Menlo Park Fire Protection District

California

COMMUNITY RISK ASSESSMENT: STANDARDS OF COVER

ESCI Emergency Services Consulting International

Providing Expertise and Guidance that Enhances Community Safety

Introduction

The following report serves as the Menlo Park Fire Protection District's Community Risk Assessment: Standards of Cover. It follows the Center for Fire Public Safety Excellence (CPSE) 6th Edition *Community Risk Assessment: Standards of Cover* model that develops written procedures to determine the distribution and concentration of a fire and emergency service agency's fixed and mobile resources. The purpose of completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations.

Creating a Community Risk Assessment: Standards of Cover document requires that a number of areas be researched, studied, and evaluated. This report will begin with an overview of both the community and the agency. Following this overview, the plan will discuss areas such as risk assessment, critical task analysis, agency service-level objectives, and distribution and concentration measures. The report will provide an analysis of historical performance and will conclude with policy and operational recommendations.

ESCI extends its appreciation to the elected officials, business members, and community members of the District and the cities they protect, the members of the Fire District, and all others who contributed to this plan.

Menlo Park Fire Protection District Board of Directors

Robert Jones
President

Jim McLaughlin
Vice President

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Director

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Executive Summary

The Menlo Park Fire Protection District (MPFPD) contracted with Emergency Services Consulting International in 2019 to conduct a Center for Public Safety Excellence, 6th Edition-compliant, Community Risk Assessment: Standards of Cover report. This *Community Risk Assessment: Standards of Cover* report quantifies community risks and recommends standards of service.

ESCI analyzed the data provided by MPFPD and others to determine the current levels of response performance. From this analysis, ESCI also identified factors influencing risk, response performance, and has identified opportunities for delivery system improvement. This document establishes response time objectives and standards for measuring the effectiveness of District resources and the deployment of those resources. This report is divided into sections generally based on the format recommended by the Center for Public Safety Excellence, *Community Risk Assessment: Standards of Cover, 6th Edition*.

MPFPD serves a resident population of approximately 95,263 people and protects an area of roughly 29 square miles. MPFPD operates from seven fire stations. The District currently utilizes ten response apparatus, not including reserve apparatus. San Mateo County Office of Public Safety Communications (PSC) provides emergency (9-1-1) answering. PSC is an accredited 9-1-1 center and utilizes Medical Priority Dispatch to prioritize requests for emergency medical services (EMS).

The analysis completed during this study revealed a number of important findings. These include:

- The total response workload has increased by 17.9% over the past seven years.
- The current fire department utilization rate is 91.7 incidents per 1,000 population. This is comparable to similar communities.
- Requests for emergency medical services are 65.3% of all responses.
- Response workload is the highest around Fire Stations 2 and 6.
- Engine 2 is very near 10% utilization (UHU).
- The addition of the second truck company has resulted in the current daily staffing being at the upper limit of the recommended span of control for the one Battalion Chief per shift configuration.
- MPFPD lacks a District-wide program that fully identifies and pre-plans responses to target hazards.
- The amount of time PSC takes to dispatch fire department response units exceeds the MPFPD performance goal and national standards.
- The amount of time that response personnel take to assemble on apparatus and initiate response exceeds the MPFPD performance goal and national standards.
- The amount of time that units spend traveling to an incident exceeds the MPFPD performance goal and national standards.
- MPFPD provided an effective response force to 27 building fires during the study period. It delivered the effective response force to only 9 of those fires within the time defined in the MPFPD performance goals.
- MPFPD is quite dependent on neighboring agencies to deliver an effective response force.
- MPFPD has adopted written financial guidelines and practices.

- Population density is increasing steadily with multiple families living in single-family residences. Training and effective response force assignments should consider difficulties encountered by overcrowding in residences.
- Traffic will continue to increase in the region, impacting MPFPD streets and roadways. Peak traffic times may decrease the MPFPD ability to gather an effective response force within the recommended guidelines.
- Buildings are increasing in vertical size. This will increase the response times to the incident as firefighters must travel vertically before they arrive at the patient or fire location.
- There are numerous large residential structures in the district, some of which lack residential fire sprinklers.
- Natural disasters can occur in the service area. MPFPD should continue to work with the local community to ensure community resilience and preparedness.
- While very few unreinforced masonry buildings still remain, these buildings remain a concern during seismic and fire activity.
- The District's financial statements are audited, and its submission of its Comprehensive Annual Financial Report (CAFR) has resulted in its receipt of the Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association.
- The District has a detailed calendar for the preparation and adoption of its annual budget.
- The District follows sound business practices accounting for its operations through the use of four major funds; General Fund, US&R Special Revenue Fund, Capital Improvement Projects Fund, and Debt Service Fund.
- The District has established an Apparatus and Equipment Replacement Plan to ensure adequate funds are available for the replacement of apparatus and equipment.
- MPFPD has experienced an average of 6.1% increase in assessed property valuation between FY 17/18 and FY 08/09; increasing from $20,911,498,219 in FY 08/09 to $34,832,408,120 in FY 17/18.
- The CalPERS Classic pension plans were closed to new employees on January 1, 2013. Employees hired after January 1, 2013, are eligible to enroll in the PEPRA plans.

The analysis conducted during the evaluation phase of this process identified a number of opportunities to improve service (Improvement Goals). The following recommendations are offered for consideration. These recommendations are described in more detail at the end of this report in the *Overall Evaluation, Conclusions, and Recommendations* section.

