2025 STATION LOCATION STUDY

Manassas Park Fire and Rescue Department

Virginia

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Emergency Services Consulting International
Providing Expertise and Guidance that Enhances Community Safety

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Executive Summary

Emergency Services Consulting International (ESCI) was contracted by the Manassas Park Fire and Rescue Department (MPFRD) in the spring of 2025 to conduct a Station Location Study within the City of Manassas Park, Virginia.

Summary of Findings

With a daily on-duty crew of nine (9) personnel, MPFRD provides services to the City of Manassas Park to include emergency response, prevention, life safety, community support, and more. The primary response area within the city is approximately 3.01 square miles and the department provides an overall response time (measure of time between dispatch of units and arrival of the first unit) of 6 minutes, 10 seconds at the 90th percentile (2020–2024). This performance is well within their target benchmark of 6 minutes, 30 seconds.

Recommendations

Although the current station location is central within the city and provides for a response time meeting current benchmarks, the potential construction of another station would provide for an opportunity for improved response times as well as counteract any potential issues with trains delaying response to the eastern portion of the city. Various factors were considered and compared to provide the following three main groups of recommendations that are outlined in detail within the report.

- Option 1 – This option keeps Station 1 and its current location and considers construction of a second station in the eastern portion of the city.
- Option 2 – This option keeps Station 1 and its current location and considers construction of a second station in the western portion of the city.
- Option 3 – This option relocates Station 1 to the western portion of the city and considers construction of a second station in the eastern portion of the city.

Acknowledgments

Manassas Park Fire and Rescue Department

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Assistant Chief (Fire and EMS Operations) | Thomas Oliver

Deputy Chief (Administrative Executive) | Adam Jones

Battalion Chief (Fire Marshal) | Rob Clark

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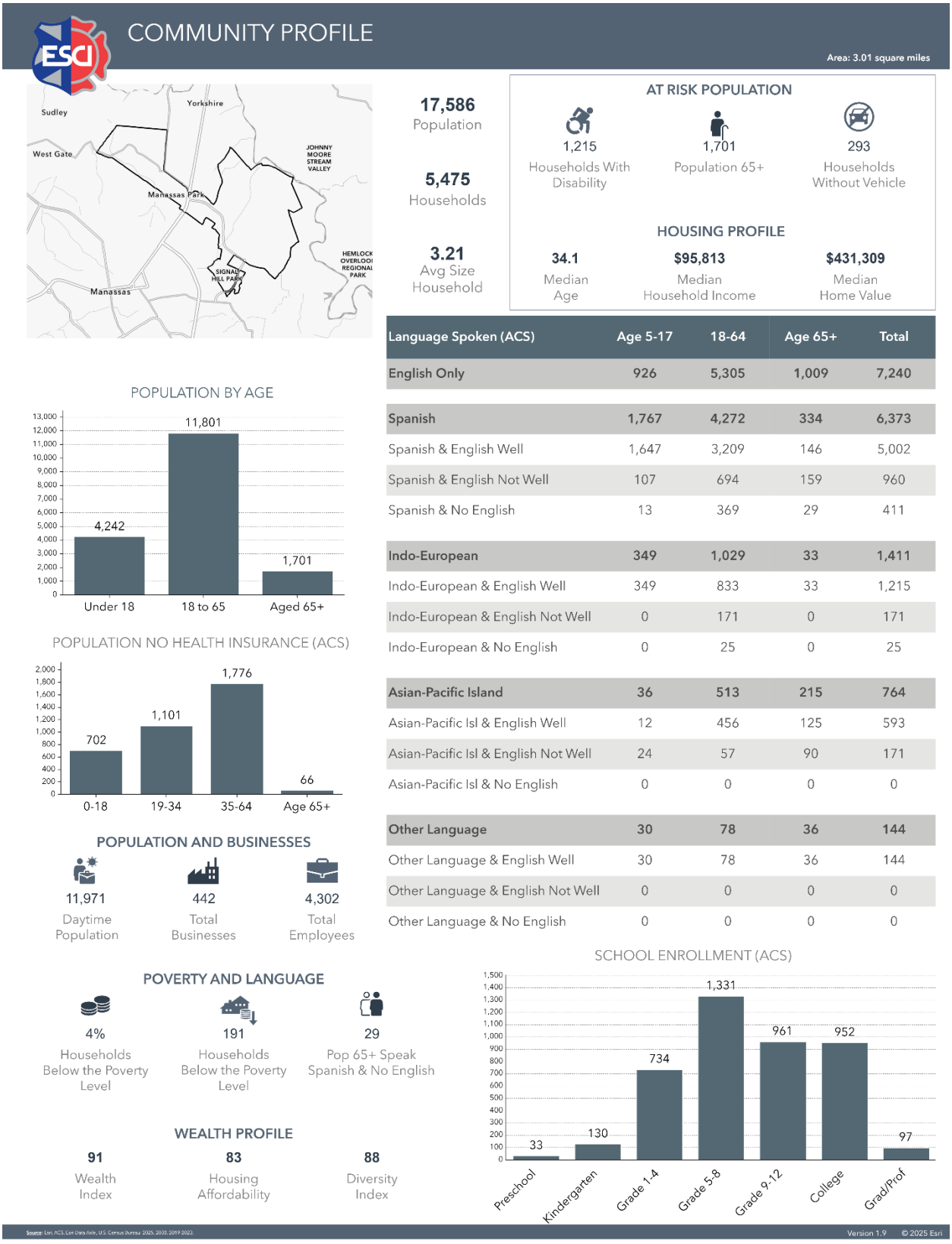
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Community Overview

Manassas Park is a city located within Prince William County, Virginia. Construction of the residential subdivision commenced in 1955, followed by the establishment of a community association in 1956 to further enhance the development. A petition led to Town status in 1957. In 1975, as the community grew, Manassas Park became the last town in Virginia to gain independent City status. The city has continued to grow and develop into a full-service city with the implementation of its own schools; police, fire rescue, and social services; and public works facilities. Figure 1. MPFRD Community Profile illustrates some of the pertinent demographic information about the community.

Figure 1. MPFRD Community Profile



Language Spoken (ACS)	Age 5-17	18-64	Age 65+	Total
English Only	**926**	**5,305**	**1,009**	**7,240**
Spanish	**1,767**	**4,272**	**334**	**6,373**
Spanish & English Well	1,647	3,209	146	5,002
Spanish & English Not Well	107	694	159	960
Spanish & No English	13	369	29	411
Indo-European	**349**	**1,029**	**33**	**1,411**
Indo-European & English Well	349	833	33	1,215
Indo-European & English Not Well	0	171	0	171
Indo-European & No English	0	25	0	25
Asian-Pacific Island	**36**	**513**	**215**	**764**
Asian-Pacific Isl & English Well	12	456	125	593
Asian-Pacific Isl & English Not Well	24	57	90	171
Asian-Pacific Isl & No English	0	0	0	0
Other Language	**30**	**78**	**36**	**144**
Other Language & English Well	30	78	36	144
Other Language & English Not Well	0	0	0	0
Other Language & No English	0	0	0	0

Organizational Overview

Manassas Park Fire and Rescue Department (MPFRD) is a career fire and rescue department providing emergency services to Manassas Park, Virginia. Services provided include response to emergencies such as fires, medical emergencies, hazardous materials, etc., but also duties related to fire prevention, public education, and training.

Following the town's establishment in 1957, the Manassas Park Volunteer Fire Department initially provided emergency services. In 1975, the city was incorporated and then in 1976 hired career staffing to become a combination department providing emergency services to the community. Then, in 2001, the final volunteer member transitioned to a career position, and the department became a fully career fire and rescue department.

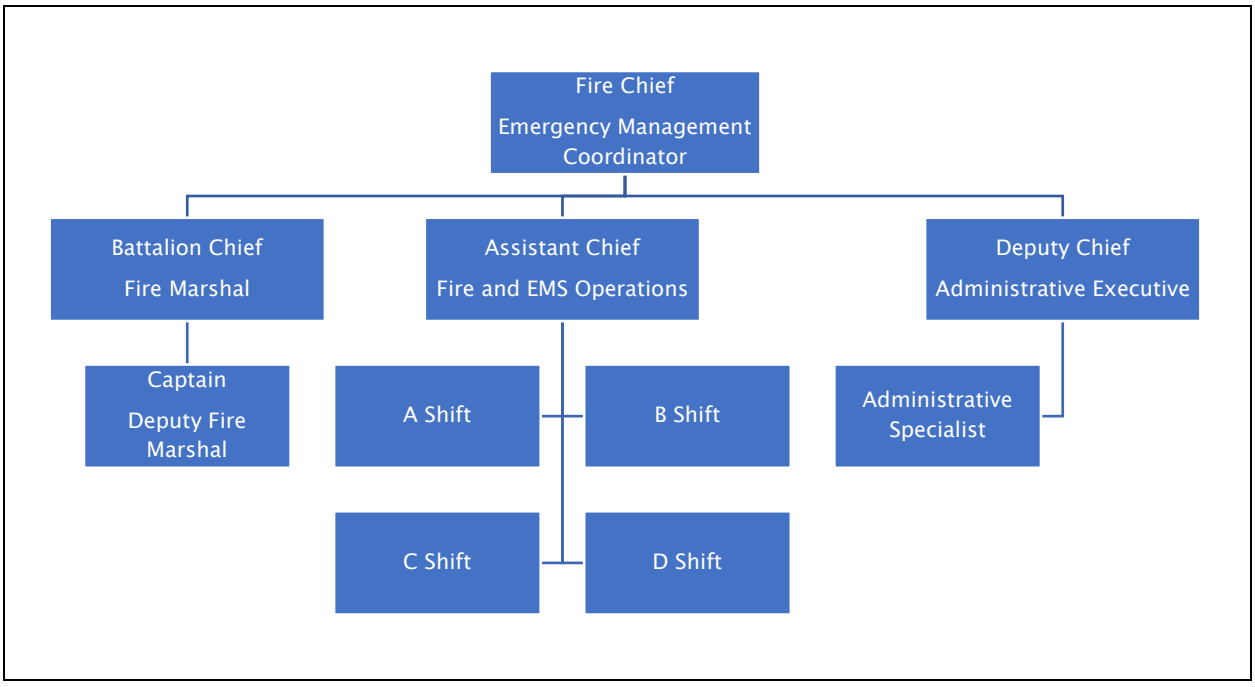
Adopted Performance Standards

MPFRD has adopted NFPA 1710 as their response performance standard. Within this standard, the benchmark is a turnout time of 60 seconds for emergency medical services (EMS) incidents and 90 seconds for fire incidents. They have also adopted a response time benchmark within the city limits to arrive on the scene within 6 minutes, 30 seconds from unit dispatch.

Organizational Design

The following figure illustrates the organization chart for MPFRD.

Figure 2. MPFRD Organizational Chart



MPFRD has developed a mission statement and core values, which are an integral part of effective organizations.

Mission Statement

The mission of the City of Manassas Park Fire and Rescue Department is to preserve and protect life and property for our community and surrounding areas. We will provide the highest level of Emergency Medical, Fire Suppression and Prevention Services by educating the public, engaging in community outreach, adopting progressive training techniques and maintaining a constant state of readiness.

Core Values

HONOR

We will exhibit principled character and personal integrity at all times.

INTEGRITY

We will be honest, respectful and loyal to our peers and the community.

PROFESSIONALISM

We will demonstrate our commitment to the community by providing excellence in service and always holding ourselves accountable.

COMPASSION

We will provide excellent care for all people no matter their situation or social status.

Accreditation & Insurance Services Office

Accreditation is a process whereby a department is able to demonstrate the establishment of performance benchmarks, regular monitoring of performance with comparison to those benchmarks, and documented plans for improvement where needed. Although MPFRD is not yet accredited, they have set a goal to begin the process in 2027.

The Insurance Services Office, Inc. (ISO) is a national insurance industry organization that evaluates fire protection for communities across the country. This organization regularly evaluates the following key components within communities and provides a written report with their findings:

- Needed fire flow
- Emergency communications
- Fire department
- Water supply

The evaluation results in a Public Protection Class (PPC©) grade which can range from 1 (highest grade possible) to 10 (lowest grade possible). The latest evaluation for Manassas Park was published in April 2023 with an effective date of August 1, 2023. The final result of the 2023 evaluation was a PPC© grade of 3. In the 2020 nationwide data provided by ISO, only 9% of communities achieved a PPC© grade of 3 (with 5.3%

achieving a higher grade). This demonstrates the excellent service provided to the City of Manassas Park.

Description of the Current Service Delivery

MPFRD provides services to the community from a single station located within the city. These services include:

- Fire suppression
- Fire inspections
- Fire investigations
- Emergency medical care at the basic life support (BLS) and advanced life support (ALS) levels
- Patient transport
- Fire and life safety education and training
- Emergency management coordination

Description of Daily Staffing

MPFRD currently operates a four-platoon (shift) schedule whereby personnel work a 24-hour shift and then are off-duty for 72 hours. The minimum on-duty crew of nine (9) personnel staffs three (3) personnel on Tower 509, three (3) personnel on Engine 509, two (2) personnel on Medic 509, and one (1) person on Battalion 589. When the tenth person is on duty, they are assigned to Tower 509.

High-Level Community Risk Assessment

Manassas Park presents as a densely populated suburban community of 17,586 residents with strong economic indicators, including a median household income of $95,813 and a remarkably low poverty rate at just 3%. This affluent bedroom community exhibits significant daily population fluctuation, with 5,615 fewer people present during daytime hours, indicating substantial outbound commuting patterns that create unique emergency response challenges.

The community's risk profile reveals several critical vulnerabilities. The extreme population density of 5,834.7 people per square mile, combined with the dramatic daily population shift of 32% compared to total population, creates complex evacuation and resource deployment scenarios. A substantial 69% of households rely on gas appliances requiring carbon monoxide alarms, presenting significant poisoning risks

during power outages or equipment failures. The aging infrastructure, with 28% of housing stock predating 1980, compounds these concerns with potentially outdated electrical and HVAC systems.

Demographic factors further complicate emergency planning. With 22% of households containing individuals with disabilities and 10% of the population over age 65, specialized evacuation and shelter resources are essential. The high homeownership rate of 62% suggests strong community stability but may indicate residents who are less prepared for rapid displacement.

Emergency planners must account for minimum daytime population affecting mutual aid availability, coordinate with regional commuter patterns, prioritize carbon monoxide detection programs, and develop disability-inclusive emergency protocols. Resource allocation should emphasize specialized equipment for vulnerable populations and enhanced communication systems to reach the substantial commuter population.

Standout MPFRD Community Elements

The following list provides a view of some of the key community elements.

- **Extreme Daily Population Shift**: The 32% population reduction during daytime hours creates unique emergency response timing challenges.
- **High Gas Appliance Dependency**: A total of 69% of households need CO alarms, indicating significant carbon monoxide risk potential.
- **Dense Urban Environment**: With 5,834.7 people per square mile, specialized crowd management and evacuation strategies are required.
- **Vulnerable Population Concentration**: The 22% disability rate and 10% elderly population demand enhanced accessibility planning.
- **Economic Resilience**: The $95,813 median income and 3% poverty rate suggest strong community recovery capacity.
- **Aging Housing Infrastructure**: The 28% pre-1980 housing stock presents potential structural and utility system vulnerabilities.
- **Strong Housing Stability**: The 62% homeownership rate suggests established community networks for mutual aid.

Community Land Use Regulations

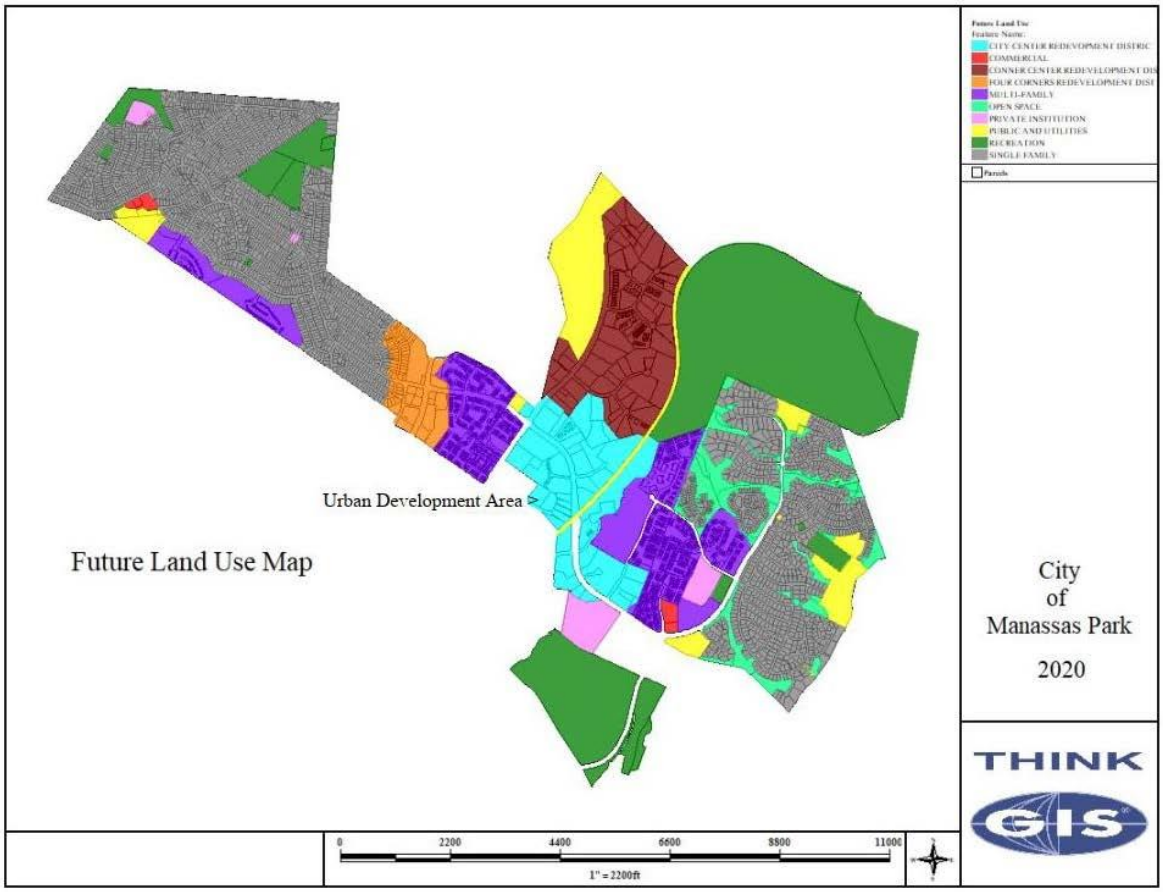
The City of Manassas Park has implemented regulations and processes to manage current and future land development through the following methods:

- City of Manassas Park Comprehensive Plan 2012 (with amendments)
- City of Manassas Park Code of Ordinances, Chapter 31—Zoning

Occupancy Types by Land Use Designation

Chapter 11 of the Comprehensive Plan was updated in June 2022 to incorporate changes to the land use and urban design. The following figure illustrates the future land use map for the City of Manassas Park.

Figure 3. Manassas Park Future Land Use Map



Service Delivery & Performance

Service delivery and performance are the metrics that best illustrate the services provided by the fire department to a community.

Service Demand Analysis

When assistance is requested, a demand for service from the fire department is made. Analyzed by each calendar year, the primary analyses of service demand include the types of incidents, when they occur, and where they occur.

