Yamhill

Fire Departments & Districts

McMinnville, Oregon

November 2021

Fire District & Departments

Scenario 3

Preferred Option Service Delivery Analysis

CFAI Compliant

Emergency Services Consulting International

Providing Expertise & Guidance that Enhances Community Safety

HISTORICAL SYSTEM RESPONSE WORKLOAD

Community leaders and department leadership should understand the level of demand of service within their community. This knowledge provides the base for determining the resources required to deliver those services when requested by the citizen. Each of the following components are an integral part of the illustration of demand for service within the proposed service areas

For purposes of this analysis, scenario 3 is evaluated based upon a consolidated department which includes the communities of **McMinnville, McMinnville Rural, Amity, Lafayette, New Carlton, Dundee and Dundee Rural.**

Service Demand Analysis

Incident Type Analysis

The first component when analyzing the demand for service within the community is to determine the type of incidents that occur. The National Fire Incident Reporting System (NFIRS) has developed a classification system which categorizes the various types of incidents into a standard code set. These codes identify the various types of incidents to which the fire department responds and provides the department an ability to document the full range of incidents it handles. Through documentation of the NFIRS incident types, a department is better able to plan for response to incidents, identify areas in which to prioritize training of personnel and identify areas where community risk reduction efforts may decrease the occurrence of particular incidents. The codes are three digits and are grouped into series by the first digit as illustrated in the figure below.

Figure 1 NFIRS Incident Types

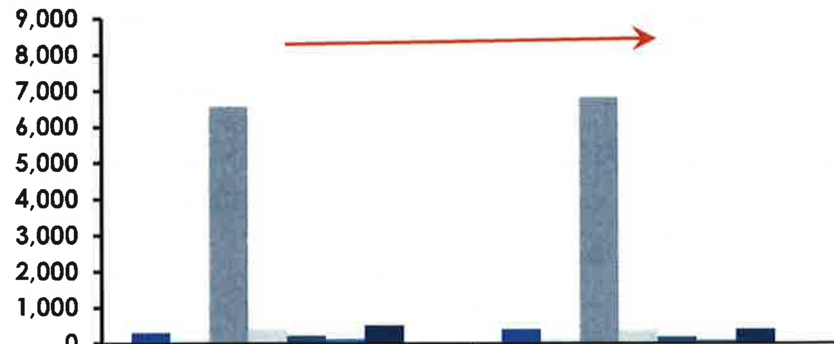
Incident Series	Incident Heading
100-Series	Fires
200-Series	Overpressure Rupture, Explosion, Overheat (No Fire)
300-Series	Rescue and Emergency Medical Service (EMS) Incidents
400-Series	Hazardous Condition (No Fire)
500-Series	Service Call
600-Series	Cancelled, Good Intent
700-Series	False Alarm, False Call
800-Series	Severe Weather, Natural Disaster
900-Series	Special Incident Type

Within a department, the firefighter generally enters the report information, including the NFIRS incident type, into a records management software designed for documentation of fire department responses. Due to this analysis considering data from departments which are not a common records management system, the computer aid dispatch (CAD) data was used instead. Thus, rather than the code representing what the firefighter would have documented as the final incident type, this analysis represents the type of incident at the time it was dispatched. This cross reference was developed in partnership with ESCI and McMinnville Fire Department leadership. Moving into the future, conceivably a consolidated department would operate on the same records management system and better enable leadership to analyze the data based on final outcome of the incident.

The following figure provides an historical overview of incidents based upon the National Fire Incident Reporting System. Due to the method in which the coding was done, there were no incidents where the dispatched incident type was defined as 800-Series or 900-Series incident types.

As illustrated in the figure below, scenario 3 shows a slight increase in service demand from 2019 to 2020 of 2.1%. The two incident types with increases were fire incidents at 36.4% and emergency medical incidents at 3.6%. The remaining incident types experienced a decrease of 7% for motor vehicle collision incidents, 6.4% for hazardous condition incidents, 18.9% for alarm incidents, 18.8% for canceled/good intent incidents and 11.4% for service call incidents.

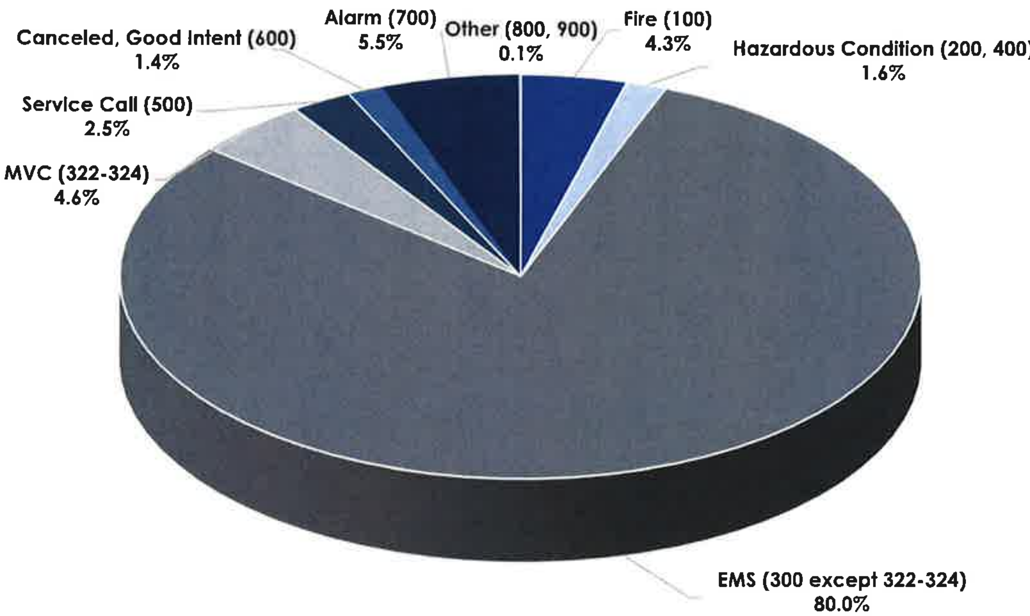
Figure 2 Service Demand by Incident Type, 2019–2020 (Scenario 3)



	2019	2020
Fire (100)	302	412
Hazardous Condition (200, 400)	140	131
EMS (300 except 322-324)	6,584	6,824
MVC (322-324)	401	373
Service Call (500)	220	195
Canceled, Good Intent (600)	133	108
Alarm (700)	512	415
Other (800, 900)	14	6
Total	8,306	8,464

A secondary analysis of the same data provides leadership with an overall view as to what types of incidents comprise which portions of the entire demand for service. As illustrated in the following figure, the greatest demand for service is for emergency medical incidents, followed by alarm incidents, motor vehicle collision incidents, fire incidents, hazardous condition incidents, service call incidents and canceled/good intent incidents.

Figure 3 Service Demand by Incident Type, 2019–2020 (Scenario 3)



Temporal Analysis

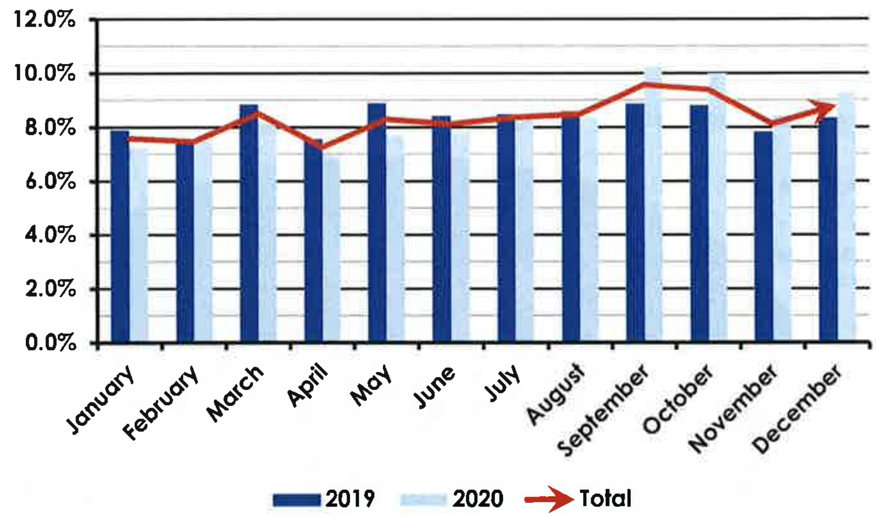
The second component when analyzing the demand for service within the community is to determine the temporal nature of incidents that occur. With the knowledge of the various temporal categories of service demand, leadership is more prepared to determine the department resources needed for current and future demand for service. Decisions as to when non-response activities occur—such as apparatus maintenance, hydrant testing, training, pre-planning target hazards, hose testing, etc.—can be handled in such a way as to have them occur during times/days/months of lesser demand for service.