RECOMMENDATIONS

Recommendation A: Continue to maintain adequate cash reserves to provide for emergency purchases or economic downturns.

The Board of Directors should continue to place a high priority on closely monitoring the financial impact of changing economic conditions on the District's ability to maintain service levels, fund infrastructure needs, and maintain sufficient reserve balances. The Board should continue to follow its budget process of requiring recurring expenses to be paid with recurring revenue and to fund deferred compensation amounts annually.

Recommendation B: Continue to maintain the apparatus and equipment replacement plan and ensure sufficient funds are available to replace apparatus and equipment.

The Board of Directors should continue with the established policies on the creation and maintenance of various capital expenditure plans and related reserve funds. Planning and setting aside funds for future capital expenditures allows for the replacements to be purchased with minimal impact on the funding for the delivery of services. These funds are currently in various accounting classifications, including "restricted," "committed," and "assigned," and can only be used for the stated purpose as determined by the Board of Directors.

Recommendation C: Continue to evaluate growth within the District to take advantage of opportunities to use specially designated tax revenues to fund stations or other capital assets.

The Board of Directors should continue to seek alternative revenue sources, including grants or specially designated tax revenues. Funding assistance from any source outside the existing revenue stream reduces stress to improve service, replace apparatus, or build new stations on that existing revenue stream.

Recommendation D: Add a second Battalion Chief per shift for a total of three additional Battalion Chiefs.

MPFPD currently staffs each operational shift with one Battalion Chief. The Battalion Chief's duties include coordination of all on-shift response personnel and supervision of response crews, ensuring coverage is balanced across the District, and assuming command of larger incidents. Typically, agencies staff with one Battalion Chief for every five response units. MPFPD's single on-shift Battalion Chief is managing nine response units. Adding a second Battalion Chief will improve overall shift management and enhance the District's effective response force.

Recommendation E: Implement a standardized program for pre-incident target hazard planning for operations personnel.

Pre-incident planning is designed to provide information for responding personnel to assist with strategies and tactics during an event and provides building familiarization to operations staff. MPFPD should institute a standardized pre-incident target hazard planning program as soon as possible for operations personnel and develop a system to access the plans during an event.

Recommendation F: Limit the use of traffic "calming" and other measures that increase travel time.

Speed humps, hard medians, curb extensions, and other measures can slow traffic and improve highway safety—however, these also slow emergency response vehicles.

Recommendation G: Work with the cities of Atherton, Menlo Park, and East Palo Alto to designate primary emergency access routes.

The designation and marking of emergency access routes will enhance emergency response times during highly congested commute times.

Recommendation H: Continue to work with the cities of Atherton, Menlo Park, and East Palo Alto to coordinate and, where appropriate, enhance emergency preparedness planning and response efforts.

Where possible, the District should work to eliminate duplication of efforts and provide support to the City's emergency preparedness planning and emergency operations center design and development.

Recommendation I: Improve the efficiency of response to emergency medical incidents.

MPFPD's current practice is to send a fire engine to all emergency medical incidents regardless of severity. Response protocols should be modified to eliminate fire unit response to low-risk or ambulance-only responses.

Recommendation J: Review dispatch processes to reduce call processing time.

PSC's call processing times are long as compared to national standards. Current overall call processing times are within 1 minute, 45 seconds, 90% of the time. For fire incidents, it is even longer within 2 minutes, 43 seconds, 90% of the time. National standards (NFPA 1221) recommend that call processing time for most calls should be within 64 seconds, 90% of the time. If medical dispatch triage questions are asked, as is the case here, the time is within 90 seconds, 90% of the time.

Recommendation K: Reduce the turnout time interval.

Turnout time is the period between when dispatchers notify response personnel of the incident and when response crews begin to travel towards the incident location. MPFPD's performance goal for turnout time is currently within 2 minutes, 90% of the time. MPFPD's overall turnout time performance is currently within 2 minutes, 3 seconds, 90% of the time.

Recommendation L: Closely monitor the impact of new development on fire department workload.

There exists developable land within MPFPD's service area and areas that can and will be redeveloped to more intense uses. Response workload will increase because of rising population and service utilization rates.

Recommendation M: Consider relocating Station 77 to a new site.

MPFPD is considering relocating Station 77 to a new location near the 1200 block of Willow Road in Menlo Park. Current and proposed first-due coverage was evaluated for both sites to determine if this relocation would provide a benefit.

Recommendation N: Move Rescue 77 to Station 6.

Rescue 77 was moved to Station 77 in January 2019. Moving this unit to Station 6 will provide a better result for the system. Station 6 is much busier than Station 77. Station 77 sits adjacent to two other stations (1 and 2) that house two response units each.

