq ft. It comes with four sleeping quarters and staffing capacity for seven, exercise and kitchen facilities, and is equipped with a station sprinkler but lacks a vehicle exhaust system.

Structure						
Date of Original Construction	2008					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Good					
Number of Vehicle Bays	Drive-through Bays	4		Back-in Bays	0	
Total Square Footage	13,874					
Facilities Available						
Sleeping Quarters	4	Bedrooms	1	Beds	6	Dorm Beds
Maximum Staffing Capability	7					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 22: SFD Fire Station 6

Address/Physical Location:	2740 25th Street SE

General Description:
Constructed in 1975, this owned station has seismic protection, auxiliary power, and is rated "Fair." It features three drive-through vehicle bays and a total area of 2,425 sq ft. The station has four sleeping quarters and includes amenities like exercise and kitchen facilities, but lacks a station sprinkler and vehicle exhaust system.

Structure						
Date of Original Construction	1975					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	3	Back-in Bays	0		
Total Square Footage	2,425					
Facilities Available						
Sleeping Quarters	4	Bedrooms	4	Beds	0	Dorm Beds
Maximum Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 23: SFD Fire Station 7

Address/Physical Location:	5021 Liberty Road South

General Description:
This owned station, built in 2008, is in "Good" condition and equipped with seismic protection and auxiliary power. It includes four drive-through vehicle bays, 10,583 sq ft, and has four sleeping quarters that sleep 7. The station also features a kitchen, exercise areas, and a station sprinkler, but no vehicle exhaust system.

Structure						
Date of Original Construction	2008					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Good					
Number of Vehicle Bays	Drive-through Bays	4	Back-in Bays	0		
Total Square Footage	10,583					
Facilities Available						
Sleeping Quarters	4	Bedrooms	1	Beds	6	Dorm Beds
Maximum Staffing Capability	7					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 24: SFD Fire Station 8

Address/Physical Location:	4000 Lancaster Drive NE

General Description:
Established in 1976 and leased by the agency, this station offers seismic protection and auxiliary power. It is in "Poor" condition, with one back-in vehicle bay and a total area of 7,200 sq ft. The station has three sleeping quarters, kitchen, and exercise facilities, but lacks a station sprinkler and vehicle exhaust system.

Structure						
Date of Original Construction	1976					
Owned or Leased by Agency	Leased					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Poor					
Number of Vehicle Bays	Drive-through Bays	0	Back-in Bays	1		
Total Square Footage	7,200					
Facilities Available						
Sleeping Quarters	3	Bedrooms	3	Beds	0	Dorm Beds
Maximum Staffing Capability	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	No					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 25: SFD Fire Station 9

Address/Physical Location:	5080 Battle Creek Road Se

General Description:
Built in 1982 and owned by the agency, this station is equipped with seismic protection, auxiliary power, and is in "Fair" condition. It has two back-in vehicle bays, spans 1,971 sq ft, and includes three sleeping quarters. The station provides kitchen and exercise facilities but does not have a vehicle exhaust system despite having a station sprinkler.

Structure						
Date of Original Construction	1982					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Fair					
Number of Vehicle Bays	Drive-through Bays	0	Back-in Bays	2		
Total Square Footage	1,971					
Facilities Available						
Sleeping Quarters	3	Bedrooms	3	Beds	0	Dorm Beds
Maximum Staffing Capability	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 26: SFD Fire Station 10

Address/Physical Location:	3611 State Street

General Description:
Constructed in 2008 and owned, this station is in "Good" condition with seismic protection and auxiliary power. It features four drive-through bays, a total space of 10,583 sq ft, and four sleeping quarters sleeping up to seven. The station is well-equipped with kitchen, exercise facilities, and a station sprinkler, but lacks a vehicle exhaust system.

Structure						
Date of Original Construction	2008					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Good					
Number of Vehicle Bays	Drive-through Bays	4	Back-in Bays	0		
Total Square Footage	10,583					
Facilities Available						
Sleeping Quarters	4	Bedrooms	1	Beds	6	Dorm Beds
Maximum Staffing Capability	7					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Figure 27: SFD Fire Station 11

Address/Physical Location:	1970 Orchard Heights Road NW

General Description:
This owned facility, established in 2008, offers seismic protection, auxiliary power, and is in "Good" condition. It has four drive-through vehicle bays, covers 10,497 sq ft, and includes four sleeping quarters that sleep seven. The station is equipped with kitchen and exercise facilities, a station sprinkler, but does not have a vehicle exhaust system.

Structure						
Date of Original Construction	2008					
Owned or Leased by Agency	Owned					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Good					
Number of Vehicle Bays	Drive-through Bays	4	Back-in Bays	0		
Total Square Footage	10,497					
Facilities Available						
Sleeping Quarters	4	Bedrooms	1	Beds	6	Dorm Beds
Maximum Staffing Capability	7					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers Assigned	Yes					
Bathroom/Shower Facilities	Yes					
Office/Computer Stations	Yes					
Washer/Dryer	Yes					
Other Notable Features	None					
Safety & Security						
Station Sprinklered	Yes					
Smoke Detection	Yes					
Decontamination/Bio. Disposal	Yes					
Security System	No					
Vehicle Exhaust System	No					

Summary of the Salem Fire Stations

The following figure summarizes some of the primary features of the 11 Salem Fire Department fire stations.

Figure 28: Combined Features of the SFD Fire Stations

Station	Square Footage	Apparatus Bays	Maximum Staff Capacity	General Condition	Station Age
Station 1	11,788	4	5	Fair	52 years
Station 2	5,841	3	8	Fair	46 years
Station 3	4,094	2	4	Fair	53 years
Station 4	6,326	3	9	Fair	49 years
Station 5	6,326	4	7	Good	15 years
Station 6	2,425	3	4	Fair	48 years
Station 7	10,583	4	7	Good	15 years
Station 8	7,200	1	3	Poor	47 years
Station 9	1,971	2	3	Fair	41 years
Station 10	10,583	4	7	Good	15 years
Station 11	10,497	4	7	Good	15 years
Totals:	**77,634**	**34**	**64**	**Averages:**	**36 years**

Fire Stations Discussion

As shown in the preceding figure, only four (36%) of SFD's fire stations were rated as "Good" (all built in 2008). The remaining seven fire stations were considered in "Fair" or "Poor" condition. The ages of the SFD's fire stations ranged from 15 to 53 years. Since fire stations are typically built to last about 50 years, the City of Salem should have or implement a capital facilities replacement plan for the older fire stations.

Ambulance Posting Locations

Falck Ambulance Northwest (FANW) maintains its headquarters facility at 1790 Front Street NE in Salem (which serves as Post #1). In addition, FANW posts ambulances at multiple locations around the city. The next figure shows the locations and times of each ambulance post.

Figure 29: Falck Ambulance Posting Locations

Post	Location	Unit	Start Time	End Time
Post #1	1650 Oak St SE	FNA #1	0400	1600
Post #2	4450 Commercial St SE	FNA #2	0500	1700
Post #3	1801 Sunnyview Rd NE	FNA #3	0600	1800
Post #4	585 Wallace Rd NW	FNA #4	0700	1900
Post #5	1880 Lancaster Dr Ne #128	FNA #5	0800	2000
Post #6	3170 Commercial St SE	FNA #6	0830	2030
Post #7	1790 Front St Ne (HQ)	FNA #7	0900	2100
Post #8	110 Hawthorne Av SE	FNA #8	1200	0000

Salem Fire Department EMS Vehicles Inventory

Fire apparatus, ambulances, and other emergency response vehicles must be sufficiently reliable to transport firefighters, EMS providers, and equipment rapidly and safely to an incident scene. In addition, such vehicles must be properly equipped and function appropriately to ensure that the delivery of emergency medical care is not compromised.

As part of this study, AP Triton requested that SFD provide a complete inventory of its EMS-specific vehicles and any specialty units. For each vehicle listed, SFD was asked to rate its condition utilizing the criteria described in the next figure.

Figure 30: Criteria Used to Determine Vehicle Condition

Components	Points Assignment Criteria
Age:	One point for every year of chronological age, based on the date the unit was originally placed into service.
Miles/Hours:	One point for every 10,000 miles or 1,000 hours
Service:	1, 3, or 5 points are assigned based on the service type received (e.g., pumper given a 5 since it is classified as severe duty).
Condition:	This category considers body condition, rust, interior condition, accident history, anticipated repairs, etc. The better the condition, the lower the assignment of points.
Reliability:	Points are assigned as 1, 3, or 5, depending on the frequency a vehicle is in for repair (e.g., a 5 would be assigned to a vehicle in the shop 2 or more times per month on average, while a 1 would be assigned if in the shop on average once every 3 months or less.

Point Ranges	Rating	Condition Description
Under 18 points	Condition I	Excellent
18–22 points	Condition II	Good
23–27 points	Condition III	Fair (consider replacement)
28 points or higher	Condition IV	Poor (immediate replacement)

The next figure lists the Salem Fire Department's current frontline EMS vehicles inventory.

Figure 31: SFD Frontline EMS Units Inventory (2023)

Unit	Type	Manufacturer	Year	Condition	Features
EMS Units					
Medic 16	Type I	Lifeline	2002	Fair	ALS equipped
Medic 18	Type I	Lifeline	2002	Fair	ALS equipped
Medic 19	Type I	Lifeline	2002	Fair	ALS equipped

As shown in the preceding figure, the Salem Fire Department operates three 21-year-old Type I Medic units—each considered in "Fair" condition. In addition, SFD maintains a 2023 *Rogue Jet Boatworks* boat (Boat 5) in "Excellent" condition and a *Custom Weld* boat (Boat 15) in "Very Good" condition.

Vehicle Maintenance & Replacement Discussion

No piece of mechanical equipment or vehicle can be expected to last indefinitely. As apparatus and vehicles age, repairs become more frequent and complex. Parts may become more difficult to obtain, and downtime for repair and maintenance increases. Since Emergency Medical Services and other emergencies prove critical to a community, downtime is one of the most frequently identified reasons for replacing ambulances and other apparatus.

Modern ambulances are complex vehicles requiring frequent maintenance and mechanics with specific technical skills. The SFD utilizes three Type I ambulances that are 21 years old and in "Fair" condition. Ambulances—or medic units—that are in service in busy systems such as Salem are typically replaced within 7–10 years. Likely, SFD's current medic units would not be adequate for the daily transportation of patients.

Capital Medical Equipment

Cardiac Devices

The SFD utilizes the ZOLL® X Series® Advanced monitor/defibrillator when providing advanced life support service. The capabilities of this device include:

- 12-Lead Electrocardiograms.
- Oxygen saturation monitoring (SpO_2).
- End-tidal carbon monoxide monitoring ($etCO_2$).
- Carbon monoxide monitoring (CO).
- Blood pressure monitoring.

In addition to these features, X Series® Advanced provides real-time feedback on ventilation rate and volume (Real BVM Help®), trending information on traumatic brain injuries (TBI Dashboard™), real-time monitoring of chest compressions (Real CPR Help®), and the RescueNet® CaseReview feature which enables post-incident review for quality management (QM) purposes.

Emergency Medical Services Management Review

Managing today's EMS service is an increasingly complex endeavor. A forward-thinking fire department must navigate many elements, such as sustaining a qualified and stable workforce, mitigating escalating health and safety risks, meeting community expectations, guaranteeing timely and adequate emergency response, and exercising prudent financial stewardship.

Beyond these organizational complexities, effective fire department management also involves establishing foundational elements like the department's Mission, Vision, and Values. It requires setting clear goals and objectives, identifying critical issues and challenges, fostering robust internal and external communication channels, ensuring meticulous and up-to-date record-keeping, and utilizing various planning processes. This report section delves into the SFD's initiatives and efforts in these crucial areas.

Foundational Elements

Mission, Vision, Values

The Salem Fire Department has thoughtfully crafted its Mission, Vision, and Core Values Statement. This defining document is prominently featured in the Department's Annual Report and displayed at each fire station.

SFD Mission Statement

"Protecting lives, property, and the environment placing safety and service above all."

SFD Vision Statement

The Salem Fire Department will:

> *"Provide excellent customer service and exceed the expectations of the people we serve, both internally and externally.*
>
> *Be responsive to the changing needs of our customers.*
>
> *Be an organization of highly trained and motivated professionals.*
>
> *Be proactive in planning for our community's future.*
>
> *Be an organization highly respected by our peers."*

SFD Core Values

- **Teamwork**
  All members work together to achieve the mission.
- **Integrity**
  Always doing what is right for our customers and our team. We are committed to honest, ethical behavior and hold ourselves accountable to these values.
- **Excellence**
  Delivering service through professionalism and respect. Striving to be the best for our customers and team members.
- **Health and Safety**
  We believe health and safety are essential to fulfilling our mission. We are committed to providing quality health and safety programs to ensure operational readiness and personal well-being.

Strategic Initiatives

In early 2018, SFD developed the Strategic Services Plan (SSP), which outlines multiple strategic initiatives. The SSP serves as a thorough overview of the organization, succinctly capturing the 'Why' (mission and principles), the 'How' (SFD's organizational framework), and the 'What' (service pillars, recommendations, and performance metrics). The SSP is accessible to all employees via the City's internal network.

The Department identified five objectives specific to the provision of EMS. The following figure shows the description and current state of each objective.

Figure 32: SFD 2018 EMS-Specific Strategic Objectives

Objective No.	Description
Objective 1-C	Research options for an electronic records management system to improve productivity and quality of information collection and analysis.
Objective 1-G	Explore alternative non-emergency medical delivery systems.
Objective 1-H	Evaluate and determine if secure access to the health information exchange (HIE) is viable.
Objective 1-I	Evaluate and improve the dispatch triage system for all response types.
Objective 1-M	Work with facilities that are high-frequency users of the EMS system to reduce SFD response workload.

Critical Issues

As a part of this study, interviews were conducted with internal customers. These customers were asked to list the organization's top four critical issues relating to EMS. AP Triton evaluated the responses, looking for commonalities that could lead to more cohesive planning for the future. The next figure summarizes the issues facing Salem Fire Department EMS.

Figure 33: SFD EMS Critical Issues

Issue No.	Description
1	Keeping our private contractor in compliance with the contract (1,030 unit hours—minimum)
2	Having to pay double overtime to place our medic in service to cover the missing hours that FANW cannot make
3	EMS enterprise fund needs to remain solvent

Consistent with the stakeholder interviews conducted throughout the study, staffing and retention are considered areas for improvement. There is a necessity for a focused strategic plan specific to EMS to identify goals and objectives for the above system challenges.

Communications

Internal Communications

Communication within SFD is facilitated through various means. The Senior Leadership Team within Administration holds a weekly meeting. This weekly huddle is a forum for Team members to connect, share pertinent updates, and discuss key issues within their respective Divisions.

To foster open dialogue with labor unions, the Fire Chief and Senior Leadership Team members regularly meet with the Executive Board from Local 314 to address and collaborate on labor-management issues.

The Deputy Chief of Operations holds monthly meetings with the Operations Division to facilitate bi-directional communication between the Fire Chief's office and emergency response personnel. These meetings feature representation from all three crews, each led by their respective Battalion Chief, to ensure that information flows smoothly up and down the chain of command.

The following figure summarizes SFD's internal communications.

Figure 34: SFD Internal Communications

Internal Communication	SFD
Regularly scheduled FD staff meetings	Yes
All personnel e-mail	Yes
Agency Intranet	Yes
Written memos used	Yes
Member newsletters	Yes
Member forums (all-hands meetings)	Yes
Open-door policy	Yes
The chain of command clearly identified	Yes

External Communications

Information is primarily disseminated to the public via the Department's official website. The Department does not currently use periodic community newsletters and ad-hoc advisory committees, which can be additional avenues for public communication. While the Department does not conduct community or regular customer satisfaction surveys, SFD actively engages with the community through prevalent social media platforms such as Facebook. Hyperlocal social networking sites like FlashAlert are also utilized for information sharing. The Deputy Chief of Administrative Services and the City's Emergency Manager act as the department's Public Information Officer (PIO) and oversee the social media program, with everyone within the department providing and monitoring content.

Reporting & Recordkeeping

Maintaining accurate and complete records is crucial for the success of any organization. By diligently collecting information from each division within the department, SFD ensures the acquisition of relevant data, thereby facilitating timely reporting per local, state, and federal requirements.

SFD employs ESO®, a third-party platform, as its electronic repository for all incident data. Training records are also electronically archived via another third-party platform, Target Solutions®.

The Department maintains and archives additional records, including those for self-contained breathing apparatus (SCBA), hose testing, ladder testing, and apparatus pump tests. SFD's shop personnel carries out vehicle maintenance, and the corresponding records are managed by the Fleet Supervisor.

Regulatory Documents & Recordkeeping

Government entities rely on written policies, standard operating procedures (SOPs), and reports for effective management and legal compliance.

The following figure summarizes SFD's regulatory documents.

Figure 35: Regulatory Documents

Regulatory Documents	SFD
Rules available for review	Yes
SOPs available for review	Yes
SOPs regularly updated	Yes
SOPs used in training evolutions	Yes
Department policies available for review	Yes
Internally reviewed for consistency	Update necessary
Internally reviewed for legal mandates	In progress
Training on policies provided	Yes

Document Control & Security

SFD employs computer-based and manual recordkeeping systems for Human Resources and similar documentation. Security within SFD is bifurcated into two main categories: document security and facility/apparatus security.

Document security is managed using password-protected computers, workstations, and cloud-based applications. Facility security is implemented using electronic access controls for external doors and remote transmitters in each vehicle to activate gates and apparatus bay doors.

Documentation & Compliance Testing

Accurate recordkeeping and secure archiving are crucial for meeting legal and regulatory requirements imposed by government agencies and adhering to best business practices. Such secure archiving can be particularly important when faced with legal or other administrative proceedings. Below is a summary of SFD's practices in reporting and recordkeeping.

Figure 36: Reporting & Recordkeeping

Record Type	SFD
Electronic Incident Records Kept	Yes
Software for Documenting Non-EMS Calls	ESO
Software Used for EMS (if different)	ESO
Periodic Reports to Elected Officials	
Financial Reports	Yes
Management Reports	Yes
Operational Reports	Yes (Monthly)
Annual Report Produced	Yes
Required Records Maintained & By Whom	
Incident Reports	Yes
Patient Care Reports	Yes
Exposure Records	Yes
Vehicle Maintenance Records	Internal, Fleet Supervisor

SFD's approach to recordkeeping is both efficient and effective. The City's fleet services systematically conduct and document vehicle maintenance, facilitating ongoing maintenance and identifying future capital expenditure needs.

Information Technology Systems

SFD collaborates with the City of Salem for all its Information Technology services. The Department of Innovation/Technology, commonly called Do-IT, handles the maintenance of Department computers, hardware, software, printers, landlines, cellular phones, tablets, and peripherals and provides any necessary technical support.

Emergency Medical Transport & System Oversight

The Emergency Medical Transport and System Oversight section summarizes the Department's services relating to pre-hospital medical care. AP Triton used focused interviews combined with information from the Department to develop a perspective of current and future EMS needs throughout the study area.

The purpose of this section is to evaluate the current level of pre-hospital care and future needs based on projected call volume and available resources. AP Triton will identify challenges relating to the EMS program and make recommendations with projected outcomes.