Service Demand by Month

Service demand by month is the first category analyzed. When possible, the department should consider planning for some of the aforementioned activities during those months with the lowest demand for service.

As illustrated in the figure below, for scenario 3, the greatest demand for service occurs in the summer months, reaching a peak in September and October. The lowest demand for service occurs in the late winter months.

Figure 4 Service Demand by Month, 2019–2020 (Scenario 3)

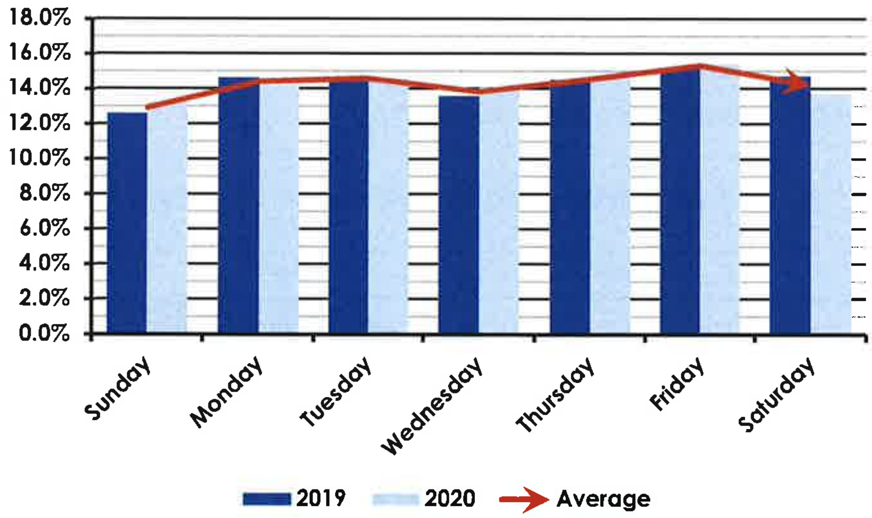


Service Demand by Day

Service demand by day is the second category analyzed. Leadership should try to coordinate non-response activities on those days with the lowest demand for service.

As illustrated in the figure below, for scenario 3, the lowest demand for service occurs on Sunday, with a gradual increase to the first peak on Tuesday. Then with a slight drop on Wednesday, service demand gradually increases to a second peak on Friday before decreasing again.

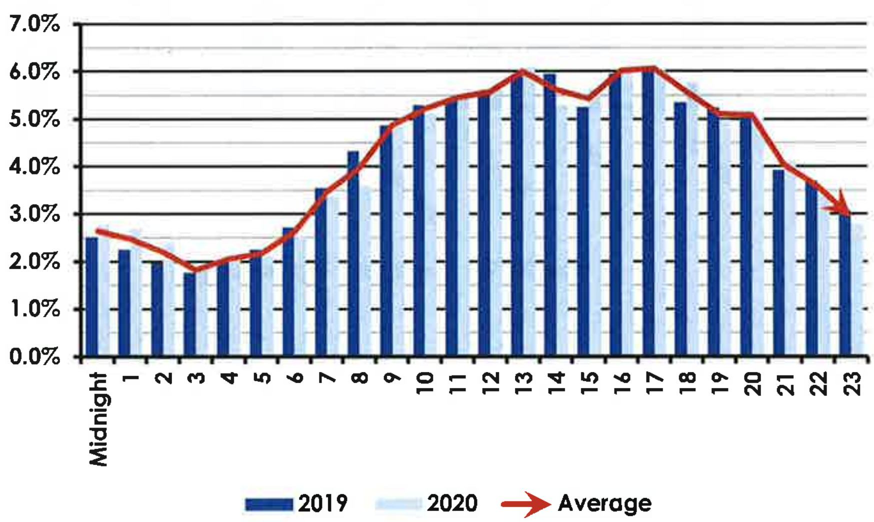
Figure 5 Service Demand by Day, 2019–2020 (Scenario 3)



Service Demand by Time of Day

Service demand by time of day is the final category analyzed. Leadership should try to coordinate non-response activities during hours that have the least demand for service. As illustrated in the following figure, the service demand by time of day is at its lowest during the early morning hours. Demand begins to increase around 5 AM—which generally coincides with population arising and beginning to prepare for their day. Service demand continues to increase throughout the morning, reaching a peak around 1 PM. This upward trend coincides with the movement of the population from their homes to their daily activities. With some fluctuation throughout the afternoon, demand for service begins decreasing around 6 PM—coinciding with the movement of the population from their daily activities to home or evening activities. As the evening activities conclude and citizens return to their homes and settle in for the night, service demand decreases at a quicker rate, returning to the point of lowest demand.

Figure 6 Service Demand by Time of Day, 2019–2020 (Scenario 3)



It is important to note that while demand for service is at its lowest during the early morning hours, the greatest number of fatal residential fires occur at night or early in the morning. Based on findings from a national study, from 2014 to 2016, residential fatal fires were highest between 1:00am to 2:00am, and 4:00am to 5:00am. The 8-hour peak period (11pm to 7am) accounted for 48 percent of residential fatal fires[1]. Leadership should consider this when determining the base level of service to enable to department to response with appropriate personnel and resources even during hours of lower demand.

Spatial Analysis

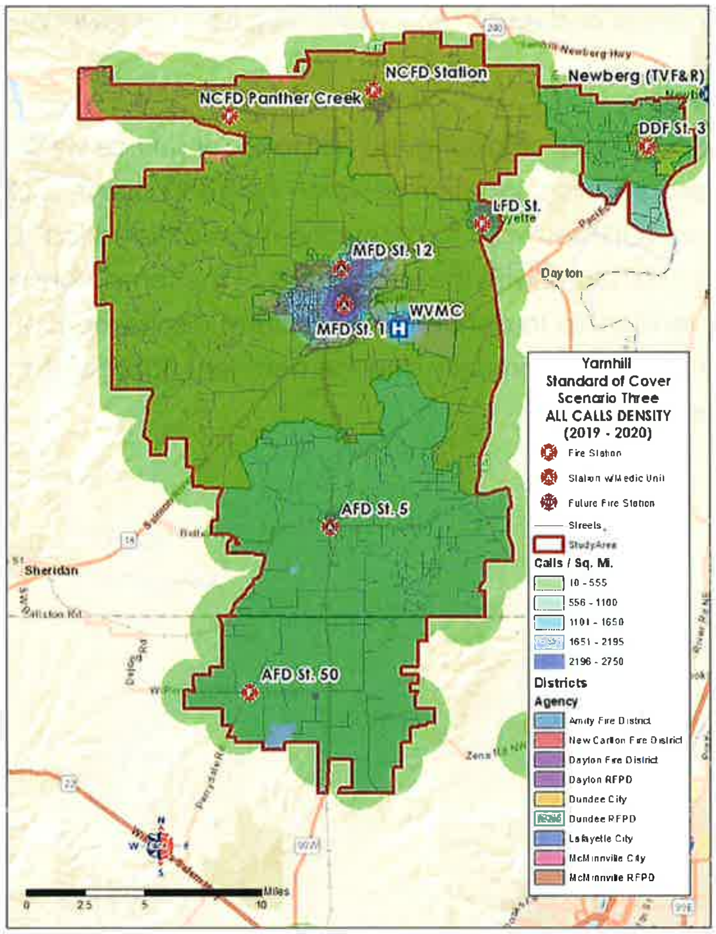
The third component when analyzing the demand for service within the community is to determine the geographical location at which incidents occur. ESCI utilizes geographical information system (GIS) software to determine the mathematical density of incidents with the service area. This, along with the knowledge of the temporal components of service demand, assists leadership to determine the current deployment of resources as it relates to the geography of the community and the pertinent national standards—and to plan for future service demand.

[1] Fatal Fires in Residential Buildings (2014-2016), Topical Fire Report Series Volume 19, Issue 1 /June 18, U.S. Department of Homeland Security, U.S. Fire Administration, National Fire Data Center.