Description of Community Served

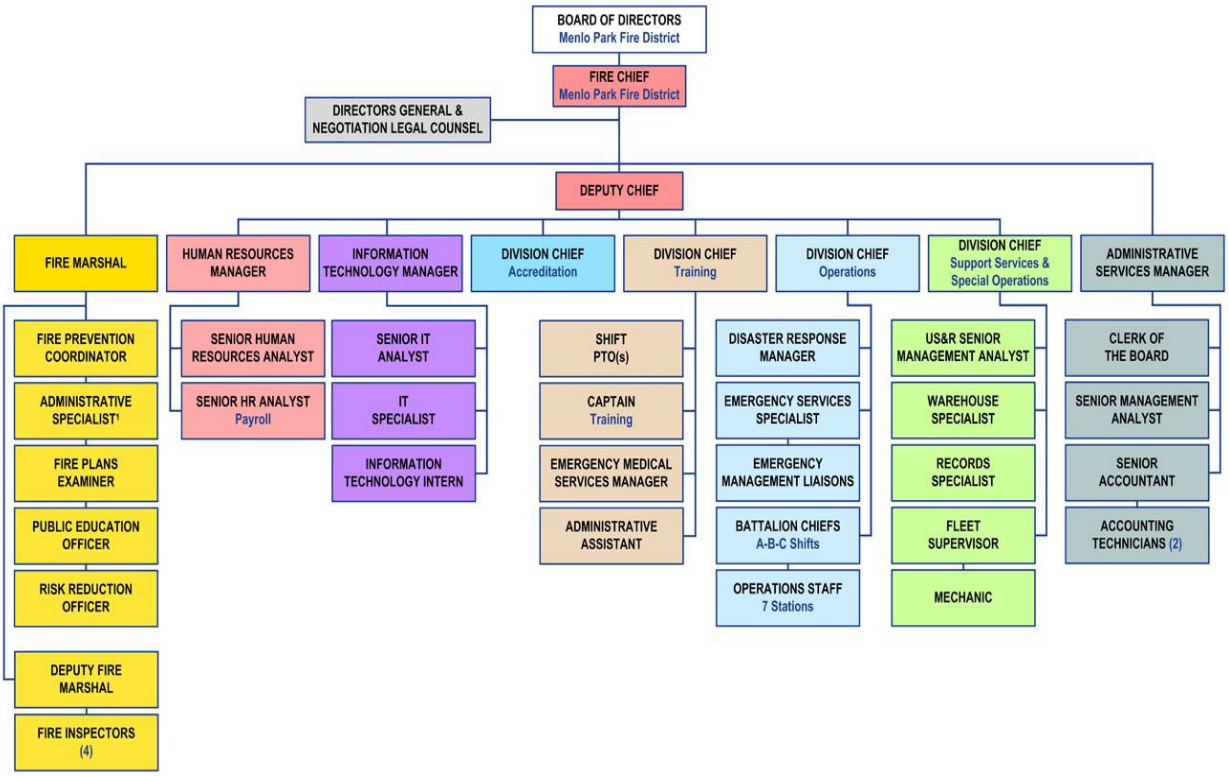
Organization Overview

This overview of the District focuses on the demographics, history, service delivery infrastructure, governance structures (and lines of authority), policies, and organizational design.

The Menlo Park Fire Protection District (MPFPD or District) was established in 1916; the District was reaffirmed and operates under the authority of the California Health and Safety Code Section 13800 et seq. (Fire Protection District Law of 1987). Located on the peninsula in the southernmost part of San Mateo County in the Metropolitan Bay Area, the District covers approximately 29 square miles that reach into the bay. The District's population is estimated at around 95,263. In addition, via a contract for services, the district provides fire and EMS response to the Stanford Linear Accelerator and National Department of Energy Laboratory.

MPFPD is a Special District governed by a Board of Directors comprised of five community members, duly elected by the citizens of the District and serving staggered four-year terms. As a Special District, MPFPD provides a full array of fire, rescue, and emergency medical services to the cities of East Palo Alto and Menlo Park, the Town of Atherton, and unincorporated areas of southern San Mateo County. The District employs 125 personnel and responds to approximately 8,743 calls for service annually. Currently, the District's assessed valuation is $34.75 billion, with an approved budget for the fiscal year (FY) 2019–2020 of $62,015,046. The Fire Chief is hired by and answers to the Board of Directors.

Figure 1: Menlo Fire Protection District Organizational Chart



[1]Time split between Prevention, HR, & Administrative Services

Financial Overview

Organizational Finance

The establishment of the financial policy for MPFPD is the responsibility of the Board of Directors with the Fire Chief responsible for fiscal administration. The District has an assessed valuation of approximately $34.75 billion before the redevelopment increment.

The District uses a one-year budget cycle to prepare the operating budget and the capital improvement plan based on a July through June fiscal year. The general fund budget for all divisions of the fire department for FY 2020 is $62,015,046.

The fire district's operating funds are generated primarily from property taxes. MPFPD generates additional revenue through billings for service, permit fees, redevelopment agency pass-throughs, homeowner property tax relief collections, and interest on invested funds.

The following figure lists the total actual revenue for MPFPD for FY 2014 through FY 2018.

Figure 2: MPFPD Revenue, FY 2014–FY 2018

Description	Actual 2013–2014	Actual 2014–2015	Actual 2015–2016	Actual 2016–2017	Actual 2017–2018
Total Revenues	**$40,132,295**	**$42,454,179**	**$45,684,444**	**$50,542,805**	**$56,826,863**

The next figure shows the general operating expenditure history for the previous five fiscal years. During the five-year period, the District's operating expenditures increased by approximately 62%. Capital expenditures have increased dramatically as the District's Capital Improvement Program has rebuilt two stations and is continuing to execute its plan.