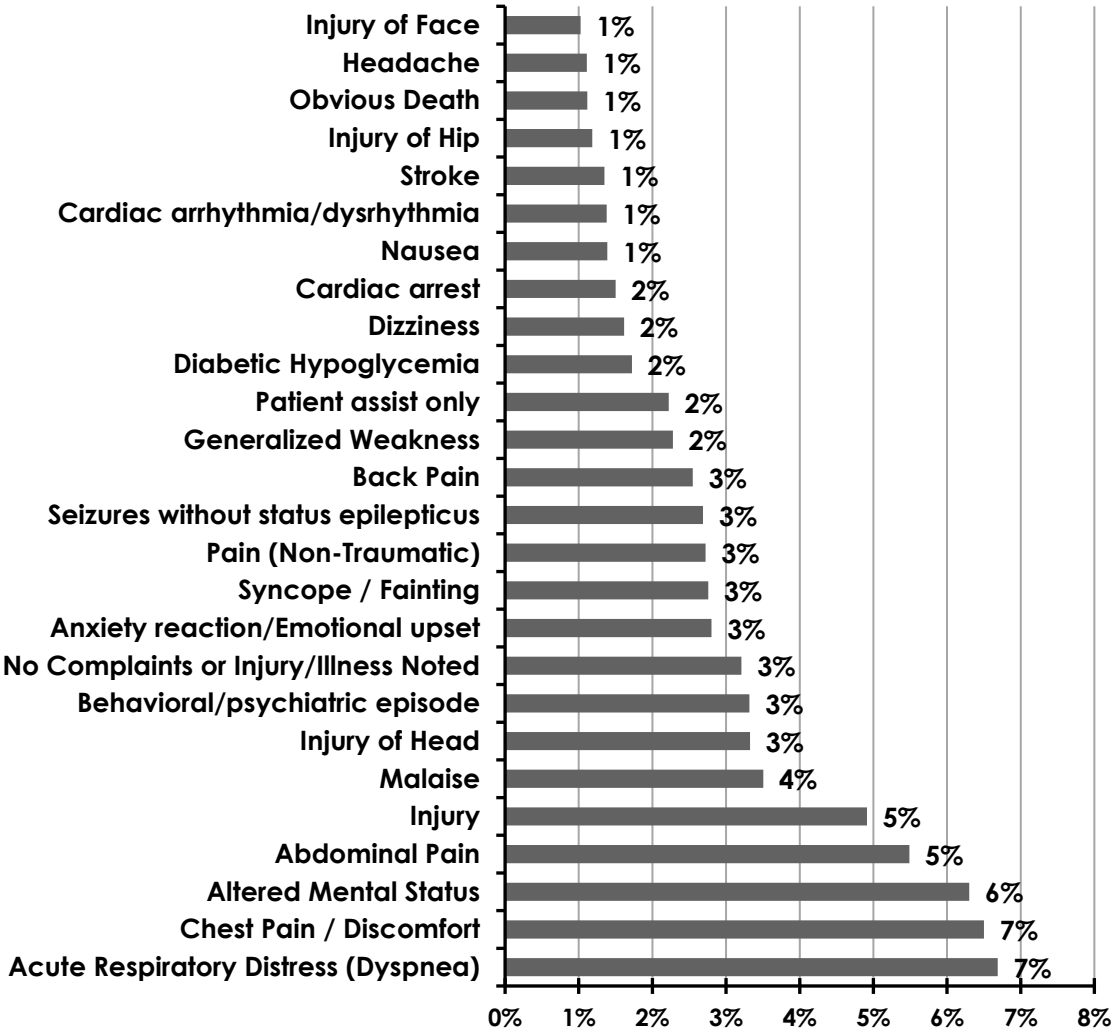
Overview

Salem Fire Department EMS established the Paramedic program in Salem Fire Department in 1980. This analysis focuses on the SFD's provision of EMS.

EMS Service Demand

A combined total for EMS service calls within the study area was approximately 142,242 incidents for 2018–2022. Based on the available data, Figure 13 shows the top 90% of medical emergency incidents.

Figure 37: SFD EMS Service Demand (2018–2022)



The criticality shown in the above figure supports the necessity of ALS response. The current staffing model requires all line Firefighters to be certified Paramedics. Future staffing models may benefit from the limited utilization of Paramedic/EMT-Basic. More on this discussion is found later in this section. The above data supports using a BLS transport unit to support ALS response capacity.

The EMS System

SFD provides paramedic first responder care, and a private ambulance provides ambulance transport to definitive care. As previously discussed, SFD has utilized 15 fire apparatuses, one staffed ambulance, and a surge capacity ambulance for the past 18 months.

Dispatch & Emergency Communications

As previously discussed, the City of Salem has one Public Safety Answering Points (PSAP), which transfer all fire and EMS calls to the Salem Fire Department Emergency Communications Center. The Department provides emergency medical dispatch (EMD) for all EMS-related incidents. The following figure compares the type of medical emergency identified by the EMD system and the paramedic's impression on scene.

Figure 38: Comparison of EMD Categorization to Provider Impression (2018–2022)

Medical Event Category	EMD Categorization	Paramedic Impression
Breathing Problem	9.0%	6.6%
Chest Pain (Non-Traumatic)	8.2%	6.5%
Abdominal Pain/Problems	4.2%	5.5%
Unconscious/Fainting	4.2%	2.8%
Convulsions/Seizure	3.3%	2.7%
Assist Invalid	2.5%	2.2%
Overdose/Poisoning/Ingestion	2.5%	0.8%
Cardiac Arrest/Death	2.4%	1.5%
Psychiatric/Behavior/Suicide	2.3%	3.2%
Stroke/CVA	2.2%	1.3%
Traumatic Injury	2.2%	4.7%
Diabetic Problem	2.0%	1.6%
Hemorrhage/Laceration	1.5%	0.7%
Back Pain (Non-Traumatic)	1.2%	2.5%
Allergic Reactions/Stings	0.7%	0.6%
Altered Mental Status	0.5%	6.3%
Headache	0.5%	1.1%

The preceding figure demonstrates the effectiveness of the EMD program.

Medical Community Demographics

Regional Medical Necessity Analysis

The following chart shows Oregon's leading causes of death compared to the national ranking. Santee County is consistently compared to state statistics. This information helps identify and compare the medical service demand in SFD's response area.

Figure 39: Leading Causes of Death in Oregan (2017)

Condition	Deaths	Rate	State Rank	U.S. Rate
1. Cancer	8,083	154.2	25th (tie)	152.5
2. Heart Disease	6,942	134.0	47th	165.0
3. Chronic Respiratory Diseases	2,088	39.7	32nd	40.9
4. Accidents	2,076	44.7	37th	49.4
5. Stroke	2,066	39.9	17th	37.6
6. Alzheimer's disease	1,850	36.0	18th	31.0
7. Diabetes	1,243	23.9	14th (tie)	21.5
8. Suicide	825	19.0	15th	14.0
9. Chronic Liver Disease/Cirrhosis	642	12.6	16th (tie)	10.9
10. Flu/Pneumonia	573	11.1	45th	14.3

Specific to SFD, the following figure compares Oregon's leading causes of death to incident volume during 2018–2022.

Figure 40: Leading Cause of Death Oregon & SFD Incident Service Demand Comparison

Condition	Cause of Death Ranking—Oregan	Service Demand Percent 2018–2022
1. Cancer	1	Unable to determine
2. Heart Disease	3	7%
3. Chronic Respiratory Diseases	5	6.6%
4. Accidents	6	4.7%
5. Stroke	7	1.3%

Five of Oregon's top ten leading causes of death translate to 37% of SFD service demand. Training emphasis should be placed on EMS responses to these medical events.

Regional Medical Health Insurance Analysis

The demography of a community significantly impacts the demand for emergency medical services. Income, poverty, health status, population ages, and health insurance can drive service demand. Available transport revenue is also affected by demographics. Approximately 71.4% of the Salem Fire Department has some form (public/private) health insurance. The following figure shows the SFD payer mix and available revenues for 2022.

Figure 41: SFD Payer Mix & Transport Revenues

Payer	Percentage FANW
Medicare	56.9%
Medicaid	27.1%
Commercial Insurance	12.9%
Self-Pay	3.6%
Other	0.4%

Medical Control & Quality Management

Emergency medical services rarely constitute definitive care. The continuum of care, starting in the pre-hospital setting and ending in the appropriate medical facility, is critical to positive patient outcomes.

The Paramedics operate on this protocol-based system with limited intervention from the Medical Program Director. The protocols will guide the paramedic treatment for a patient with an extreme medical emergency, such as a stroke or evolving myocardial infarction, and direct the Paramedics to call them for additional directions not covered by those protocols. Based on available data and site visit interviews, the Medical Director has limited involvement in the initial hiring of Paramedics.

AP Triton recommends that the Medical Director be pivotal in deciding who will work under their license. Additionally, the Medical Director should take an active role in all medical deficiencies identified in the CQI process and make final judgments regarding a Paramedic's ability to function in the system.

Several processes accomplish quality assurance. The EMS Coordinator, EMS Training Officer, and QI Committee members oversee the program. The process begins with key performance indicators (KPIs) identified through the First Watch software. The following figure shows the specific KPI for each category.

Figure 42: Key Performance Indicators

Heading	ACS/STEMI	DSI/RSI	ETI	Diabetic	Cardiac Arrest
Assessment					
History (PMI, allergies, meds.)	X	X	X	X	X
Two sets of vitals	**No**	**No**	**No**	**No**	**No**
SPO2	**No**	X	X	**No**	X
ETCO2	**No**	X	X	**No**	X
Breath Sounds	X	X	X	N/A	X
Pain Scale	X	N/A	N/A	N/A	N/A
12-lead ECG	X	X	**No**	N/A	X
Stroke Scale	N/A	N/A	N/A	**No**	N/A
GCS	**No**	**No**	**No**	**No**	N/A
Blood Glucose	**No**	**No**	**No**	X	**No**
Oxygen	X	X	X	X	X
IV/IO					X
Medication (efficacy)	X	X	X	X	X
CPAP/BiPAP			X	X	
Documentation	X	X	X	X	X

This analysis identified several areas for improvement regarding KPIs. SFD does not automatically review CVA (Stroke), refusals, and various respiratory emergencies (asthma, anaphylaxis, CHF). These specific events have high criticality and associated liability and should be reviewed. The preceding figure (highlighted in **bold/red**) also shows specific metrics that need to be automatically captured and reviewed. Specific time stamps should be considered for all assessments and interventions.

The preceding KPIs should trigger the training and education usually facilitated by the EMS Training Officer.

A challenge currently facing many EMS agencies is the need for more objective data to support high-quality care. As previously discussed, there is a necessity for evidence-based data that can provide accurate information regarding the level of care provided.

Additionally, the data may support program expansion and budgetary increases. This evaluation process indicated an opportunity for improvement regarding data collection and analysis. Currently, SFD is using ESO® for patient care reporting. The program will export data to an Excel format if adequately documented, and the data can be easily interrogated to provide various evaluations.

Like many EMS organizations throughout the country, an opportunity exists for SFD to evaluate staffing, protocols, medications, and procedures utilized by the system. Emergency medical services must balance being financially responsible and offering the required service levels. Each piece of staffing, equipment, and supply that the Salem Fire Department EMS purchases that is not required by law or industry standards should be subject to a cost-benefit analysis. The following figures show the utilization of procedures and medications in the SFD system.

Figure 43: SFD Medication Utilization (2022)

Medication	Utilization
Adenosine	4
Amiodarone	83
Amiodarone Infusion	14
Atropine	51
Benadryl	444
Calcium Chloride	48
Cardizem	200
Dexamethasone	126
Dextrose 10%	227
Dextrose 50%	2
Droperidol	807
Epi 1:100000	147
Epinephrine 1:10	356
Epinephrine Infusion	378
Esmolol	6
Fentanyl	3,757
Glucagon	58
Imodium	1
Ketamine	613
Ketorolac	1,009
Lasix	1
Levophed	70
Lidocaine	29
Magnesium Sulfate	74
Magnesium Sulfate Infusion	19
Midazolam	494
Nitro Paste	109
Nitroglycerin	40
Nitrostat	649
Other Medication	32
Reglan	2
Rocuronium	119
Sodium Bicarb 8.4%	52
Solu-Medrol	293
Terbutaline	23
Tranexamic Acid (TXA)	60
Zofran	3,672

Figure 44: SFD Procedure Utilization (2022)

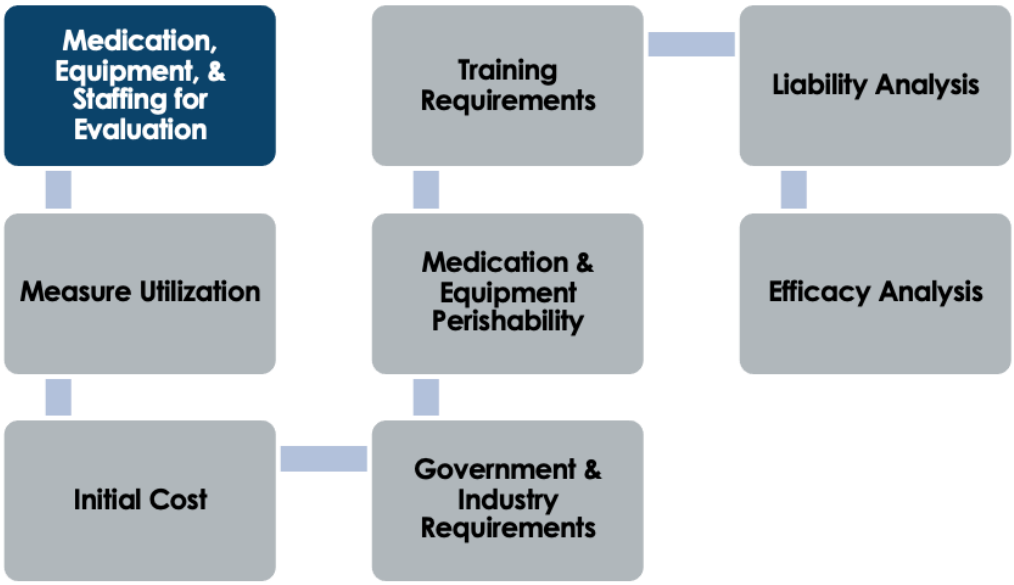
Procedure	Utilization
Miscellaneous	**441**
Magill Forceps	2
Nasogastric Tube	18
Needle Cricothyroidotomy	2
Orogastric Tube	7
Pleural Decompression	6
Simple Thoracostomy	10
Surgical Cricothyroidotomy	1
Video Laryngoscopy	395
Critical Care	**1,375**
ALS Assessment	1,368
Lab Values	1
Pericardiocentesis	6
Defib/Cardio/Pace	**378**
Cardioversion	15
Dual Sequence Defibrillation (DSD)	44
Manual Defibrillation	260
Pacing	56
Pacing Discontinued	3
IV Therapy	**18,532**
Intraosseous	527
IV Bolus	3,784
IV Monitoring	371
IV Therapy	13,850

The preceding procedures and medications should be evaluated based on a seven-step analysis.

1. Measure utilization of procedure or medication—all other resources should be based on the specific jurisdiction. The resources needed in a rural area frequently differ from those needed in an urban area.
2. Identify the overall cost of supply or equipment.

3. Training (initial & continued)—The total cost of a resource is affected by the initial and ongoing training needed for proficiency. The degree of training should be considered in relation to a particular piece of equipment, medication taken, or services rendered.
4. Reviewing a resource's perishability—medications have certain expiration dates and can have financial implications if they are not used. Due to reliability or technological advancements, technical equipment like cardiac monitors are also prone to perishability.
5. Regional, state, and federal requirements can be a requirement regardless of other factors.
6. Liability Analysis—evaluate the utilization of a medication or procedure compared to the liability risk associated.
7. Measure efficacy—a statistical study must be carried out to ascertain the appraised resource's overall effectiveness.

Figure 45: Procedures & Medications Seven Step Analysis



The above analysis must involve the Medical Director, SFD leadership, and hospital emergency department staff. The results will help identify the specific service levels and the purchase and utilization of resources on specific response apparatus.

Logistical Support

A routine utilization study would help identify opportunities for improved inventory control. SFD does not currently utilize an electronic system for logistical support. SFD now uses a manual system performed by crews during daily ambulance checks. The EMS Training Officer manages the primary cache of EMS supplies. Due to the organization's size, AP Triton recommends implementing a partially automated inventory control system. Various systems have proven cost-effective in the long run, especially in reducing expiration waste and lost supplies.

An efficient inventory control system can become cost-effective, channeling funding to other aspects of the program. The systems can provide current inventories that assist crews in familiarizing themselves with the location of equipment and supplies. These systems include bar code scanning, QR readers, and radio frequency ID (RFID).

Paramedic Coverage & Configuration

The next figure shows the minimum requirements for Paramedic staffing for SFD.

Figure 46: SFD Paramedic Staffing

Response Unit	Station Location	EMT-Basic	Paramedic
Station 1	370 Trade Street SE		5
Station 2	875 Madison Street NE		8
Station 3	1884 Lansing Avenue NE		3
Station 4	200 Alive Avenue S		8
Station 5	1520 Glen Creek Road NW		3
Station 6	2740 25th Street SE		3
Station 7	5021 Liberty Road S		3
Station 8	4000 Lancaster Drive NE		3
Station 9	5080 Battle Creek Road Se		3
Station 10	3611 State Street		3
Station 11	1970 Orchard Heights Road NW		3

SFD currently staffs all apparatus with Paramedics. The Department is considering plans to utilize Firefighter/EMT Basics. The change in the model may result in improved patient care. Recent research supports that multiple Paramedics on single-patient incidents do not translate to improved care or outcomes. A 2018 article in the Journal of Emergency Medical Services (JEMS) summarized some research associated with multiple Paramedics in a single patient incident. The findings included:[4]

- A lower number of Paramedics per capita resulted in higher survival rates in cardiac arrest patients. The conclusion was related to the dilution of skills associated with limited call volume systems.
- Multiple Paramedics on cardiac arrests did not increase survivability, Return of Spontaneous Circulation (ROSC), or discharge compared to a single paramedic response.
- Multiple Paramedics did not translate to higher success rates of pre-hospital advanced procedures. However, there did appear to be an increased time on scene of traumatic events associated with multiple versus single Paramedics.

Anecdotal research supports the use of multiple Paramedics in high-volume systems due to the increased incidence of burn-out. Based on the information in the Service Delivery Section, the unit hour utilization (UHU) does not support additional units in the system. SFD's single full-time ambulance has a UHU of the system with an average ambulance UHU of 15.6% (2022).

The Falck Ambulances Northwest supporting the Salem system have an average UHU of 15.14%. Other units with full BLS staffing and ALS staffing with one Paramedic and one EMT may be a cost-effective way to address issues identified earlier in this section. SFD may consider performing a cost/benefit analysis of the current staffing plan.

Hospitals & Tertiary Care Facilities

Most patients from the SFD area are transported to Salem Hospital. The following figure shows all transports by SFD in 2022.

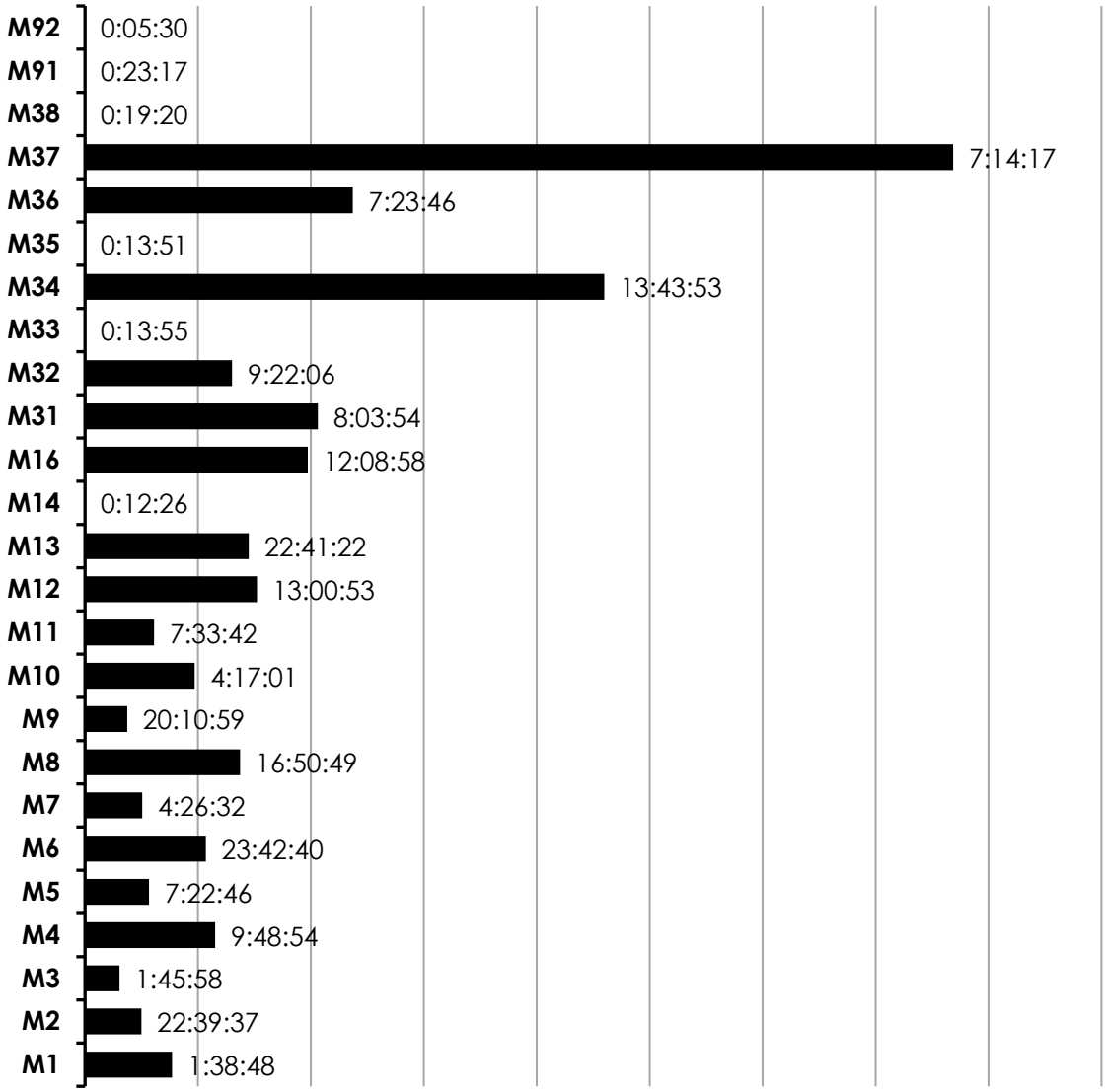
Figure 47: SFD Transport Destination (2022)

Facility	Transports
Good Samaritan Regional Medical Center Corvallis	1
Samaritan Albany General Hospital	1
OHSU Hospital & Clinics	2
Good Samaritan Corvallis Hospital	8
Willamette Valley Medical Center	8
Salem Health West Valley	14
Legacy Silverton Medical Center	23
Santiam Hospital	30
Salem Hospital	10,449

The large coverage area and the necessity to transport to appropriate levels of definitive care contribute to the incident concurrency.