Incident Type Analysis

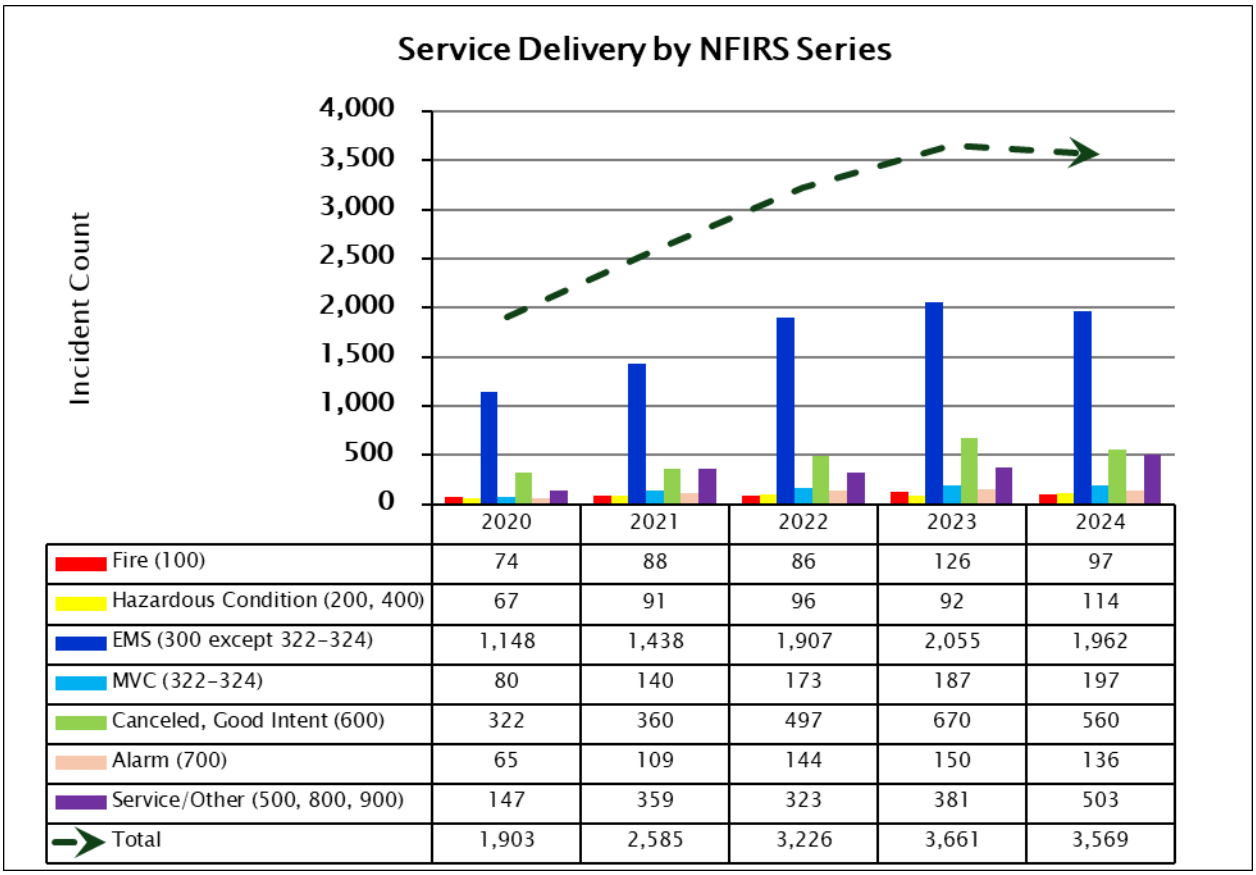
Documentation of response to incidents includes recording the type of incident that was found by an arriving unit. The National Fire Incident Reporting System (NFIRS) and its successor, the National Emergency Response Information System (NERIS), are industry-standard systems used by the local fire department to record this information. The systems track over one hundred incident types, which are grouped into series as illustrated in the following figure.

Figure 4. NFIRS Incident Series

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	Canceled, Good Intent
700-Series	False Alarm, False Call
800-Series	Severe Weather, Natural Disaster
900-Series	Special Incident Type

The following figure illustrates the types of incidents MPFRD has responded to over the past five years.

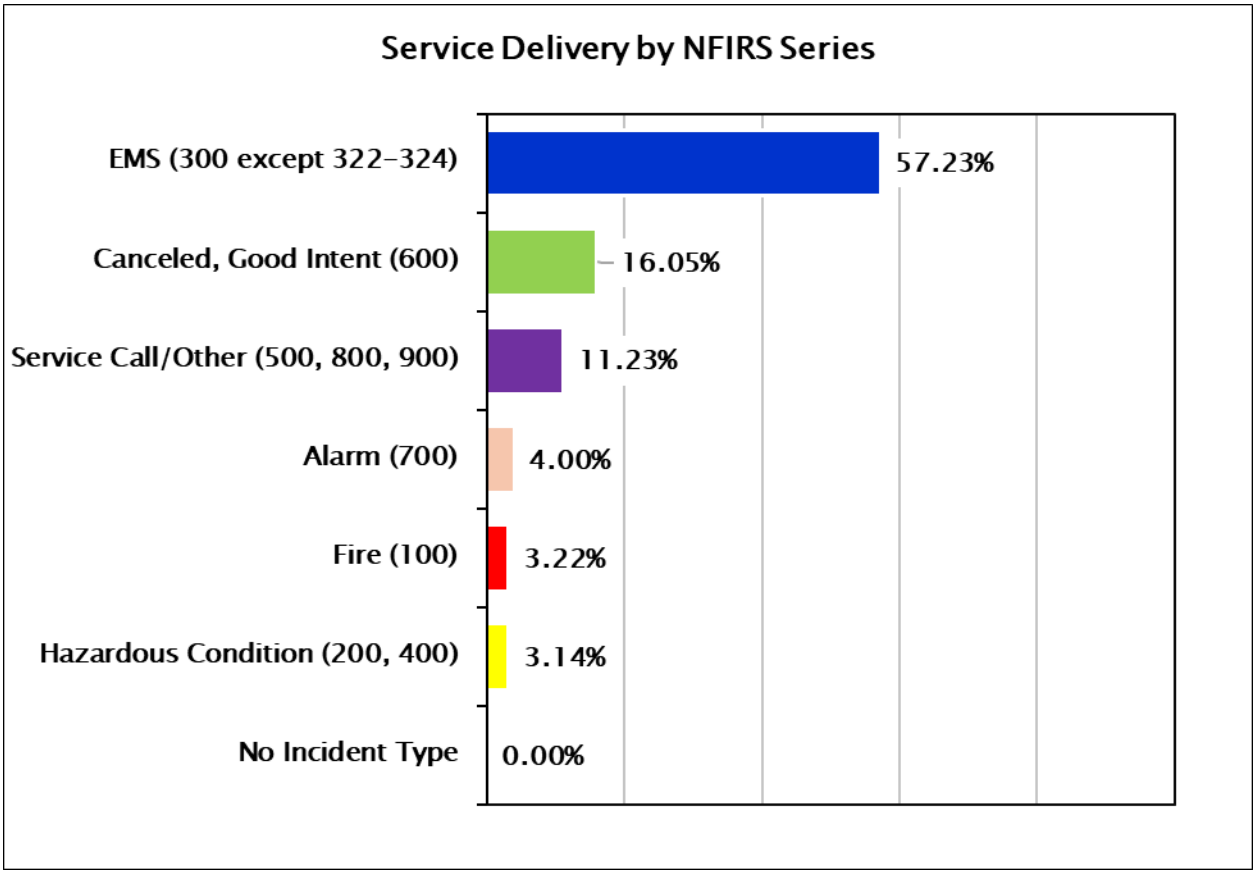
Figure 5. MPFRD Service Demand by NFIRS Series, 2020–2024



	2020	2021	2022	2023	2024
Fire (100)	74	88	86	126	97
Hazardous Condition (200, 400)	67	91	96	92	114
EMS (300 except 322–324)	1,148	1,438	1,907	2,055	1,962
MVC (322–324)	80	140	173	187	197
Canceled, Good Intent (600)	322	360	497	670	560
Alarm (700)	65	109	144	150	136
Service/Other (500, 800, 900)	147	359	323	381	503
Total	1,903	2,585	3,226	3,661	3,569

Another consideration is to determine the percentage represented by each category comprising the entirety of service demand, as illustrated in the following figure.

Figure 6. MPFRD Service Demand Percentages by NFIRS Series, 2020–2024



Temporal Analysis

Another data point documented for each incident response is the time at which it occurs. This may be analyzed from three different views—month, day, and hour—as illustrated in Figure 7. MPFRD Service Demand by Month, 2020–2024, Figure 8. MPFRD Service Demand by Day, 2020–2024, and Figure 9. MPFRD Service Demand by Hour, 2020–2024.

Figure 7. MPFRD Service Demand by Month, 2020–2024

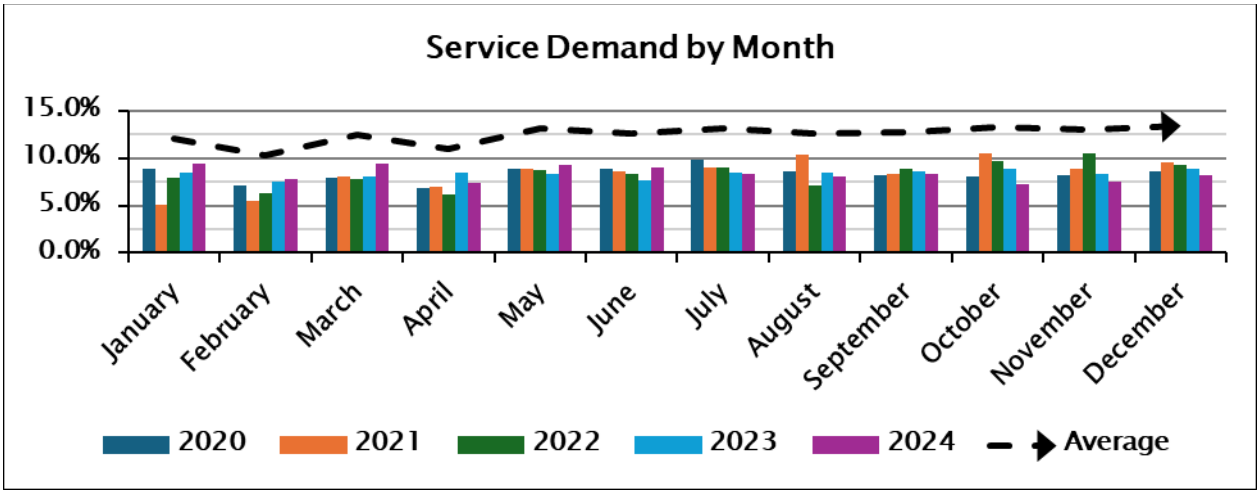


Figure 8. MPFRD Service Demand by Day, 2020–2024

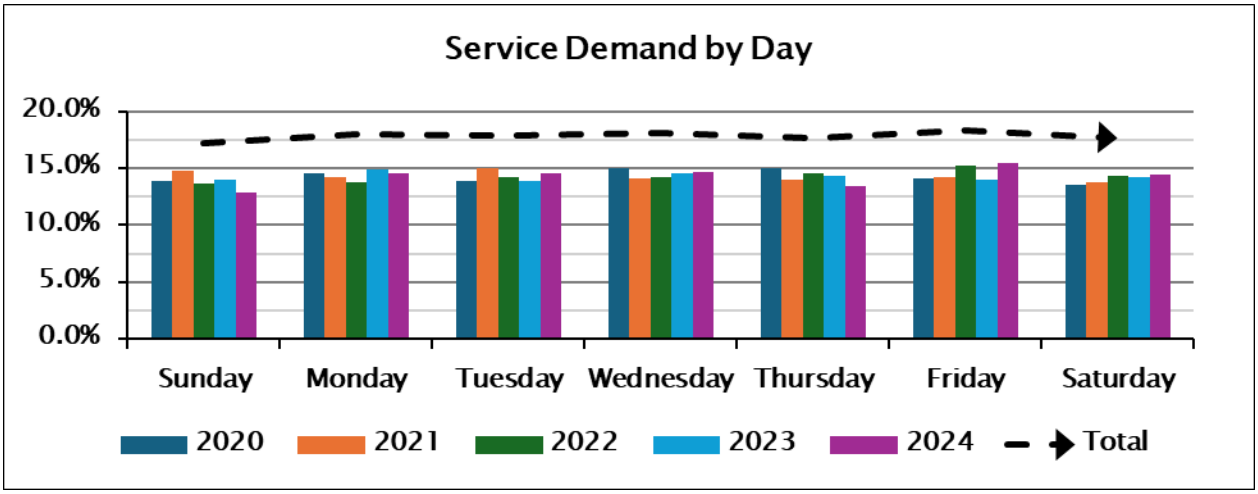
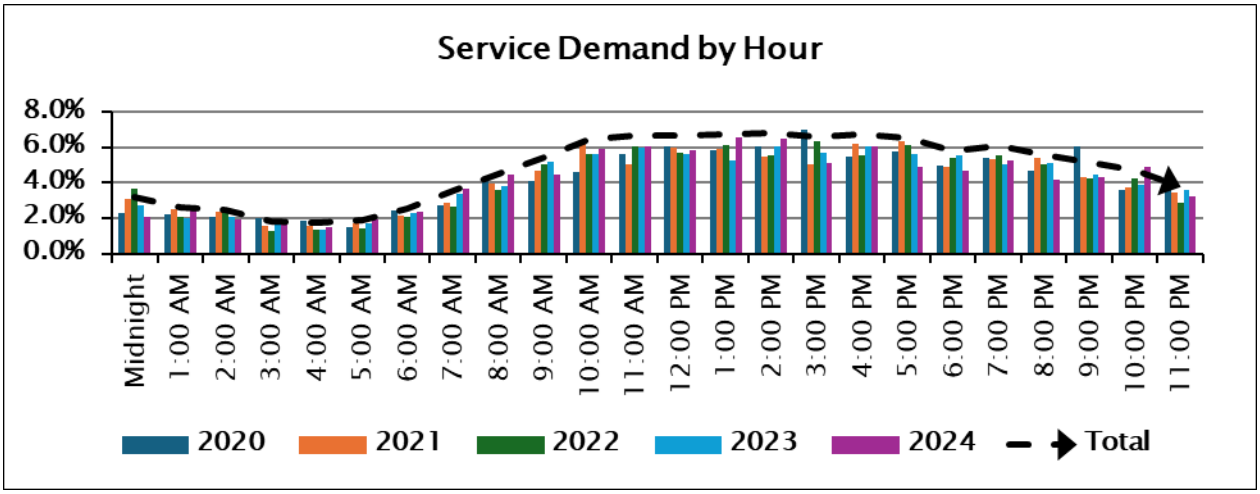


Figure 9. MPFRD Service Demand by Hour, 2020–2024



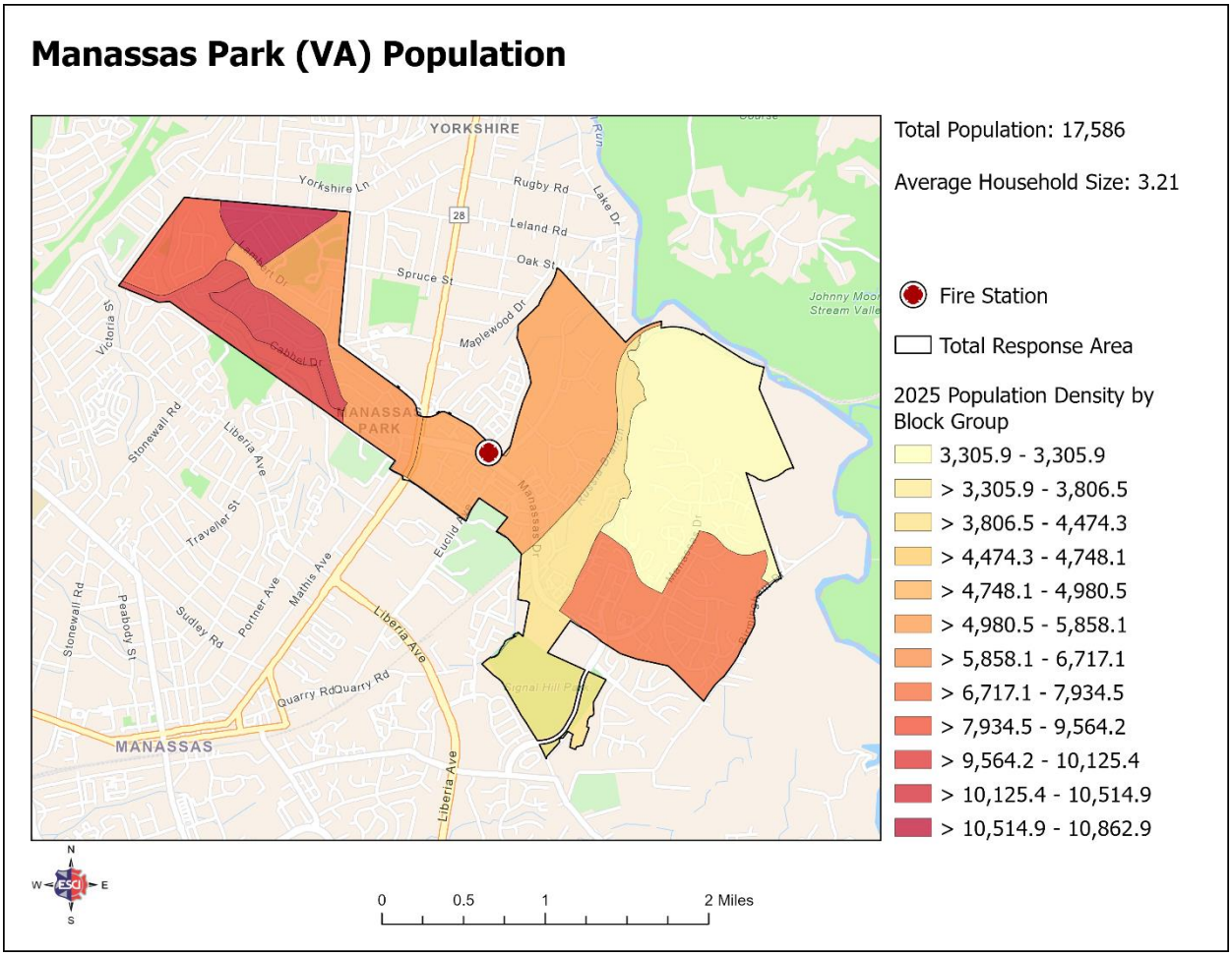
One additional note regarding the time of day: Based on a recent national study, the occurrence of residential structure fires with fatalities was highest between midnight and 1:00 AM from 2018 to 2020. The eight-hour peak period (11:00 PM to 7:00 AM) accounted for 45% of residential fatal fires[1].

[1] *Fatal Fires in Residential Buildings (2018–2020)*, Topical Fire Report Series, Vol. 22, Issue 2, June 2022, U.S. Department of Homeland Security, U.S. Fire Administration, National Fire Data Center.

Geographic Analysis

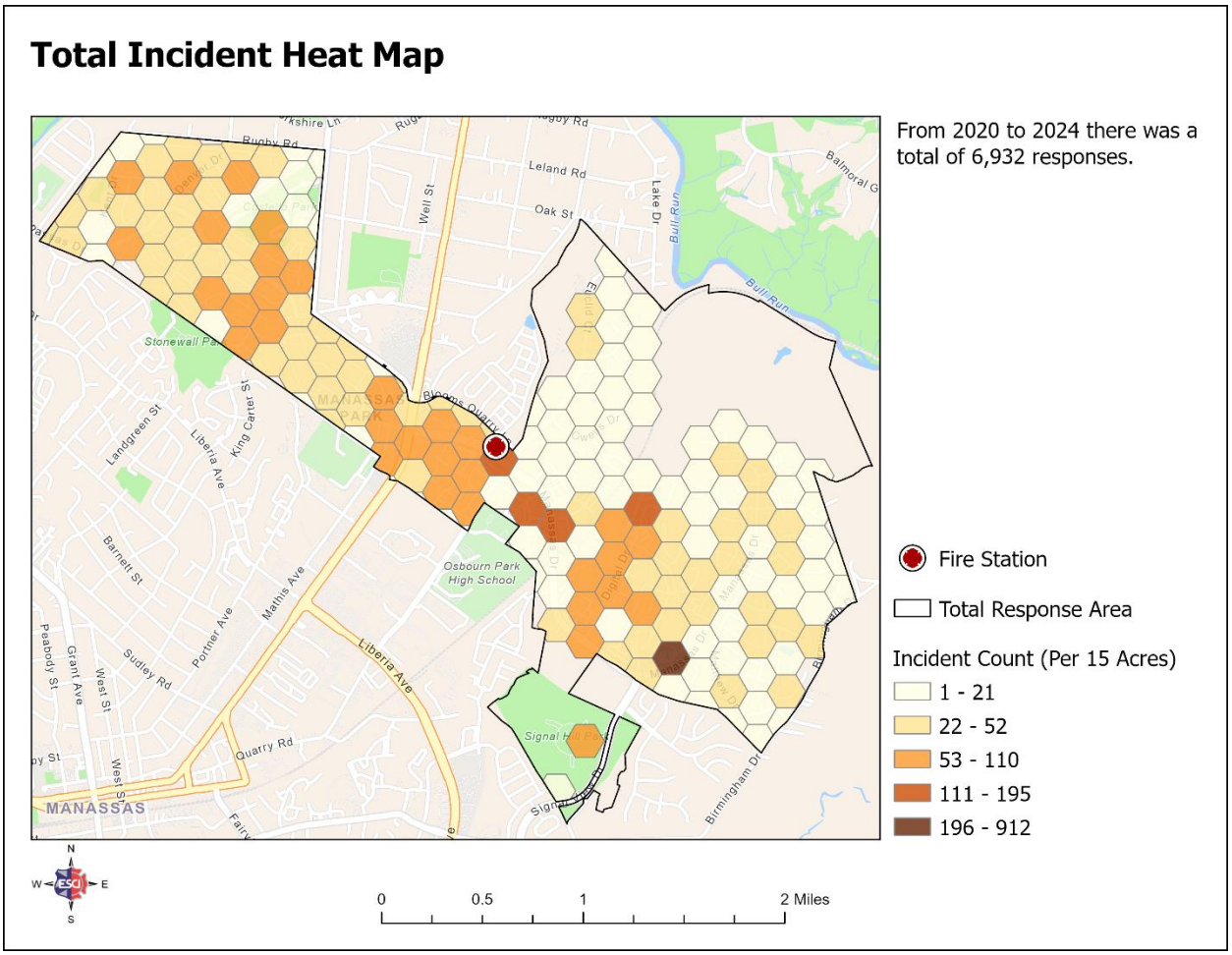
The location of incidents is closely related to the population density within the community. In other words, where there is greater population density (the number of people per unit area, such as a square mile), there tends to be a greater incident density. Heat maps are used to display this information. To compare the initial relationship of incidents and population, the first information needed is the population density, as illustrated in the following figure.