Figure 3: MPFPD Actual Expenditures by Year, FY 2014–FY 2018

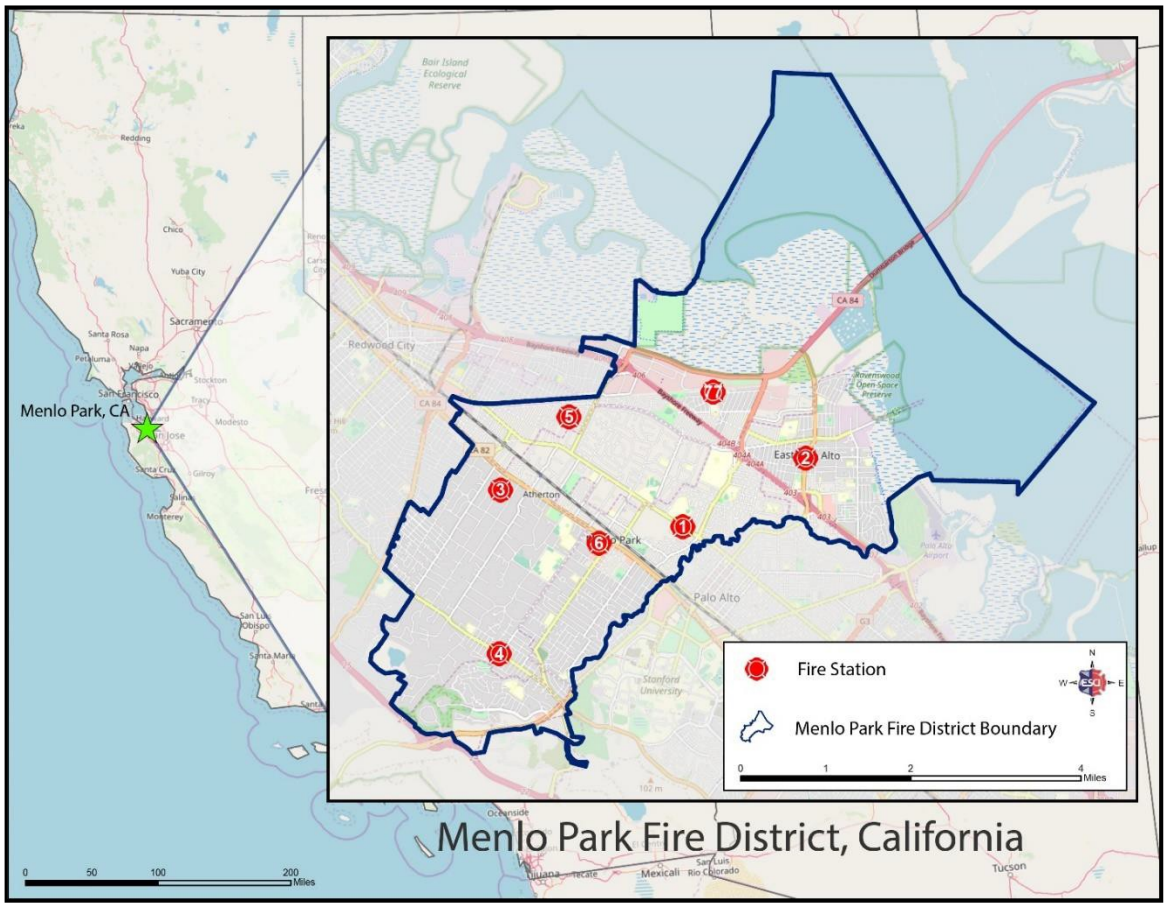
Description	Actual 2013–2014	Actual 2014–2015	Actual 2015–2016	Actual 2016–2017	Actual 2017–2018
Operating Expenses	27,881,815	40,953,284	30,730,918	42,357,866	45,197,988
Capital Expenditures	1,909,554	4,340,850	4,591,325	12,521,567	22,364,246
Debt Service	1,001,585	1,002,210	1,020,489	1,017,766	1,002,685
Total Expenditures	**$30,792,954**	**$46,296,344**	**$36,342,732**	**$55,897,199**	**$68,564,919**

The District has developed a comprehensive apparatus and equipment replacement program to plan for the obsolescence of its fleet of apparatus and equipment. This plan ensures that adequate funds are set aside for the replacement of old apparatus and equipment. Planning of this nature is important to the long-term financial and operational stability of any fire and emergency medical service organization. Such programs provide systematic development and renewal of the physical assets and rolling stock of the agency. The District has also created several Capital Improvement Projects Funds to pay for land acquisition, station improvement or replacement projects, and other major capital expenditures. These funds are derived from transfers from the General Fund or new debt instruments. The capital program must link with the planning process to anticipate and time capital expenditures in a manner that does not adversely influence the operation of the agency or otherwise place the agency in an unfavorable financial position. In 2012, MPFPD contracted with a facilities management firm to perform a detailed and comprehensive Facilities Condition Assessment of the District's Administration Building and its seven fire stations. As a result, the District commenced with a rebuilding project for its outdated fire stations.

Service Area Overview

The Menlo Park Fire District is located on the peninsula in the southernmost part of San Mateo County in the Metropolitan Bay Area. It covers approximately 29 square miles that reach into the bay. The District's population is estimated at around 95,263.