The following figure shows the average transport time for each unit in 2022.

Figure 48: Average Transport Time by Unit (2022)



Percentage of EMS Transports

There is a direct correlation between the number of ambulance transports, system revenue, system concurrence, and resource management. The following figure shows the percentage of ambulance transports based on the hour of the day.

Figure 49: Ambulance Transport Percentage by Hour of the Day (2022)

Hour	EMS Incidents	Patients Transported	Percent Transport
00	746	593	79.5%
01	655	510	77.9%
02	595	462	77.6%
03	552	435	78.8%
04	554	436	78.7%
05	596	482	80.9%
06	684	547	80.0%
07	914	718	78.6%
08	1,175	980	83.4%
09	1,314	1,086	82.6%
10	1,481	1,210	81.7%
11	1,537	1,251	81.4%
12	1,527	1,185	77.6%
13	1,558	1,245	79.9%
14	1,548	1,227	79.3%
15	1,539	1,215	78.9%
16	1,566	1,210	77.3%
17	1,514	1,187	78.4%
18	1,388	1,081	77.9%
19	1,363	1,086	79.7%
20	1,200	935	77.9%
21	1,093	840	76.9%
22	934	718	76.9%

SFD is very consistent throughout the day. There is a slight decrease during the evening period, but it is not an indication for review.

Ambulance Patient Offload Times

In many communities, EMS systems are challenged by the delay in handing off patients upon arrival at the hospital. The interval between arriving at the hospital and transferring care to another qualified healthcare provider may be referred to as: *Ambulance Patient Offload Time* (APOT), *Wall Time*, or Hospital Turnaround Time.

Emergency departments are often at capacity, and EMS crews must maintain attendance and care of the patient until a patient bed becomes available and the emergency department has the necessary staffing.

The following figure shows the average time each of the FANW ambulances were at the receiving hospital after arrival.

Figure 50: Average Falck Ambulance Northwest APOT Times (2022)

Unit	Average Time
M1	22:42:03
M10	3:29:46
M11	7:06:17
M12	19:21:16
M13	22:19:31
M14	19:58:12
M2	6:41:01
M3	0:55:40
M4	10:52:05
M5	19:51:35
M6	22:10:37
M7	21:32:24
M8	8:32:03
M9	10:54:59

Response Performance

The following figure shows the 90th percentile for each response metric and a comparison of MFR from SFD and ambulance response by Falck Ambulance Northwest.

Figure 51: Response Performance Comparison EMS Incidents (2022)

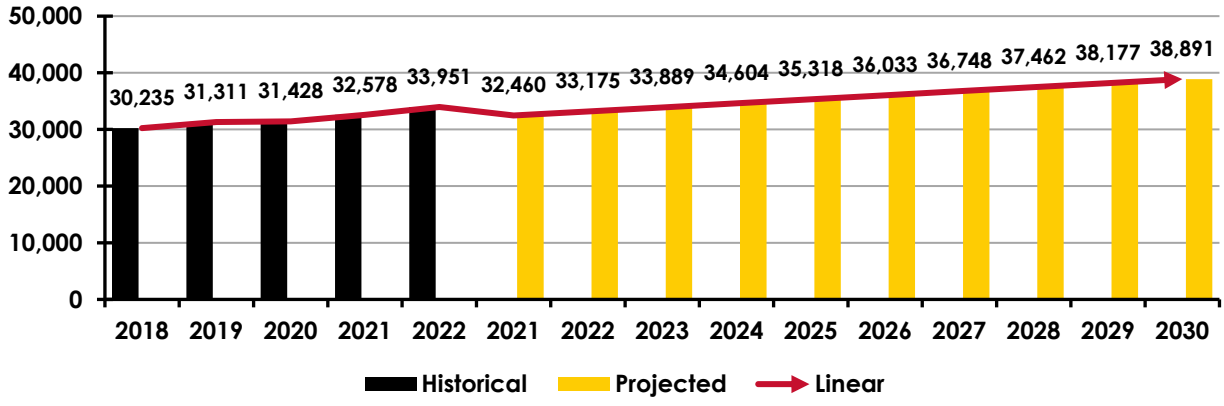
Agency	Turnout Time	Travel Time	Response Time
Salem Fire Department	01:54	0:08:37	0:09:07
Falck Ambulance Northwest	0:00:44	0:11:24	0:11:47

Impact of Aging Population on EMS Service Demand

The existing population will likely continue to age in place. The increasing elderly population will increase the demand for emergency medical services as the elderly population is disproportionately more of a consumer of these services. National medical industry studies suggest that patients over 65 are three times more likely to access local emergency services than other age groups.

The following figure shows the historical growth in the population 65+ and the projected growth over the next eight years.

Figure 52: Salem Fire Department Aging Population



The current population of persons 65 and older living in Salem, Oregan, according to the 2022 estimate, was 33,951, or 19% of the population.[5] Over the next eight years, assuming the current 65 and older demographic stays in the area, this group will increase by 13% by 2030.

The preceding information is consistent with SFD's demand for service over the past five years. Over the past five years, the highest patient demographic was ages 65+, and the highest increase in service delivery.

It is reasonable to assume that the demand for emergency medical services in this age group will increase proportionally to the increase in demographic size. This means that in ten years, SFD will experience a rise in EMS due to the more significant percentage of utilization by the elderly category.

Since the service demand data for EMS calls are not stratified by age, it is difficult to predict the exact impact on the number of calls. It is also impossible to know whether people of that age will remain in the city or move to other areas. Conversely, it may be that the individuals moving into the city may be disproportionately in the "over 65" demographics.

In addition to standard emergency medical services, there will be an increased need for non-emergent medical services provided by a community paramedicine program or a mobile intensive healthcare program. Such programs might be developed through a cooperative venture between the hospitals and SFD.

Training & Continuing Medical Education

Training is the foundation of all aspects of emergency services. An individual's ability to effectively utilize resources and equipment depends on the training level an organization has provided. The following section provides an overview of the current training program's equipment, facilities, execution, and efficacy.

Training Staff

Training is a significant component of an efficient and capable department. The SFD training program appears to have opportunities for improvement. There is an EMS Deputy Chief and EMS Coordinator who focus on operational functions. A single EMS Training Officer is responsible for all training sessions and logistical needs for the division.

The limited staff provides all the necessary EMS training and education for the Department's first responder programs and internal training requirements.

General Training Competencies

The following figure summarizes the general training topics and certification levels provided by SFD. The Department has limited Training SOGs with hour requirements to obtain and maintain various certification levels.

Figure 53: General Training Competencies by SFD

Training Competencies	Salem Fire Department
ALS courses provided (ACLS, PHTLS, PALS, others, etc.)	AHA and NAEMT card classes are offered once a year, some hybrid, some in-person.
Scene safety & incident management training	Covered during the new hire academy. All providers certified in ICS 100, 200, 700, and 800.
Infection control & prevention training provided	Virtual

SFD has demonstrated the capacity to manage critical incidents with state-of-the-art equipment and highly trained personnel. The Department maintains general competencies by the continuing medical education (CME) required by the National Registry and the State of Oregon.

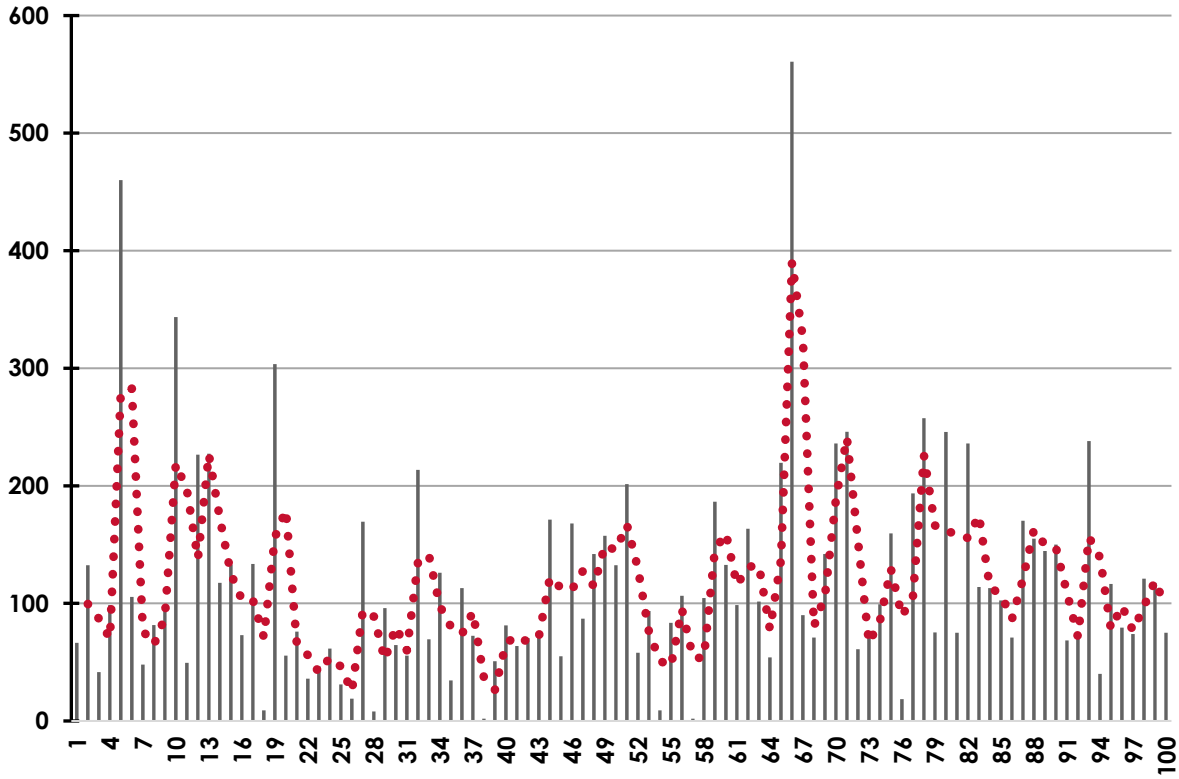
The Department would benefit from an extensive utilization of a random check-off system that documents the proficiency of a specific skill. The evaluation criteria include the following.

- Recognition of the necessity for the medical procedure
- Gathering appropriate equipment and supplies for the procedure
- Procedural requirements, including identifying anatomical sites
- Recognition of the efficacy or complications relating to the procedure
- Appropriate documentation

SFD should consider developing a policy for specific skill check-offs each year to support overall skill proficiency within two years.

SFD demonstrated an inconsistent level of training for each Paramedic throughout the year. The following figures show a breakdown of the total number of training hours each paramedic received in 2022.

Figure 54: Individual Training Analysis



The training program should continue efforts to maintain consistent training hours per individual Paramedic/EMT.

Training Topics Discussion

The following figure summarizes the percentage of training topics compared to service demand in 2022.

Figure 55: SFD Training Emphasis Comparison to Service Demand (2022)

Incident Type	Training	Incident
Fire	30%	< 1%
EMS	41%	72%
Hazmat	8%	< 1%
Rescue	13%	< 1%
Wildland	8%	< 1%
Other	< 1%	26%
Cardiac	5%	10%

Note: Numbers rounded to the nearest integer.

The previous figure shows an opportunity for improvement relating to the Department's annual training program. It is important to note that 72.3% of all incidents are related to EMS; however, only 41.2% of training is allocated to patient care. SFD has a progressive advanced life support response program. Based on the number of Paramedics in the Department, an increase in EMS training hours is warranted.

EMS Training Program

The Department's past hiring practice was to hire only Paramedics/Firefighters. In 2022, the Department provided 15,493 paramedic-level medications or procedures. The skill volume translated to an average of 99.3 medications/procedures per Paramedic. Seventy-eight advanced airway procedures (intubations/supraglottic) were performed during the same period, correlating to 0.5 airway procedures per Paramedic.

The dilution of skills, which, as discussed in the EMS Section, can impact overall patient outcomes. Intubations performed in a hospital setting are beneficial, but the performance of paramedic skills in the field setting is essential. AP Triton recommends establishing a cooperative agreement with Salem Hospital so Paramedics can support skill competency.

Another consideration relates to SFD protocols that include rapid sequence intubation (RSI). The data shows that most intubations occurred during the care of cardiac arrest patients. Combined with the minimal number of intubations per paramedic each year, the efficacy of RSI should be evaluated.

The following figure shows the breakdown of medications/procedures provided in 2022 and the skills ratio per paramedic.

Figure 56: Procedure Ratio per Paramedic (2022)

Procedure	Total	Procedure/Paramedic
12-Lead ECG	1,152	8.47
3-Lead ECG	807	5.93
AED Defibrillation	4	0.03
ALS Assessment	7,338	53.96
Cardiac Alert	7	0.05
Cardioversion	1	0.01
Consult	6	0.04
Consult/Order Requested	3	0.02
Cooling	3	0.02
CPAP	28	0.21
CPR Discontinued	23	0.17
Cricoid Pressure	0	0.00
Delayed Sequence Intubation	1	0.01
$ETCO_2$ Digital Capnography	1	0.01
$ETCO_2$ Monitoring	78	0.57
ETI Verification	3	0.02
iGEL	17	0.13
Intraosseous	45	0.33
Magill Forceps	2	0.01
Manual Airway	8	0.06
Nasogastric Tube	1	0.01
Orogastric Tube	1	0.01
Orotracheal Intubation	2	0.01
Pacing	16	0.12
Pacing Discontinued	3	0.02
Pain Management	4	0.03
Patella Reduction	2	0.01
PEEP	5	0.04
Pleural Decompression	4	0.03
QuickTrach (Adult)	1	0.01
Rapid Sequence Intubation	2	0.01
ResQPOD	12	0.09

Figure 57: Procedure Ratio per Paramedic Continued (2022)

Procedure	Total	Procedure/Paramedic
Sedation Assist Intubation (SAI)	0	0.00
Sepsis Notification	10	0.07
STEMI Alert	5	0.04
Stretcher	4,357	32.04
Stroke Alert	38	0.28
Trauma Alert	54	0.40
Vagal Maneuvers	18	0.13
Video Laryngoscopy	41	0.30

Figure 58: Medication Ratio per Paramedic (2022)

Medication	Total	Medication/Paramedic
Acetaminophen	7	0.05
Activated Charcoal	1	0.01
Adenosine	11	0.08
Afrin	0	0.00
Albuterol	196	1.44
Alteplase	0	0.00
Amiodarone	9	0.07
Atropine	0	0.00
Atrovent	168	1.24
Benadryl	7	0.05
Calcium Gluconate	1	0.01
Cardizem	0	0.00
Decadron	16	0.12
Dexamethasone	46	0.34
Diphenhydramine	23	0.17
Dopamine	0	0.00
Duoneb	16	0.12
Epi 1:100000	2	0.01
Epi Pen	0	0.00
Epinephrine 1:1	15	0.11
Epinephrine 1:10	159	1.17
Esmolol	2	0.01
Etomidate	0	0.00
Fentanyl	97	0.71
Glucagon	3	0.02
Haloperidol	11	0.08
Ketamine	33	0.24
Labetalol	0	0.00
Lidocaine	8	0.06
Magnesium Sulfate	1	0.01
Midazolam	76	0.56
Morphine	7	0.05
Nicardipine	0	0.00
Nitroglycerin	188	1.38

Figure 59: Medication Ratio per Paramedic Continued (2022)

Medication	Total	Medication/Paramedic
Other - Medication	5	0.04
Push Dose Epi	3	0.02
Racemic Epinephrine	0	0.00
Rocuronium	12	0.09
Sodium Bicarb 8.4%	2	0.01
Succinylcholine	0	0.00
Tylenol	4	0.03
Vasopressin	0	0.00
Versed	0	0.00
Zofran	241	1.77
Zyprexa	20	0.15

As discussed in the EMS section, SFD should utilize the above information to determine the cost and efficacy of procedures and medications in the system.

Training Methodologies & Delivery

The SFD EMS training program is primarily computer-based continuing medical education (CME) with monthly skill sessions, depending on the availability of the training schedule.

All training occurs at the SFD training center. An opportunity for improvement may be the de-centralization of training cycles and consideration for a surge capacity car to cover districts so crews have less requirement for off-duty overtime sessions. More on these discussions can be found in the EMS System Design section.

As previously discussed, AP Triton recommends that SFD consider a balanced EMS training program that includes focused training, required re-certification training, immersion training, and repetitive training.

Figure 60: Balanced Training Program

Immersion Training

A common challenge for any training program is the development of training that translates to improved efficacy. Current research supports the effectiveness of immersion training that creates the illusion of an actual event. Individuals face evolutions with a high level of realism, resulting in a metaphorical immunization to some of the event's stress and challenges.

An example would be an active shooter exercise that involves volunteer victims wearing "cut suits," which allows a paramedic to perform advanced procedures while law enforcement stabilizes the scene.[6] There are difficulties associated with these types of events. They tend to be labor-intensive and cost-prohibitive due to the overtime required. A solution to the problem is to create immersion training on a smaller scale and design the training to be mobile.

Training Repetition

Another perspective relates to the success found over the past ten years in King County, Washington. Efficacy has been shown based on repetitive skills training to master specific skills. King County has demonstrated one of the highest advanced airway successes in the country based on redundant skills training.[7] Numerous organizations have pursued and purchased high-fidelity simulators for enhanced EMS training. The simulators provide excellent real-time feedback during a training scenario.

The devices cost between $60,000–$110,000, and limitations include extensive maintenance needs and a lack of mobility. They have proven effective in a hospital setting or training facility where the end-users are in one location.

A more cost-effective and proficient solution is the use of mid-fidelity manikins. Multiple manikins can be purchased and deployed throughout the organization for the same amount of funding. This option can provide training without significant drive times to central training facilities and allows Paramedics to have repetitive skill practice sessions.

SFD has minimal EMS training resources. The training center has one full-capacity ALS manikin that needs replacing. There is a cache of expired medications and medical kits used for simulation. The challenge with this centralized training facility is the requirement for mandatory off-duty training cycles, the cost of overtime, and, with 142 Paramedics, adequate time for participation.

Another benefit of mid-fidelity training manikins is the opportunity to develop proper sequencing. Identifying the order of critical interventions is critical to successful patient outcomes.

Focused Training

Another component of a balanced training program includes focused training. An organization's training schedule should consist of a percentage of training reflecting retrospective statistical data from actual incidents. The Department should look for areas of improvement relating to actual emergency responses. The preceding figure," SFD Training Emphasis Comparison to Service Demand," shows the Department's balance between actual incident volume and training topic percentage.

This gap is minimal compared to many similar-sized organizations and is often attributed to the necessity to maintain regional and State certification requirements. AP Triton recognizes these limitations, but training should be focused on service demand when possible.

A good example is the region's training regarding the current COVID-19 pandemic. Responders were required to learn enhanced body substance isolation, triage protocols, and critical interventions specific to the pandemic. Another example is based on current incident data showing increased responses to patients 65 and over. The training program should look for additional patient care or service-level opportunities.

Recertification Training

Regional and State requirements for certifications are generally not an option for non-compliance. Organizations should perform a cost/benefit analysis on the various optional certifications when an opportunity exists.

Training Delivery & Scheduling

The following figure summarizes the training methodologies utilized by SFD.

Figure 61: Methodologies Utilized in Training

Training Methodologies	SFD
Personnel Training/CME Records Maintained	Records are retained physically and electronically
Electronic System used for Documenting Records	Vector Solutions (Target Solutions)
Actual Skills Performed Documented for each Member	Minimal Documentation
Advanced Clinical Skills Success Rates Documented	Vector Solutions (Target Solutions)
Other Clinical Skills Success Rates Measured	Vector Solutions (Target Solutions)
Certification/Licensing Expiration Dates Tracked	Vector Solutions (Target Solutions)
Training Requirements Monitored for Compliance	Yes
Training & CME Methods	
Online/Web-Based Application	Vector Solutions (Target Solutions)
Computerized Interactive System/Devices; Simulations	Yes
Classroom/Lectures	Yes, quarterly live training is performed
Clinical Skills Practice/Evaluation	Yes, skills sessions yearly
Simulation Lab	Minimal Resources
Other Training/CME Methods	Yes

SFD has seen limited turnover over the past year, supporting a level of experience necessary to provide service. The staffing challenges in the future will require a formalized and consistent training program. Based on the system volume, exceptional resources, and administrative structure, AP Triton recommends developing initial EMT-Basic and Paramedic training programs.