Figure 10. MPFRD Population Density, 2025



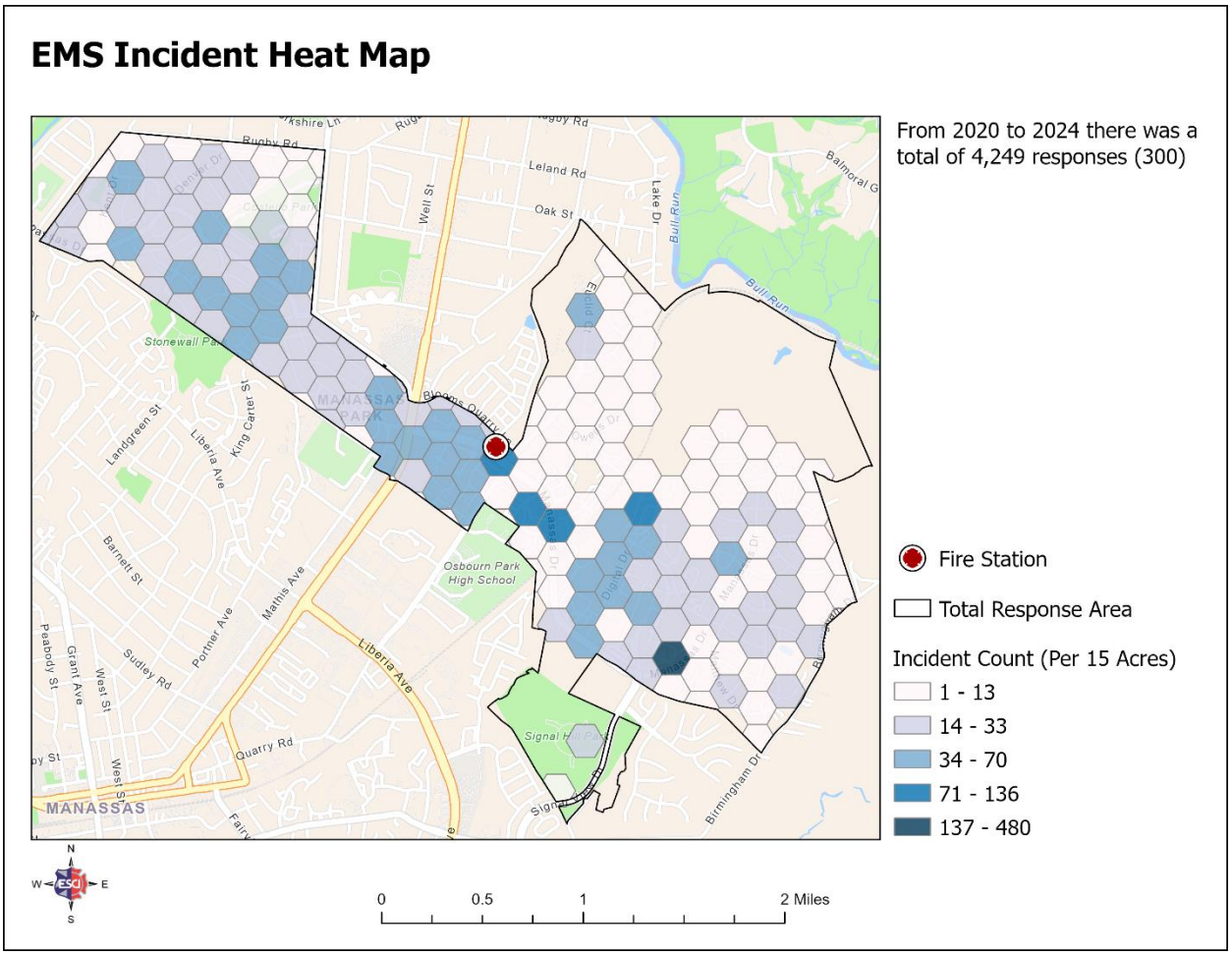
Another datapoint documented for each incident response is the location of the incident, either by address or its latitude and longitude. The first view of incident density includes all responses within the service area, regardless of incident type, as illustrated in the following figure. It should be noted that the incident counts in incident density figures will vary from those in the incident type analysis figures. Incident type analysis includes all incidents regardless of location and whether there is a valid latitude/longitude, whereas incident density only includes those incidents within the service area with a valid latitude/longitude.

Figure 11. MPFRD Incident Density (All Incidents), 2020–2024



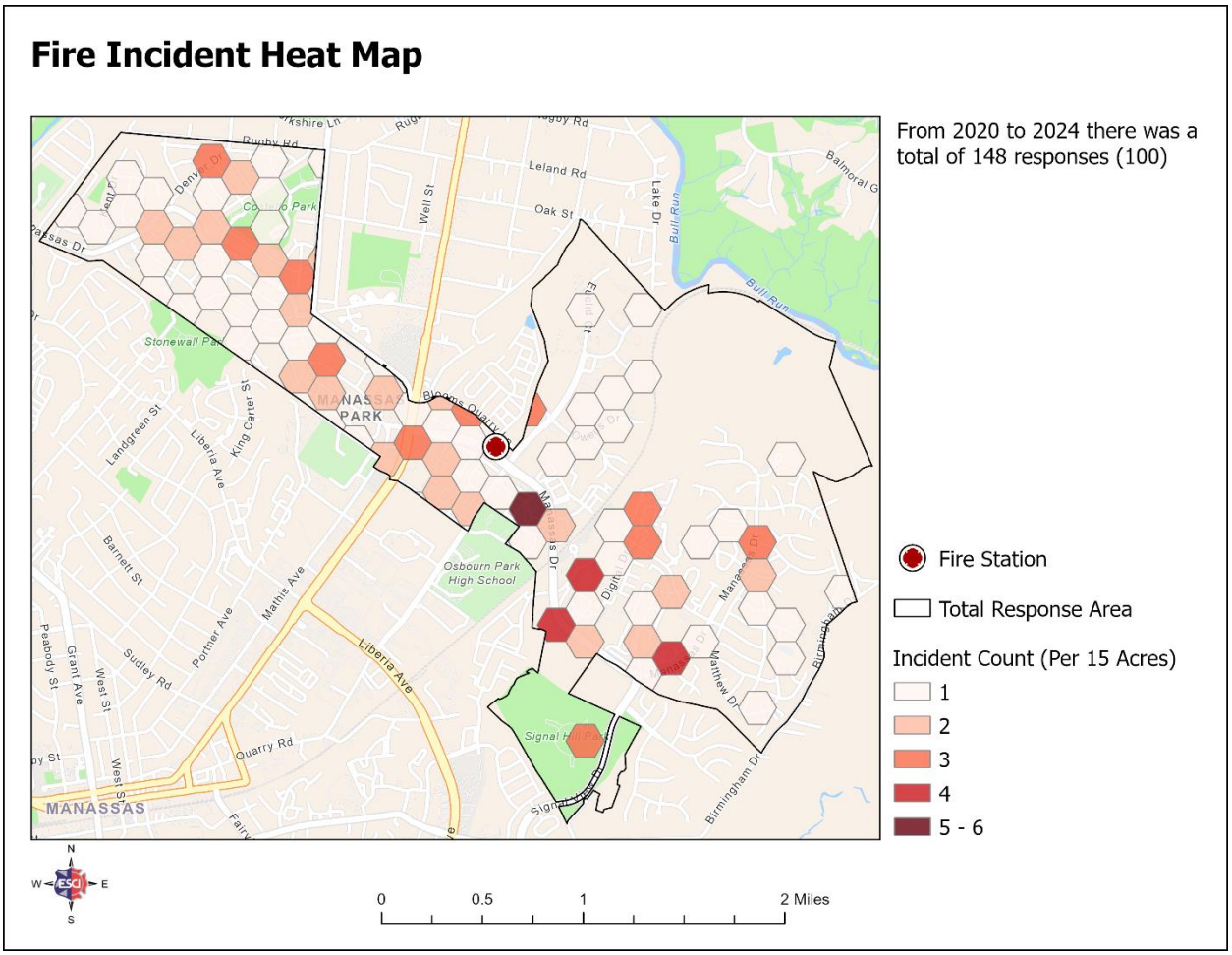
The second view of incident density includes only emergency medical services incidents, as illustrated in the following figure.

Figure 12. MPFRD Incident Density (EMS), 2020–2024



The third view of incident density includes only fire incidents, as illustrated in the following figure.

Figure 13. MPFRD Incident Density (Fire), 2020–2024



Resource Distribution Analysis

The placement of emergency services resources within the community should be compared to the location of incident density. Various industry standards and best practices should also guide it.

ISO Distribution

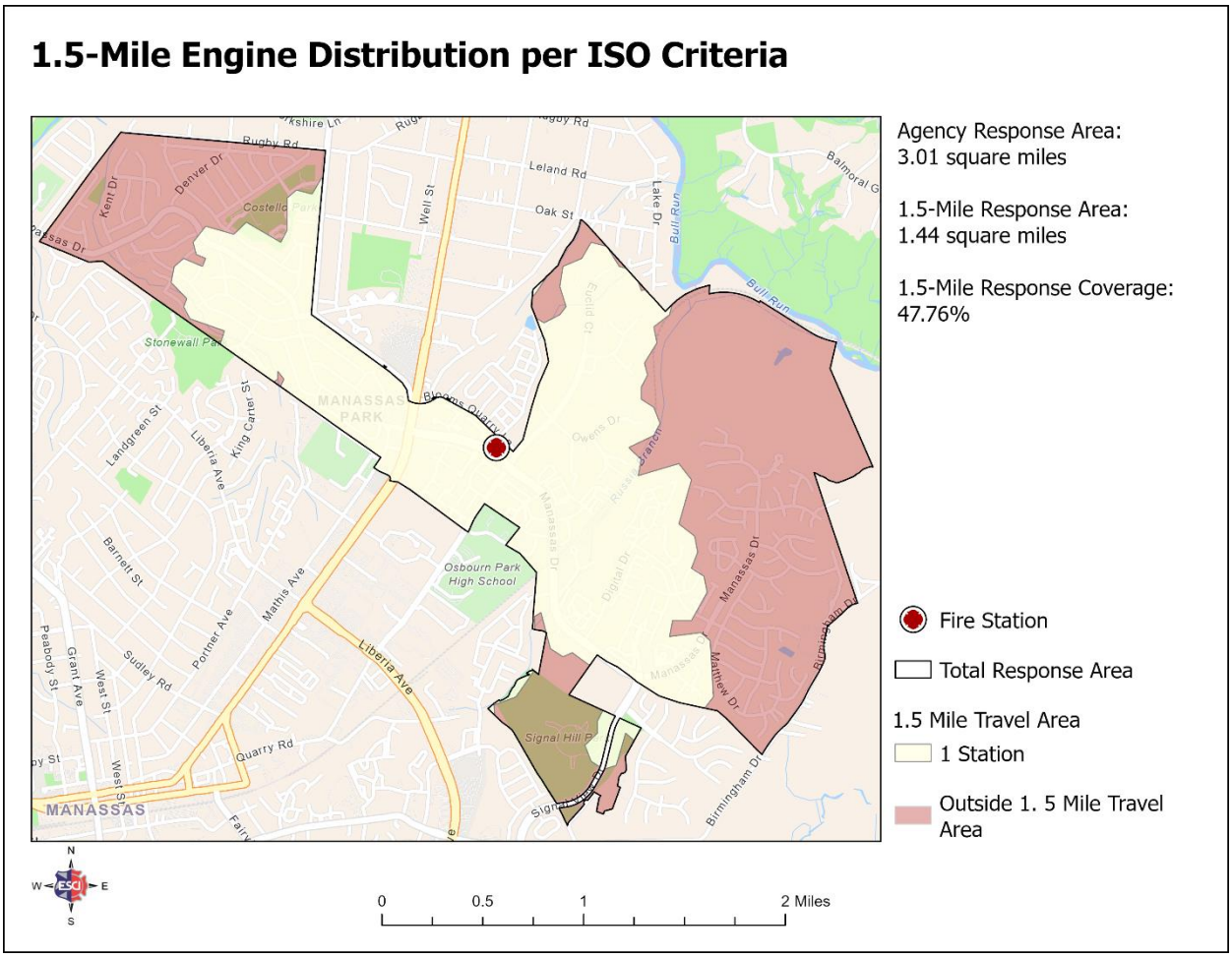
The Insurance Services Office, Inc. (ISO) is a national insurance industry organization that evaluates fire protection for communities across the country. A community's ISO rating is an important factor when considering fire station and apparatus concentration, distribution, and deployment, as there is a correlation between a community's ISO rating and the cost of fire (homeowners) insurance for 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.

1.5-Mile Engine Distribution

ISO's first measure is the overall percentage of the service area that lies within a 1.5-mile travel distance of the first due fire engine from a fire station, as illustrated in the following figure.

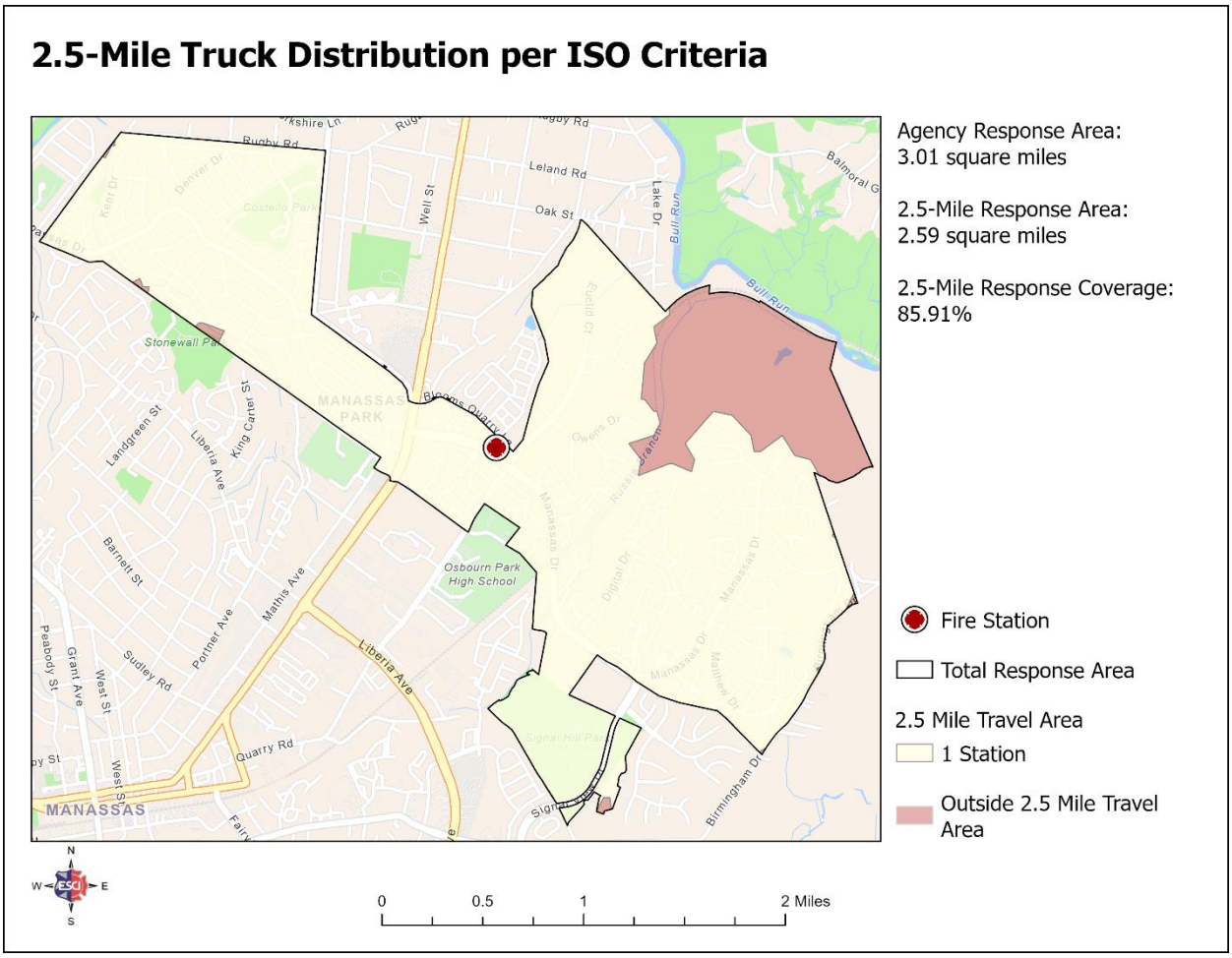
Figure 14. MPFRD 1.5-Mile Engine Distribution



2.5-Mile Aerial Distribution

ISO's second measure is the overall percentage of the service area that lies within a 2.5-mile travel distance of the first due aerial apparatus from a fire station, as illustrated in the following figure.