Figure 4: Menlo Park FPD



Review of Services Provided

MPFPD's service area includes the cities of East Palo Alto and Menlo Park, the Town of Atherton, the Stanford Linear Accelerator and the National Department of Energy Laboratory, and other unincorporated areas of southern San Mateo County. The District provides services from several strategically located fire stations housing seven engine fire companies, two Truck/Ladder Companies, one EMS Rescue, one Type 1 Heavy Rescue Unit, and several water rescue crafts (airboat, rigid bottom inflatable boat, jet skis). The District provides administrative support from one main administrative building and a secondary located behind the main building. These buildings house the offices of senior administrative staff and the Fire Prevention and Inspection Bureau. Additionally, MPFPD is the sponsoring agency for one of the CAL-OES Swift Water Rescue Task Forces and FEMA Urban Search and Rescue California Task Force #3.

MPFPD also provides and receives automatic and mutual aid to other agencies within the region. San Mateo County Office of Public Safety Communications (PSC) provides emergency (9-1-1) answering. PSC is an accredited 9-1-1 center and utilizes Medical Priority Dispatch to prioritize requests for emergency medical services (EMS).

STAFFING INFORMATION

At the time of this study, there were 99 full-time shift personnel involved in delivering services to the jurisdiction. Staffing coverage for emergency response is through the use of career firefighters on 48-hour shifts. For an immediate response, no less than 32 personnel are on duty at all times. One of the 32 personnel on each shift is a Battalion Chief, who is responsible for commanding incidents and relieving company officers of that responsibility on multi-company emergency operations and more complex incidents.

The following figure illustrates administrative and staffing support for the Menlo Park Fire Protection District at the time of the study.

Figure 5: Administrative and Support Staff

Position	Number
Fire Chief	1
Deputy Chief	1
Division Chief	4
Fire Marshal	1
Deputy Fire Marshal	1
Fire Prevention Coordinator	1
Fire Inspectors	4
Administrative Support Staff	10
Administrative Captain	1
Fleet Mechanic (CS Firefighters)	2

The following figure illustrates response personnel by rank in the organization.

Figure 6: Response Personnel by Rank

Position	Number
Battalion Chief	3
Fire Captain	27
Firefighters cross-certified as Apparatus Operators	49
Firefighter—Career	20

Resources as Currently Deployed

The following figure provides basic information on each of the District's core services, its general resource capability, and information regarding staff resources for each service.

Figure 7: Resource Staffing and Capabilities

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Fire Suppression	7 staffed engines 2 staffed ladder trucks 1 command response units 1 two-person rescue 1 Safety Officer Additional automatic and mutual aid engines, aerials, and support units available.	32 suppression-trained personnel on-duty 24/7/365. **Additional automatic and mutual aid firefighters available.**
Emergency Medical Services	7 Engines – ILS equipped 2 Ladder trucks – ILS equipped 1 Rescue – ILS equipped	32 minimum staffing 24/7/365 trained to BLS minimum, of those 10 full ALS Paramedics.
Vehicle Extrication	2 trucks equipped with hydraulic rescue tools, hand tools, airbags, cutting torch, stabilization cribbing, and a combination cutter-spreader hydraulic rescue tool.	32 minimum staffing 24/7/365, all firefighters vehicle rescue trained.
High-Angle Rescue	1 cross-staffed heavy rescue equipped with rescue-rated rope and all associated hardware.	66 personnel trained to RS1 level, no policy with respect to 24/7/365 minimum daily staffing.[1]
Trench and Collapse Rescue	1 cross-staffed heavy rescue equipped with pneumatic shoring jacks, cribbing, limited lumber, and hand tools for initial stabilization.	32 minimum staffing 24/7/365 trained to minimum Basic Trench Rescue and awareness.
Swift-Water Rescue	All engines and trucks equipped with throw bags, PFDs, and helmets. Two cross-staffed water rescue vehicles, two Air Boats (one is reserve), and one rigid hull inflatable.	42 certified as swimmers, 42 Swift Rescue Technicians, 20 Air Boat Drivers, 21 Rigid Bottom Inflatable Boats, and 20 Inflatable Rubber Boats.[1]

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Confined Space Rescue	1 cross-staffed heavy rescue equipped with a tripod, cribbing, pneumatic shores, air monitoring equipment, basket stretchers, and rescue-rated rope.	32 minimum staffing 24/7/365 trained to a minimum, all personnel trained to the operations level.
Hazardous Materials Response	Hazardous Materials response vehicle equipped with personal protective equipment, gas and radiation monitoring equipment, containment supplies, and non-sparking tools.	32 minimum staffing 24/7/365 trained to minimum operations awareness level.

[1] Many District members are members of the CA-TF3 US&R Team and fully trained Larro, RS1, RS2, and RS3 in addition to supplementary training for each technician position.

Apparatus/Vehicles

Other than firefighters assigned to stations, response vehicles are undoubtedly the next most important resource of the emergency response system. The delivery of emergency services will be compromised if emergency personnel cannot arrive quickly due to unreliable transportation or if the equipment does not function properly.

Fire apparatus are unique and expensive pieces of equipment, customized to operate efficiently for a narrowly defined mission. An engine may be built in such a way that the compartments fit specific equipment and tools. Virtually every space on a fire vehicle is designed for function. This same vehicle, with its specialized design, does not lend itself well to operate in a completely different capacity, such as a hazardous materials unit or a rescue squad. For this reason, fire apparatus offers little flexibility in use or reassigned purpose. As a result, communities across the country have sought to achieve the longest life span possible for these vehicles. Unfortunately, no piece of mechanical equipment can be expected to last forever. As vehicles age, repairs tend to become more frequent and more complex.