Training Facilities & Resources

In today's EMS, multiple resources are necessary to arm the trainer with the tools to provide realistic, practical, and verifiable training. The well-known and well-respected research consultant, Gordan Graham, described the necessity to focus on "high risk/low frequency" events.[8]

This concept is evident in the amount of training required for structure fires compared to actual call volume. An organization must have adequate training facilities to prepare for the infrequency and inherent danger of structure fires. The following is a summary of the current training resources and facilities utilized by SFD.

Figure 62: Training Facilities & Resources

Facilities & Resources	SFD
Adequate Training Space	Yes
Driver's Course/Rodeo	No
Adequate Classroom Facility	Yes
Computers & Simulations	Yes
EMS Equipment Assigned to Training	Minimal
Mobile Training Resources	Minimal

SFD has inadequate EMS training resources; future growth will require additional capacity. To promote fiscal responsibility and efficiency, AP Triton recommends de-centralizing training resources and building mobile units (training ambulances) for use throughout the city.

Service Delivery & Performance

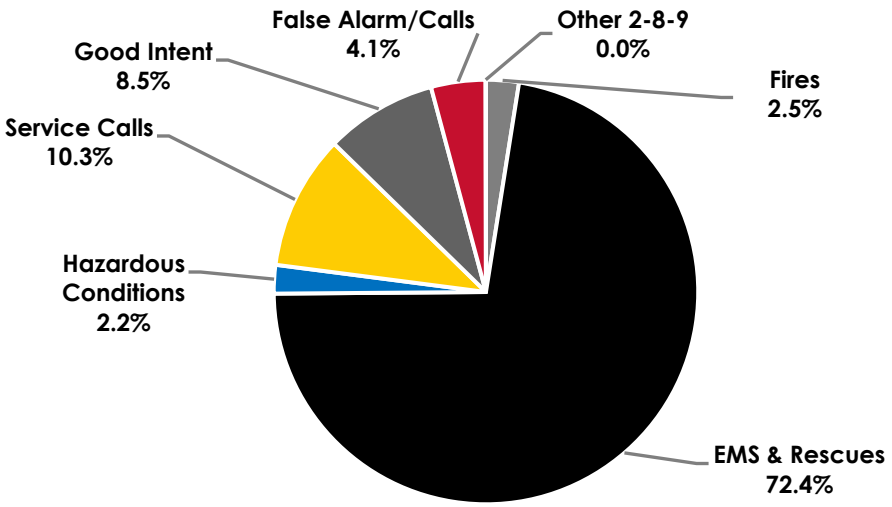
The City of Salem has the critical task of maintaining fiscal responsibility while meeting performance expectations in emergency service provision. This report offers a detailed analysis of fire and EMS services by the Salem Fire Department (SFD) based on verified statistics during a site visit from November 30 to December 1, 2023.

Service Demand

Analysis of the past four years shows a predominance of emergency medical response calls. Fire-related responses saw a 16% rise from 2019 to 2022, with a slight decline in 2020, likely due to the COVID-19 pandemic. The pandemic's long-term impact on service demand is still being evaluated, with early signs pointing to an increase in 2023.

The following figure shows the breakdown of incident types for 2022.

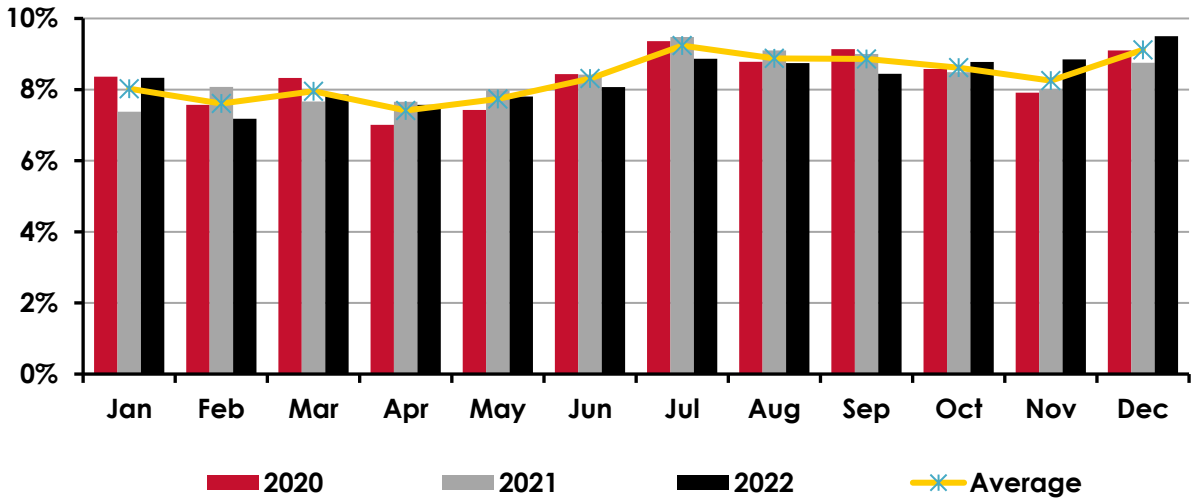
Figure 63: Incident Breakdown by Percentage (2022)



Temporal Variation

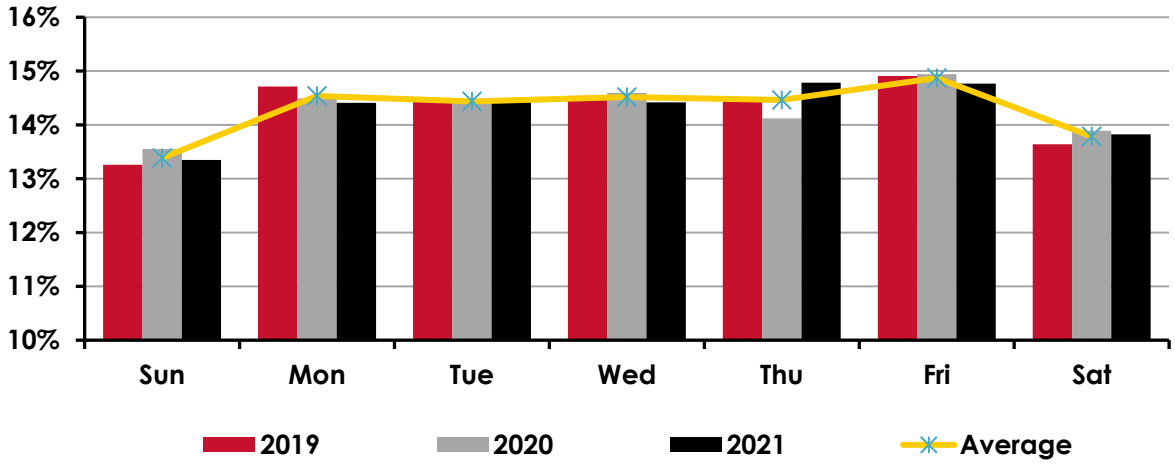
The study examines how demand for EMS services varies over time and space, using data from 2020 to 2022. Seasonal and weekly trends are identified, along with peak demand times. Spatial analysis further includes an assessment of geographical service demand and resource allocation, particularly concerning fire and EMS incident density.

Figure 64: Service Demand by Month (2020–2022)



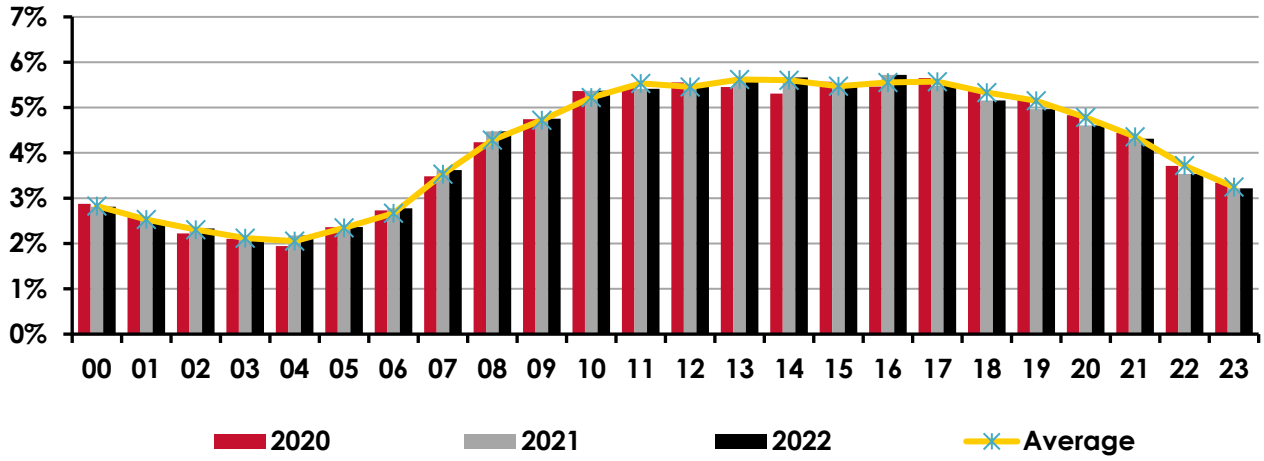
SFD experiences consistent call volume throughout the year, with the lowest call volume recorded in February and peak demand reaching 9.50% in December. There may be an opportunity to increase staffing during the summer to accommodate the seasonal upswing in demand. Additionally, the data indicates a slight dip in call volume on Saturdays and Sundays, which can affect the scheduling of training and other essential duties throughout the week.

Figure 65: Service Demand by Day of the Week (2020–2022)



Moreover, a graphic representation illustrates the service demand by the hour of the day, revealing a notable increase in service demand on Fridays, particularly around 10:00 a.m.

Figure 66: Service Demand by Hour of the Day (2020–2022)



Spatial Analysis

The report assesses resource distribution using Insurance Services Office (ISO) criteria and NFPA/CPSE standards. Salem Fire Department's current ISO rating and its implications for fire insurance rates are discussed. The analysis also involves a Geographic Information System (GIS) evaluation of station locations concerning response times.

Geographic Service Demand

The fire and density of incidents are visualized in the two figures below, with varying colors representing the number of incidents per square mile. These maps illustrate the correlation between station locations and the intensity of service demand.

Figure 67: Incident Density—EMS Calls (2019–2022)

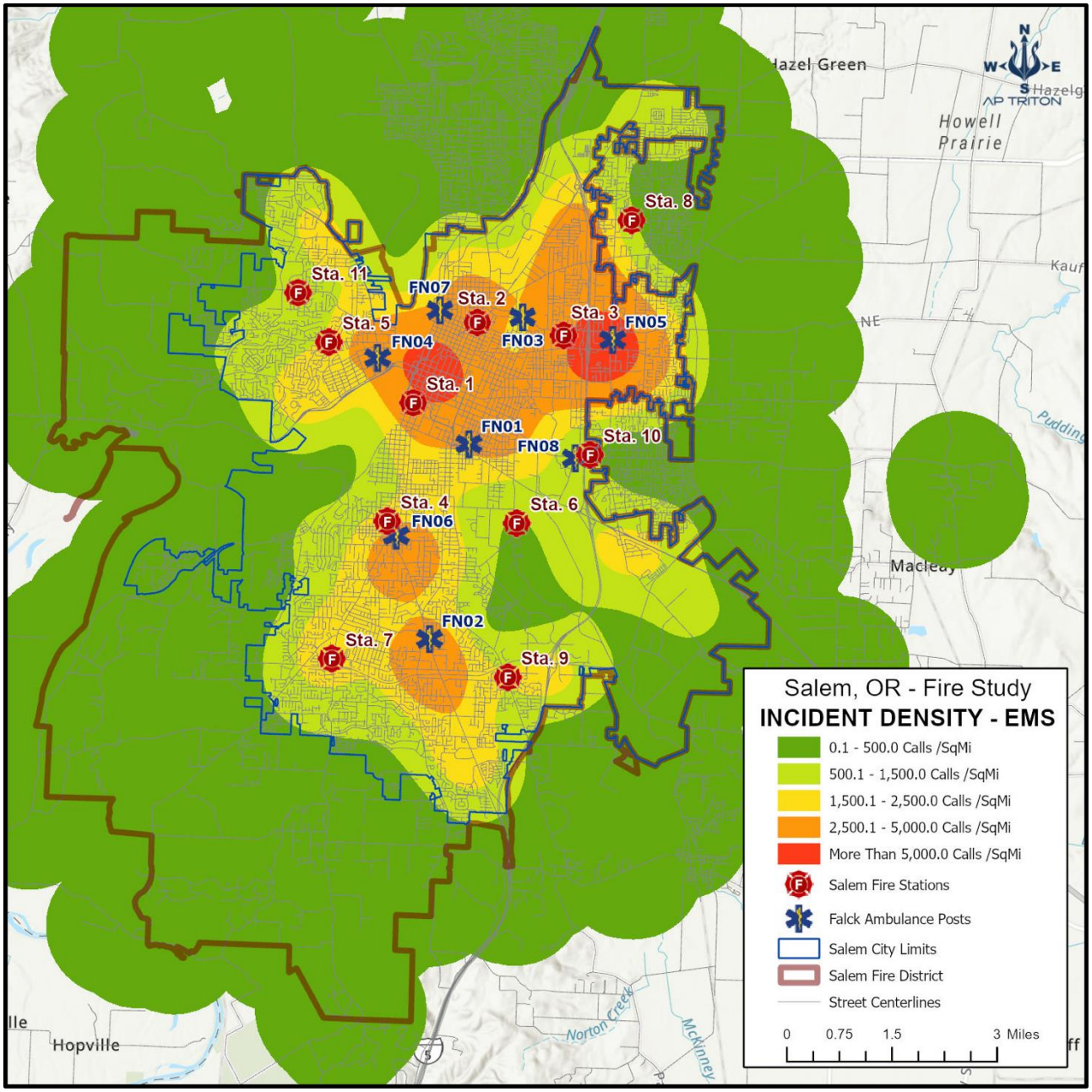
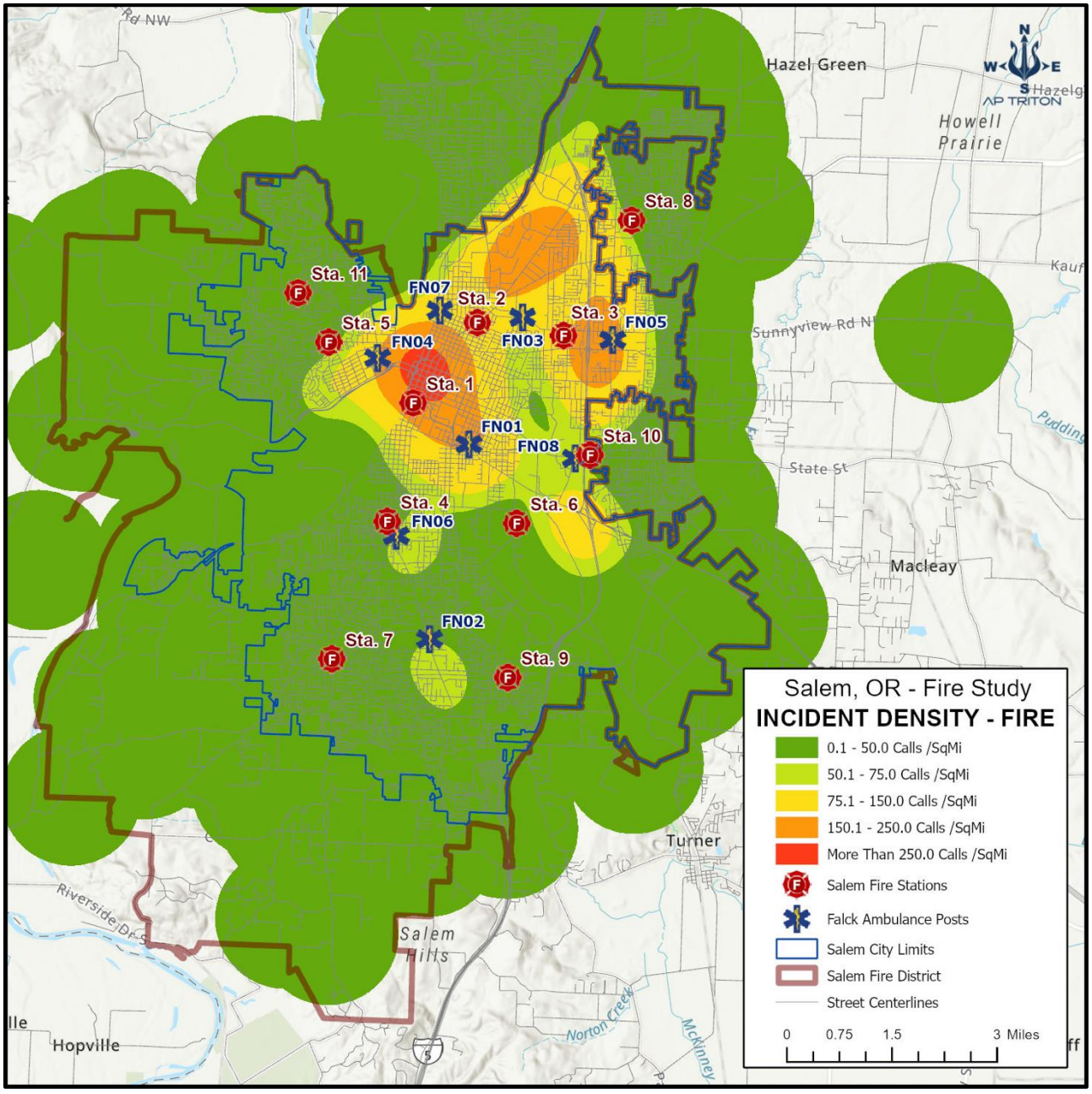


Figure 68: Incident Density—Fire-Related Calls (2019–2022)



Service demand is dispersed widely throughout the response area, with higher incident density concentrated in the south-central part of the city. As expected, areas with higher incident density tend to align with areas of higher population density.

Distribution Analysis

Two methods for evaluating the distribution of fire department resources within a jurisdiction are employed. The first method adheres to the Insurance Services Office (ISO) criteria, which determines compliance with the Fire Suppression Rating Schedule (FSRS). The second method, used by the National Fire Protection Association (NFPA) and the Center for Public Safety Excellence (CPSE), defines desired response time standards and measures compliance with those standards. Geographic Information System (GIS) analysis is instrumental in evaluating the effectiveness of station locations concerning response time.

ISO Criteria

The ISO is an independent organization that collects and analyzes data from fire departments in communities throughout the United States to determine rates for fire insurance. ISO assesses all areas of fire protection and breaks them down into four major categories: emergency communications, fire department, water supply, and community risk reduction. Following an on-site evaluation, an ISO rating, or specifically, a Public Protection Classification (PPC®) number, is assigned to the community ranging from 1 (best protection) to 10 (no protection).

The PPC® score is developed using the Fire Suppression Rating Schedule (FSRS), which outlines sub-categories of each of the four major categories, detailing the specific requirements for each evaluation area. SFD has an ISO rating of 2/10, with the last assessment in 2015. The rating demonstrates an excellent capacity for fire suppression within the city limits of Salem.

A community's ISO rating is essential when considering fire station and apparatus distribution and deployment due to its effect on the cost of fire insurance for the residents and business owners. The ability of a fire department to arrive on the scene of an incident equipped with personnel, equipment, and water sufficient to mitigate a fire effectively is a critical factor for an ISO evaluation. For a structure to be eligible to receive a PPC rating better than 10, the structure must be within five road miles from a fire station. Typically, areas outside five road miles are rated Class 10 unless the fire department can demonstrate that sufficient fire flow is available.

Then, some credit is given for the water supply. In addition, to receive maximum credit for the station and apparatus distribution, ISO evaluates the percentage of the community (contiguously built upon area) that is within specific distances of both engine/pumper companies (1.5 miles) and aerial/ladder apparatus (2.5 miles). In addition, ISO evaluates a community's availability of sufficient water supply, which is critical for extinguishing fires. One of the areas assessed regarding the water supply is the geographical locations and distribution of fire hydrants. Based on ISO scoring, structures outside a 1,000-foot radius of a fire hydrant are subject to separate ratings. That rating depends on the fire department demonstrating alternate water sources and the ability to use them.

Suppose a fire department can demonstrate that sufficient fire flow can be maintained at a minimum rate of 250 gallons per minute for two hours at a given location. This can be accomplished in several ways, such as a dry hydrant, a storage tank, tanker/tender shuttle operations, capability for long large-diameter hose lays, or drafting operations.

Regardless of the system or systems utilized, sufficient fire flow must be demonstrated regardless of the system or systems used. SFD has shown the ability to meet water supply within five road miles of their stations. The following two figures illustrate the ISO 1.5-mile travel capability, ISO engine capability, and 2.5-mile for ISO aerial capabilities.