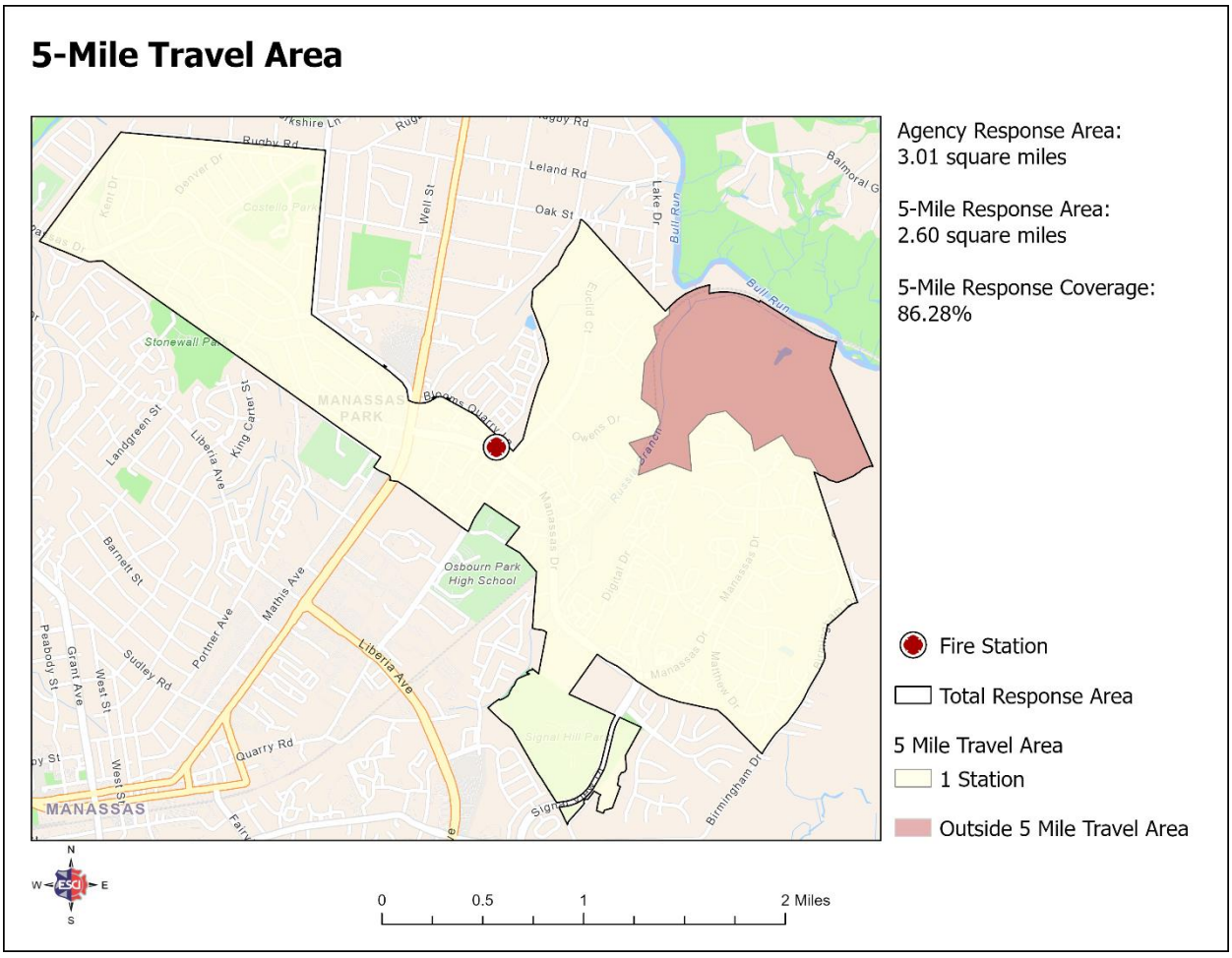
Figure 15. MPFRD 2.5-Mile Aerial Distribution



5-Mile Distribution

ISO's third measure is the overall percentage of the service area that lies within a 5-mile travel distance of a fire station, as illustrated in the following figure. Areas outside of the 5-mile travel distance are subject to a PPC® rating of 10 (no fire department protection available).

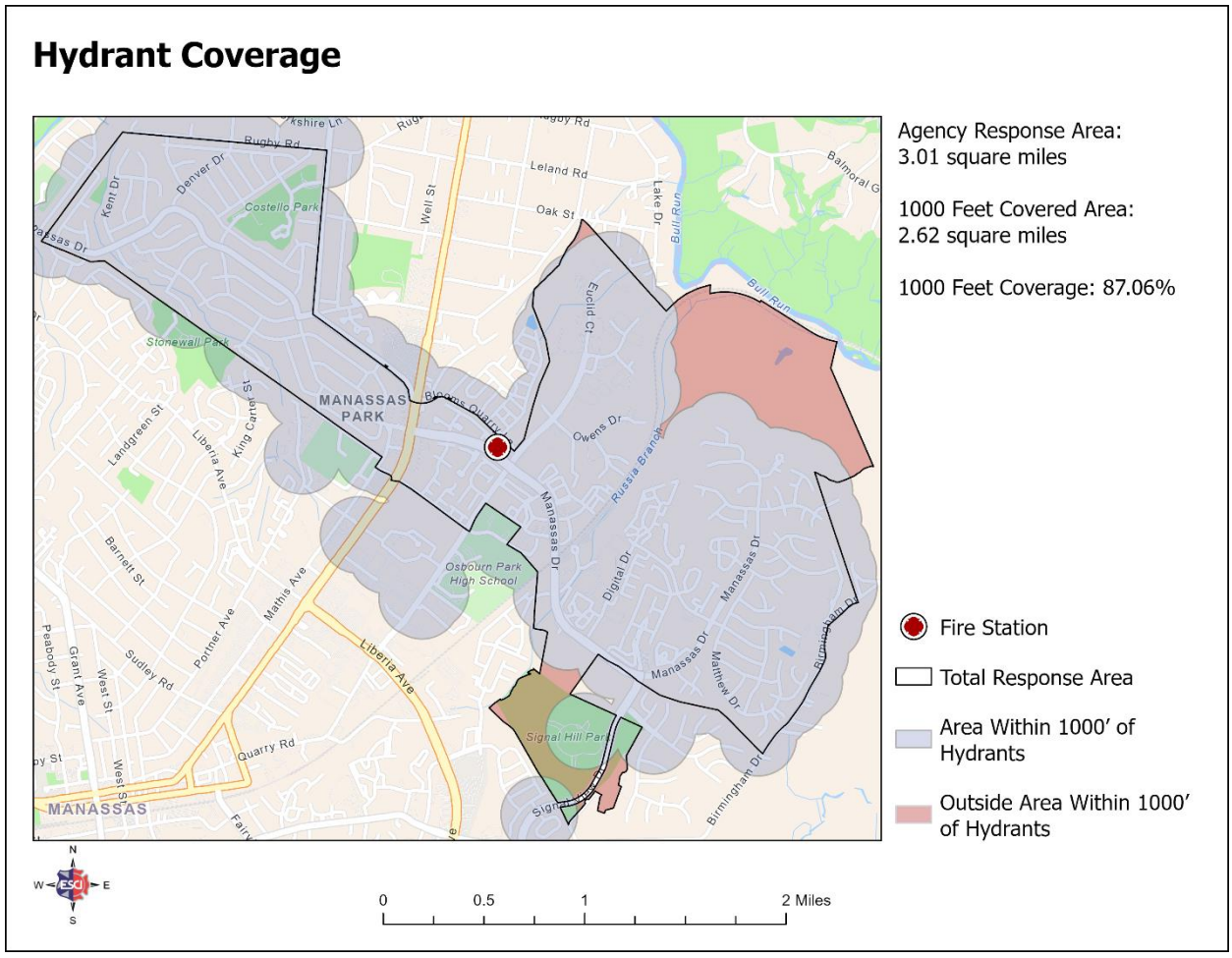
Figure 16. MPFRD 5-Mile Station Distribution



Water Supply

ISO's fourth measure is the overall percentage of the service area that lies within a 1,000-foot travel distance of a fire hydrant, as illustrated in the following figure. Exceptions are made when a fire department can show that a dry hydrant or a suitable water tanker operation can provide the needed volume of water for fire suppression activities for a specific period.

Figure 17. MPFRD Hydrant Distribution



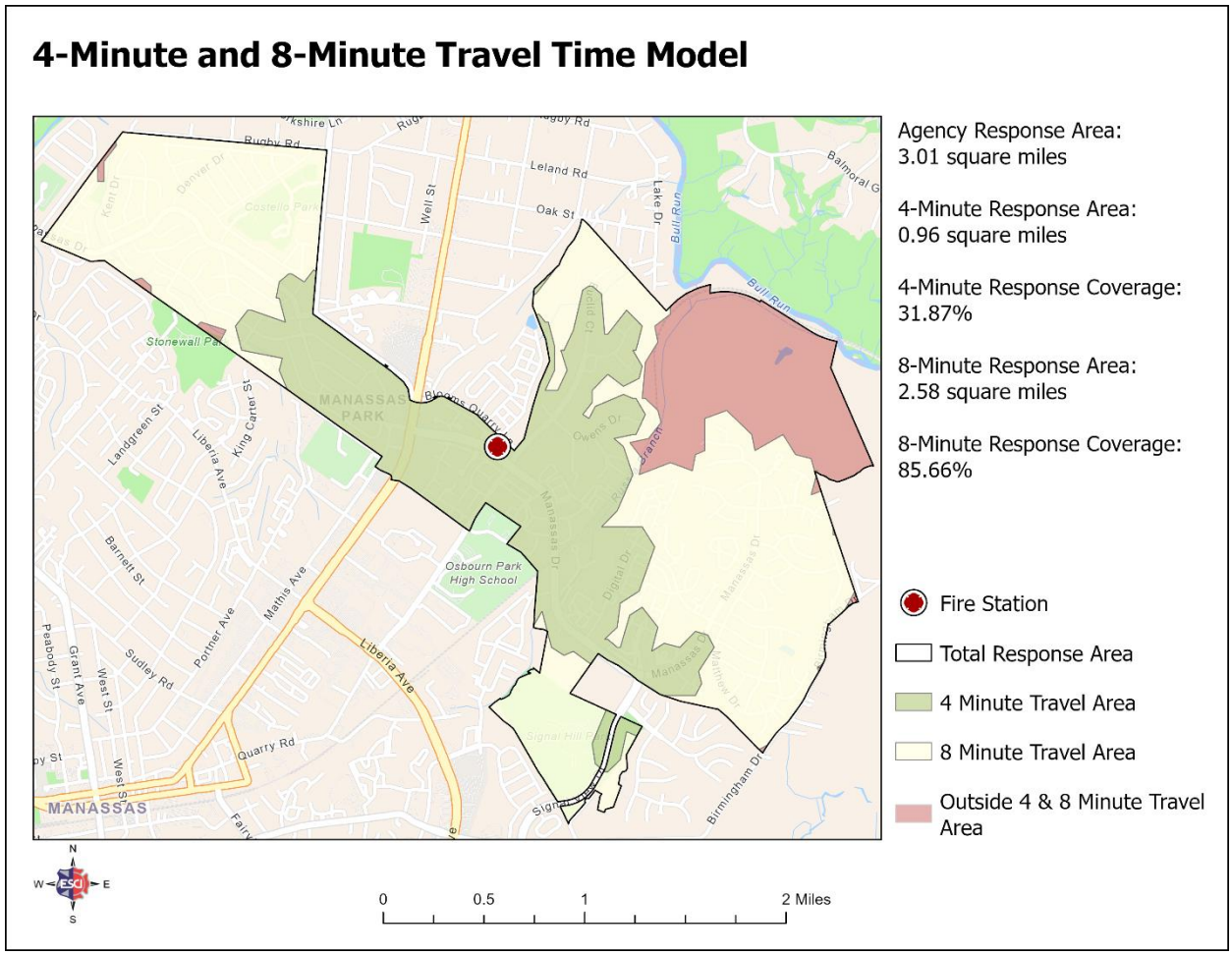
NFPA Distribution

The National Fire Protection Association (NFPA) is an industry trade association that develops and provides standards and codes for fire departments and emergency medical services for use by local governments.

The standard 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*, serves as a national consensus standard for career fire department performance, operations, and safety. Within this standard, a travel time of 4 minutes 90% of the time is identified as the benchmark for career departments to reach emergency incidents within their jurisdiction with the first arriving unit. Additionally, the balance of the response (called the effective response force or ERF) is required to arrive at the incident within 8 minutes 90% of the time.

The following figure illustrates the service area that falls within the 4-minute and the 8-minute travel times of a fire station.

Figure 18. MPFRD 4-/8-Minute Travel Time per NFPA Criteria



The previous graphic provides theoretical travel times based on all units within the station at the time of dispatch. The following figure illustrates actual travel times grouped into 4-minute increments.

Figure 19. MPFRD Travel Time Analysis, 2020-2024

Travel Time Category	2020	2021	2022	2023	2024
4 Minutes or Less	63.3%	60.9%	59.0%	59.2%	48.3%
4-8 Minutes	33.5%	34.8%	36.4%	36.8%	44.3%
8-12 Minutes	2.8%	3.1%	3.3%	2.8%	5.7%
Greater than 12 Minutes	0.4%	1.2%	1.3%	1.2%	1.7%

Resource Concentration Analysis

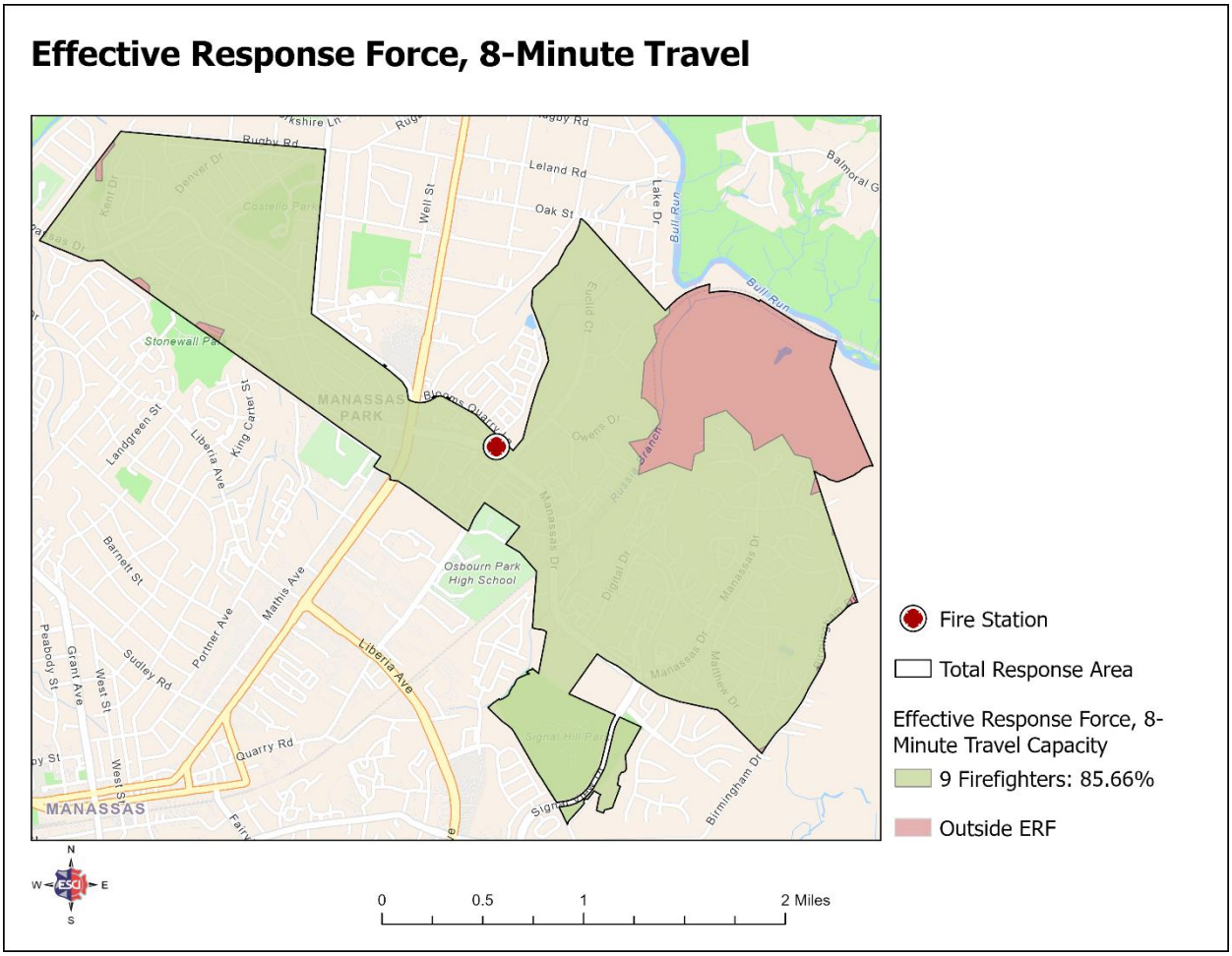
Each of the prior measures provided a view specifically associated with the arrival of the first unit to an incident scene. Although arriving at an incident quickly and safely is important, the ability to safely mitigate the incident is also impacted by the prompt arrival of sufficient resources. The measure of this ability is referred to as effective response force (ERF). It ensures that sufficient personnel and resources arrive on the scene early enough to safely control a fire or mitigate other types of emergencies prior to substantial damage, injury, or loss of life. ERF is also commonly referred to as the "full assignment" to the incident. 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.

Figure 20. NFPA 1710 ERF Recommendations Based on Risk

Task	Moderate Risk (Sgl. or Dplx. Residential)	High Risk (Strip Mall or Apartment)	Extreme Risk (Multistory or Highrise)
Command	1	2	2
Apparatus Operator	1	2	2
Handlines (2 FFs each)	4	6	4
Support Members	2	3	8
Search and Rescue	2	4	4
Ground Ladders/Ventilation	2	4	
Aerial Operator (If Deployed)	1	1	2
Initial Rapid Intervention Crew	4	4	4
Initial Medical Care Component		2	4
Building Fire Pump (If Equipped)			1
Hoseline – Floor Above Fire			2
Elevator Operations Manager			1
Incident Safety Officer			1
Interior Staging Manager			2
Member Rehabilitation			2
Vertical Ventilation Crew			4
Lobby Control			1
Total	**16 (17)**	**27 (28)**	**42 (43)**

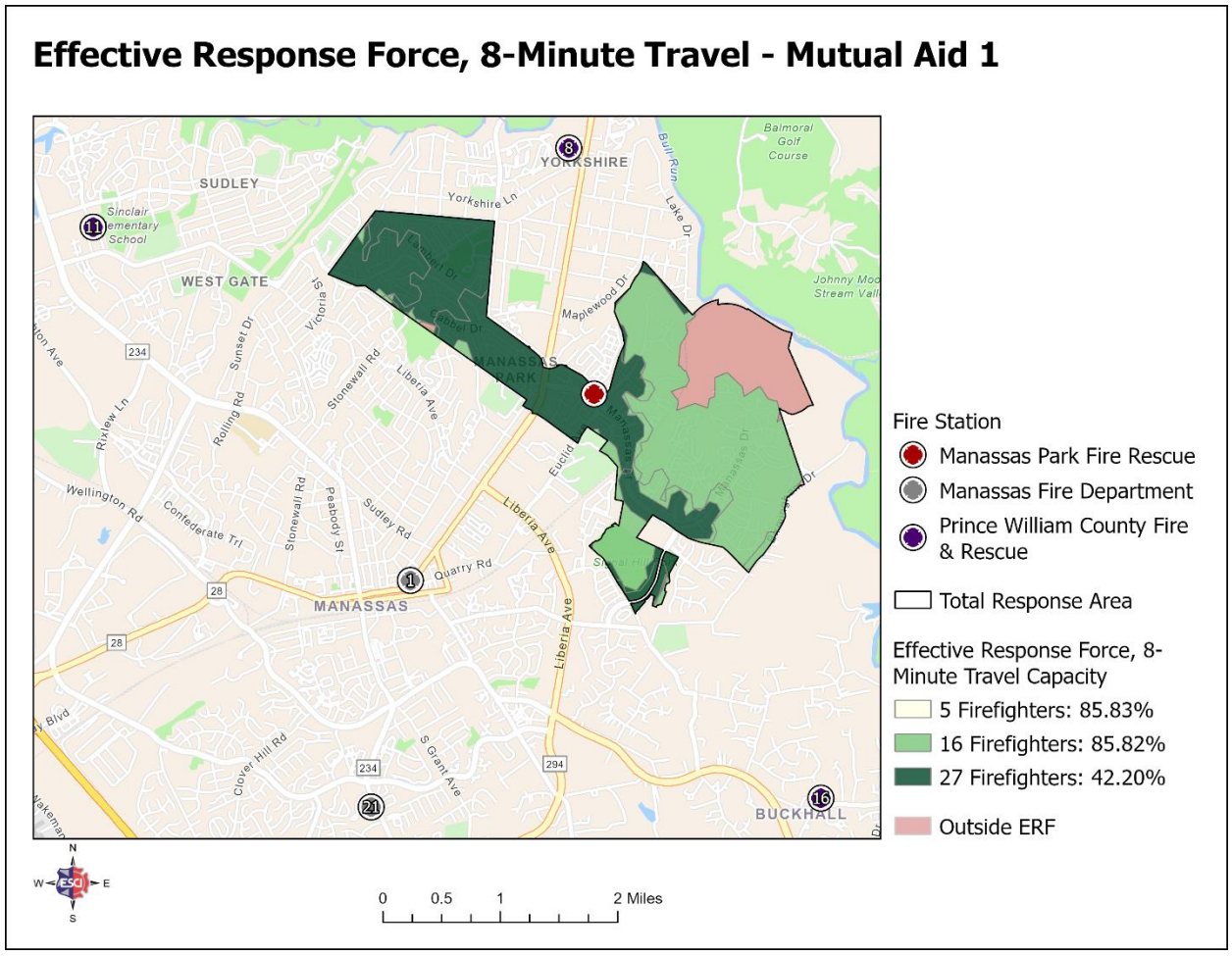
The following figure illustrates the concentration of firefighters that may arrive within the 8-minute travel time. Where responses from more than one station overlap, the number of firefighters arriving increases.