Parts may become more difficult to obtain, and downtime for repairs increases. Given the emergency mission that is so critical to the community, downtime is one of the most frequently identified reasons for apparatus replacement. Because of the expense of fire apparatus, most communities develop replacement plans. To enable such planning, communities often turn to the accepted practice of establishing a life cycle for apparatus that results in an anticipated replacement date for each vehicle. The reality is that it may be best to establish a life cycle for planning purposes, such as the development of replacement funding for various types of apparatus; yet, apply a different method (such as a maintenance and performance review) for determining the actual replacement date, thereby achieving greater cost-effectiveness when possible.

It is beyond the scope of work and the expertise of ESCI to provide a mechanical assessment of the apparatus. For a mechanical evaluation of the apparatus. The information that follows was provided by MPFPD staff.

The following figure lists the apparatus assigned to each of the seven MPFPD fire stations.

Figure 8: MPFPD Fire Stations and Apparatus

Station 1							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Battalion 1	Pickup	2017	Chevy	Excellent	4	N/A	N/A
Engine 1	Type 1 Engine	2009	Pierce	Good	4	1,500	650
Truck 1	Truck	2003	Pierce	Good	4	N/A	N/A
Engine 101	Type 1 Reserve	2002	Pierce	Fair	4	1,500	650
Training 101	Type 1 Engine	2005	Pierce	Fair	4	1,500	650

Station 2							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 2	Type 1 Engine	2018	Pierce	Excellent	5	1,500	650
Truck 2	Truck	2018	Pierce	Excellent	5	N/A	N/A

Station 3							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 3	Type 1 Engine	2015	Pierce	Good	5	1,500	650

Station 4							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 4	Type 1 Engine	2019	Pierce	Excellent	5	1,500	650
Engine 104	Type 1 Engine	2002	Pierce	Fair	4	1,500	650
Engine 504	Type 6 Engine	2016	Pierce	Good	3	50	400

Station 5							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 5	Type 1 Engine	2018	Pierce	Excellent	5	1,500	650

Station 6							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 6	Type 1 Engine	2019	Pierce	Excellent	5	1,500	650

Station 77							
Apparatus Designation	Type	Year	Make/Model	Condition	Seating Capacity	Pump Capacity	Tank Capacity
Engine 77	Type 1 Engine	2009	Pierce	Fair	4	1,500	650
Engine 177	Type 1 Engine	2007	Pierce	Fair	4	1,500	650
Rescue 77	Type 5 Engine	2017	BME	Good	3	50	400
Engine 677	Type 6 Engine	2006	Ford	Fair	3	50	150
Quint	Quint	2016	Pierce	Good	5	2000	650

These are the types of apparatus shown in the preceding figure:

- **Engine**—Primary response unit from each station for most types of service requests equipped with a pump and ability to carry water.
- **Truck**—A specialized apparatus used for structure fires, rescues, and other service requests equipped with long ladders, salvage, overhaul equipment, and rescue tools.
- **Tender**—A vehicle used for fires in areas without fire hydrants that is designed to carry large quantities of water to a fire incident.
- **Wildland Engine**—A smaller vehicle with a pump and water tank designed to be used for brush and grass fires in wildland areas.
- **HazMat**—A vehicle that carries specialized equipment for use on hazardous materials emergencies.

Apparatus Summary

Generally, fire agencies utilize the guideline as follows to establish capital equipment replacement programs:

- Engines: 15 years frontline and 5 years in reserve.
- Wildland Engines: 15 years frontline and 5 in reserve.
- Truck Companies: 15 years frontline and 5 to 10 years in reserve.

The level of activity, topography, and other factors may influence these guidelines.

Review of Community Expectations

ESCI gathered community attitudes about the Menlo Park Fire Protection District and its services by direct interviews of stakeholders. ESCI completed 29 stakeholder interviews over a three-day period. Of the 29 interviewees, these stakeholders represented the Fire District Board, City and County Administration, Community Members, Business Community, MPFPD Labor, Administrative Staff Members, Human Resources, Chief Officers, and the Fire Prevention Bureau.

It is important to note that the information solicited and provided during this process was provided in the form of "individual inputs," some of which are perceptions as reported by stakeholders. ESCI accepted all information at face value without an in-depth investigation of its origination or reliability. The project team reviewed the information for consistency and frequency of comment to identify specific patterns and trends. The observations included in this report were confirmed by multiple sources, or the information provided was significant enough to be included. Based on the information review, the team was able to identify a series of observations, recommendations, and needs that are included in this report. The stakeholder responses are summarized next.

Stakeholder Input

Citizen and Business Community Members

Describe your expectations of the Fire District:

- The Fire District should provide the community with an adequate response time.
- Be fiscally responsible.
- Have in place and follow, adequate and up-to-date policies and procedures.
- Be responsible to the ratepayers.
- Be transparent so that the public knows what is going on.
- Provide well-trained personnel that are thoughtful of the community's needs.
- That the District's website is informative, up-to-date, and provides the public an opportunity to fill out forms, communicate with the District, etc.
- That the Fire District is well organized and attract the right people to be members.
- Pleased with the direction the District is taking regarding accreditation and is aware of the Standards of Cover process.
- Provide the highest level/full spectrum of emergency services while protecting life and property.
- Be professional to the utmost degree.