Figure 69: ISO 1.5-Mile Engine Travel Capabilities

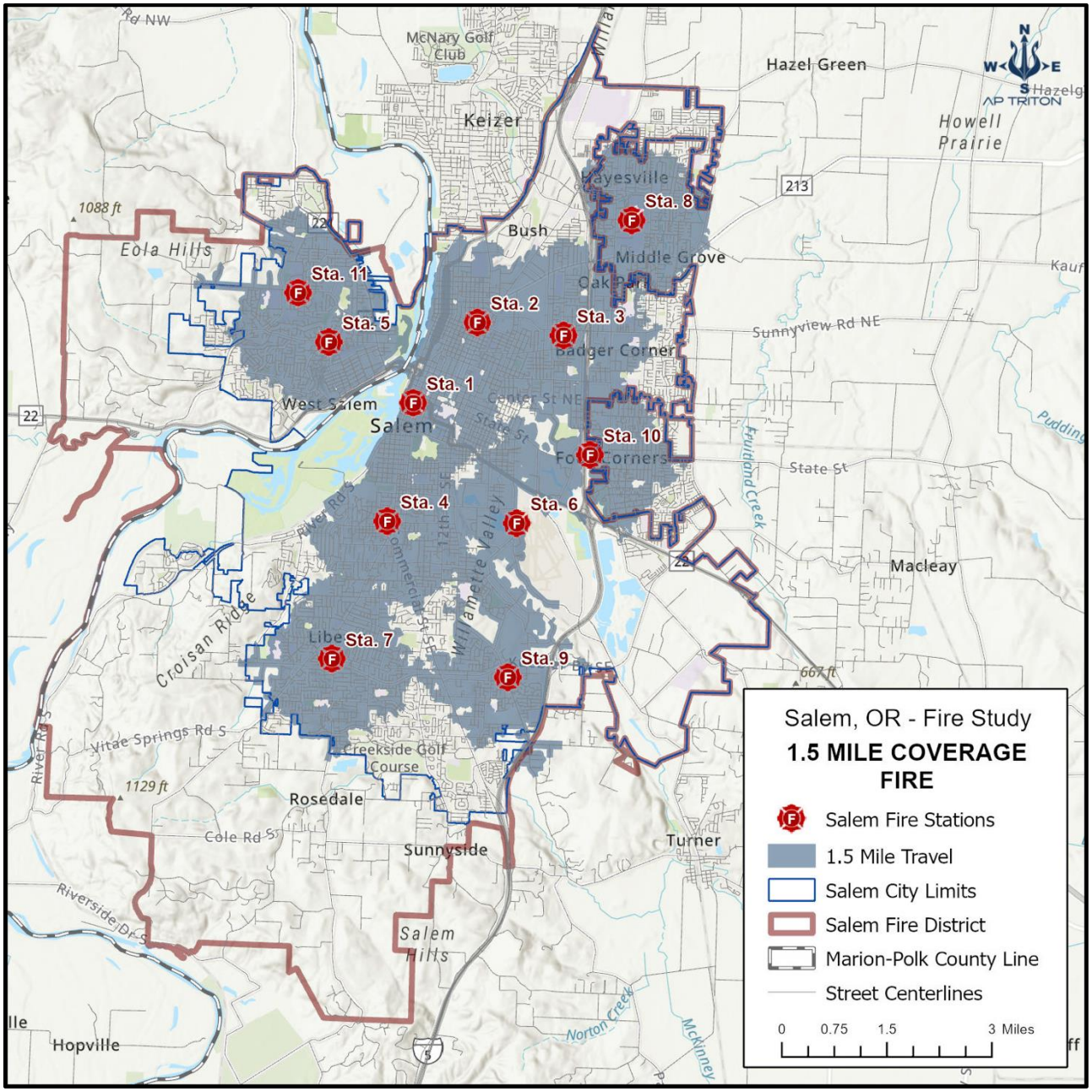
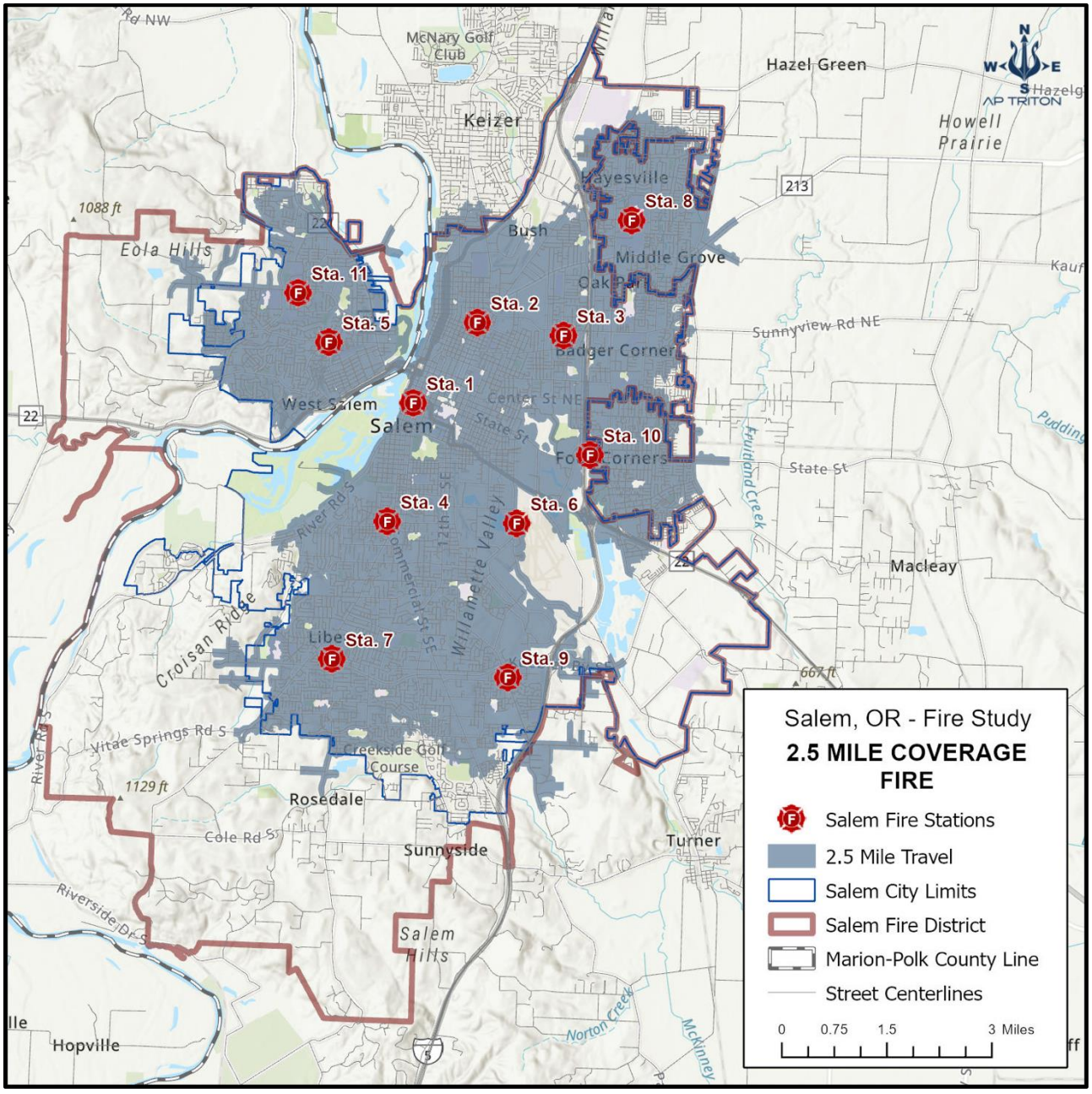


Figure 70: ISO 2.5-Mile Truck Travel Capabilities

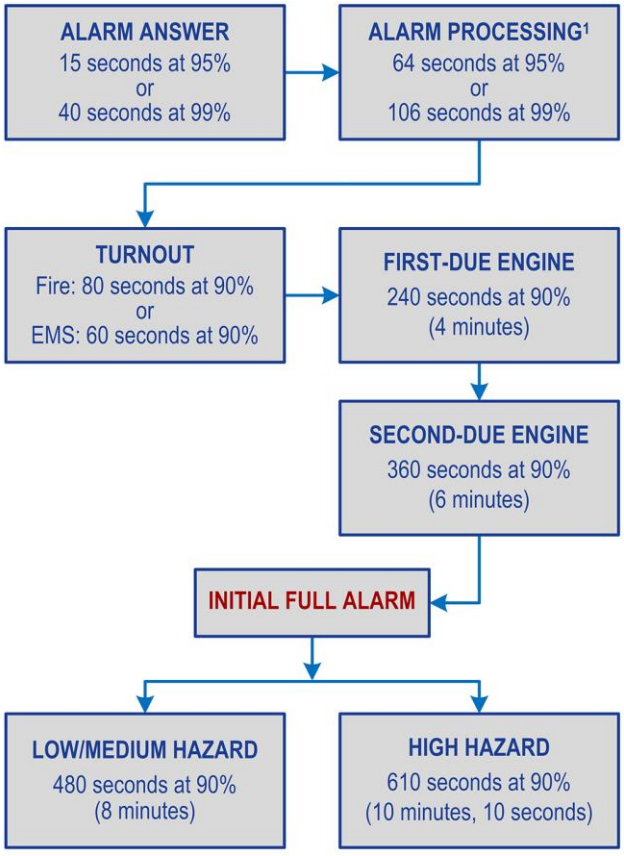


The preceding maps show the coverage areas within 2.5 miles. The Salem Fire Department response is consistent with the suburban geography.

Travel Time Analysis

The second standard for assessing resource distribution employs travel time criteria. The following figure displays a travel time model from current station locations over the existing road network. Travel time calculations account for posted speed limits, turns, intersections, and one-way streets. NFPA Standards 1710 and 1720 recommend different travel times based on population density. NFPA 1710 prescribes a travel time of 240 seconds (4 minutes) for an entirely urban environment, while NFPA 1720 outlines response times for rural areas. The response times vary depending on population density and the specific demands of the area. Most departments, including those serving rural areas, find it impractical to apply the NFPA 1710 travel time universally. Instead, they adopt the 4-minute travel time for urban and suburban zones and the NFPA 1720 response time for rural areas.

Figure 71: NFPA 1720 Response Time Recommendations



[1]From NFPA 1710, which references NFPA 1221 (2019), and states high-priority incidents should be at 60 seconds or less at 90%.

Both standards recommend call processing time as one minute and turnout time for staffed stations as one minute for EMS calls and 80 seconds for fire or special operations calls. Call processing time is not reflected in the NFPA 1720 response time, so deducting only the turnout time (1:20) from a 14-minute response time is 12 minutes, 40 seconds (12:40). AP Triton has used a 4 and 8-minute travel time in the GIS analysis. An eight-minute response is also shown with the four-minute travel time for comparison.

Figure 72: Travel Time Analysis—4-Minute Coverage

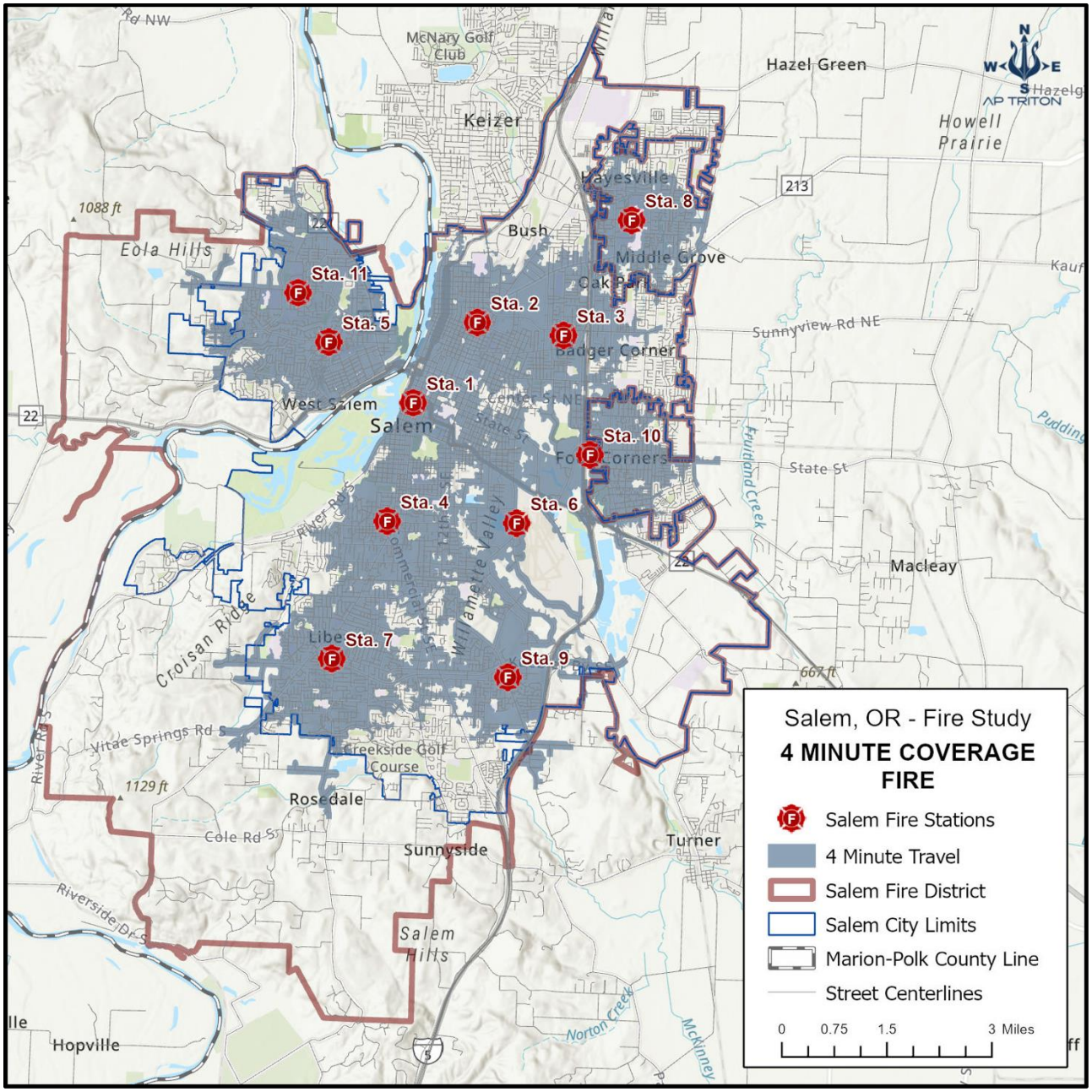
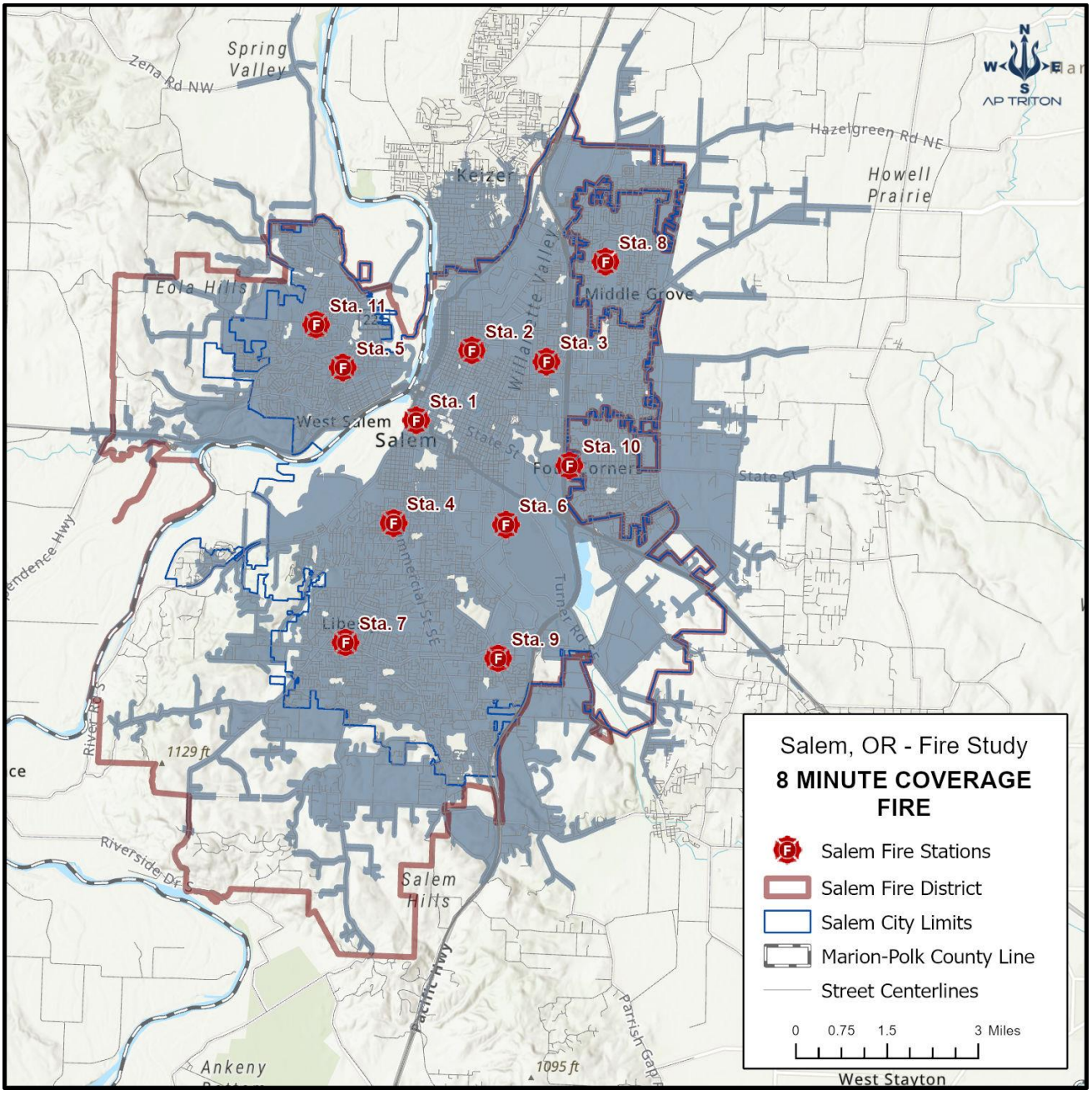


Figure 73: Travel Time Analysis 8 minutes



The previous maps reveal that most areas within the Salem City limits can be reached within a 4-minute or 8-minute travel time, indicating appropriate station locations. However, it suggests the potential need for additional stations to achieve 4-minute or 8-minute response times in the western sections of the city commensurate to growth.

EMS Mutual Aid

Effective EMS systems require mutual aid units from outside agencies during periods of peak demand and major medical events, including multi-casualty incidents (MCI). This analysis shows that SFD has excellent mutual aid agreements with the surrounding departments and demonstrates the capacity to acquire additional resources when necessary. The next figure shows the agencies participating in mutual aid with SFD.

Figure 74: Mutual Aid Organizations with 10–20 Minutes Response Time

Department Name	Station	Station Address	City	Level
Keizer Fire District	#350	661 Chemawa Rd NE	Keizer	ALS
Marion County FD #1	#1	300 Cordon Rd NE	Salem	ALS
Polk County FD #1	#90	1800 Monmouth St	Independence	ALS
St. Paul Fire District	#750	4233 Church Ave	St. Paul	ALS
Woodburn Ambulance		1040 N. Boones Ferry Rd.	Woodburn	ALS
Lyons Fire District	#550	1114 Main St	Lyons	ALS
Santiam Ambulance		1401 N 10th Ave	Stayton	ALS
Turner Fire District		7605 3rd St	Turner	ALS
Jefferson Rural FPD		189 N Main St	Jefferson	ALS

Reliability Study

This section focuses on unit utilization and comprises three types of analyses: unit utilization based on call volume, concurrent service requests analysis, and unit hour utilization.

Unit Workload Analysis

Units that are very busy or are already out when a second call occurs can result in increased response times from remote units. The following process for evaluating apparatus response determines how much time an apparatus is assigned to a specific incident. This is a measurement from the initial dispatch time until the unit is available for another incident.

Units that are consistently busy or already committed to another call when a second call is received can result in increased response times from more distant units. Unit hour utilization (UHU) is one measure of workload calculated by dividing the total time a unit is dedicated to all incidents by the total annual time. Expressed as a percentage, it indicates when a unit is unavailable for a response.

The following figure presents call statistics for each apparatus within the SFD system in 2022.