Geographic Service Demand

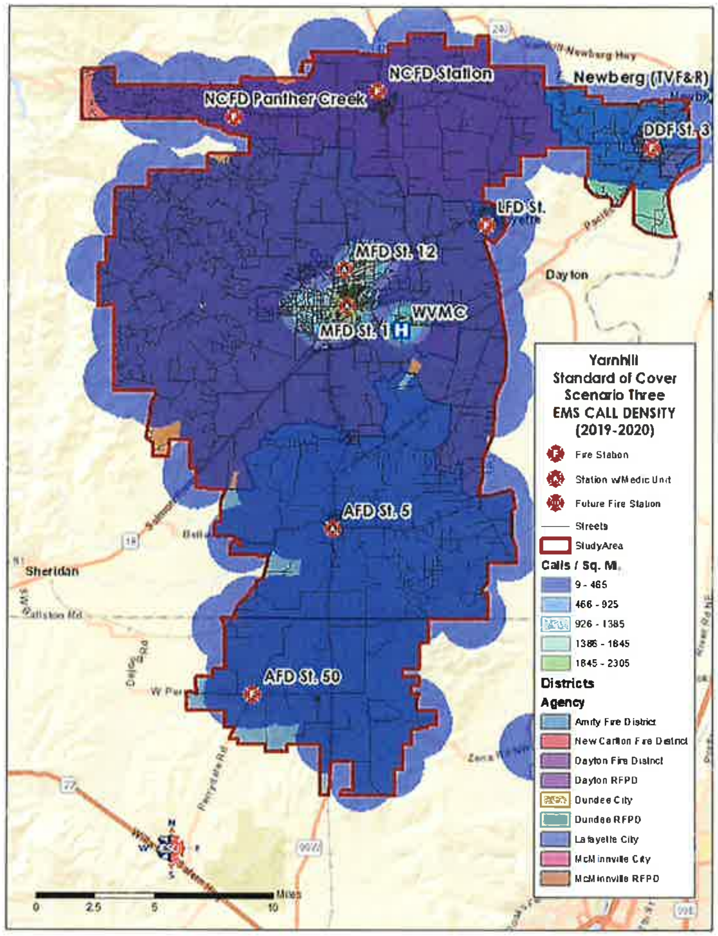
As illustrated in the figure below, the overall incident density for scenario 3 is primarily centered near MFD Station 1 and the hospital, which coincides with the area of greater population density within the service area.

Figure 7 Geographical Incident Density—All Incidents, 2019–2020 (Scenario 3)



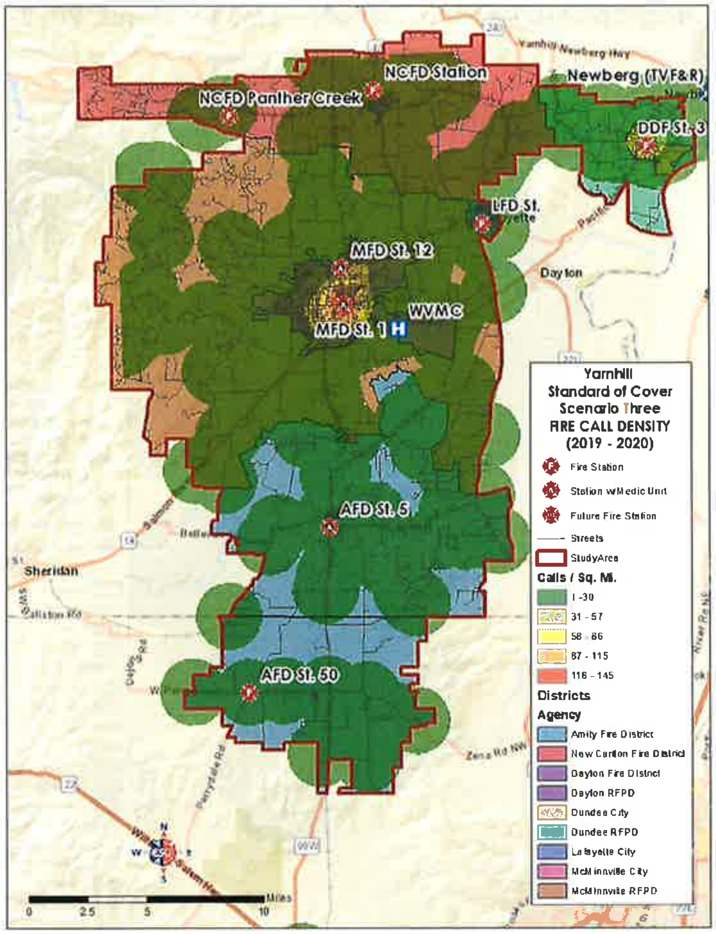
As illustrated in the figure below, the emergency medical incident density for scenario 3 is primarily centered near MFD Station 1 and the hospital, which coincides with the area of greater population density within the service area.

Figure 8 Geographical Incident Density—EMS Incidents, 2019–2020 (Scenario 3)



As illustrated in the figure below, the fire incident density for scenario 3 is primarily centered near MFD Station 1 with smaller centers around DDF Station 3 and AFD Station 5.

Figure 9 Geographical Incident Density—Fire Incidents, 2019–2020 (Scenario 3)



ISO Distribution

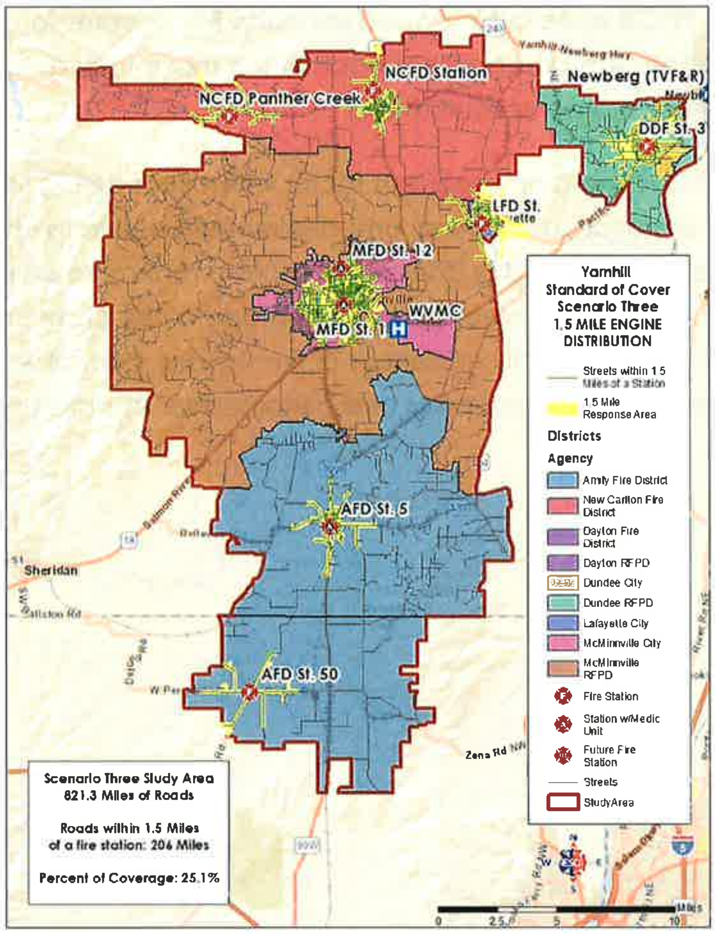
The Insurance Services Office (ISO) is a national insurance industry organization that evaluates fire protection for communities across the country. ISO assesses all areas of fire protection as broken down into four major categories including emergency communications, fire department, water supply, and 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 major four, detailing the specific requirements for each area of evaluation.

A community's ISO rating is an important factor when considering fire station and apparatus concentration, distribution, and deployment due to its effect on the cost of fire insurance for the residents and businesses. To receive maximum credit for station and apparatus distribution, ISO evaluates the percentage of the community (contiguously built upon area) that is within specific distances of fire stations, central water supply access (fire hydrants), engine/pumper companies and aerial/ladder apparatus.

Travel Distance from a Fire Station

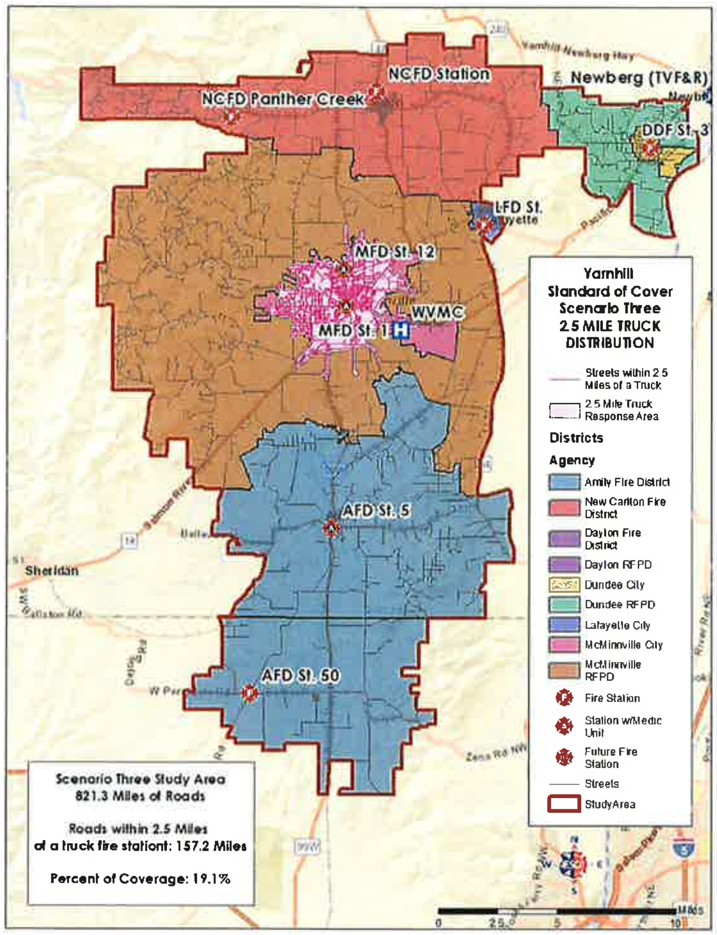
The first travel component evaluated by ISO is the percentage of service area that falls within 1.5-mile travel distance of a fire station. This percentage is based upon road miles analyzed by geographical information systems (GIS) software. As illustrated in the figure below, 25.1% of the proposed service area for scenario 3 is within 1.5 miles of a fire station.