Which of these expectations is not met to your satisfaction?

- None! All expectations are being met.

What do you think the Fire District is doing particularly well?

- Fiscal planning is excellent.
- The growth of the District.
- Impressed that the District is a multi-city jurisdiction.
- East/West coverage.
- The website is updated, providing new information and is relatively easy to find whatever you are looking for, including being able to search for a form.
- Training is very good and is adapted to the Community.
- Members are trained as FEMA Search & Rescue Task Force 3 and Swift Water rescue.
- The District has the ability to obtain the appropriate equipment.

Are there services that you think the District should be providing that they are not providing now?

- Emergency Planning.
- The District should be more involved in training the citizens to be better prepared for emergencies, i.e., Disaster Preparedness.
- Improve community outreach.

Are there services the District is providing that you think should be discontinued or done differently?

- Eliminate duplication of services provided by the City and Fire District; it is not cost-effective.
- Improve the current process for inspections; perception is that it is taking too long.
- Members of the public have indicated there are too many fees charged by more than one agency. Possibly consider combining Fire, City, and Police fees.
- Implement a policy or protocol that governs whether or not the District will pilot equipment/new technology when approached by vendors and or from an internal source.

When you dial 9-1-1 to report an emergency, how long should it take for help to arrive?

- Immediately.
- Seven minutes, 90% of the time; however, if someone is not breathing 7 minutes isn't acceptable.
- Feel comfortable that they will get there as quickly as they can.

Does that expectation change depending on where in the community you are located?

- No, it does not, and it should not.
- Smaller quick-attack response units could decrease response time.

Administrative Support

What strengths contribute to the success of the Fire District?

- The recruitment processes.
- The District's Rank and File, their training and skillsets.
- The District's current processes and procedures have resulted in the highest quality of workers in the District.
- Training Division.
- Good apparatus and rolling stock.
- Quality skillsets in the office.

What does the District do well?

- Recruitment and Retention.
- The Deputy Chief has buy-in from the line personnel.
- The relationship with line personnel is comfortable.
- The firefighters go the extra mile.
- Living in this community is better because of our Safety Officer's dedication.

What are some areas in which you think the District could make improvements?

- A Business Manager or position similar.
- Strategic Planning.
- The promotion or reclassifying process is focused on the individual rather than the position.
- There is a diversity problem; 90% of our employees are Caucasian.
- Explorer Program and Cadet Programs.

What do you see as the top issues faced by the Fire District today?

- Reorganization of Administration.
- Upgrade of the stations.
- Succession Plan—lack of.
- Growth Management/Vision/Traffic Management/etc.
- Consensus of the "buy-in"

If you could change one thing in the Fire District, what would it be?

- Fire Board-Fire District leadership relations.

How would you describe the level of services provided by the District in particular by your division or section?

- Extremely high.
- Everyone cares about what they are doing.
- A solid "A" or "A-."
- We do very well; there is always room for improvement.

Chief Officers, Labor Leaders, Rank & File

What strengths contribute to the success of the Fire District, and what does the District do well?

- Manages emergencies well.
- Extremely strong Training Division.
- Trains at a high level.
- Provides a high level of service.
- Responds well.
- Deployment of apparatus and crews is strong.
- Solid members in the crew.
- The budget allows the District to attack a problem. Different from other fire agencies, funding is not a problem.
- The District fosters "Peer Review" and addresses issues before they get out of hand.
- We are very fortunate to attract and hire good people

What are some areas in which you think the District could make improvements?

- Succession planning.
- Improved communication with the Fire Chief.
- Gather together and stand true to our Mission Statement.
- Overtime is causing members to be overworked.
- A Strategic Plan is being prepared. At this point in time it is not adopted by the Board.
- Leadership training and Officer Development is needed.
- Improvement of communicating at the Senior Management level.
- The strained relationship with all jurisdictions including Atherton.

What opportunities, from your viewpoint, are available in order to improve the District's services and capabilities?

- Increased training at the Officer-level should be addressed.
- Consider developing an emergency management division and offer services to other agencies. A member of the District is highly qualified to create an Office of Emergency Services, manage training and exercises.
- Revisit the joint (Menlo Park Fire Protection District & Menlo City Police Department) Emergency Operations Center concept to prepare for disasters.
- Look at creating a Succession Plan and/or reviewing our structure top to bottom; reprioritize programs considering the process of elimination, when necessary.
- Complete a project before beginning a new one.
- Focus on mentorship for leaders.

What challenges do you see in making those improvements?

- The District's opportunities are endless; can we just focus on one or two items, complete them before moving forward?
- All ranks should get back into the Strategic Plan and learn it and do it.
- Increase Public Education by going into the neighborhoods.
- Consider developing a Community Classroom. Send a group of people into a neighborhood every weekend. Consider using Amazon's door-to-door program.

What do you see as critical issues faced by the Fire District today?