Figure 21. MPFRD Effective Response Force per NFPA 1710



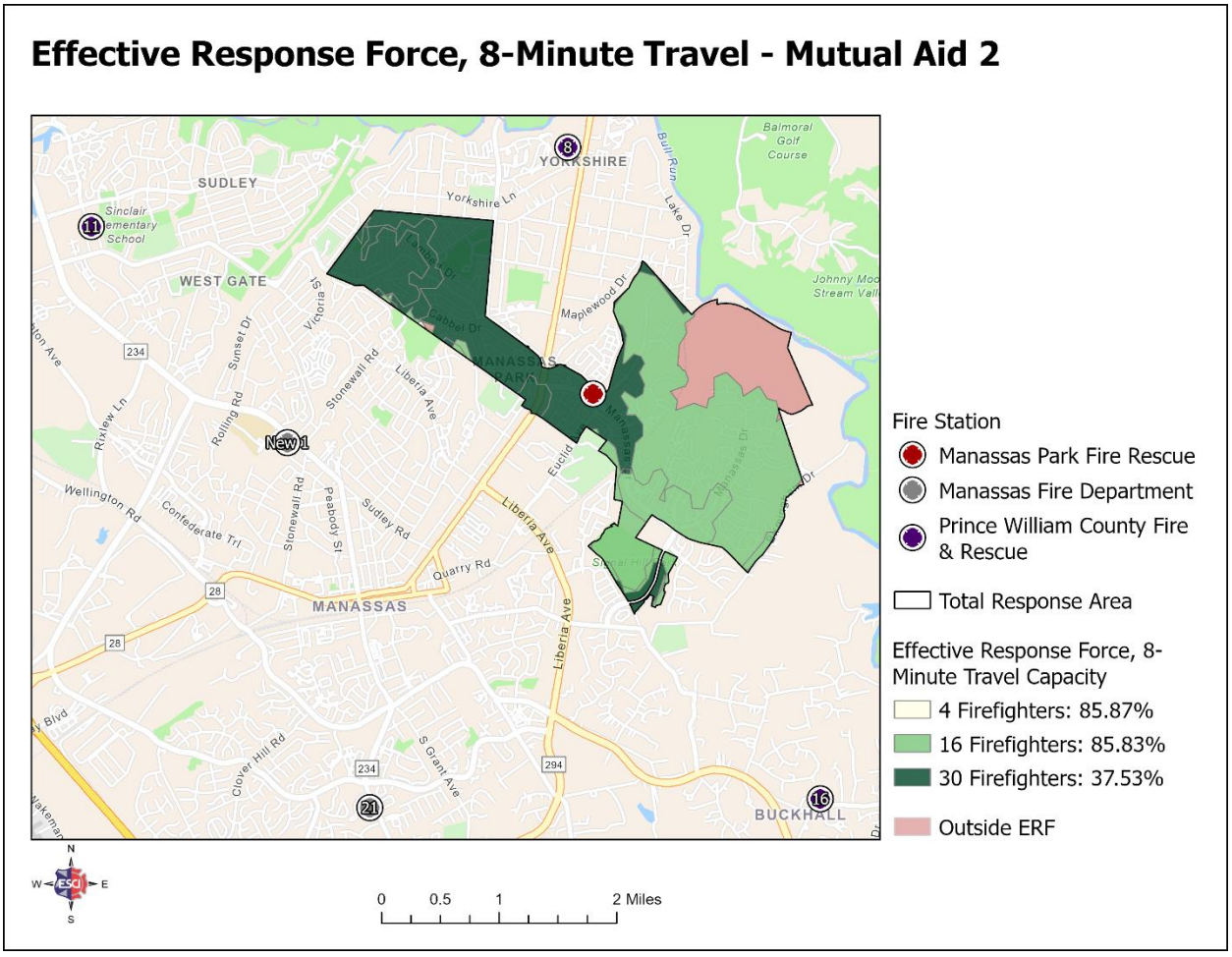
MPFRD is one agency of several providing services within the boundaries of Prince William County, Virginia. These agencies work together through automatic and mutual aid agreements to share resources when responding to calls for service. The following figure illustrates the combined ERF including units and personnel from the City of Manassas Park and the three Prince William County stations that are within an 8-minute travel time of Manassas Park.

Figure 22. MPFRD Effective Response Force (With Aid Stations – Current)



The City of Manassas Park is in the process of constructing a new fire station to replace Station 1. The following figure illustrates the same combined ERF as the preceding figure but with the relocation of Station 1.

Figure 23. MPFRD Effective Response Force (With Aid Stations – Future)



Resource Reliability Analysis

To assess the reliability of a unit in responding to incidents within its primary response area, workload, and zone, the unit's first arrival time should be analyzed. Zone unit first arrival was not evaluated as MPFRD operates from a single station.

Commitment Time

A fair measure of workload for each unit within the department is to evaluate the amount of time assigned to incidents as compared to the total time the unit is in service, known as a commitment factor. Although there are limited formal performance measures to use as a target, in May 2016, the Henrico County (Virginia) 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 commitment factor scale for its department. The following figure is a summary of the findings related to commitment factors. MPFRD's leadership may use it as a basis for developing internal workload measures. These workload measures may vary based on the type of apparatus (i.e., fire engine versus transport ambulance).

Figure 24. Example Commitment Factors

Factor	Indication	Description
16%–24%	Ideal Commitment Range	Personnel can maintain their training requirements and physical fitness while still consistently achieving response time benchmarks. Units are available to the community more than 75% of the time.
25%	System Stress	Community availability and unit sustainability are not questioned. First-due units are responding to their assigned community 75% of the time, and response benchmarks are rarely missed.
26%–29%	Evaluation Range	The community served will experience delayed incident responses. Just under 30% of the day, first-due ambulances are unavailable; thus, neighboring responders will likely exceed goals.
30%	"Line in the Sand"	Not Sustainable: Commitment Threshold—The community has a less than 70% 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 following figure illustrates the commitment factors by unit.

Figure 25. MPFRD Commitment Times, 2020–2024

Unit	2020	2021	2022	2023	2024	Change Over Study Period
A509	0.0%	0.0%	0.0%	1.1%	4.0%	4.0%
BC589	1.7%	2.0%	1.7%	1.7%	1.6%	-0.1%
E509	7.0%	6.7%	1.8%	1.4%	2.1%	-4.9%
M509	13.8%	16.8%	20.2%	20.3%	18.2%	4.4%
PE509	0.0%	2.0%	7.8%	8.0%	5.6%	5.6%
TW509	0.0%	0.0%	0.0%	0.0%	1.1%	1.1%

Response Performance Analysis

The speed at which a unit arrives at the scene of the caller's emergency is a key factor in their evaluation of the services provided. Industry standards and best practices recommend that departments regularly monitor this performance (total response time), as well as all of the following time performance measures that are subsets of total response time:

- Alarm handling time
- Turnout time
- Travel time
- Response time

In analyzing response performance, ESCI aligns with national standards and best practices and generates percentile measurements of time performance. Percentile measurements are a more accurate way to measure performance standard compliance. A 90th percentile measurement means that 10% of the values are greater than the value stated, and all other data are at or below this level. This can be used as a performance objective to determine the degree of success in achieving the goal.

As this report progresses through response performance analysis, it is essential to note that each component of response performance is not cumulative. Each is analyzed as an individual component, and the point at which the percentile is calculated exists in a set of data unto itself. Each of the following analyses only included those incidents where the response was coded as "emergency" priority.

Alarm Handling Time

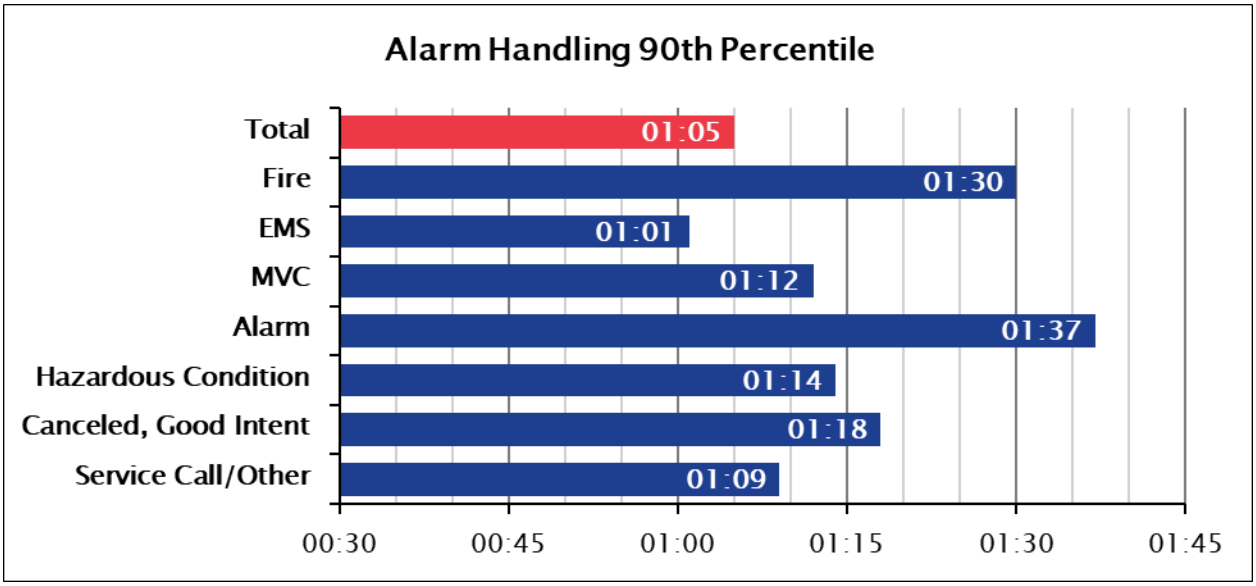
The measure of time between answering the 9-1-1 call and the dispatching of resources is known as alarm handling time. For this measure, there is one applicable standard as illustrated in the following figure.

Figure 26. Alarm Handling Time Benchmark, NFPA 1225

Standard	Performance
NFPA 1225: *Standard for Emergency Services Communications* (2022 Edition)	60 seconds at the 90th percentile

The following figure illustrates the department's alarm handling time performance.

Figure 27. MPFRD Alarm Handling Time Performance, 2020-2024



Turnout Time

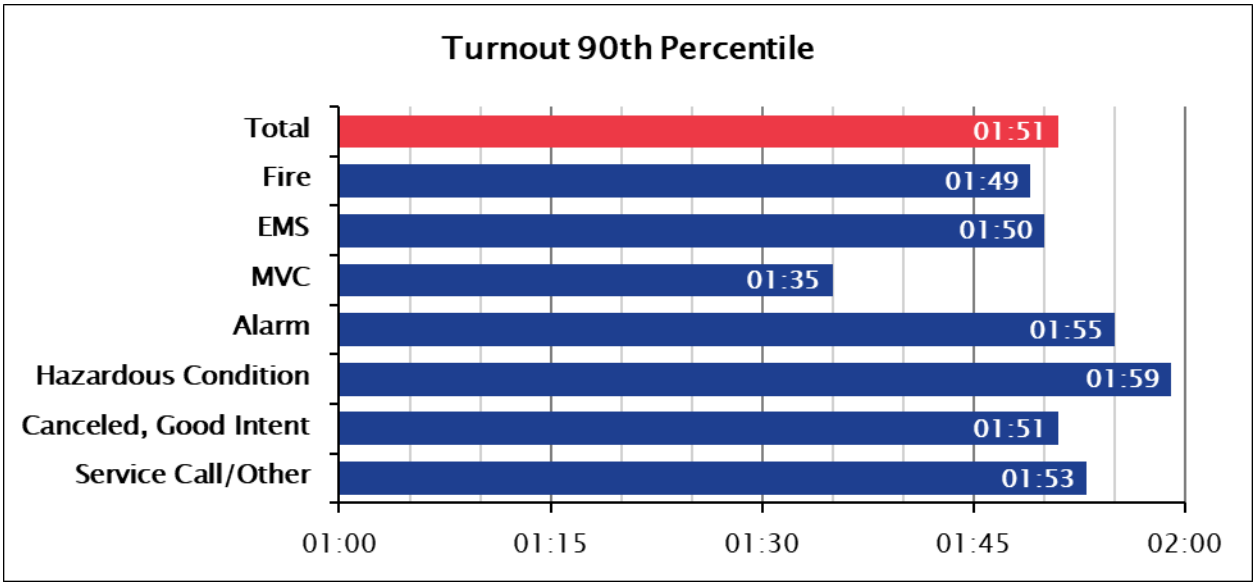
The measure of time between notifying the fire department (dispatching) and the time the first unit goes en route is known as the turnout time. For this measure, there is one applicable standard as illustrated in the following figure.

Figure 28. Turnout Time Benchmark, NFPA 1710

Standard	Performance
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*	Fire and Special Operations Incidents 80 seconds at the 90th percentile All Other Incidents 60 seconds at the 90th percentile
MPFRD	EMS Incidents 60 seconds at the 90th percentile Fire Incidents 90 seconds at the 90th percentile

The following figure illustrates the turnout time for the first responding units.

Figure 29. MPFRD Turnout Time Performance, 2020–2024



As this is the first measure under direct control of the fire department, the department's leadership may consider the various actions that occur within this measure and determine if there are areas where process changes could improve performance. These factors include:

- Systems used to notify personnel of an incident.
- Station design, as it relates to the movement of personnel from living quarters to the apparatus bay.
- Personnel adherence to department policies and acting with appropriate speed toward the apparatus.
- Time required to don protective equipment before responding.
- Moving equipment between apparatus when units are cross-staffed.
- Time from starting the apparatus until the radio system is capable of transmitting.

Travel Time

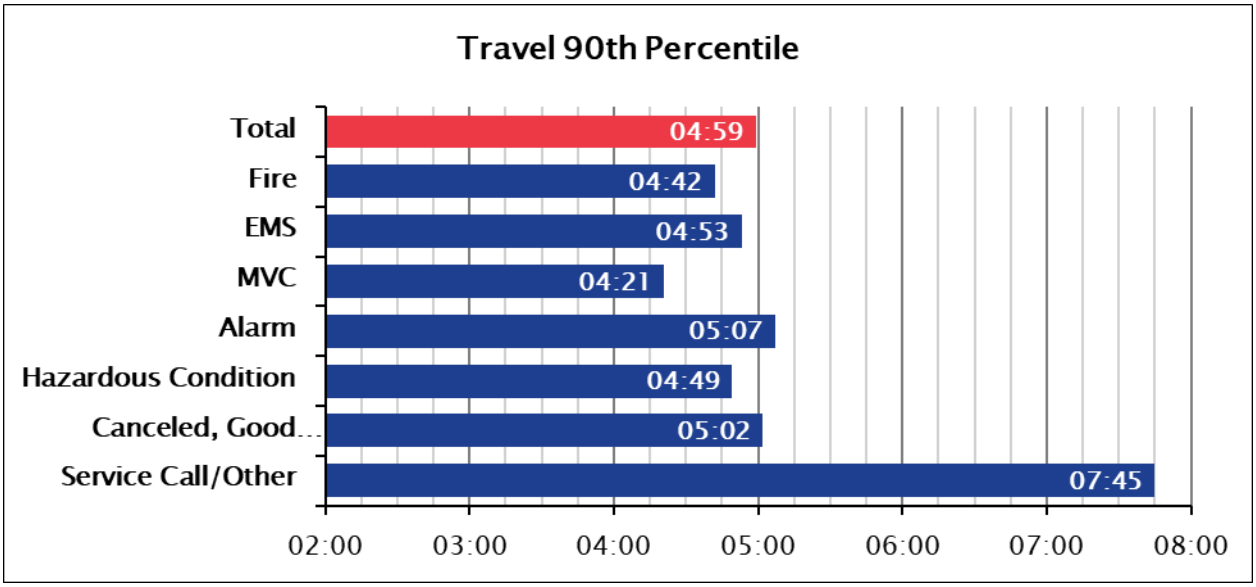
The measure of time between the apparatus moving towards the scene of the emergency and its arrival at the scene is known as travel time. For this measure, there is one applicable standard as illustrated in the following figure.

Figure 30. Travel Time Benchmark, NFPA 1710

Standard	Performance
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*	4 minutes at the 90th percentile

The following figure illustrates the travel times for the first responding units.

Figure 31. MPFRD Travel Time Performance, 2020–2024



Response Time

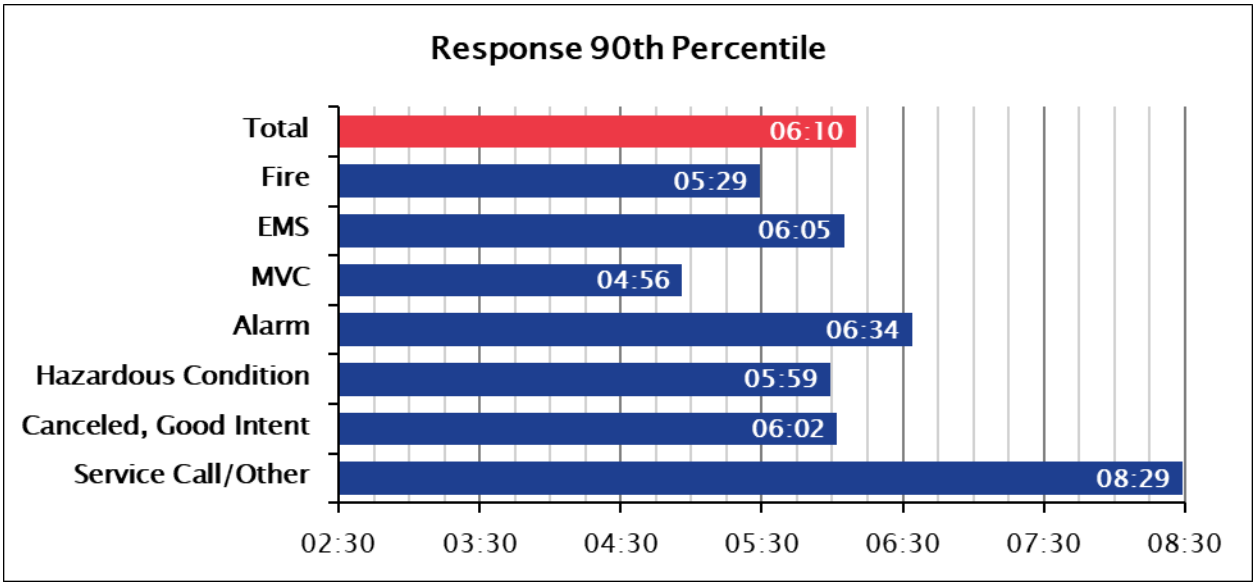
The measure of time between the dispatch of units and arrival at the scene of the emergency is known as response time. For this measure, there is no specific applicable standard. However, by combining the individual component standards, the following figure illustrates expected performance.

Figure 32. Response Time Benchmark

Standard	Performance
Turnout Time	Fire and Special Operations Incidents 80 seconds at the 90th percentile All Other Incidents 60 seconds at the 90th percentile
Travel Time	4 minutes at the 90th percentile
Combined	Fire and Special Operations Incidents 5 minutes, 20 seconds at the 90th percentile All Other Incidents 5 minutes at the 90th percentile
MPFRD	6 Minutes, 30 seconds at the 90th percentile

The following figure illustrates the response times for the first responding units.