Figure 10 1.5-Mile Engine Distribution per ISO Criteria (Scenario 3)



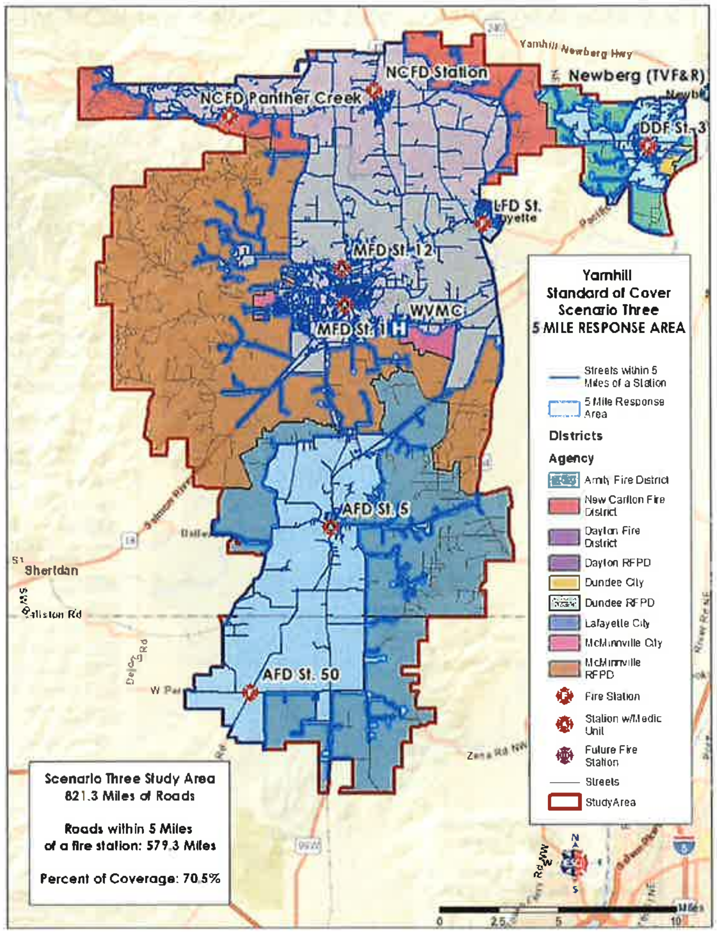
The second travel component evaluated by ISO is the percentage of the service area that falls within 2.5-mile travel distance from a station with an aerial apparatus. As illustrated in the figure below, 19.1% of the proposed service area for scenario 3 is within 2.5 miles of an aerial apparatus.

Figure 11 2.5-Mile Aerial Apparatus Distribution per ISO Criteria (Scenario 3)



The final travel component evaluated by ISO is the percentage of the service area that falls within 5-mile travel distance from a fire station. As illustrated in the following figure, 70.5% of the proposed service area for scenario 3 falls within 5 miles of a fire station.

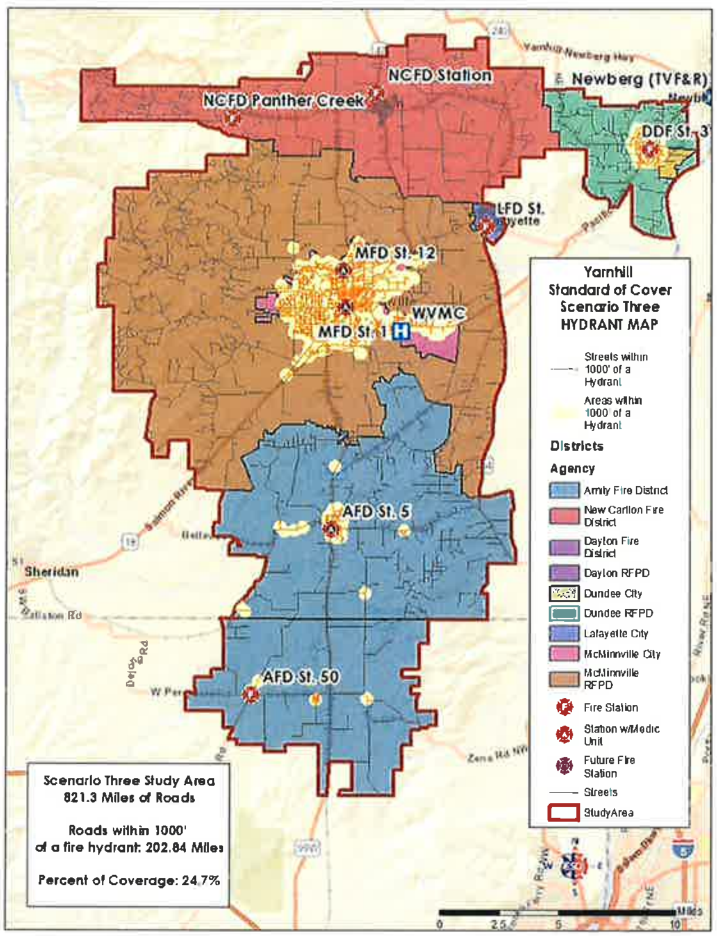
Figure 12 5-Mile Coverage per ISO Criteria (Scenario 3)



Fire Hydrant Coverage per ISO Criteria

ISO evaluates a community's availability of a sufficient water supply, which is critical for the extinguishment of fires. Included in this evaluation is the geographic location and distribution of fire hydrants. Structures outside a 1,000-foot radius of a fire hydrant are subject to a lower Public Protection Classification® rating than areas with adequate hydrant coverage, thus signifying limited fire protection. Exceptions are made when a fire department can show that either a dry hydrant or a suitable water tanker operation is possible to provide the needed volume of water for fire suppression activities for a specific period. As illustrated in the following figure, 24.7% of the proposed service area for scenario 3 is within 1,000 feet of a fire hydrant.

Figure 13 Hydrant Coverage per ISO Criteria (Scenario 3)



Unit Workload and Response Reliability Analysis

While incident type analysis, temporal analysis and spatial analysis enable leadership to plan for the response to service demand, the reliability of that response is impacted by workload and incident concurrency. Workload is a measure of the number of responses handled by each unit while concurrency is a measure of the number of incidents occurring simultaneously.

Response Unit Workload

When measuring the amount of workload handled by an individual unit, there are two common methods—number of incidents and amount of time. Of the two methods, the greater value to measure is the amount of time spent by units while responding to incidents. This measure is referred to as unit hour utilization (UHU) and represents the amount of time a unit was assigned to incidents as compared to the amount of time that unit was in service. The greater amount of time spent responding to incidents, the less often that unit is available for additional responses. As UHU increases, leadership may consider the option of balancing workload by movement of existing resources or consider implementation of additional resources.

While there are limited formal performance measures to use as a target measure, in May 2016, Henrico County (VA) Division of Fire published an article after studying their department's EMS workload. As a result of the study, Henrico County Division of Fire developed a general commitment factor scale for their department[2]. The next figure is a summary of the findings as it relates to commitment factors. Department leadership may use this as the basis for an internal discussion to determine the measure that is appropriate for their community.

[2] How Busy Is Busy?; Retrieved from https://www.fireengineering.com/articles/print/volume-169/issue-5/departments/fireems/how-busy-is-busy.html

Figure 14 Henrico County VA Commitment Factors

Factor	Indication	Description
16%-24%	Ideal Commitment Range	Personnel can maintain training requirements and physical fitness and can consistently achieve response time benchmarks. Units are available to the community more than 75 percent of the day.
25%	System Stress	Community availability and unit sustainability are not questioned. First-due units are responding to their assigned community 75 percent of the time, and response benchmarks are rarely missed.
26%-29%	Evaluation Range	The community served will experience delayed incident responses. Just under 30 percent of the day, first-due ambulances are unavailable; thus, neighboring responders will likely exceed goals.
30%	"Line in the Sand"	Not Sustainable: Commitment Threshold—community has less than a 70 percent chance of timely emergency service and immediate relief is vital. Personnel assigned to units at or exceeding 0.3 may show signs of fatigue and burnout and may be at increased risk of errors. Required training and physical fitness sessions are not consistently completed.