Figure 75: Fire Apparatus Utilization SFD Total Calls (2022)

Unit	Count	Total	Average	Utilization
E1	3,735	17:40:21	0:14:33	10.34%
E10	3,233	15:48:34	0:19:27	11.96%
E11	1,886	23:58:24	0:19:05	6.85%
E2	3,520	7:38:32	0:18:08	12.14%
E3	4,530	10:27:40	0:18:35	16.01%
E4	2,898	1:40:09	0:19:25	10.70%
E5	2,515	5:21:16	0:17:53	8.55%
E6	2,348	18:36:30	0:18:16	8.16%
E7	2,988	12:18:47	0:19:03	10.83%
E8	2,731	2:59:09	0:19:34	10.17%
E9	3,342	7:18:22	0:18:40	11.86%
M16	1,975	4:08:54	0:41:41	15.66%
M19	79	17:23:44	0:31:26	0.47%
L2	1,086	21:14:47	0:18:25	3.80%
L4	887	5:03:55	0:21:27	3.62%

A national guideline consistent with NFPA standards supports consideration for additional resources when fire apparatus (engines/trucks) utilization exceeds 10% and fire ambulances exceed utilization of 35%. SFD has numerous apparatuses that exceed these guidelines, specifically Engine 2 and Engine 3.

Concurrent Incidents

Another aspect of resource reliability is the frequency of multiple incidents occurring simultaneously. The following figures illustrate the number of times multiple units are assigned to incidents. The data from 2023 indicates numerous instances of concurrent incidents, which can impact the Department's ERF during structure fires.

The following figure shows the number and percentage of concurrent calls for SFD.

Figure 76: Response Unit Concurrency Percentages (2023)

Incidents in Progress	Percentage
Single Incident	6.9%
Two Incidents	15.9%
Three Incidents	19.8%
Four Incidents	19.1%
Five Incidents	15.3%
Six Incidents	10.4%
Seven Incidents	6.3%
Eight Incidents	3.3%
Nine or More Incidents	3.0%

Based on the above information, SFD is a high-volume system at capacity for response to service demand.

Response Performance

In analyzing response performance, AP Triton employs percentile measurements to assess response time performance. These measurements are derived from industry best practices outlined by the Center for Public Safety Excellence (CPSE) and the National Fire Protection Association (NFPA) standards 1710 and 1720. Percentile measurements offer a more accurate representation of performance as they consider the performance of most data points, reducing the impact of outliers.

The "average" measure is a commonly used descriptive statistic called the mean of a data set. The most important reason for not using the average for performance standards is that it may not accurately reflect the performance for the entire data set and may be skewed by outliers, especially in small data sets. One extremely good or bad value can skew the average for the whole data set.

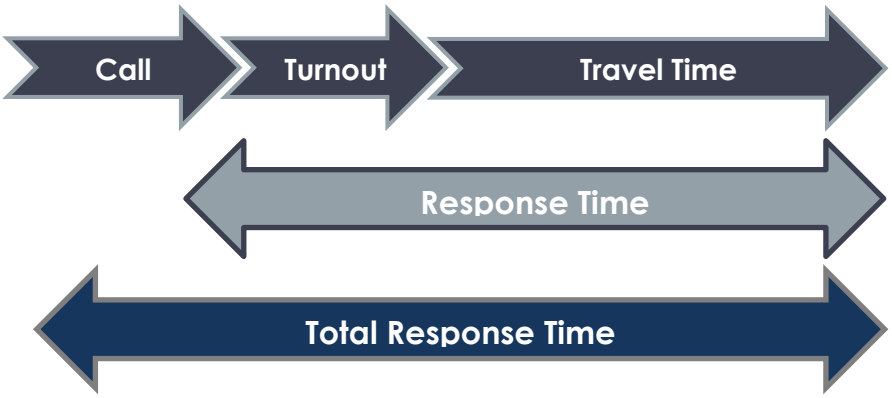
The "median" measure is another acceptable method of analyzing performance. This method identifies the value in the middle of a data set and thus tends not to be as strongly influenced by data outliers.

Percentile measurements are a better measure of performance because they show that most of the data set has achieved a particular level of performance. The 90th percentile means that 10% of the values are more significant than the value stated, and all other data are at or below this level. This can be compared to the desired performance objective to determine the degree of success in achieving the goal.

As this report progresses through the performance analysis, it is essential to remember that each response performance component is not cumulative. Each is analyzed as an individual component, and the point at which the fractile percentile is calculated exists in a set of data unto itself. The response time continuum—the time between when the caller dials 911 and when assistance arrives—is comprised of several components:

- **Alarm Processing Time:** The interval between the time from receiving the alarm at the primary PSAP until the beginning of the transmittal of the response information via voice or electronic means to emergency response facilities or the emergency response units (ERUs) in the field.
- **Turnout Time:** The interval between the time that personnel or units are notified of a call and the time when they begin to respond to the incident.
- **Travel Time:** The time interval begins when a unit is en route to the emergency incident and ends when the unit arrives at the scene.
- **Response Time:** A combination of turn out time and travel time. This is the most utilized measure of fire department response performance.
- **Total Response Time:** The NFPA 1710/NFPA 1720 definition of Total Response Time is the interval from receiving the alarm at the dispatch center to when the first emergency response unit initiates or intervenes to control the incident. For this report, Total Response Time will be defined as receipt of the alarm at the dispatch center until the arrival of the first fire department unit.

Figure 77: Response Time Continuum

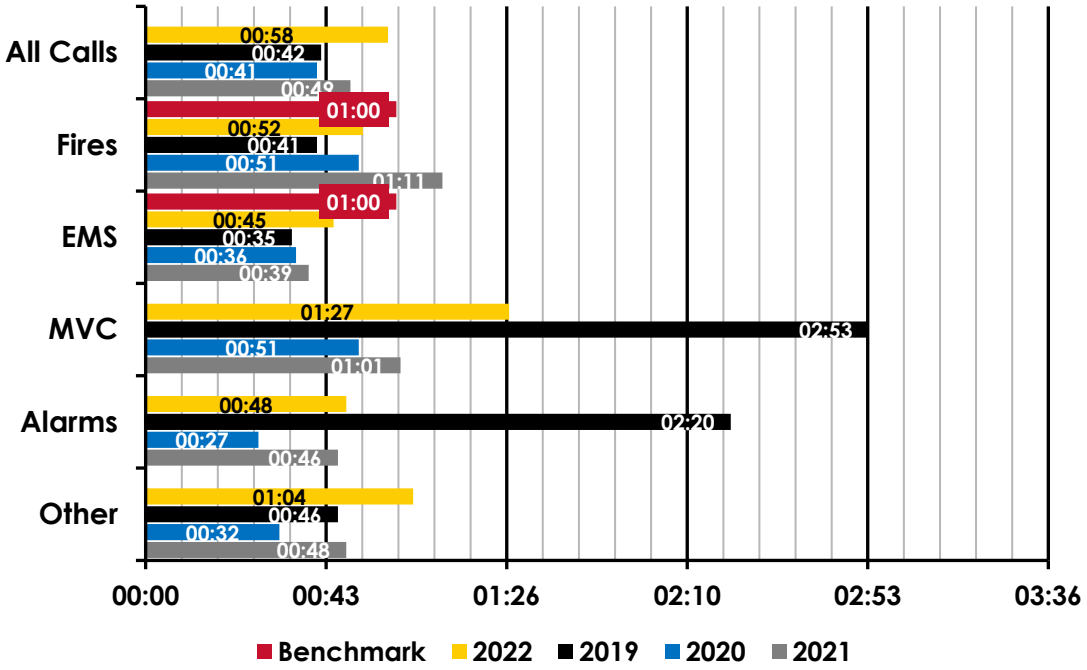


The definitions for each population category follow the Center for Public Safety Excellence (CPSE) standards for density: Urban (> 2,000 persons per square mile), Suburban (> 1,000 persons per square mile), and Rural (< 1,000 persons per square mile).

Alarm Processing Time

The following figure shows the alarm processing time performed by Dispatch. After removing outliers in motor vehicle accidents and alarms in 2022, the Dispatch Center appears to meet or exceed national standards.

Figure 78: Alarm Processing Time

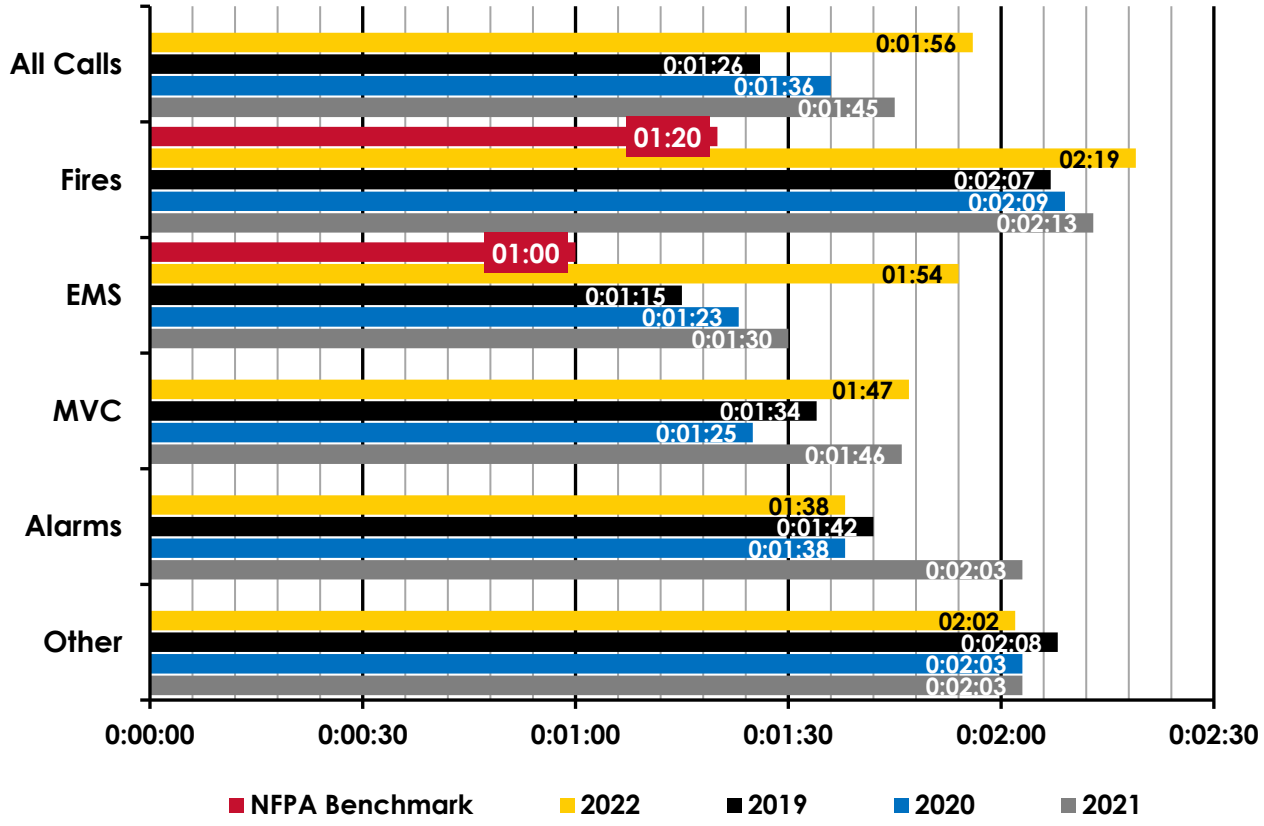


Turnout Time Performance

The ability to quickly react to the notice of an alarm and begin responding to an incident is the first component under the direct control of the fire department personnel. Turnout is the time it takes personnel to receive the dispatch information, move to the appropriate apparatus, and proceed to the incident.

NFPA 1710 specifies that turnout time performance for staffed stations should be less than 60 seconds, measured at the 90th percentile for incidents other than fire and special operations. For those incidents, turnout time performance should be 1 minute, 20 seconds. There is no specific performance specified for non-staffed stations.

Figure 79: SFD Turnout Time Performance (2019–2021)

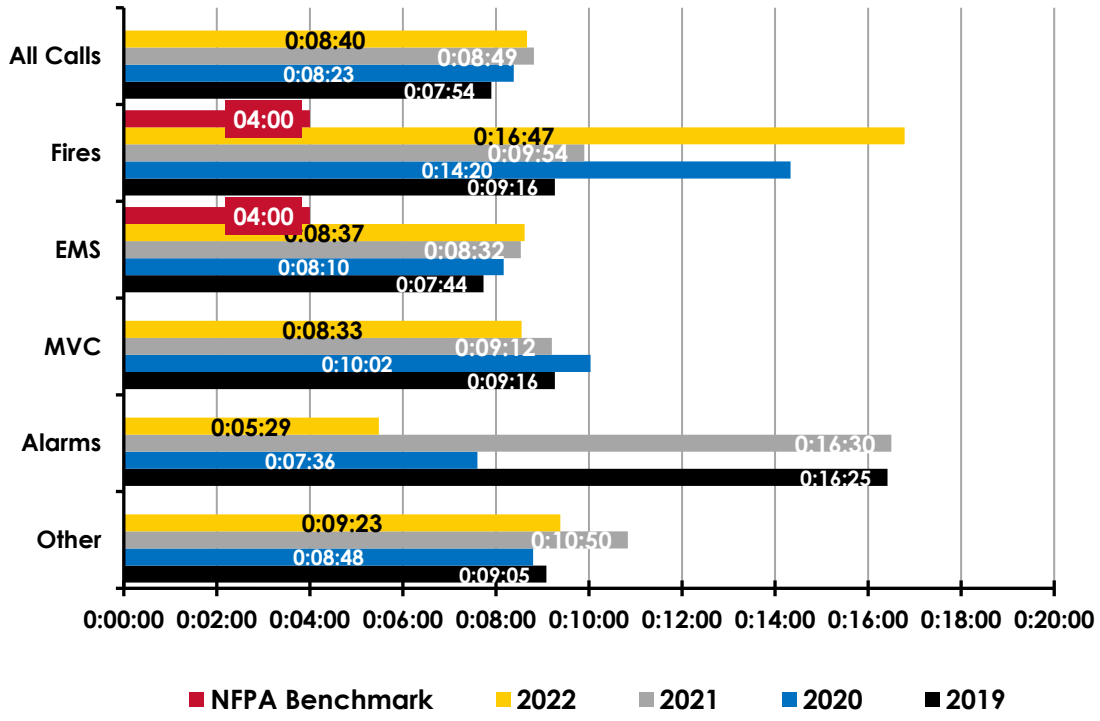


As illustrated in the preceding figure, the turnout time for SFD in 2022 was 1 minute, 56 seconds.

Travel Time Performance

Often, travel time is the most extended segment of the total response time. This may be impacted significantly by geographic location, traffic, time of day, weather, and other factors.

Figure 80: SFD Travel Time Performance (2019–2021)

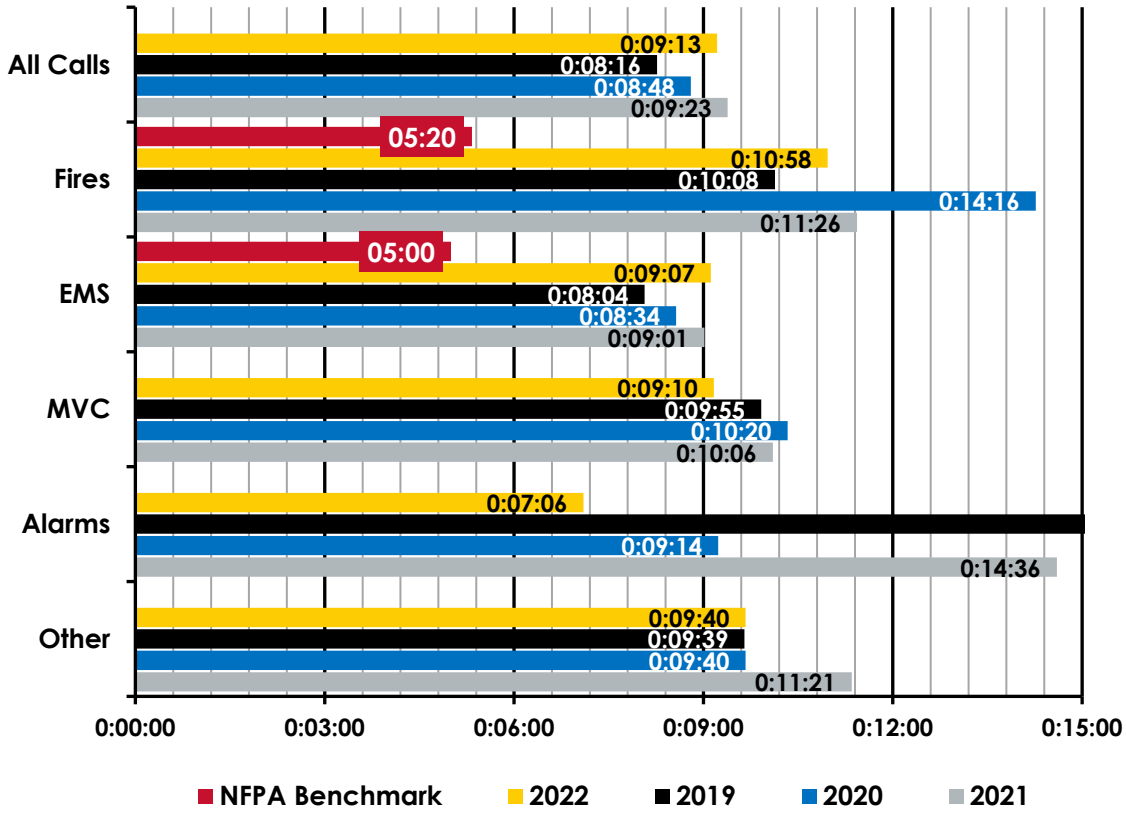


As illustrated in the preceding figure, the travel time performance (2022) for SFD incidents is 8 minutes, 40 seconds.

Response Time Performance

When turnout and travel time are combined, this is expressed as response time with an expected performance of five minutes or less in a staffed station. This is one of the most often tracked and reported response time performance measures, comprising components under the Department's direct control.

Figure 81: SFD Response Time Performance (2019–2022)



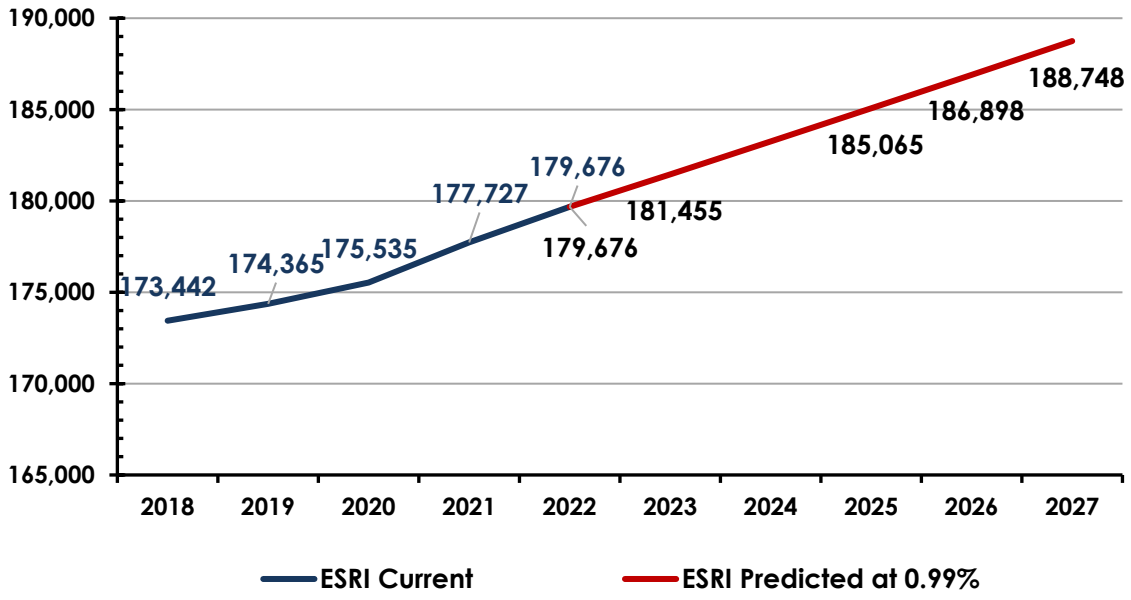
As previously stated, SFD has reached service demand capacity, and future growth will require additional resources to maintain response performance benchmarks.

Projected Population Growth & Future Service Demand

Population Growth Projections

According to the U.S. Census Bureau, the City of Salem's service area had a population of 173,442 in 2018. Over the past four years, there has been minimal population growth of approximately 3.5%. The impact of the COVID-19 pandemic on future growth is yet to be fully understood. Projections are based on historical data and Esri projection software, as shown in the following figure.