Figure 33. MPFRD Response Time Performance, 2020-2024



Total Response Time

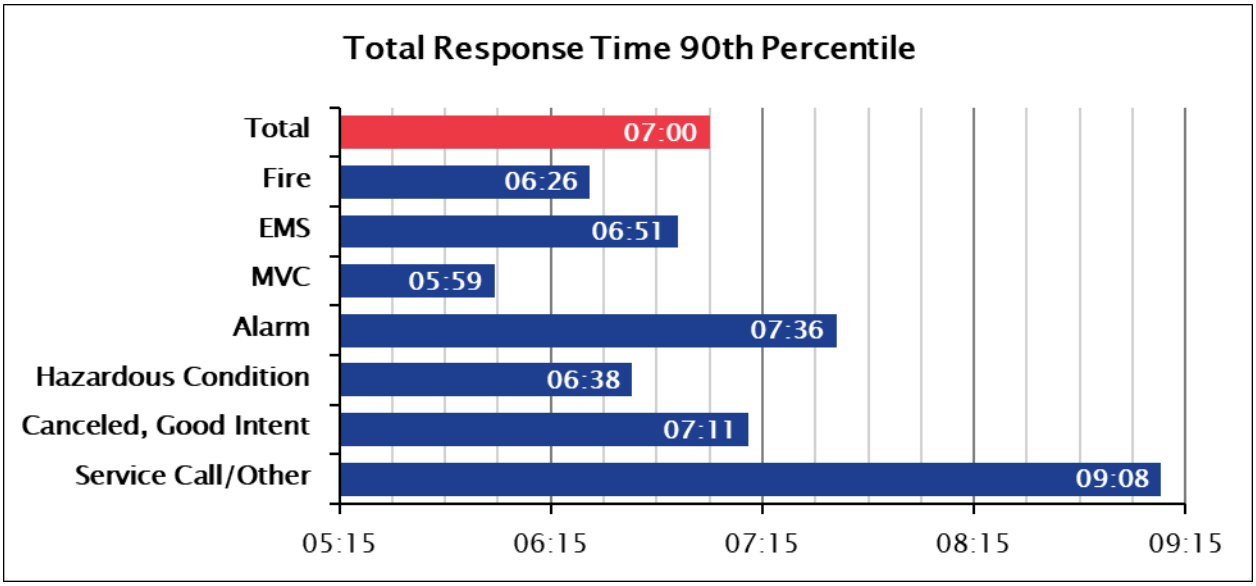
The measure of time between answering the 9-1-1 call and arrival at the scene of the emergency is known as total response time. For this measure, there is no specific applicable standard. However, by combining the individual component standards, the following figure illustrates expected performance.

Figure 34. Total Response Time Benchmark

Component	Performance
Alarm Handling Time	60 seconds at the 90th percentile
Turnout Time	Fire and Special Operations Incidents 80 seconds at the 90th percentile All Other Incidents 60 seconds at the 90th percentile
Travel Time	4 minutes at the 90th percentile
Combined	Fire and Special Operations Incidents 6 minutes, 20 seconds at the 90th percentile All Other Incidents 6 minutes at the 90th percentile

The following figure illustrates the total response time for the first responding units.

Figure 35. MPFRD Total Response Time Performance, 2020-2024



Mutual & Automatic Aid

Fire departments throughout the nation enter into agreements with neighboring agencies whereby resources are shared. Within an automatic aid agreement, resources from all agencies are included in an initial dispatch of the incident. Within a mutual aid agreement, outside agency resources are only dispatched upon the request of the primary agency.

The following figure illustrates the agreements currently in place for MPFRD.

Figure 36. Automatic & Mutual Aid Agencies

Agency	Agreement Type
Prince William County Fire & Rescue Department	Automatic
City of Manassas	Automatic
Northern Virginia (NOVA) Mutual Aid Agreement	Mutual

As with other information, the use of automatic and mutual aid is documented within the system for each response. The following figure illustrates the use of automatic and mutual aid during the study period.

Figure 37. MPFRD Aid Given/Received, 2020–2024

Description	2020	2021	2022	2023	2024
Automatic aid given	685	1,193	1,827	1,939	1,847
Automatic aid received	338	537	517	647	584
Mutual aid given	4	5	0	0	0

Future System Demand Projections

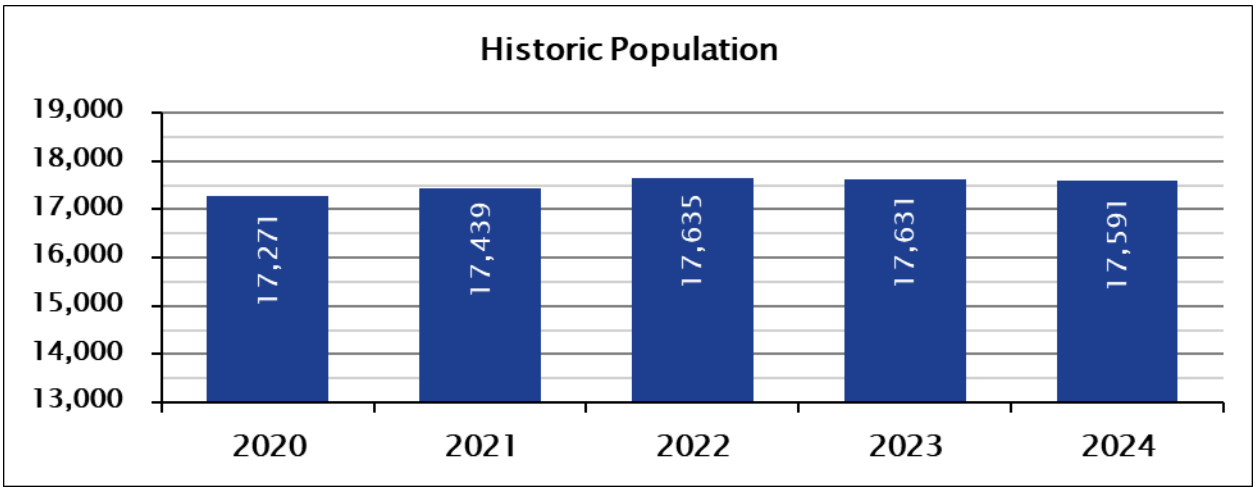
The project proceeds with an assessment of future community conditions, service demand, and fire protection risks that the department can be expected to encounter. ESCI will analyze potential growth projections and interpret their impact on emergency service planning and delivery.

Population Growth Projections

Population History

Based on Esri population trend data derived from Esri (2024, 2029), the U.S. Bureau of Labor Statistics (2024), and the American Community Survey (2018–2022), there was an increase of population within the MPFRD service area of 1.9% from 2020 to 2024, as illustrated in the following figure. This results in a compounded annual growth rate of 0.37%.

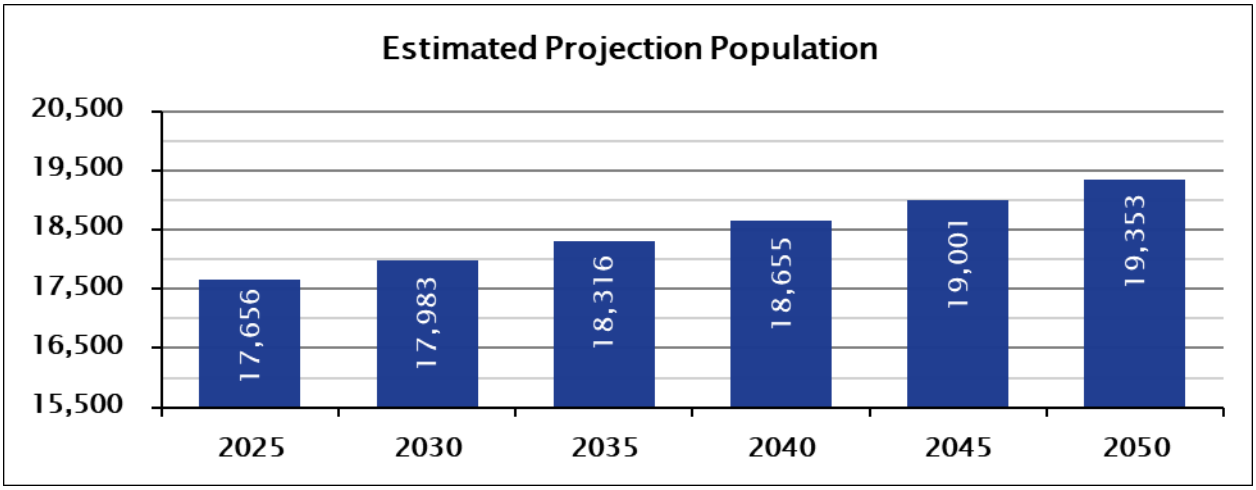
Figure 38. MPFRD Population, 2020–2024



Population Projection

Using a compounded annual growth rate of 0.37%, future population growth can be theoretically estimated, as illustrated in the following figure.

Figure 39. MPFRD Projected Population, 2025–2050



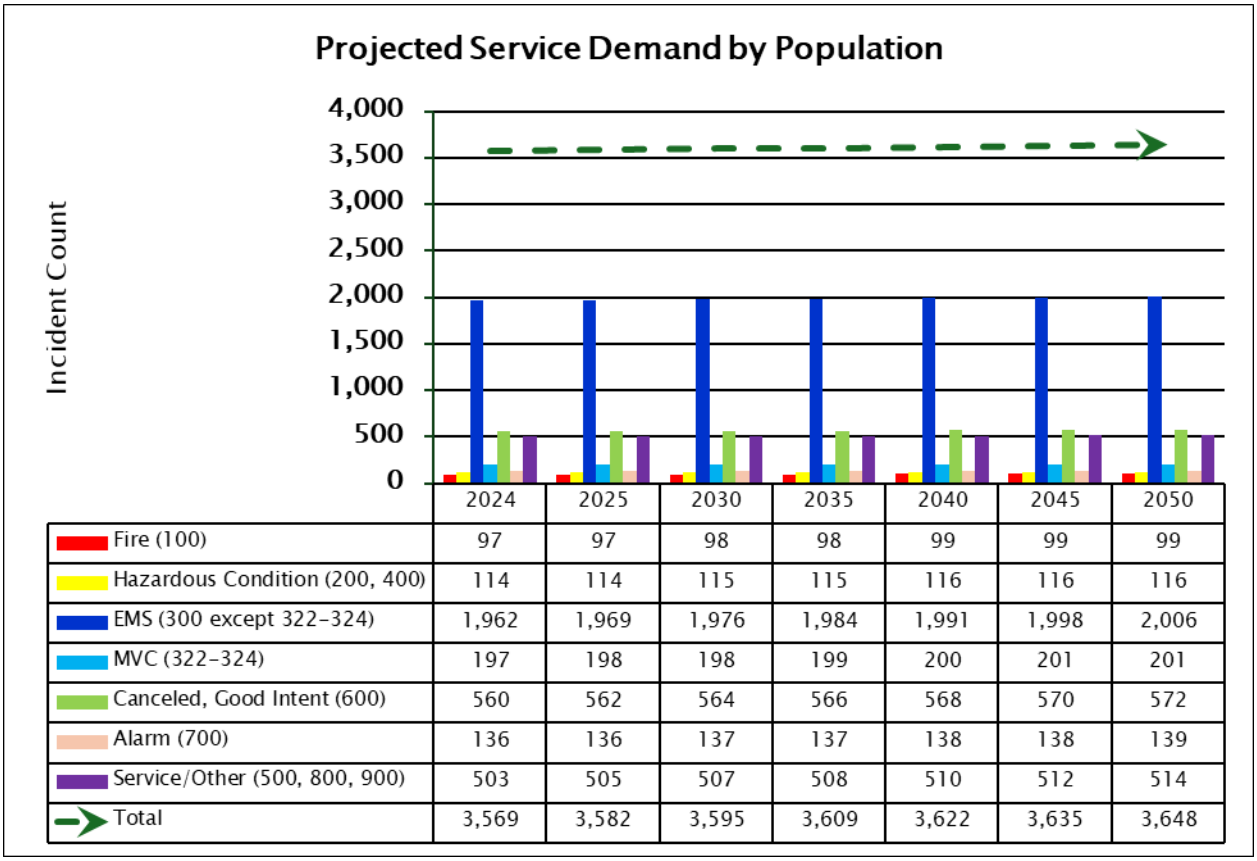
Service Demand Projections

ESCI uses two formulas to compute future service projections: historical incident trends and population trends. These two trends provide upper and lower boundaries for forecasting call volumes.

Future Service Demand by Population

By evaluating the current number of incidents per 1,000 population and applying that to the projected population growth from the preceding figure, it is possible to forecast a lower future service demand boundary within the community, as illustrated in the following figure.

Figure 40. MPFRD Baseline & Projected Service Demand by Population Change, 2024–2050

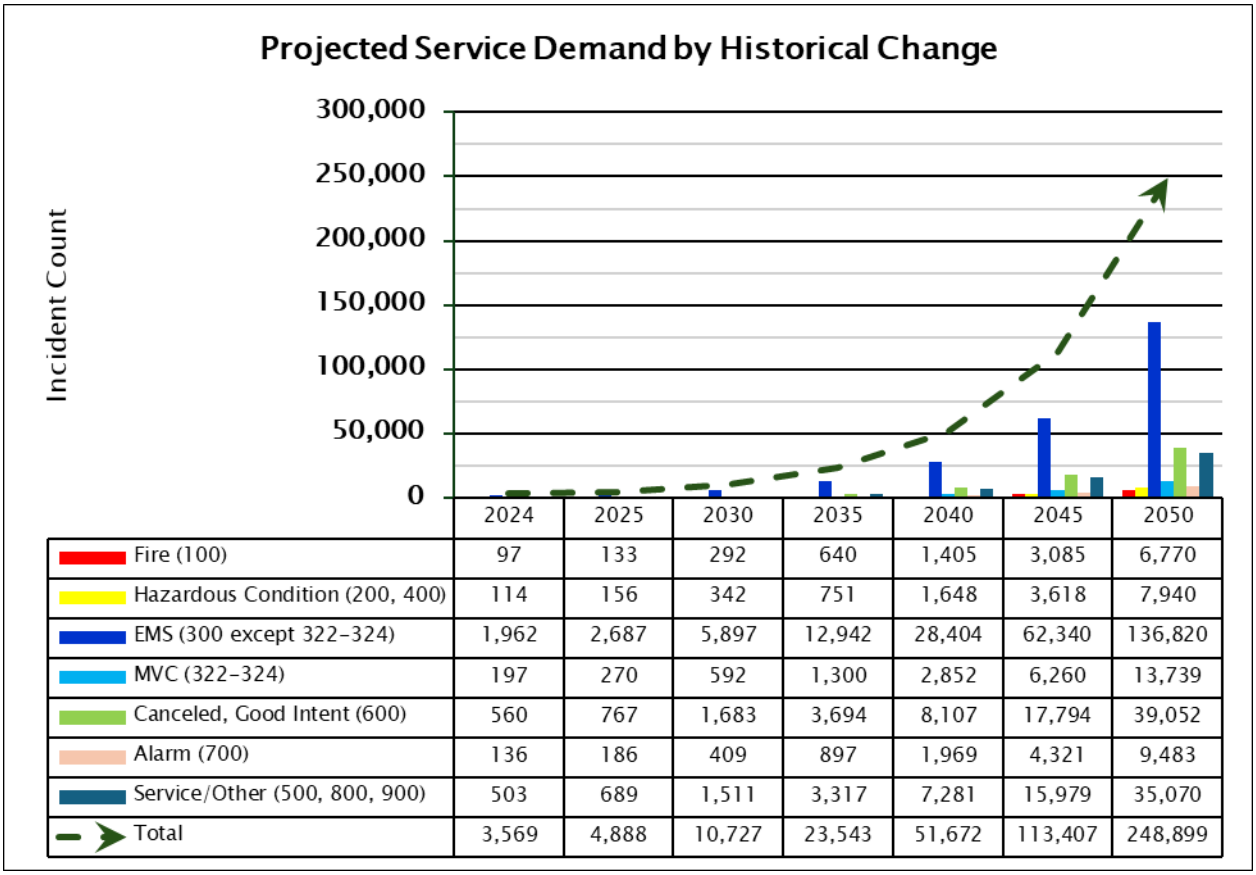


	2024	2025	2030	2035	2040	2045	2050
Fire (100)	97	97	98	98	99	99	99
Hazardous Condition (200, 400)	114	114	115	115	116	116	116
EMS (300 except 322–324)	1,962	1,969	1,976	1,984	1,991	1,998	2,006
MVC (322–324)	197	198	198	199	200	201	201
Canceled, Good Intent (600)	560	562	564	566	568	570	572
Alarm (700)	136	136	137	137	138	138	139
Service/Other (500, 800, 900)	503	505	507	508	510	512	514
Total	3,569	3,582	3,595	3,609	3,622	3,635	3,648

Future Service Demand by Historical Change

By applying the compounded annual growth rate (17%) derived from the incident type analysis, it is possible to forecast an upper boundary for future service demand within the community, as illustrated in the following figure.

Figure 41. MPFRD Baseline & Projected Service Demand by Historical Change, 2024-2050



	2024	2025	2030	2035	2040	2045	2050
Fire (100)	97	133	292	640	1,405	3,085	6,770
Hazardous Condition (200, 400)	114	156	342	751	1,648	3,618	7,940
EMS (300 except 322-324)	1,962	2,687	5,897	12,942	28,404	62,340	136,820
MVC (322-324)	197	270	592	1,300	2,852	6,260	13,739
Canceled, Good Intent (600)	560	767	1,683	3,694	8,107	17,794	39,052
Alarm (700)	136	186	409	897	1,969	4,321	9,483
Service/Other (500, 800, 900)	503	689	1,511	3,317	7,281	15,979	35,070
Total	3,569	4,888	10,727	23,543	51,672	113,407	248,899

Conclusions & Recommendations

Station Location Recommendations

The ESCI project team worked with the MPFRD leadership team to evaluate potential locations for fire stations within the community. This discussion centered around the ability to provide the best coverage to the greater amount of historical incident density as well as the challenges associated with the impact of trains impeding travel to the eastern portion of the city. The following three groups of station locations provide scenarios for discussion amongst elected officials and leadership. In order to provide data for discussion, each scenario will be compared to the following data points of coverage from the current fire station coverage. A more detailed area map for each potential location is shown in Appendix A.

- Percentage of service area within the 4-minute travel distance of a fire station.
- Percentage of historical incidents within the 4-minute travel distance of a fire station.
- Percentage of structures within the 4-minute travel distance of a fire station.

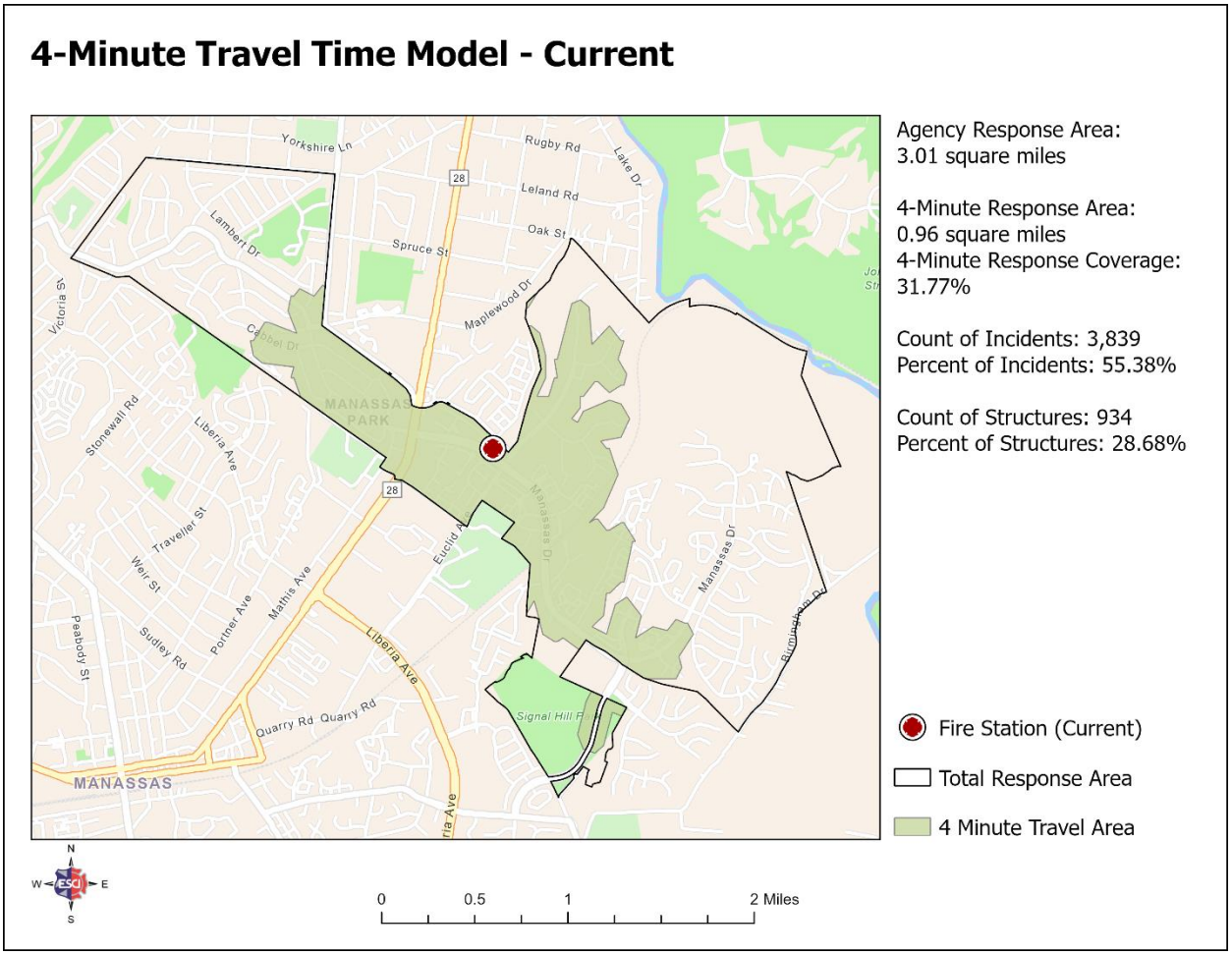
The following figure provides a list of potential station locations along with the name used for each within the scenarios.