The measure of workload is generally assessed on units with career staffing based on the unit in-service 24 hours a day, seven days a week. For purposes of this analysis, this methodology was used even though the majority of units are volunteer units and not specifically staffed. The unit hour utilization for units is illustrated below. While all units appear to be within the ideal commitment range, leadership should continue to monitor M12, M1 and M10 as those units experience the highest unit hour utilization.

Figure 15 Unit hour Utilization, 2019–2020 (Aerial Apparatus)

Unit	2019	2020	Change Over Study Period
T1	0.37%	0.34%	-0.03%
T20	0.02%	0.00%	-0.02%
T21	0.00%	0.11%	0.11%

Figure 16 Unit hour Utilization, 2019–2020 (Battalion)

Unit	2019	2020	Change Over Study Period
BC140	0.01%	0.03%	0.02%
C191	0.00%	0.00%	0.00%
DC1	4.24%	3.72%	-0.53%

Figure 17 Unit hour Utilization, 2019–2020 (Chief)

Unit	2019	2020	Change Over Study Period
C10	0.53%	0.46%	-0.07%
C12	0.30%	0.21%	-0.09%
C13	0.06%	0.01%	-0.05%
C14	0.00%	0.00%	0.00%
C3	0.01%	0.00%	-0.01%
C4	0.14%	0.06%	-0.08%
C5	0.26%	0.00%	-0.26%
C7	0.51%	0.38%	-0.13%
DC12	0.38%	0.68%	0.30%
DC8	0.00%	0.00%	0.00%
C03	0.39%	0.29%	-0.10%
CA03	0.00%	0.03%	0.03%

Figure 18 Unit hour Utilization, 2019–2020 (Duty Officer)

Unit	2019	2020	Change Over Study Period
C41	0.01%	0.01%	0.00%
C42	0.00%	0.00%	0.00%
C50	0.26%	0.28%	0.03%
C51	0.04%	0.00%	-0.04%
C53	0.05%	0.00%	-0.05%
C62	0.22%	0.25%	0.03%
DC5	0.14%	0.22%	0.08%

Figure 19 Unit hour Utilization, 2019–2020 (Engine)

Unit	2019	2020	Change Over Study Period
E1	9.02%	8.56%	-0.46%
E10	1.83%	1.55%	-0.28%
E101	0.17%	0.17%	-0.01%
E14	1.16%	1.21%	0.05%
E15	0.17%	0.00%	-0.17%
E16	0.36%	0.25%	-0.11%
E191	0.00%	0.11%	0.11%
E198	0.03%	0.08%	0.06%
E20	0.01%	0.08%	0.07%
E21	0.03%	0.00%	-0.03%
E30	0.20%	0.19%	0.00%
E31	0.14%	0.01%	-0.13%
E32	0.03%	0.01%	-0.02%
E4	0.20%	0.20%	0.01%
E41	0.00%	0.05%	0.05%
E42	0.16%	0.04%	-0.12%
E43	0.12%	0.00%	-0.12%
E5	1.12%	0.93%	-0.19%
E51	0.36%	0.34%	-0.02%
E53	0.24%	0.25%	0.00%
E54	0.02%	0.00%	-0.02%
E7	1.61%	1.09%	-0.52%
E74	0.45%	0.34%	-0.10%
E77	0.17%	0.16%	-0.01%
E8	0.00%	0.00%	0.00%
E9	0.02%	0.00%	-0.02%
E98	0.10%	0.00%	-0.10%
SWE137	0.00%	0.04%	0.04%
E030	0.67%	0.86%	0.19%
E031	0.53%	0.53%	0.00%
E032	0.06%	0.17%	0.12%

Figure 20 Unit hour Utilization, 2019–2020 (Medic Unit)

Unit	2019	2020	Change Over Study Period
M1	18.11%	16.67%	-1.44%
M10	17.70%	15.83%	-1.87%
M12	22.86%	22.52%	-0.34%
M13	0.37%	0.33%	-0.04%
M181	0.21%	0.15%	-0.06%
M182	0.00%	0.23%	0.23%
M191	0.34%	1.14%	0.80%
M192	0.07%	0.00%	-0.07%
M193	0.03%	0.31%	0.28%
M20	0.06%	0.82%	0.77%
M21	0.00%	0.01%	0.01%
M5	3.18%	4.21%	1.03%
M8	0.84%	0.00%	-0.84%
M81	0.00%	0.00%	0.00%
M82	0.14%	0.00%	-0.14%
M9	0.33%	0.00%	-0.33%
M91	0.01%	0.00%	-0.01%
MTVFR1	0.05%	0.01%	-0.04%
R191	0.00%	0.01%	0.01%
R20	1.05%	0.75%	-0.30%
R21	0.20%	0.03%	-0.17%
R30	0.00%	0.01%	0.01%

Figure 21 Unit hour Utilization, 2019–2020 (Rescue)

Unit	2019	2020	Change Over Study Period
R4	0.02%	0.00%	-0.02%
R5	1.88%	1.52%	-0.36%
R03	1.13%	1.03%	-0.10%
R030	0.00%	0.34%	0.34%

Figure 22 Unit hour Utilization, 2019–2020 (Type 3 Engine)

Unit	2019	2020	Change Over Study Period
HB54	0.16%	0.23%	0.07%
HB58	0.03%	0.02%	-0.01%
HB59	0.01%	0.01%	0.00%
HB7	0.04%	0.07%	0.03%

Figure 23 Unit hour Utilization, 2019–2020 (Type 6 Brush)

Unit	2019	2020	Change Over Study Period
BR1	0.59%	4.27%	3.68%
BR101	0.90%	1.09%	0.19%
BR11	0.21%	0.25%	0.05%
BR191	0.00%	0.00%	0.00%
BR198	0.01%	0.03%	0.02%
BR21	0.01%	0.00%	-0.01%
BR30	0.00%	0.00%	0.00%
BR31	0.00%	0.00%	0.00%
BR37	0.05%	0.04%	-0.01%
BR39	0.01%	0.04%	0.03%
BR4	0.01%	4.00%	3.99%
BR41	0.01%	0.01%	0.00%
BR5	0.32%	0.45%	0.13%
BR56	0.04%	0.08%	0.05%
BR57	0.10%	0.14%	0.04%
BR7	0.16%	0.18%	0.01%
BR71	0.73%	4.79%	4.05%
BR9	0.00%	0.00%	0.00%
BR98	0.02%	0.00%	-0.02%
BRSVF	0.01%	0.00%	0.00%
SWBR135	0.00%	0.01%	0.01%
BR031	0.00%	0.02%	0.02%
BR037	0.15%	4.64%	4.49%
BR039	0.05%	0.19%	0.14%

Figure 24 Unit hour Utilization, 2019–2020 (Water Tender)

Unit	2019	2020	Change Over Study Period
WT1	0.58%	0.24%	-0.34%
WT10	0.22%	0.20%	-0.03%
WT191	0.00%	0.00%	0.00%
WT198	0.00%	0.05%	0.04%
WT3	0.03%	0.04%	0.01%
WT30	0.00%	0.00%	0.00%
WT4	0.10%	0.04%	-0.07%
WT5	0.16%	0.20%	0.04%
WT51	0.00%	0.01%	0.01%
WT53	0.07%	0.07%	-0.01%
WT76	0.19%	0.13%	-0.06%
WT98	0.03%	0.00%	-0.03%
WTPC	0.02%	0.00%	-0.02%
WTPC1	0.00%	0.00%	0.00%
WTSVF	0.01%	0.05%	0.04%
WTSVF2	0.00%	0.01%	0.00%
WT03	0.13%	0.10%	-0.03%
WT030	0.00%	0.02%	0.02%

Figure 25 Unit hour Utilization, 2019–2020 (Special Operations)

Unit	2019	2020	Change Over Study Period
HZMT	0.02%	0.00%	-0.02%
HR9	0.01%	0.00%	-0.01%

Incident Concurrency

Incident concurrency—incidents occurring simultaneously—also impacts the reliability of the department's ability to respond to calls for service. There is no specific national standard to apply to this measure, but it provides leadership with an understanding of how often the department may be unable to handle calls for service without requesting assistance from automatic aid and mutual aid resources. Also, as the number of concurrent incidents increases, the ability to meet response time standards may be impacted since department units may now be responding from a more geographically distant location than the regular response unit.

Figure 26 Incident Concurrency 2019–2020 (Scenario 3)

Concurrent Incidents in Progress	2019	2020	Change Over Study Period
Single Incident	50.40%	46.86%	-3.54%
Two Incidents	31.47%	32.08%	0.61%
Three Incidents	12.25%	13.83%	1.57%
Four Incidents	4.17%	5.19%	1.02%
Five Incidents	1.29%	1.48%	0.19%
More than Five Incidents	0.41%	0.56%	0.15%

HISTORICAL SYSTEM PERFORMANCE REVIEW

For most citizens, the measure they are most often requesting is measure of how long it takes for a department to respond to their individual call for service. This measure is referred to as response performance and is analyzed through data recorded in the computer aid dispatch system (CAD) as well as the records management system (RMS).