Figure 82: City of Salem Population Projections (2018–2027)



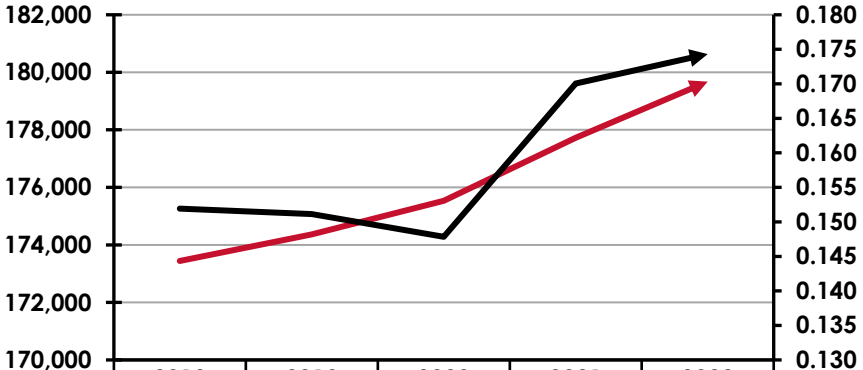
Based on the above analysis, the SFD response area will see a population increase of 4.9% over the next five years. As previously mentioned, this is a conservative estimate and does not account for future trends relating to COVID-19.

Service Demand Projections

AP Triton utilized population projections for the City of Salem to forecast future service demand. Population tends to be a reliable indicator of service demand, with the current service demand per 1,000 persons as a reference point for future service demand. The following service demand projections are based on an estimated population of 188,748.

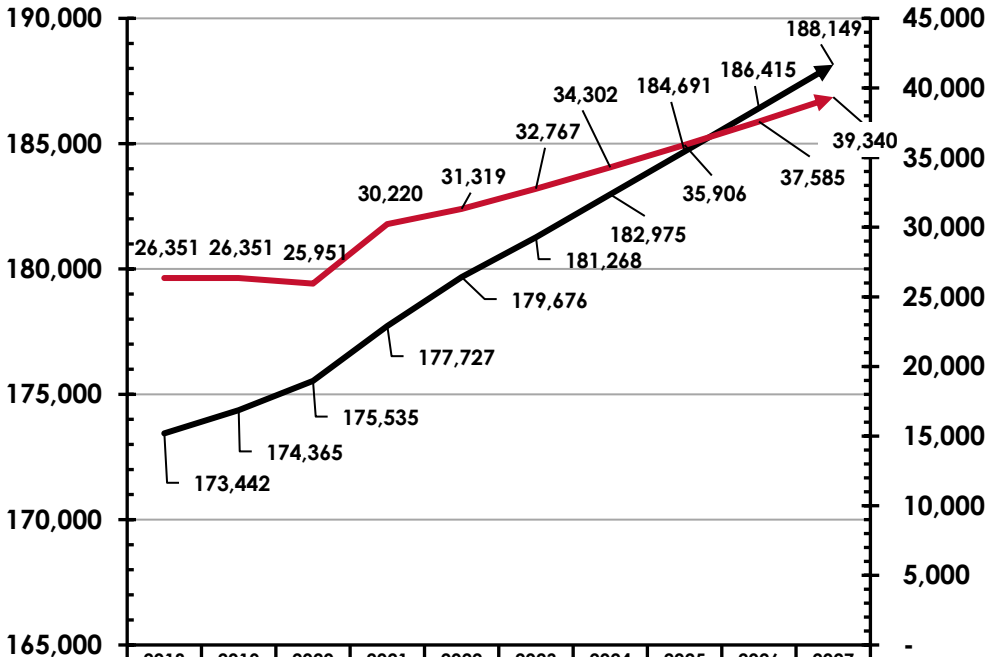
The next figures depict the projected and overall service demand based on population projections.

Figure 83: Service Demand (2018–2022)



	2018	2019	2020	2021	2022
Population* (ACS)	173,442	174,365	175,535	177,727	179,676
Incident per Capita	0.152	0.151	0.148	0.170	0.174

Figure 84: Projected Service Demand (2023–2027)



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Population* (ACS)	173,442	174,365	175,535	177,727	179,676	181,268	182,975	184,691	186,415	188,149
Total Incidents	26,351	26,351	25,951	30,220	31,319	32,767	34,302	35,906	37,585	39,340

Consistent with population growth, SFD anticipates a marginal increase in incident volume over the next five years.

Section II:
EMS SYSTEM VALUATION

Financial Overview

EMS Transport Provider Financing

Understanding healthcare system financing, specifically the emergency medical services (EMS) transport reimbursement process, is complex. Independent government agencies and private sector concerns often play a significant role in determining reimbursable costs and rates associated with EMS transport reimbursement. Pricing floors and ceilings apply to all EMS transport providers, regardless of whether they are in the public or private sector.

The U.S. healthcare system is one of the largest civilian industries in the United States. In its entirety, this system exchanges hundreds of millions of dollars in billable or collectible services from patients and providers every day. Although the industry is complicated, this system's actual financial processes for transacting receipts and expenses are less.

EMS and ambulance billing processes are significantly narrower in scope than the national healthcare system. A "payer mix" includes four primary entities that account for most of the transport reimbursement language and payables to the providers. These payers are Medicare, Medicaid, private commercial insurance, and private payers (no insurance). Entities such as workers' compensation, auto insurance, travel insurance, the Affordable Care Act (ACA), copays, deductibles, and others also contribute to transport revenues. Still, the four mentioned here are the primary payers.

Many government agencies conduct all billing services in-house. County hospitals, clinics, mental health, and dental offices are services provided in almost every county in the state, and some of the largest healthcare providers are local governments. The provincial government offers ambulance service billing and collections every day across the country at a collection rate on par with the private providers or, in some cases, higher.

When an agency chooses to refrain from providing billing in-house, it often uses an outside company specializing in billing EMS and ambulance services. Numerous companies offer this service to public providers and private ambulance providers.

One of the most misunderstood parts of the billing and collection process is the difference in collection rate. The provider's billing and collection policy determines the reimbursement rate to the most significant degree.

For example, two ambulance providers respond to the same patient and provide the same treatment and services. Both charge a hypothetical county rate of $1,600. Ambulance Provider "A" waives the co-pay and deductible of $200 and collects the insurance payment of $1,400 as payment in full. Ambulance Provider "B" accepts a compromise offer of $150 for the co-pay and deductible and collects the $1,400 insurance payment. Provider "A" has a collection rate of 88% of the billable amount, while Provider "B" has a collection rate of 97%. Without knowing the billing policy, one could believe Provider "B" has the better billing company because of the higher collection rate. However, both providers have the same billing company but different collection policies.

Determining the Value of the System

The monetary value of the system is determined by how much revenue can be recognized by the number of transports in the system. There is a fixed amount of money available, referred to as the "cap," regardless of whether the provider is public or private; however, there is a disparity in revenue collected due to billing and collections. Through various practices, some agencies are better at obtaining monies than others. While the agency's collection rate is often cited as the most successful metric, additional vital factors affect the success of billing and collections: billing policy, collection policy, transport rate, documentation, billing contractor's level of effort, and understanding of the payer mix.

Billing Policy

A billing policy ensures that organizations meet the appropriate state and federal requirements when assessing fees and collecting payments for each service provided. Federal regulations around 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 due to their presumed ability to pay. More specifically, the federal government ensures the entire transported populace is issued a service invoice or bill to ensure accurate accounting of the system usage. As such, billing policies must include information on consistent and fair patient treatment regardless of race, ethnicity, gender, or religion.

Establishing a billing policy defines clear and uniform guidelines for compliance, timeliness, and accuracy. The billing policy also outlines reasonable efforts to determine eligibility for financial assistance as defined by any county assistance program, which then mandates collections policies.

Collection Policy

How aggressive an agency is in its collection policy is a matter of organizational or business philosophy and will significantly affect the revenue stream. Any entity's collections approach will have positive and negative impacts depending on whether the entity is private or public. In addition, some payers have a fixed monetary rate attached, which will create a fixed reimbursement cap on the maximum potential collection of transport receivables available within the system.

While most private ambulance companies are aggressive with their collection policies, many public ambulance providers' policies are less so. This is because private ambulance companies generate revenue or profit, while public sector-based transport entities carry political considerations and public relations consequences. To mitigate such effects for a public sector entity such as the Salem Fire Department, the collection process should stop once the collection effort reaches a point where the return in either money or political consequences is less than the monetary gain.

Transport Rate

The data provided by the Salem Fire Department established the number of responses in 2022. Generally, there will be a set number of calls for service in any given period. Transport directly impacts transport revenue receivables as a percentage of total responses. Fewer transports result in less revenue; however, we know that patients who request transport or whose medical condition requires it are not necessarily transported.

There will always be a percentage of calls that will not result in transport—this can be projected as a percentage of the overall call volume to avoid revenue shortfalls and staff reductions. For example, if two ambulances in the system facilitate one non-transport for assorted reasons each shift, this equates to 730 non-transports per year. Using Medicare rates without a co-pay ($480) results in over $350,000 annually in lost income. AP Triton has accounted for projections like these in the model, and all future forecasts should also account for them.

Call volumes will fluctuate, but significant or seasonal changes in call volume are predictable. Future calculated deployment levels should be based on historical facts instead of assumptions. Unilaterally adding ambulances to a given system without regard to demand justification does not equate to being able to run more calls. The belief that "transporting more patients means more revenue" is untrue. Call volume should dictate deployment capacity, not revenue goals. Close adherence to quantitative and proven research results in less financial risk and consequence to the Salem Fire Department.

Documentation

Proper documentation by field units is crucial to the provider's collection rate. Improper or incomplete documentation hurts revenue collection. Training is critical for field units to document the assessment and treatment provided on scene accurately.

Through Medicare and Medicaid, reimbursement is based on the patient's needs and is not reimbursed simply because the patient called for transport. Many calls that should be billed and paid at an Advanced Life Support (ALS) rate are often returned at the Basic Life Support (BLS) rate, while some that should have been collected at either the ALS or BLS rates are not found to meet any reimbursement criteria and are left unpaid. Accurate documentation can increase revenue in an area where service is already provided.

Billing Contractor's Level of Effort

The billing contractor or billing office also influences the collection rate. The practices and efforts demonstrated by the billing provider correlate directly to the collections received. There are two common ways public providers conduct billing for ambulance services—third-party and in-house.

Choosing an outside third-party billing company means that the third party performs all the billing on behalf of the provider. Their ability to collect depends on several factors. Relaxed or vague billing and collection policies will result in less revenue collected. Most billing companies base their fees on a percentage of the amount they collect. In cases where the provider has a billing and collection policy that allows a reduced amount to be collected, the biller will likely charge a higher percentage rate to meet their profit margin. When utilizing a third-party billing company and implementing clear and effective policies, FTE hours must be considered, as someone in the City should be assigned to manage the contractual relationship and analyze the service regularly.

Another option is to conduct all billing in-house. The most significant obstacle in establishing in-house billing services is the operations infrastructure. Therefore, when assessing the ability to provide an ambulance billing service in-house, considerations should include capital outlay for facilities, hardware, software, personnel, and training. Realistically, planning for at least six to nine months from conception to capability for implementation of an in-house billing team is reasonable.

Numerous variables influence a provider's ability to collect revenue in a service area. Establishing policies, training personnel, and closely monitoring the delivery system will pay forward in revenue collection. The advertised percentage of collections by billing companies is irrelevant because it does not address all the facets of successful billing.

Therefore, it is always in the Department's best interest to regularly review the billing and collection services to ensure that business practices and policies are current, whether in-house or via a third party.

Understanding the Payer Mix

Transport reimbursement depends on both services provided and billing the appropriate party responsible for service payment. As mentioned previously, there are four categories for reimbursement: Medicare, which is the primary health care coverage for persons over the age of 65; Medicaid, a component of the federal Medicaid program and is provided for specific qualified individuals and families (primarily low income at 138% of the national poverty level); commercial insurance, most commonly associated with benefits provided by employers to their employees but which also may be purchased independently; and private pay, which is the term generally applied to those without insurance.

Within these categories are numerous subcategories used for reimbursement, such as workers' compensation, liability, and auto insurance, which will not be discussed in this report.

To create an appropriate reimbursement scenario, the Salem Fire Department must factor in the economic and population subsets that result in the estimated payer mix. For this report, we have utilized the actual payer mix provided by Faulk Ambulance Northwest, the current service provider for the City of Salem.

To establish system value, we used the various databases previously listed along with historical data on transport volume to arrive at the transport value of the system. The values used for this section include the following:

Figure 85: Projected 2024 Statistics

Projected Volume	Total
Projected 2024 Call Volume	27,461
Projected 2024 Emergency Transports	19,819

Service charges are based on current rates, as shown in the following figure. It is important to note that Salem Fire Department rates are lower than those of the surrounding entities, which should be considered moving forward. Although increased charges do not affect all payers the same and do not increase the number of collections one-for-one, there is an additional cost recovery for the system. AP Triton uses an average transport mileage of five miles in this calculation.

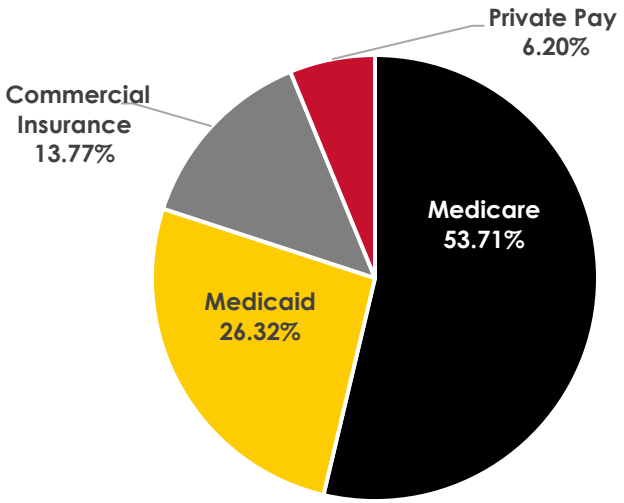
Figure 86: Projected 2024 Average Transport Billing

Treatment	Cost
Base Rate	$2,023.35
Mileage @ 6 miles/Tx	$194.25
Total Average Charge per Transport:	**$2,217.60**

Figure 87: Estimated 2024 Payer Mix & Transports

Cost Center	Percent of Transport	Number of Transport
Medicare/Medicare HMO	53.71%	10,645
Medicaid/Medicaid HMO	26.32%	5,216
Commercial Insurance	13.77%	2,729
Private Pay	6.20%	1,229
Totals:	**100%**	**19,819**

Figure 88: Payer Mix



Applying the reimbursement formula to the payer mix requires adjusting for collection rates. There are multiple ways to calculate the rate adjustment. This one uses a simple percentage-to-volume ratio. To a large degree, variations in collection percentages across the payer mix depend upon the stability of each payer. The most stable is Medicare, as eligibility requirements are more explicit. Medicaid and private insurance tend to have slightly less stable enrollee numbers, as the situations that allow participation in those cost centers change with everyone's circumstances. Private pay is similar.

AP Triton typically finds that a percentage of charges within each payer category will be unbillable for several reasons. The most common reason is that the patient is no longer covered or has not met the deductible. Our experience has shown that for each category in the above-pictured payer mix, there is a corresponding percentage of collections to billables. Medicare has a maximum benefit of $648, of which Medicare covers 80% on average, or $518. Commercial insurance runs 80%, while private patients pay about 3% to 5% of the total transport fee.

Treat No Transport

A "treat no transport" (TNT) scenario exists where the responding ambulance treats the patient at the scene but does not transport them to the hospital. The Salem Fire Department TNT fee is $917.00. However, a patient has not been charged TNT in several years. Therefore, TNT has not been included in the System Value calculations.

First Responder Fee

The First Responder Fee (FRF) reimburses a first response agency regardless of patient transport. This fee allows organizations to recoup the costs of delivering ALS first response and patient care outside ambulance transport. That revenue is not included in this report but can be considered as several fire organizations are already doing so.

GEMT Cost-Recovery Opportunities

Ground Emergency Medical Transport

The Ground Emergency Medical Transport (GEMT) program creates enhanced reimbursement opportunities for departments providing emergency transportation to patients on Medicaid. In general, GEMT supplemental payment programs allow participating providers to expand their staff, buy necessary equipment, and allow providers to answer the GEMT services requested by all clients in their community. Thirty-five departments are participating in the GEMT supplemental payment programs in the State.

GEMT Fee for Service

In Oregon, there are two programs that departments can participate in. The first program is based on fee-for-service (FFS) Medicaid patients. The FFS program consists of filling out a Certified Public Expenditure (CPE) report that lists all the city's expenditures for the given service. The city does not participate in the FFS program but can enroll in the future.

GEMT—Coordinated Care Organization

The second program is GEMT Coordinated Care Organization (CCO). The Centers approved the Medicare and Medicaid Services (CMS) program in January 2021. The program seeks to increase the reimbursement to "Government Owned" Ground Emergency Medical Systems providers by maximizing the Federal funding available. The city currently participates in this program. Given the forecasted number of Medicaid transports, the Salem Fire Department could realize an additional $4,417,952 in GEMT reimbursement from this program.

System Valuation

The next figure illustrates the current system value by payer call volumes and the reimbursement amount.

Figure 89: System Value

Cost Center	Volume	Reimbursement
Medicare/Medicare HMO	10,645	$5,347,795
Medicaid/Medicaid HMO	5,216	$1,768,346
Commercially Insured	2,729	$4,841,599
Private Pay/Non-Insured/Other	1,229	$136,246
Medicare Co-Payment $120 @ 30%		$416,423
Total Maximum Payer Mix Reimbursement:		**$12,510,412**

Total System Value

AP Triton has estimated a system value for 2024 using all given and known data. This valuation of $12,510,412 will be used in this study to estimate cost recovery estimates for ambulance modeling. One method for checking the accuracy of calculations is determining the ratio between billing and collections.

Common collection ratios fall within 25–35% of billing charges, depending on the payer mix. In this scenario, the total billing for emergency transport is forecasted at $43,950,614, and collection is $12,510,412 for all providers. This represents a 28.46% collection rate, similar to what the Salem Fire Department is currently experiencing.

Section III:
EMS SYSTEM DESIGN

EMS System Delivery Modeling & Recommendations

AP Triton has evaluated multiple EMS delivery models and provides five for consideration by the Salem Fire Department. The following models will allow the City of Salem to assess the emergency medical services (EMS) service delivery and governance options for its consideration and ultimate success.

AP Triton will provide a comprehensive overview of each option so the City can arrive at the best option to provide its residents, businesses, and visitors with the highest service levels. The following 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 fire personnel and subcontracting.

Please be aware that in our reports and analyses, there may be slight rounding differences due to the use of whole numbers. This approach is adopted to facilitate easier reading and understanding of the data. Despite these minor variances, the integrity and accuracy of the information are maintained, ensuring that it remains highly relevant and reliable for the intended purposes.

System Costs

Four options call for the Salem Fire Department to hire personnel and purchase equipment. The 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 subcontracting model, itemized costs are also listed, along with a total unit hour cost for the entire system.

These system costs include additional personnel costs 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 Salem Fire Department's deployment model.

If the City of Salem provides all ambulance transport directly, these costs are much higher than if they decide to subcontract for all, or a substantial number of, the system. In the subcontracting model, many of these costs are included within the hourly contractual rate. The following figures detail how AP Triton's cost estimates were developed.

The amortization is based on a six-year turnover of vehicles and equipment. Although the six-year life span does cover the total span of the equipment's practical use, most equipment, such as radios, gurneys, and ambulances, have a much longer use span (if not front-line, then possibly in reserve). Each item in the cost center will also have a unit hour cost directly related to the number of ambulance hours needed in Salem's system.

Figure 90: 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	6 Years	$33,333	$7.31
Cardiac Monitor	6 Years	$6,000	$1.32
Make-Ready Equipment	6 Years	$4,167	$0.91
Data Tablet	3 Years	$1,000	$0.18
Power Gurney	5 Years	$4,667	$1.02
Ambulance Setup	5 Years	$2,500	$0.55
TOTAL	—	**$51,667**	—
Operating Expenses			
Ambulance Insurance	Yearly	$2,571	$0.48
Fuel/Maintenance/Mechanic/License	Yearly	$41,000	$7.71
Data Connection	Yearly	$1,200	$0.23
Training (Model Dependent)	Yearly	$5,494	$0
Medical Supplies	Yearly	$24,000	$4.51
Totals:	—	**$74,265**	—

Administrative Costs

Administrative costs consist of 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 91: Administrative Costs

Administrative Cost Center–Ambulance	Total Annual Cost
Billing (4% of Net Collections)	$500,416
Margin/Reserve Account (15% of Net Costs)	$1,178,759
Five-Year Startup Cost Recovery (Model Dependent)	$307,561
Total:	**$1,986,736**

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.

Understanding the Models

The ambulance transport models are developed using known Salem Fire Department costs and costs derived from industry standards surrounding fire/private ambulance transport systems. Although these costs are thorough and based on existing systems using these models, they are only some-encompassing. Prices can vary for items listed, such as cardiac monitors, radios, gurney systems, overtime required, etc. Private provider salaries are based on industry standards from surrounding counties and could be raised or lowered based on decisions made in the implementation process.