Figure 42. Potential Station Locations and Names

Location Name	Actual Location
Digital Drive	Intersection of Digital Drive and Manassas Drive
Signal View Drive	9146 Signal View Drive
Kent Drive	331 Manassas Drive
Tremont Street	Area near Tremont Street and Colburn Drive

The following figure illustrates the current coverage of the preceding three data points.

Figure 43. MPFRD 4-Minute Travel Time Evaluation (Current)



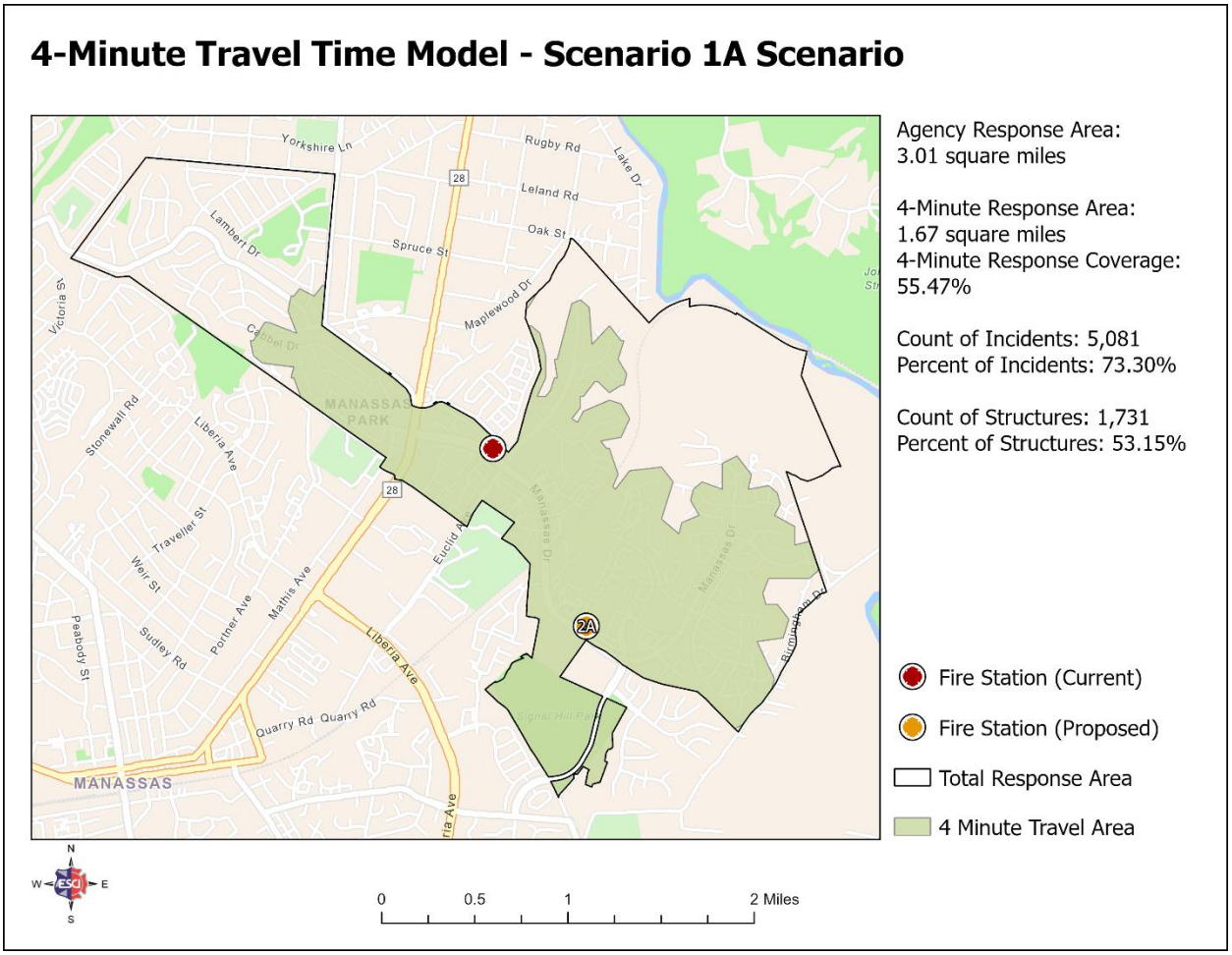
Option 1 – Station 1 Location Unchanged/New Station 2 Built in Eastern Portion of the City

With both of the following scenarios, Station 1 would remain at its current location, 9080 Manassas Drive.

Scenario 1A – Digital Drive

This scenario keeps Station 1 at its current location and proposes construction of Station 2 near the intersection of Digital Drive and Manassas Drive, as illustrated in the following figure. The impact created by opening this station as compared to current coverage is an increase to the 4-minute travel time of 23.7%, an increase to the incidents covered by 17.9%, and an increase to the structures covered by 24.5%.

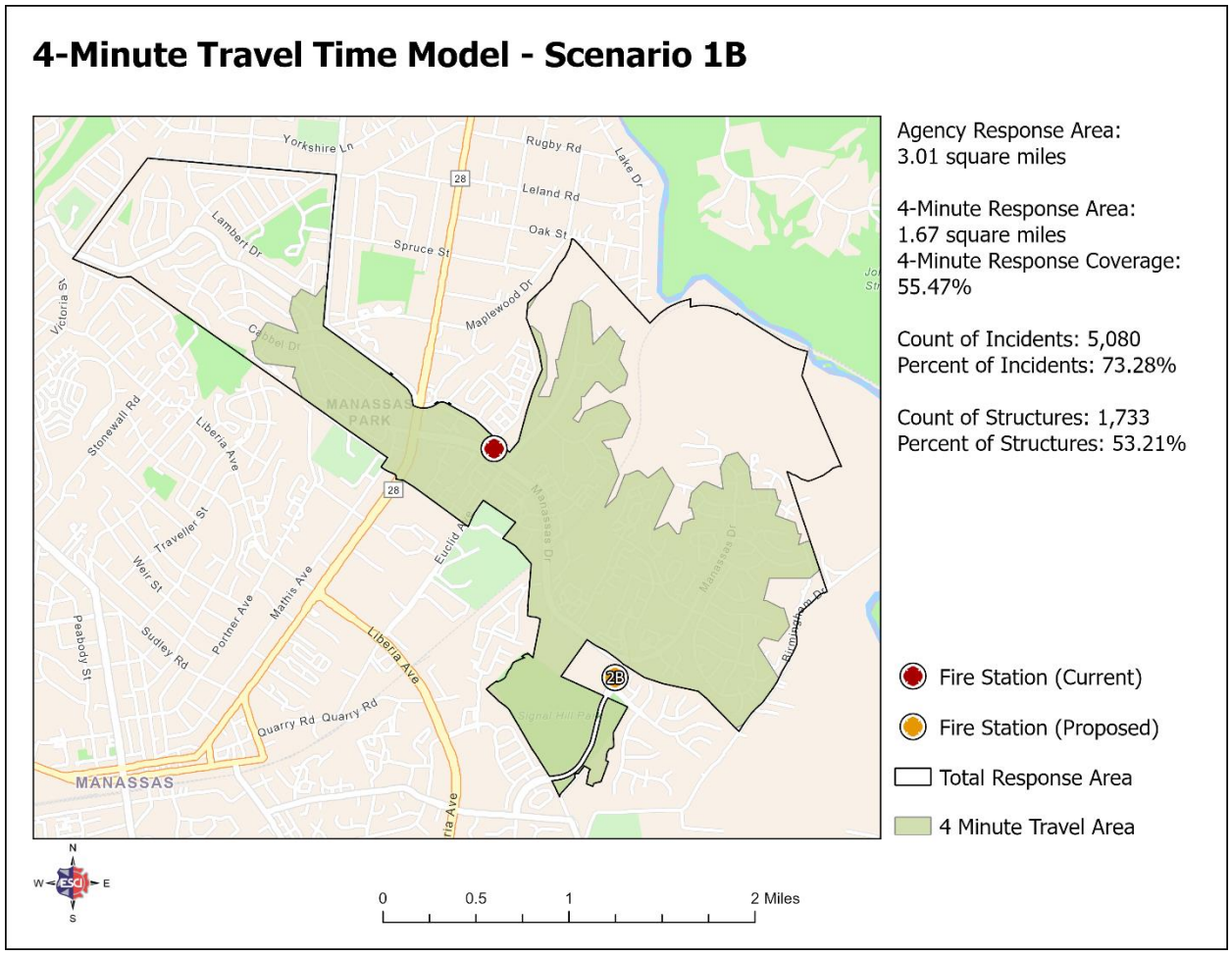
Figure 44. MPFRD 4-Minute Travel Time Evaluation (Scenario 1A)



Scenario 1B – Signal View Drive

This scenario keeps Station 1 at its current location and proposes construction of Station 2 near the intersection of Signal View Drive and Manassas Drive, as illustrated in the following figure. The impact created by opening this station as compared to current coverage is an increase to the 4-minute travel time of 23.7%, an increase to the incidents covered by 17.9%, and an increase to the structures covered by 24.5%.

Figure 45. MPFRD 4-Minute Travel Time Evaluation (Scenario 1B)

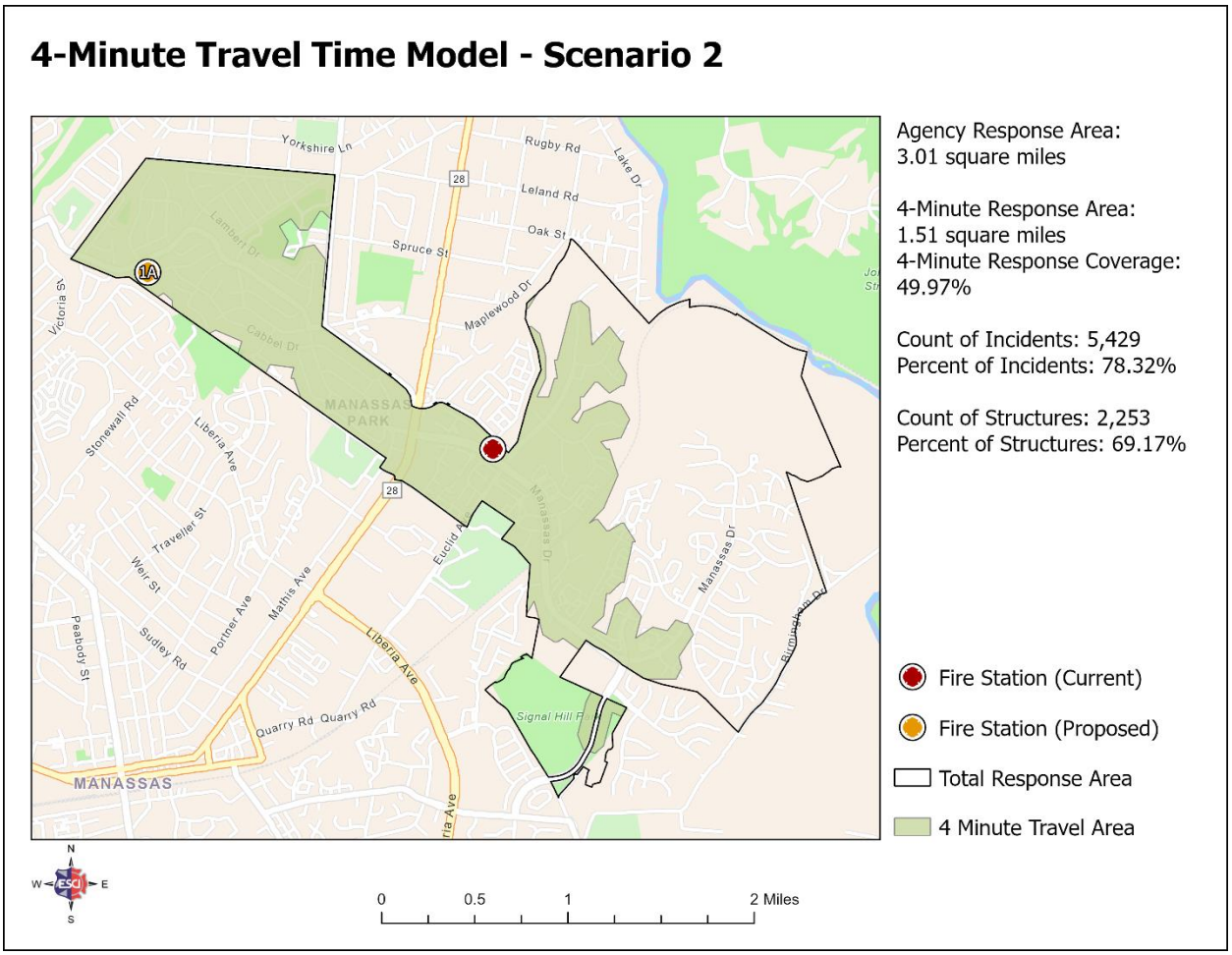


Option 2 – Station 1 Location Unchanged/New Station 2 Built in Western Portion of the City

Scenario 2 – Kent Drive

This scenario keeps Station 1 at its current location and proposes construction of Station 2 on the property at 331 Manassas Drive, as illustrated in the following figure. The impact created by opening this station as compared to current coverage is an increase to the 4-minute travel time of 18.2%, an increase to the incidents covered by 22.9%, and an increase to the structures covered by 40.5%.

Figure 46. MPFRD 4-Minute Travel Time Evaluation (Scenario 2)

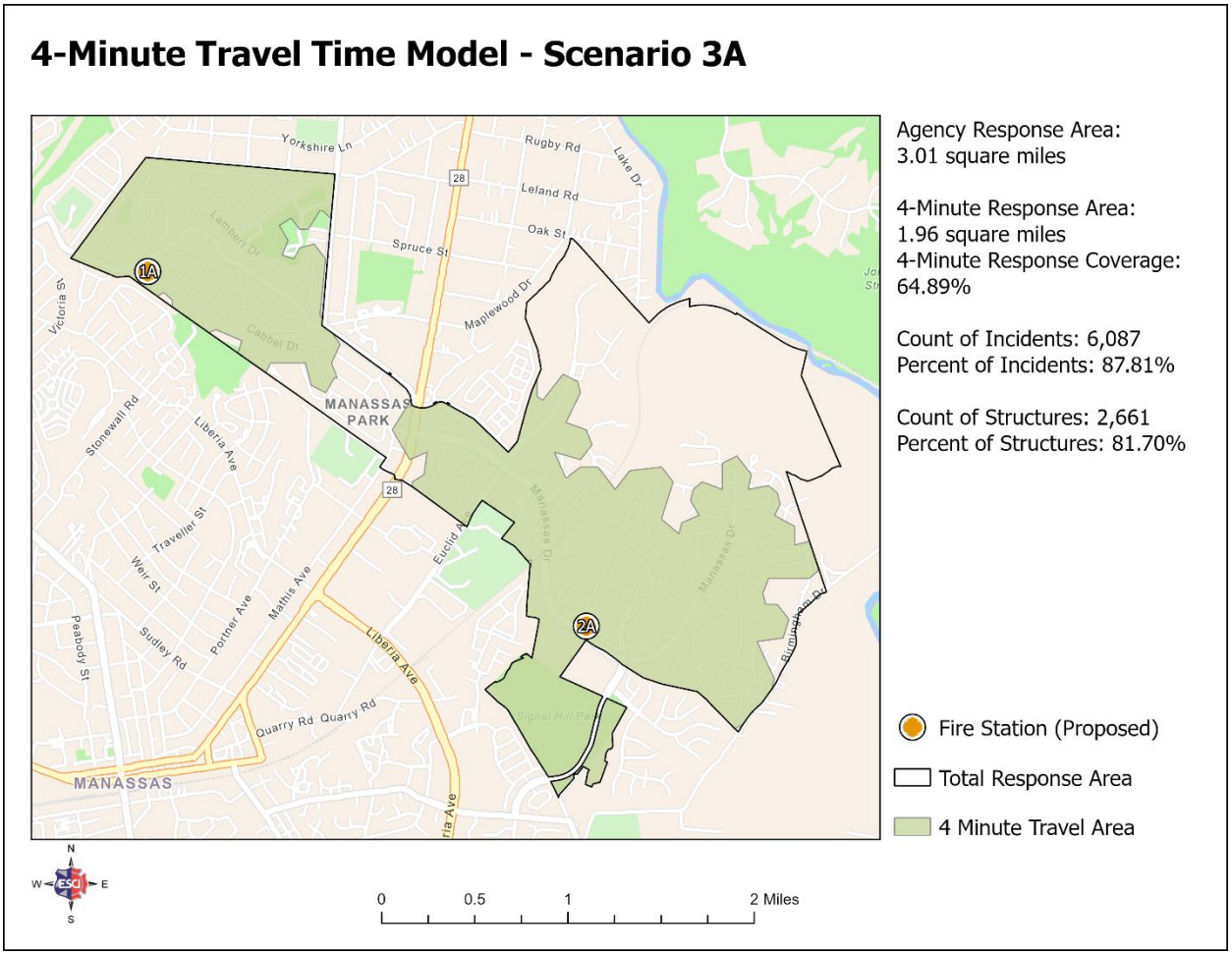


Option 3 – Station 1 Rebuilt in Western City/New Station 2 Built in Eastern Portion of the City

Scenario 3A – Kent Drive/Digital Drive

This scenario relocates Station 1 from its current location to the property at 331 Manassas Drive and proposes construction of Station 2 near the intersection of Digital Drive and Manassas Drive, as illustrated in the following figure. The impact created by opening this station as compared to current coverage is an increase to the 4-minute travel time of 33.1%, an increase to the incidents covered by 32.4%, and an increase to the structures covered by 53%.