In analyzing response performance, ESCI generates percentile measurements of response time performance. The use of percentile measurement using the components of response time follows the recommendations of industry best practices. The best practices are derived by the Center for Public Safety Excellence (CPSE), Standard of Cover document and the National Fire Protection Association (NFPA) 1710: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*.

The "average" measure is a commonly used descriptive statistic also 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 entire data set.

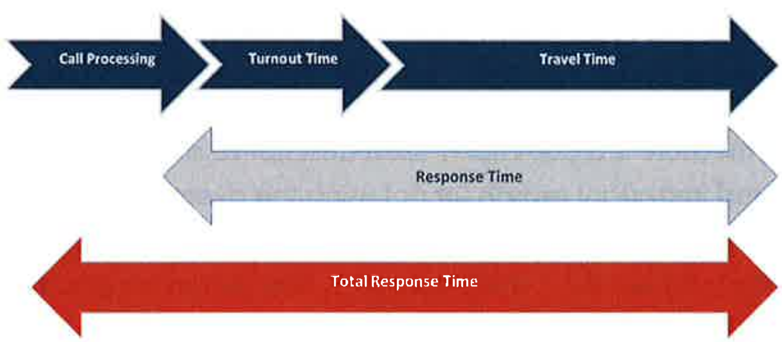
The "median" measure is another acceptable method of analyzing performance. This method identifies the value at the middle of a data set and thus tends to not be as strongly influenced by data outliers.

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 percent of the values are greater 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 important to keep in mind that each component of response performance 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:

- *Call Processing Time*—The time between a dispatcher getting the call and the resources being dispatched.
- *Turnout Time*—The time between unit notification of the incident and when they are responding.
- *Travel Time*—The time the responding unit spends on the road to the incident
- *Response Time*—A combination of turnout time and travel time, the most commonly used measure of fire department response performance.
- *Total Response Time*—The time from when the 911 call is answered until the dispatched unit arrives on the scene.



Tracking the individual components of response time enables jurisdictions to identify deficiencies and areas for improvement. In addition, knowledge of current performance for the components listed above; is an essential element of developing response goals and standards that are relevant and achievable. Fire service best practice documents recommend that fire jurisdictions monitor and report the components of total response time.[3]

Call Processing

Call processing is a measure of the time between a dispatcher getting the call and the resources being dispatched. This involves the dispatcher determining the nature of the service request, the location of the incident and the resources which should be assigned to the incident.

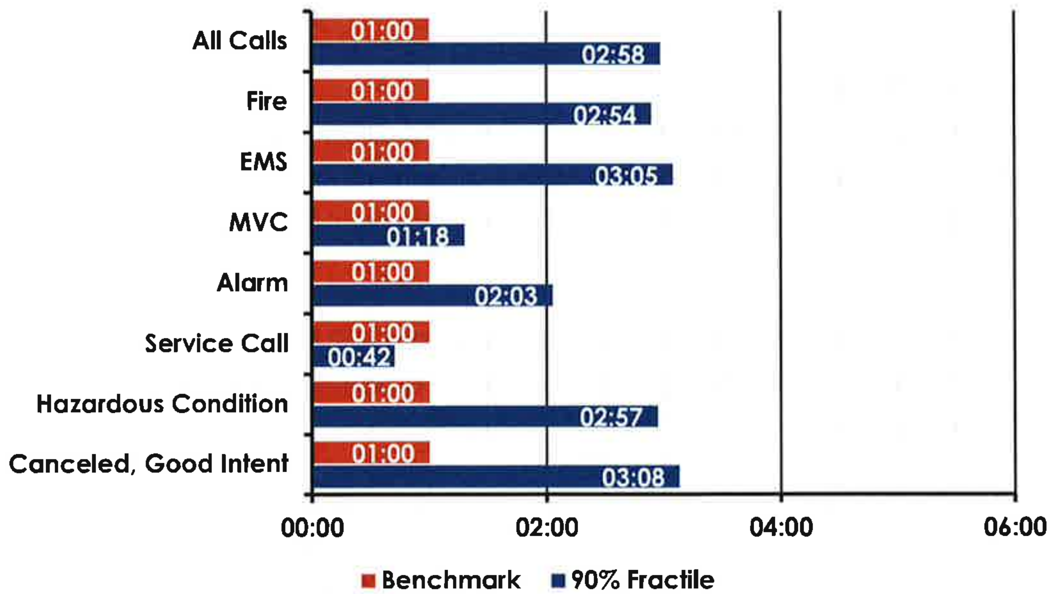
The NFPA standard for call processing is derived from NFPA 1225: *Standard for Emergency Services Communications* (2022) and requires the processing of the call to occur within 60 seconds, 90 percent of the time for high-priority incidents.

This particular measure does not fall under the direct supervision of the fire department. Within Yamhill County, the call taking and dispatch function for the fire department is handled by the Yamhill Communications Agency (YCOM911). Department leadership should work closely with YCOM911 leadership to validate analysis of the measure and make improvements where appropriate.

[3] *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, Center for Public Safety Excellence Community Risk Assessment: Standards of Cover, 6th Edition.*

For scenario 3, overall call processing time is 2 minutes, 58 seconds. When evaluated by incident type, call processing time ranged from 42 seconds for service call incidents to 3 minutes, 8 seconds for canceled/good intent incidents.

Figure 27 Call Processing Time Performance, 2019–2020 (Scenario 3)

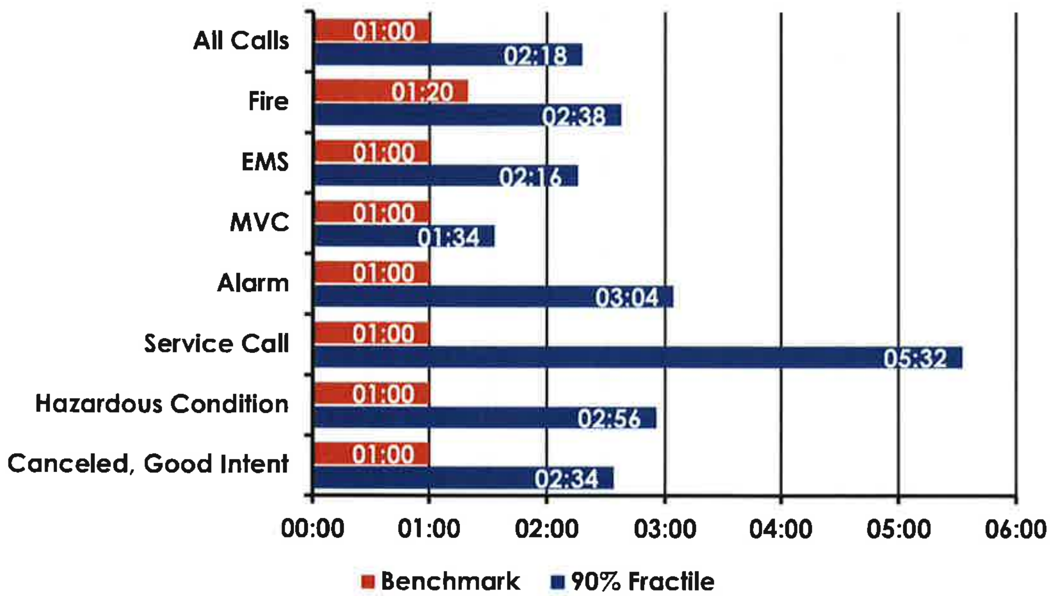


Turnout Time

Turnout time is the measure of the time between unit notification of the incident and when they are responding. This is the first response time performance measure component that falls under direct supervision of the fire department. It is comprised of the time it takes for the personnel to receive the dispatch information, move to the appropriate apparatus, don appropriate protective equipment and proceed to the incident. NFPA 1710 specifies that turnout time performance should be less than 60 seconds (01:00), 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 (1:20).

For the scenario 3, overall turnout time is 2 minutes, 18 seconds. When evaluated by incident type, turnout time ranged from 1 minute 34 seconds for motor vehicle collision incidents to 5 minutes, 32 seconds for service call incidents.