AP Triton also encourages the Salem Fire Department 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 operating costs for the models 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.

> *Note: Option #1 projects costs for a Firefighter model. This model does not cover the added cost of putting dozens of Firefighters through a Salem Fire Academy. This additional cost must be taken into consideration if this model is chosen.*

During the evaluation of the system, AP Triton determined that a transportation model servicing the City of Salem would require seven 24-hour ambulances and one 10–12-hour day car to cover surge needs during peak activity. This breakdown uses existing call data, including time of day and call concurrence. As a system is implemented, adjustments might have to be made to accommodate "real world" dynamics, such as hospital wall time, training needs, and surge protection. When the Salem Fire Department picks a specific model, a strategy can be developed to determine the practical deployment of ambulances in the system.

Supervision is built into each model based on the specific needs of the deployment. For instance, the Firefighter model (Option #1) staffs one Administrative BC to manage the program and three field Captains to run day-to-day operations. These positions are removed in the subcontracting model and reduced to one staff Captain to manage the program, as the subcontractor manages all day-to-day operations.

Deployment Models

Option #1: Firefighter Transport Model

Fire Agencies Providing Ambulance Transport with Sworn Personnel

Option #1 for consideration by the Salem Fire Department is a sworn Firefighter/Paramedic and sworn Firefighter/Emergency Medical Technician (EMT) staffing model for delivering all emergency ambulance services. Our compiled data indicates that a maximum of 0.40 UHU is recommended for transport units with sworn personnel; this basis will be provided in each transport option utilizing sworn personnel.

For the sworn Option #1, seven 24-hour staffed ALS units are recommended, with one 12-hour flex ALS unit staffed with overtime to ensure call volume coverage during the peak load demand. These units will ensure availability during anticipated system demand, built on the premise of 1,263 hours a week or an average of 180 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 21 Firefighters/Paramedics and 21 Firefighters/EMTs, including salary and benefits. The full deployment will require 42 personnel.

Figure 92: Option #1—Firefighter Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
42 FTEs	Firefighter Paramedic/EMT		$8,398,616
207-hour Average	Constant Staffing–Overtime		$447,763
Staffing Costs:		**$134.65**	**$8,846,378**

Along with the costs above, the system cost center figures will be added to create total system costs. The 12-hour surge shift is added to each model for consistency, and the 12 hours is added to each unit hour calculation. For example, seven 24-hour ambulances equate to 61,320 hours yearly; the additional 12-hour ambulance adds 4,380 hours for 65,700 hours.

Figure 93: Option #1—Firefighter Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	$8,846,378
Operating Depreciation	$741,600
Operating Costs	$1,017,575
Administration Costs	$1,182,037
Option #1 Total Operational Costs:	**$11,787,590**
12-Hour OT Shifts for Peak Staffing	$451,162
Margin/Roll-Over Account/Fund	$1,178,759
Billing (3.25% Net Collections)	$406,588
Option #1 Total Administrative Costs:	**$2,036,509**
Total Revenue	$12,510,412
Total Option #1 Costs	$13,824,099
Total System Cost per Unit Hour	$210.41
Option #1 NET Cost Recovery (Loss):	**($1,313,687)**

Benefits/Challenges—Option #1

To provide Option #1, the City of Salem will have to consider several benefits and challenges before its implementation. The most notable benefit is the increase in overall sworn personnel staffing. Adding 42 personnel would significantly increase the flexibility needed to manage a modern-day fire department. Although the initial startup of this model would take longer than other models to onboard academies, the payoff would be a significantly more stable workforce.

The Firefighter Transport Model has many challenges, primarily the difficulties with hiring a significant number of sworn personnel. This may pose a roadblock to quickly getting service levels up to meet the system's demands. There are considerable overtime costs involved with staffing in Option #1 as all vacancies (sick leave, vacation) and flex car deployments are predicated on overtime provided by the sworn personnel.

Adding 21 new Paramedics to the Department could cause turnover problems as Firefighters/Paramedics promote off the ambulance, requiring sending people to school. Purchasing fire apparatus, including ambulances, is significantly delayed compared to previous years and could add to start-up timelines.

Option #2: Ambulance Operator Model

Fire Agencies Providing Ambulance Transport Non-Sworn Personnel

Option #2 is a model using non-sworn (Single-Role) personnel. Non-sworn EMTs and Paramedics will staff all the ambulances in the system. This model can be flexible in its personnel staffing, using 24-hour units and 12-hour flex shifts. Staffing the identified 1,263 hours per week would require 21 new EMTs and 21 new Paramedics working 24-hour shifts.

This model includes supervision and support staff. Supervision consists of three sworn Fire Captain/Paramedic staff at $295,708 each. Support staff includes a civilian Business Manager ($147,456 annually), a Management Analyst ($147,455 annually), and a Human Resources Hiring Manager ($147,455 annually). While we understand that billing will be handled by an outside contractor, Salem Fire Department will still need to manage this important contractual relationship. It is worth noting that this is the minimum number of recommended supervision and support staff. Salem Fire Department could also consider adding civilian employees in the Logistics Division.

The task of onboarding 42 new employees and the constantly high turnover rate expected for this class of employees is a significant undertaking.

This model tends to be 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. Salary and benefits used in this model are from Marion County as no current Salem Fire Department single-role personnel exist.

Figure 94: Option #2—Ambulance Operator Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
42 Full-Time	Single-Role Paramedics/EMTs		$5,801,879
	Constant Staffing – Overtime		$107,044
Staffing Cost:		**$89.94**	**$5,908,883**

Benefits/Challenges—Option #2

There are many benefits to an Ambulance Operator Model. One is that it would increase the number of fire personnel on duty across the City but not the number of sworn personnel. The Ambulance Operator model also benefits from training and vetting the City's next generation of Firefighters. Single-Role employees are vetted in stations and emergencies before they are hired as full-time Firefighters. Multiple West Coast fire departments 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 City resources in 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 Option #2 has challenges, it can generate significant net revenue over expenses to reinvest into the EMS system.

Figure 95: Option #2—Ambulance Operator Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	$5,908,883
Operating Depreciation	$741,600
Operating Costs	$999,523
Administration Costs	$1,182,037
Option #2 Additional Model Costs:	**$8,832,043**
12-Hour OT Shifts for Peak Staffing	$309,973
Margin/Roll-Over Account/Fund	$883,204
Billing (3.25% Net Collections)	$406,588
Option #2 Total Administrative Costs:	**$1,599,765**
Total Revenue	$12,510,412
Total Option #2 Costs	$10,431,808
Total System Cost per Unit Hour	$158.78
Option #2 NET Cost Recovery (Loss):	**$2,078,604**

Option #3: Hybrid Sworn/Non-Sworn

Hybrid Ambulance Transport Services Sworn/Non-Sworn

Option #3 offers ambulances staffed with sworn (Firefighters) and non-sworn (single role) personnel 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.

There are many ways to split the safety and non-safety staffing. The model presented has four 24-hour Firefighter-staffed units and three 24-hour Single-Role-staffed 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 96: Option #3—Hybrid Sworn/Non-Sworn Staffing Costs

Employee Count	Classification	Hourly Costs	Total Annual Cost
21 Full-Time	Firefighter PM/EMTs		$3,599,407
89-hour Average	Constant Staffing–Overtime		$82,507
21 Full-Time	Single-Role PM/EMTs		$3,725,847
	Constant Staffing–Overtime		$61,145
Staffing Cost:		**$114.09**	**$7,495,906**

Figure 97: Option #3—Hybrid Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	$7,495,906
Operating Depreciation	$741,600
Operating Costs	$1,010,940
Administration Costs	$1,182,037
Option #3 Additional Model Costs	**$10,430,482**
12-Hour OT Shifts for Peak Staffing	$0
Margin/Roll-Over Account/Fund	$1,043,048
Billing (3.25% Net Collections)	$406,588
Option #3 Total Administrative Costs	**$1,449,637**
Total Revenue	$12,510,412
Total Option #3 Costs	$11,880,119
Total System Cost per Unit Hour	$180.82
Option #3 NET Revenue	**$630,293**

Benefits/Challenges—Option #3

Having seasoned Firefighters working on the ambulances creates a very flexible system to staff any surge units necessary. Although this creates a cost-effective model, it might take existing staff from other needed duties. The Salem Fire Department may find turnover a detriment to the long-term staffing needs. It may also consider new employee hiring, recruitment, benefits workload, and recruitment challenges of simultaneously hiring several new sworn employees a significant hurdle.

Option #4: Private Subcontracting

Private Ambulance Subcontracting for Transport Services

Option #4 would have the Salem Fire Department partner with a private company to provide emergency ambulance 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, California, 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 Salem Fire Department personnel to provide any deployment hours. The Salem Fire Department would be the Provider of Record, providing all administrative oversight for delivering EMS transport services. The Department would contract for all necessary billing programs and facilitate the system's revenue and expenditure needs.

The following figure outlines the estimated costs of Option #4, including hourly rate, unit hours needed, annual contract, estimated additional system costs, and revenues after expenses.

Figure 98: Option #4—Subcontracting Model Costs

Cost Center	Hourly Rate	Hours Needed	Annual Cost
Subcontract ALS Costs	$150.00	65,700 hours	$9,855,000
Subcontract BLS Costs	$135.00	0 hours	$0
Total Cost:			**$9,855,000**

Figure 99: Option #4—Subcontracting Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	$9,855,000
Operating Depreciation	$0
Operating Costs	$302,400
Administration Costs	$294,911
Option #4 Additional Model Costs	**$10,452,311**
12-Hour OT Shifts for Peak Staffing	*Built into Sub-Contracting Cost*
Margin/Roll-Over Account/Fund	$1,045,231
Billing (3.25% Net Collections)	$406,588
Option #4 Total Administrative Costs	**$1,451,820**
Total Revenue	$12,510,412
Total Option #4 Costs	$11,904,131
Total System Cost per Unit Hour	$181.19
Option #4 Net Cost Recovery (Loss)	**$606,281**

Benefits & Challenges—Option #4

There are several advantages for the Salem Fire Department 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.
- The option can generate significant 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 personnel.

With Option #4, Salem must recognize the additional workload associated with starting up operations. Points to consider are as follows:

- The Salem Fire Department is required 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 City of Salem administrative regulations followed for a competitive bid.
- Finding suitable private ambulance subcontractors may be challenging 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 and states.

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 the Salem Fire Department in the Subcontracting Model include:

- Salem would have operational control of the system and hold the subcontractor directly accountable for failing to meet contract requirements at any time.
- Salem would be the Provider of Record and perform/subcontract all billing services for transport in this option.
- As the Provider of Record, Salem could access additional federal funding through the PP-GEMT program.

Option #5: Hybrid Subcontracting

Hybrid Ambulance Transport Services Fire-Based and Subcontracting

Option #5 is a hybrid model that emphasizes the advantages of several previous models. It directly provides some 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 in the following figure display a 50/50 split to start the deployment, if this model is chosen, AP Triton could build a specific cost structure that fits Salem's needs.

Figure 100: Option #5 Hybrid Subcontracting Staffing Costs

Employee Count/Hours	Classification	Hourly Costs	Total Annual Cost
24 Full-Time/39,420 hours	Single-Role AOs		$3,867,919
	Constant Staffing–Overtime		$71,336
35,040 hours	Subcontracting Costs	$150.00	$4,599,000
Staffing Cost:			**$8,538,255**

Figure 101: Hybrid Subcontracting Model System Costs

Model Costs/Revenues	Total Annual Cost/Revenue
Personnel/Staffing Costs	$8,538,255
Operating Depreciation	$370,800
Operating Costs	$551,807
Administration Costs	$1,182,037
Option #5 Additional Model Costs	**$10,642,899**
12-Hour OT Shifts for Peak Staffing	$0
Margin/Roll-Over Account/Fund	$1,057,156
Billing (3.25% Net Collections)	$406,588
Option #5 Total Administrative Costs	**$1,463,745**
Total Revenue	$12,510,412
Total Option #5 Costs	$12,106,643
Total System Cost per Unit Hour	$197.43
Option #5 NET Revenue	**$403,769**

Benefits/Challenges—Option #5

The Hybrid Subcontracting Model could dampen some of the downsides of previous models, like 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 stairstep approach like this could lower the entry burden. Multiple ways exist to split the services between the City and a private provider. With the City as the Provider of Record, additional federal financing (PP-GEMT) could also be available.

Startup Costs

If the Salem Fire Department chooses Options #1, #2, or #3, there will be significant startup costs, including purchasing ambulances and equipment, hiring, orientation, and training personnel, overhead, and billing setup. The funding method should be determined before acting on 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 your current provider. Option #5 could start with minimal startup 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 & Setup

Options #1, #2, and #3 would require purchasing and setting up a minimum of 12 ambulances for 911 transport service to maintain an effective fleet, not including interfacility or critical care transports. It is our understanding that Salem Fire Department recently purchased ambulances for use by dual role Firefighter/Paramedics for $450,000 each. In option #2, AP Triton recommends that Type II van type ambulances be considered for single role staffing. As with the startup 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 the Salem Fire Department to navigate 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:

Figure 102: Projected Ambulance Costs

Cost Center	Cost
Base Vehicle	$200,000
Cardiac Monitor	$36,000
Make Ready Equipment	$25,000
Data Tablet	$3,000
Power Gurney	$28,000
Set-up	$15,000
Cost Each:	**$307,000**
Number of Ambulances Needed	12
TOTAL COST:	**$3,684,000**
Amortized Yearly Costs:	**$620,000**

Hiring & Orientation

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

Figure 103: Estimated Hiring Costs for Non-Sworn Employees

Cost Center	Cost Each	Total
Recruiting	$20.00	$1,260
Testing	$40.00	$2,520
Prints/DOJ	$49.00	$3,087
Background	$240.00	$15,120
Medical	$600.00	$37,800
HR Processing	$150.00	$9,450
PM Orientation Hours	Hourly * 40 hours	$20,000
EMT Orientation Hours	Hourly * 40 hours	$19,631
Orientation/Training Facility	$8000.00	$8,000
Safety Gear	$350	$14,700
Supplies	$200.00	$8,400
Total:		**$139,968**

Figure 104: Estimated Hiring Costs for Sworn Firefighters

Cost Center	Cost Each	Total
Recruiting	$20.00	$840
Testing	$40.00	$1,680
Prints/DOJ	$49.00	$2,058
Background	$1,200.00	$50,400
Medical	$600.00	$25,200
HR Processing	$150.00	$6,300
PM Orientation Hours	Hourly * 40 hours	$30,215
EMT Orientation Hours	Hourly * 40 hours	$27,468
Orientation/Training Facility	$8000.00	$8,000
Safety Gear	$3,500	$147,000
Supplies	$200.00	$8,400
Total:		**$307,561**

Summary of Transportation Models

Four of the models presented show a positive net cost recovery for the City. The Subcontracting Model uses a $150/ALS unit hour price point to illustrate the maximum amount the City could pay a private provider and still see a positive cost recovery.

Figure 105: Ambulance Transport Model Summary

Ambulance Transport Models	Unit Hour Cost	Net Cost Recovery (Loss)
Option #1—Firefighter Model	$210.41	**($1,313,687)**
Option #2—Ambulance Operator Model	$158.78	$2,078,604
Option #3—Hybrid Sworn/Non-Sworn Model	$180.82	$630,293
Option #4—Subcontracting Model	$181.19	$606,281
Option #5—Hybrid Subcontracting Model	$197.43	$403,769

*The subcontracting model is set at a $150.00 unit hour price for the private provider; the additional $31.24 represents additional costs to the city itemized in the cost analysis.

Tiered Response Considerations

A Tiered Response System uses a combination of ALS and BLS units to service the system based on call acuity. While these systems are more cost-effective than an all-ALS system, they rely on an emergency medical dispatch system with a robust quality assurance program. After the Salem Fire Department has achieved the level of quality improvement they are striving for in the dispatch center, it is recommended that the City consider implementing a Tiered Response System.

Mobile Integrated Healthcare

Introduction to Mobile Integrated Healthcare (MIH)

Mobile Integrated Healthcare (MIH) is an alternative approach for handling low-acuity calls. It is on the leading edge of fire-based EMS and should be considered the future of emergency medical services (EMS). Rising call volumes require utilizing alternative treatment modes and transport options. Using MIH programs, Firefighters and other responders can be equipped with additional training and medical equipment to help better treat and, therefore, possibly defer the rising number of low acuity calls that have plagued numerous systems nationwide.

AP Triton will discuss four avenues with viable solutions for integrating mobile healthcare into a system in the Salem Fire Department. 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 when developing an MIH program, there are potential options that can assist in addressing this growing problem.

Although many variations of provider-led responses are currently being used, the following four programs have proven successful options: Community Paramedicine, Advanced Practice Provider Care Units, Responder-led Telemedicine, and Behavioral Health Response Units. Each of these programs has unique qualities that can serve the residents and visitors of the City of Salem in different ways while maintaining excellent patient care, flexibility, and sustainability. These programs are not exclusive; many departments have adopted multiple programs to address the needs of diverse populations. The following briefly describes each model and an example of current departments with working programs.

Community Paramedicine

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

The concept trains Paramedics currently working in the field on the safe treatment and care of patients with non-acute illnesses or injuries. It has them develop strategies to get the patient to the most appropriate receiving center for their condition (e.g., Urgent Care Facility, Behavioral Health evaluation facility, etc.).

CP is on the leading edge nationwide, with legislation being developed collaboratively with state, county, and local EMS professionals.

> *"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."*

Community Paramedicine is primed to be the future of EMS nationwide.

Advanced Practice Provider Care Unit

Advanced Practice Provider (APP) Care Units are a viable and successful alternative in several fire departments, including 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 APP unit and a Community Paramedic unit is the ability to make physician-level decisions in the field, such as writing prescriptions, referring to other physicians, referring 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 home. 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.*[9]

Using Beverly Hills Fire Department 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, predetermined dispatch protocols created in collaboration with the department's Medical Director would be followed.

If applicable, the APP Unit is then 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, as an option, the APP crew could be called by an emergency unit on the scene post-paramedic assessment if the Paramedic determined the patient was a good candidate for treatment by the APP unit.

Overview

An APP response dramatically benefits the community and offers a practical, appropriate alternative to 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 in the City of Salem.

An APP program is unique when discussing fire department-led MIH because the APP can work independently on non-911 calls. An APP can integrate into multiple areas in the county without seeking approvals or relying on state regulations. With an unlimited supply of funding, an APP program could add 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 the City of Salem 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 have a Telemedicine appointment with a medical practitioner in an emergency dispatch center or be contracted as an on-call service. With the nation adapting to virtual meetings (Zoom, Teams, and other video conferencing mediums), talking to a medical professional on an iPad or similar device doesn't seem as foreign as it would have been three years ago.

In this model, first responders would evaluate the patient and then pivot the call 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 telemedicine professional, who could engage the patient directly to determine the most appropriate treatment plan.

After a thorough telemedicine interview and patient assessment, the medical professional and patient would determine the next steps: transporting the patient to the hospital via ambulance, referring the patient to a clinic or urgent care center for treatment, advising them to contact their physician, or having the patient remain at home and monitor themselves.

In addition to the final resolution, the Telemedicine Physician could prescribe medications to the patient's pharmacy, provide detailed care records to the physician, provide follow-up Telemedicine appointments, 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 (CCFPD)-EMS Alliance with American Medical Response contracted with a new Tele911 company in November of 2021 to help deliver this 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.*[10]

Overview

The entry point for Telemedicine is typically low, putting the burden of funding on the Telemedicine group that will ultimately look to bill for the services they provide. Telemedicine typically uses existing ALS resources and equipment to administer the program, so costs are low. However, there could be impacts to the overall system. Having an ALS unit stay on the scene while a Physician group is contacted and a thorough medical exam is conducted could delay additional responses in the system. These 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 of the nation. Most units are associated with Police departments and used to curve the over-use 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.*[11]

Other models have various connections to public and private organizations in the local areas they serve, such as P.E.R.T (Psychiatric Emergency Response Team), used in Orange and LA Counties, 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.*[12]

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. The programs are often a public/private partnership that does not require additional fire personnel and would supplement the three response models discussed earlier.

Overview

Alternative methods to deal with the changing face of healthcare are needed for departments to adjust to a new paradigm in EMS. Behavioral Health Units fill this gap and will continue to become more mainstream. There is a large amount of Federal grant funding available for programs dealing with the homeless, and if the Salem Fire Department chooses this model, this should be thoroughly explored.

MIH Summary

As stated previously, MIH is on the cutting edge nationwide. Each model described in this section is a viable option for the Salem Fire Department. Each has its benefits and constraints, which need to be considered by the City when moving forward with a new program.

Section IV:
APPENDICES

Appendix A: Table of Figures

Appendix B: References

[1] Respiratory Protection Standard 29 CFR 1910.134; Occupational Health & Safety Administration.

[2] NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, to the Public by Career Fire Departments; National Fire Protection Association.

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[8] Gordon Graham, http://www.gordongraham.com/about.html

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