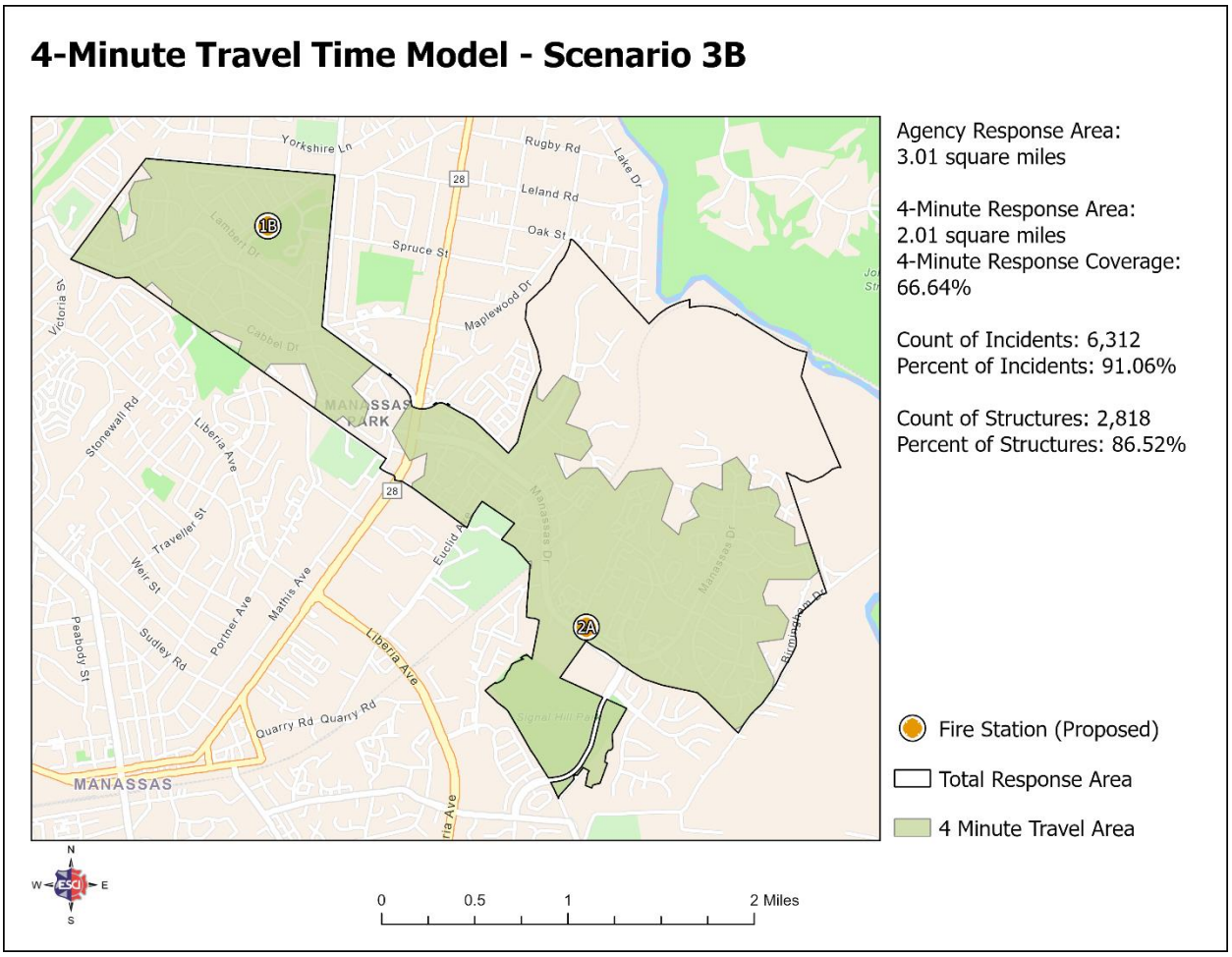
Figure 47. MPFRD 4-Minute Travel Time Evaluation (Scenario 3A)



Scenario 3B – Tremont Street/Digital Drive

This scenario relocates Station 1 from its current location to the area near Tremont Street and Colburn Drive and proposes construction of Station 2 near the intersection of Digital Drive and Manassas Drive, as illustrated in the following figure. The impact created by opening this station as compared to current coverage is an increase to the 4-minute travel time of 34.9%, an increase to the incidents covered by 35.7%, and an increase to the structures covered by 57.8%.

Figure 48. MPFRD 4-Minute Travel Time Evaluation (Scenario 3B)



Station Location Summary

The following table provides a comparison of all scenarios to the current coverage.

Figure 49. MCFRD Summary of Station Location Proposals

Scenario	4-Minute Change	Incident Change	Structures Change
Current	N/A	N/A	N/A
Scenario 1A	23.7%	17.9%	24.5%
Scenario 1B	23.7%	17.9%	24.5%
Scenario 2	18.2%	22.9%	40.5%
Scenario 3A	33.1%	32.4%	53.0%
Scenario 3B	34.9%	35.7%	57.8%

Staffing & Deployment Recommendations

Staffing and deployment of apparatus at the new fire station, along with potential changes to staffing and deployment of apparatus at the existing fire station, are very dependent upon the various options selected by elected officials and leadership. Figure 50. Staffing (Current), Figure 51. Staffing (Scenario 1A), Figure 52. Staffing (Scenario 1B), Figure 53. Staffing (Scenario 2), Figure 54. Staffing (Scenario 3A), and Figure 55. Staffing (Scenario 3B) present a base of staffing and deployment. Leadership may also consider only relocation of existing apparatus and staff without adding additional units/personnel.

Figure 50. Staffing (Current)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Tower 509	3	N/A	N/A
Engine 509	3	N/A	N/A
Medic 509	2	N/A	N/A
Battalion 589	1	N/A	N/A

Figure 51. Staffing (Scenario 1A)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Tower 509	3	New Engine	3
Engine 509	3	N/A	N/A
Medic 509	2	N/A	N/A
Battalion 589	1	N/A	N/A

Figure 52. Staffing (Scenario 1B)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Tower 509	3	New Engine	3
Engine 509	3	N/A	N/A
Medic 509	2	N/A	N/A
Battalion 589	1	N/A	N/A

Figure 53. Staffing (Scenario 2)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Tower 509	3	New Engine	3
Engine 509	3	N/A	N/A
Medic 509	2	N/A	N/A
Battalion 589	1	N/A	N/A

Figure 54. Staffing (Scenario 3A)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Engine 509	3	Tower 509	3
Medic 509	2	New Engine	3
Battalion 589	1	N/A	N/A

Figure 55. Staffing (Scenario 3B)

Station 1		Station 2	
Unit	Staffing	Unit	Staffing
Engine 509	3	Tower 509	3
Medic 509	2	New Engine	3
Battalion 589	1	N/A	N/A

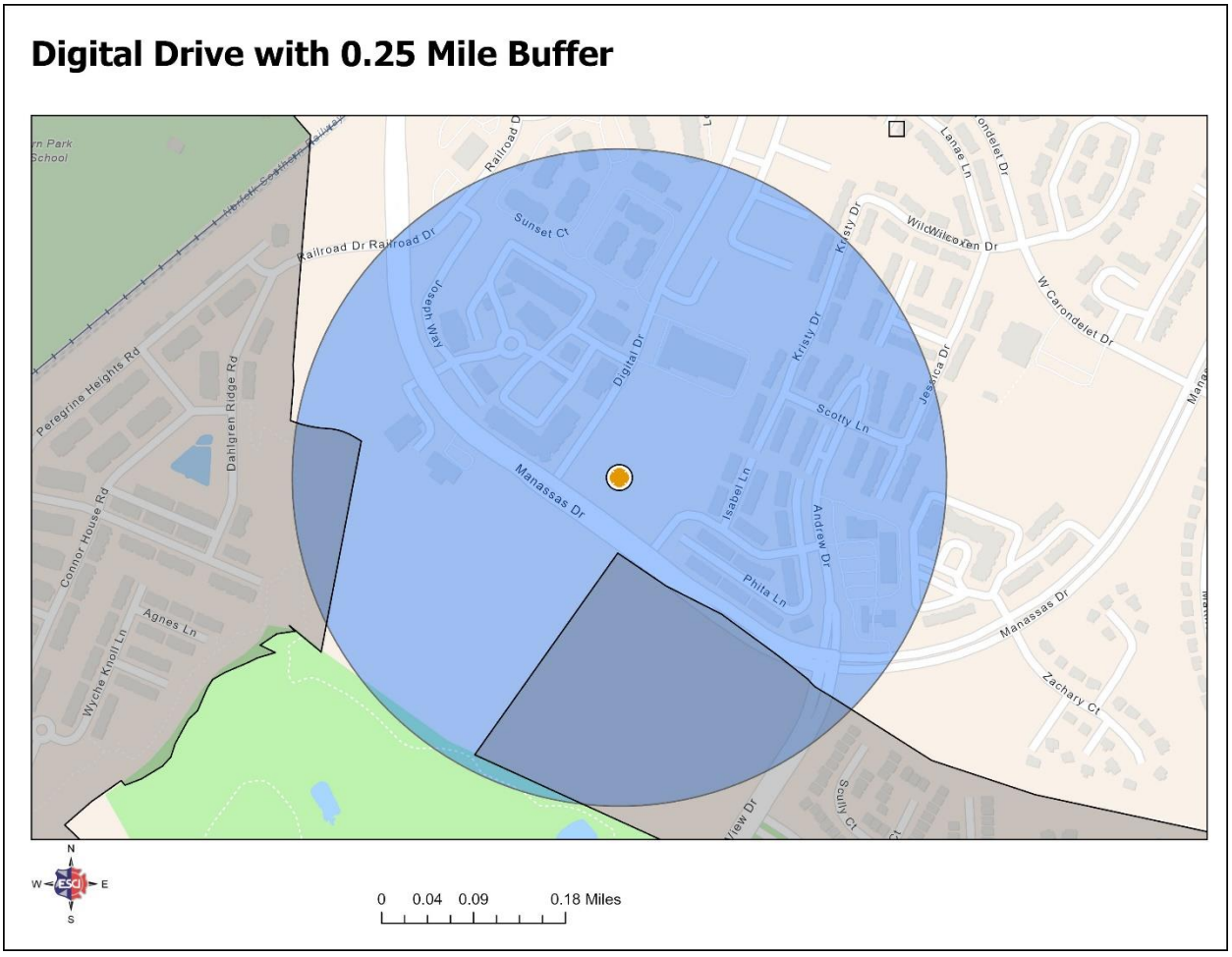
Appendix A – Station Location Detail

Figure 56. Digital Drive Location with Buffer through illustrate the potential fire station location along with a 0.25-mile buffer.

Digital Drive

This location is used in Scenario 1A, Scenario 3A, and Scenario 3B.

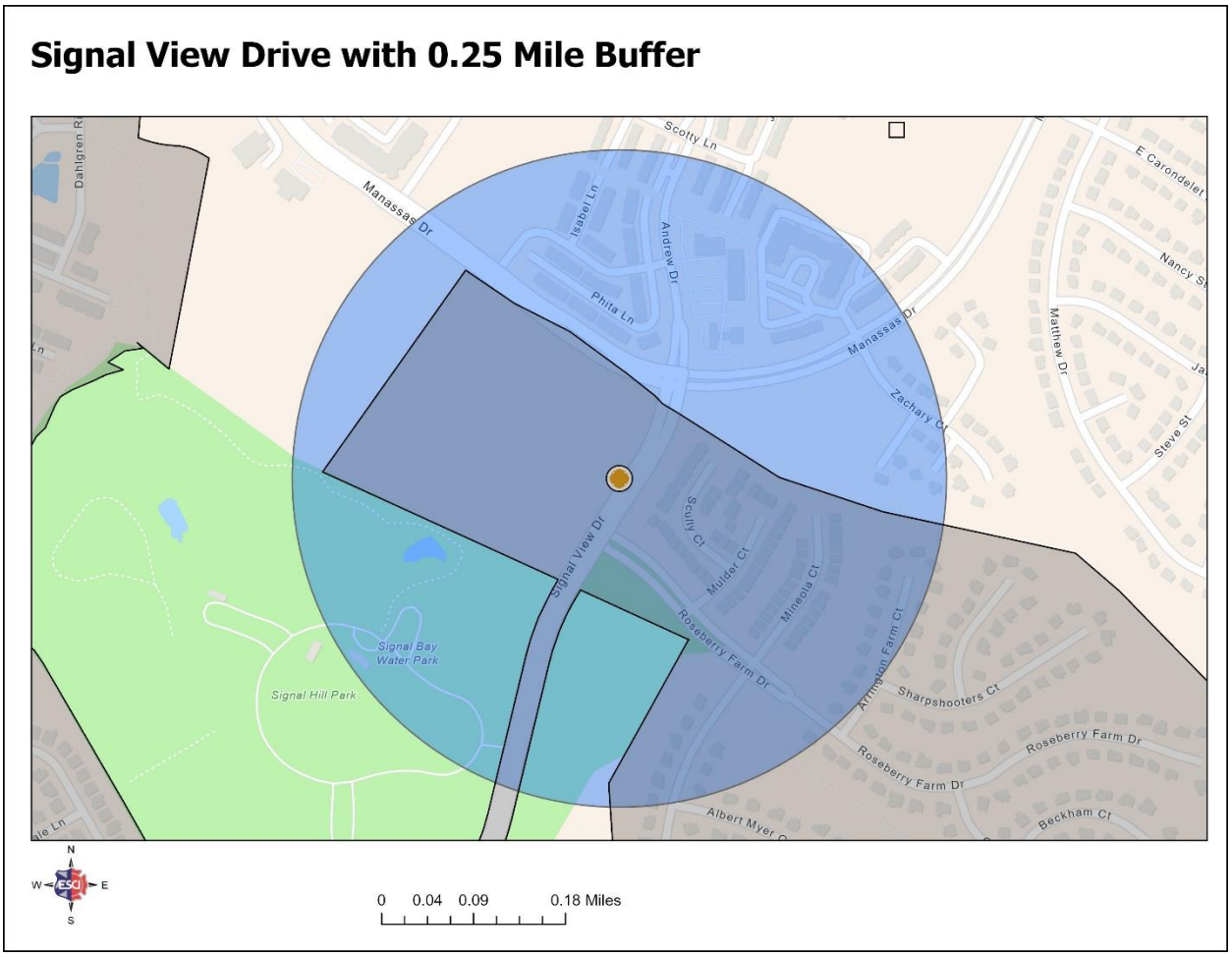
Figure 56. Digital Drive Location with Buffer



Signal View Drive

This location is used in Scenario 1B.

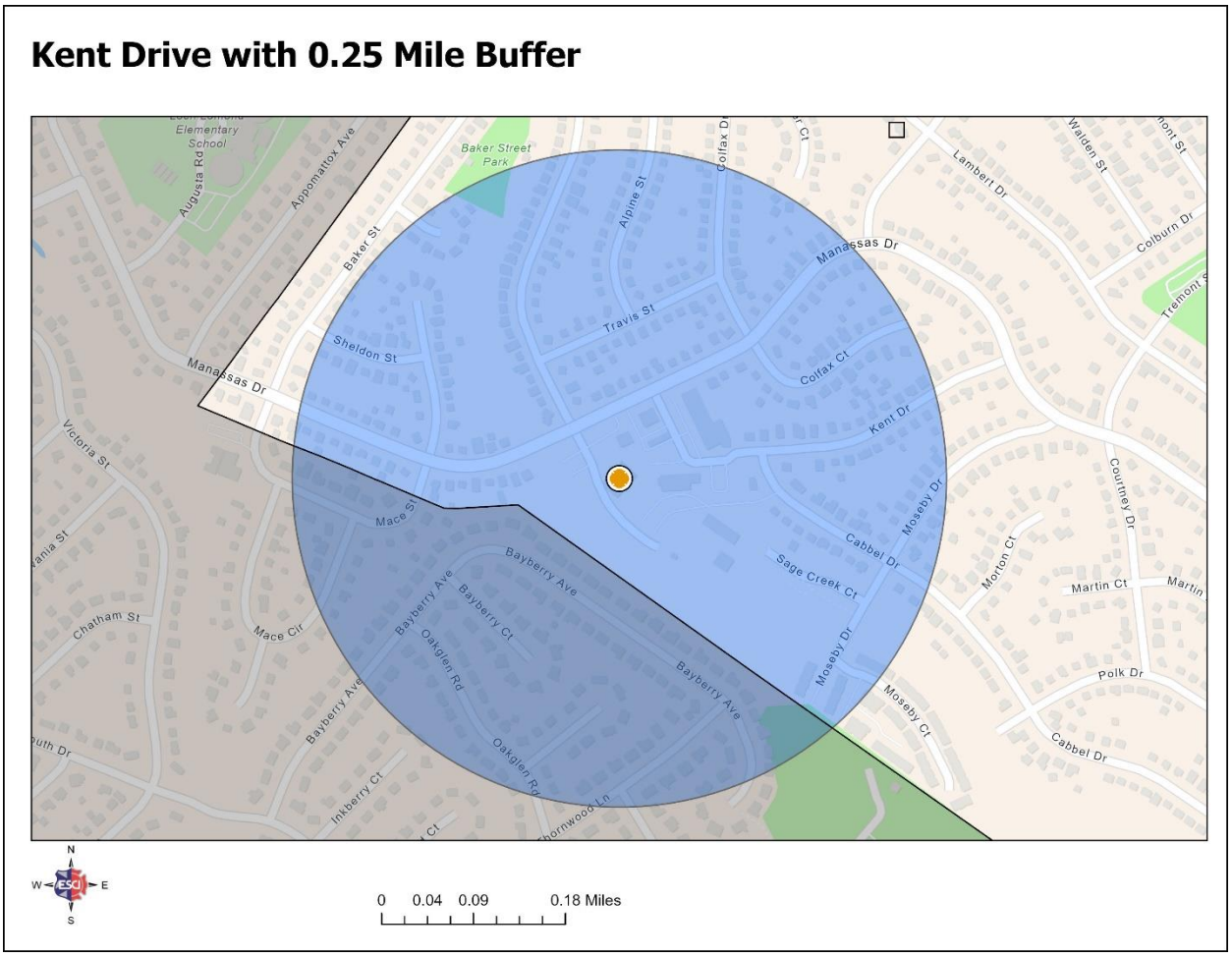
Figure 57. Signal View Drive Location with Buffer



Kent Drive

This location is used in Scenario 2 and Scenario 3A.

Figure 58. Kent Drive Location with Buffer



Tremont Street

This location is used in Scenario 3B.

Figure 59. Tremont Street Location with Buffer

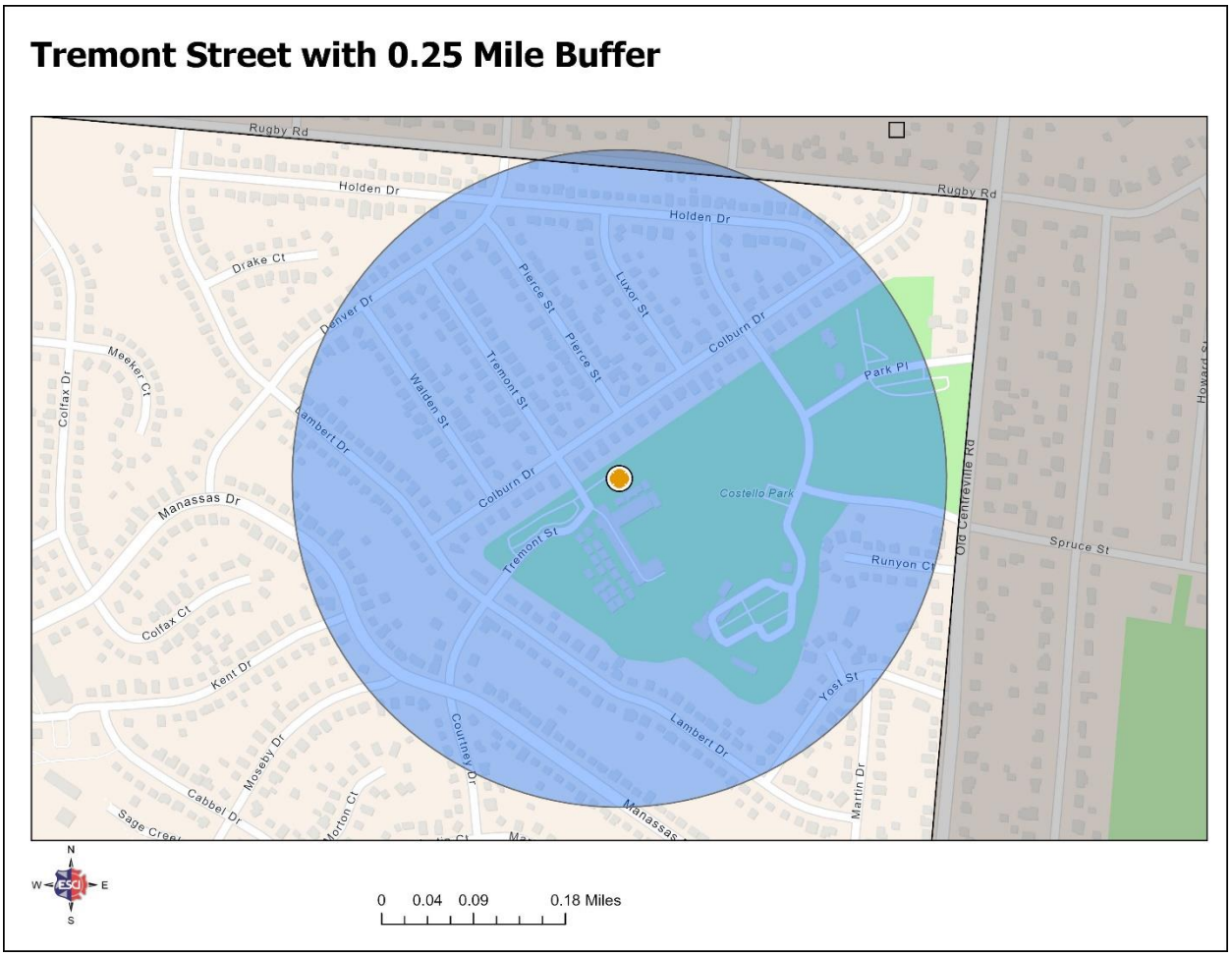


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