Figure 28 Turnout Time Performance, 2019–2020 (Scenario 3)



Regardless of the outcome of the consolidation discussion, department leadership should consider evaluation of this performance measure further to determine availability of potential changes to improve performance. Considerations may include:

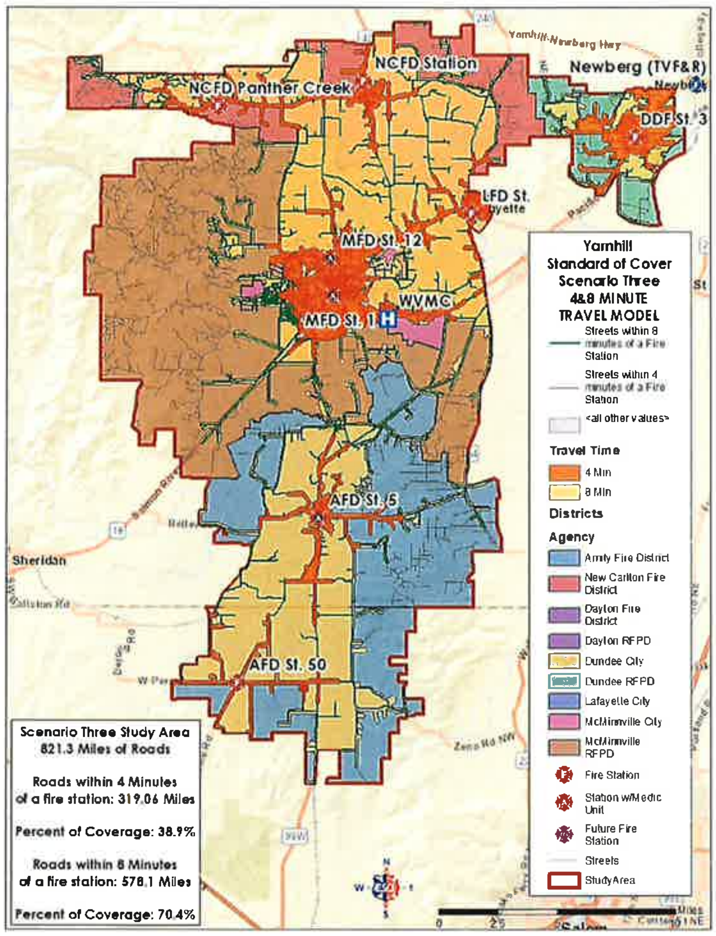
- Station design as it relates to crew movement from living quarters to apparatus.
- Efficiency of alerting systems.
- Efficiency of door closing equipment.
- Time for apparatus to be started and radio powered on for transmission.
- Crew activities and ability to move quickly.

Distribution & Initial Arriving Unit Travel Time

National Fire Protection Association (NFPA) standards and the Center for Public Safety Excellence (CPSE) accreditation of fire departments both evaluate response time criteria for purposes of analyzing resource distribution. For low/medium hazard incidents, the first unit should arrive within 4 minutes and the full assignment should arrive within 8 minutes. Travel time is calculated using the posted speed limit and adjusted for negotiating turns, intersections, and one-way streets.

As illustrated below, the ability to respond within the service area for scenario 3 covers 38.9% of the service area within 4 minutes and 70.4% within 8 minutes.

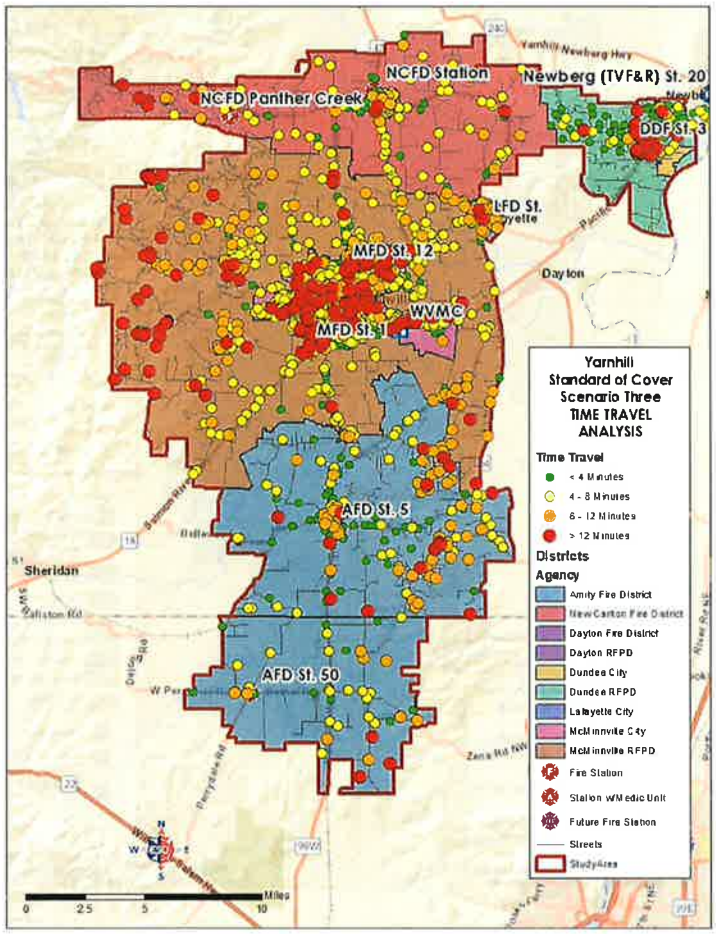
Figure 29 Theoretical 4-Minute/8-Minute Travel Time (Scenario 3)



While the preceding figures illustrate the theoretical travel time, it is based on units responding from their assigned stations. This does not always occur so it benefits leadership to see the analysis of actual travel time to incidents. While travel time increases as the incident becomes further distant from the station, concern may arise when identifying long travel times near fire stations—likely caused by units from that station not being available at the time of incident, or not at the station when dispatched.

As illustrated in the figure below, the travel time to actual incidents within scenario 3 was less than 4 minutes to 67.57% of incidents, 4–8 minutes to 25.86% of incidents, 8–12 minutes to 4.3% of incidents and greater than 12 minutes to 2.26% of incidents.

Figure 30 Actual Travel Time, 2019–2020 (Scenario 3)

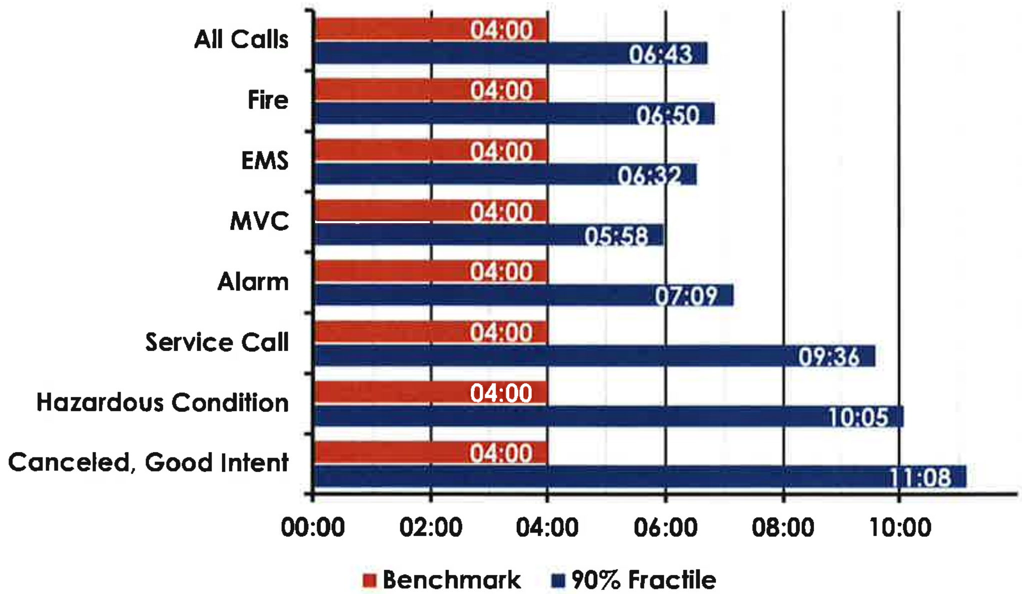


Travel Time Performance

Travel time is the measure of the time the responding unit spends on the road to the incident and is potentially the longest component of total response time. This measure can be greatly impacted by the geographic distance from the unit to the incident, weather conditions, traffic conditions, etc. While the NFPA standard recommends arrival of the first unit with 4 minutes, this is a difficult measure to achieve for most departments.

For the scenario 3, overall travel time is 6 minutes, 43 seconds. When evaluated by incident type, travel time ranged from 5 minute 58 seconds for motor vehicle collision incidents to 11 minutes, 8 seconds for canceled/good intent incidents.

Figure 31 Travel Time Performance, 2019–2020 (Scenario 3)

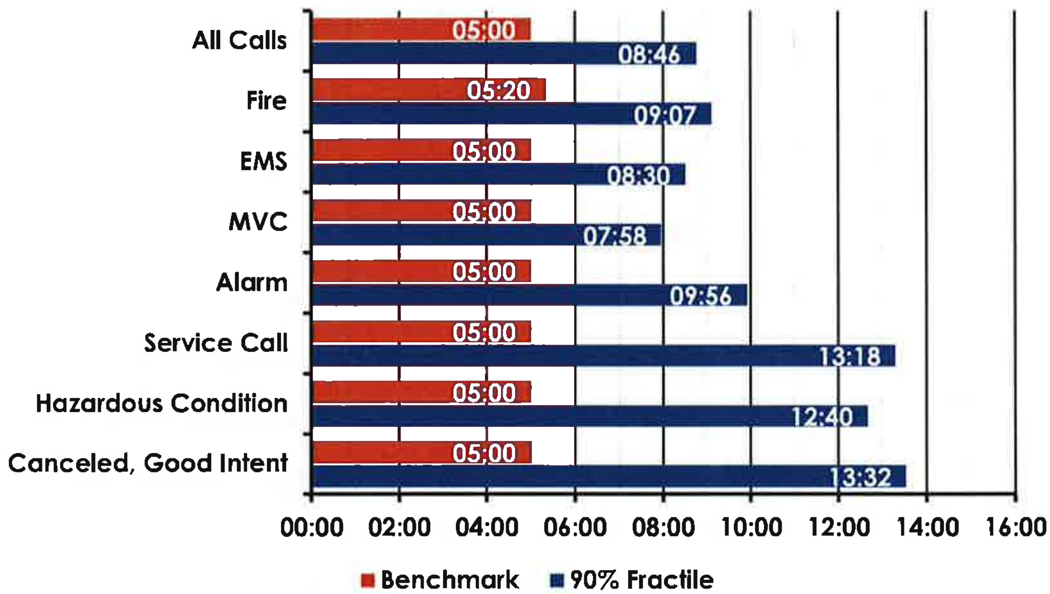


First Arriving Response Time

Response time is the measure when turnout time and travel time are combined and is the most commonly used measure of fire department response performance. Both of the components of response time are components upon which the department has the ability to directly impact.

For the scenario 3, overall response time is 8 minutes, 46 seconds. When evaluated by incident type, response time ranged from 7 minute 58 seconds for motor vehicle collision incidents to 13 minutes, 32 seconds for canceled/good intent incidents.

Figure 32 Response Time Performance, 2019–2020 (Scenario 3)

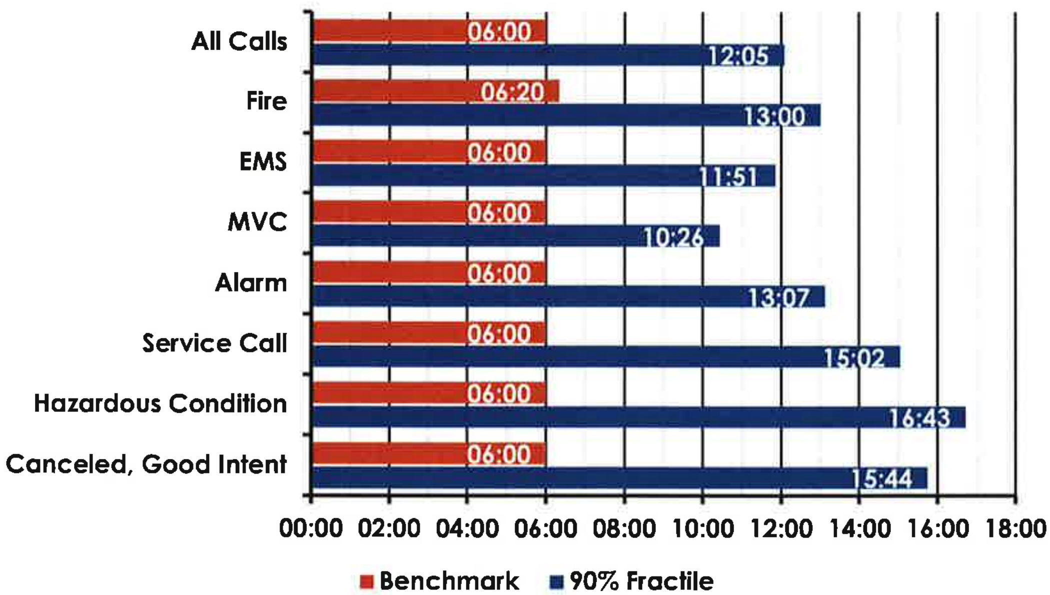


First Arriving Unit Received to Arrival Time (Total Response Time)

Total response time is the measure of the time from when the 911 call is answered until the dispatched unit arrives on the scene. This measure comprises all of the components of the response time continuum.

For the base scenario, overall total response time is 12 minutes, 5 seconds. When evaluated by incident type, total response time ranged from 10 minute 26 seconds for motor vehicle collision incidents to 16 minutes, 43 seconds for hazardous condition incidents.

Figure 33 Total Response Time Performance, 2019–2020 (Scenario 3)



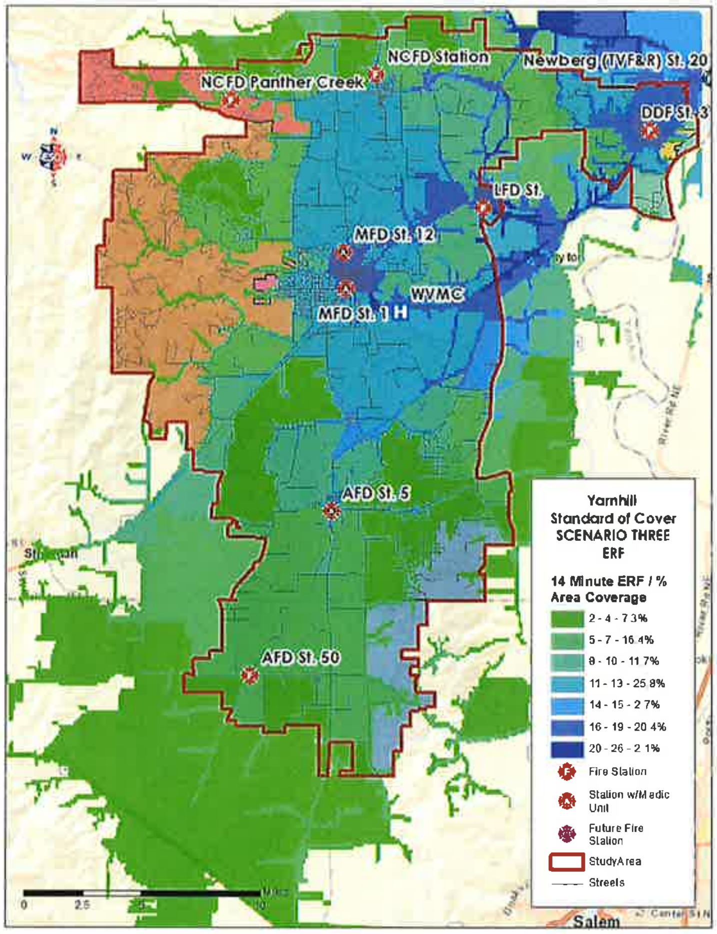
Concentration and Effective Response Force Capability Analysis

While the ability to get the first unit on scene is an important measure, for some incidents—such as structure fires—another important measure is the ability to assemble sufficient staff and resources at the incident within a minimal amount of time. When sufficient staff and resources arrive in a timely manner, there is a greater ability to reduce injury/death to victims as well as decrease property damage. The measure of this ability is referred to as effective response force (ERF). The following figure illustrates the ERF recommended through standards such as NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* and the Commission on Fire Accreditation (CFAI) Standards of Cover, 6th Edition.

Functions/Tasks	Single-Family Residence (2,000 SF)	Open Air Strip Shopping Center (13,000–196,000 SF)	3-Story Garden Apartment (1,200 SF)
Command	1	2	2
Apparatus Operator	1	2	2
Handlines (2 members each)	4	6	6
Support Members	2	3	3
Victim Search and Rescue team	2	4	4
Ground Ladders/Ventilation	2	4	4
Aerial Device Operator (if ladder used)	(1)	(1)	(1)
Initial Rapid Intervention Team	4	4	4
Initial Medical Care Component	N/A	2	2
Total	**16 (17)**	**27 (28)**	**27 (28)**

As illustrated in the following figure, 22.5% of the service area for scenario 3 has sufficient response within 14 minutes to meet the recommended ERF for a residential structure fire. For larger incidents, the department would be unable to meet the ERF within 14 minutes as recommended by the standard without relying on mutual aid or automatic aid resources.

Figure 34 Effective Response Force (Scenario 3)



Second Unit Arrival Time

The preceding figure provides an illustration of ERF based on geographical positioned resources. With that illustration, it is assumed that all units are at their station when dispatched to the incident. In order to compare this closer to actual responses, the following figures provide an illustration of arrival times of units responding to structure fires. For purposes of this analysis, the dataset used included all units with an on-scene timestamp for those incidents where three or more units arrived on scene.

Figure 35 Structure Fire Order of Arrival, 2017–2020 (Scenario 3)