- The Mechanical Division is understaffed, has no Succession Plan, and has only two full-time mechanics.
- No set priorities.
- Increase communication with the Fire Chief.
- No County-wide HazMat team and no training for the County's Chief officers.
- Improve focus on what we are good at and what we want to be; cannot do everything.
- Relationship with the Town of Atherton.
- A staffing model is needed for the east/west traffic.
- Establish minimum daily staffing at 4 fire personnel.
- Focus on hiring new hires that are already Paramedics.
- Initiate Leadership training beginning at the Captain level.
- Improve internal relationships—top to bottom.
- A Management Staffing Study is needed.
- A Long-Range Plan, a Fiscal Master Plan, and a Succession Plan.
- Increased community engagement.
- Fire Board cohesion.

Fire District Board, City & County Manager(s)

Describe your expectations of the Fire District.

- Good partnerships that include a boundary-drop arrangement.
- Provide life and safety protection.
- Educate and provide emergency preparedness.
- Maintain an appropriate response time.
- Maintain partnership with other departments, i.e., Police, etc.
- Work with Public Works regarding traffic calming.
- The Fire District should provide the best emergency response services our residents deserve.
- View our residents as clients.
- The Fire District needs to promote itself.
- The Fire District needs to be innovative; think out of the box.
- Provide excellent quality service at an efficient cost.
- Cultivate high quality within the ranks while focusing on the future.
- Adapt to the changing environment utilizing current technology to improve the quality of services.

Which of these expectations is not being met to your satisfaction?

- Would like to see quicker response time(s).
- Need for more community outreach.
- Promote the District better—community outreach.
- Prepare for the future; several Officers will be retiring in the near future; no succession plan.
- Focus on controlling costs and being more efficient.
- The District is slow to adapt to changes in measuring how the change affects overall service.
- The District seems to lack the capacity for "planning."

Are there services that you think the Fire District should be providing that they are not providing now?

- There exists a desire to have the District provide more community engagement.
- The Council wants more presence from the Fire District; there is no representation by the Fire District at their meetings.
- There is a need to mutually invest in an Emergency Preparedness Plan.
- Public Education is needed.
- The Fire District should be more visible; more community outreach. Be visible and approachable.
- District-based ambulance services.

When you dial 9-1-1 to report any emergency, how long should it take for the help to arrive?

- 5 to 7 minutes
- Less than 3 minutes; maybe longer on the west end.
- As quick as the ambulance; no longer.
- 6 to 8 minutes
- 4 to 5 minutes, depending on the time of day.
- As quickly as possible; pleased with current response time(s).

Does that expectation change depending on where in the system service area you are located?

- Yes.
- More staging should be considered during peak hours.
- There is a concern on the eastern side, that they will get there on time.
- Possibly; consider measuring demand levels and staffing efficiency in order to provide the appropriate service within an appropriate timeframe.

There are two deployment strategies for fire service resources. The first suggests that all residents of the District should receive generally the same level of service (i.e., fire stations are spaced uniformly to equalize response time throughout the community). The other suggests resources should be deployed to serve the next most-likely emergency to occur (the more populated an area, the more likely an emergency will occur). One choice tries to create as much equity in the delivery of service to all residents. The other will concentrate resources in areas with higher incident activity, leaving other areas with slower service. Which strategy do you think makes the most sense for the community?

- Where the next likely event could occur.
- Would like to see quick attacks—also known as "Peak hour units."
- The second option as long as there is a protocol in place.

Fire districts have no mandates for Disaster Preparedness. What are your expectations of the Fire District regarding Disaster Preparedness?

- Fire and Police work together to get it accomplished.
- There is an Emergency Operations Center within the Menlo Park Fire Protection District's area of responsibility. There is an expectation that the District participate.

Fire Prevention

What strengths contribute to the success of the Fire District?

- Other strengths: Community support—being able to do what we are doing!
- Small agency with several programs.
- Healthy finances.
- The level of service we provide is exceptional!

What does the District do well?

- Continually providing a high level of service.
- Task-driven orientation "get it done, get it done," is amazing.

What are some areas in which you think the District could make improvements?

- Succession planning.
- Receiving good Management Training.
- Identify future Chiefs.
- Currently overloaded with programs, projects, etc. Need some time to dwindle down to the basics.
- Leadership Development.
- Mission Statement and stick to it.
- Identify primary objectives.

What opportunities, from your viewpoint, are available to improve the District's service and capabilities?

- Externally: Improve relationships with other governmental entities.
- Consider liaison(s) that work with the cities we serve. We do not attend their meetings.
- How do they get involved and have some presence? We need to find a way.
- Consider implementing an electronic plan submittal program, which is a City government multi-use system.

What do you see as the top critical issues faced by the Fire District today?

- Relationship with Atherton.
- Getting a true Risk Assessment.
- Evacuation Plan—the State is putting pressure on all communities to have the plan.
- Pre-plan maps.
- Investigations as well as vegetation mapping.

How would you describe the level of services provided by the District in particular to your Division?

- The process of modernization; we are better than most Prevention Bureaus.
- On a 1 to 10 scoreboard, a "10."
- Plan reviews and inspections; turnaround time for inspections is 1 to 2 days!

Community Risk Assessment

There are numerous risk factors that can influence the types of services a community requires.

Hazard identification is the process of recognizing the range of natural or human-caused events that threaten an area. Natural hazards result from uncontrollable, naturally occurring events such as flooding, windstorms, and earthquakes, whereas human-caused hazards result from human activity and technological hazards. An example of a technical hazard is an accidental hazardous materials release.

Community risk is assessed based on several factors; service area population and its population density, the demographics of the population served, local land use and development, and the geography and natural risks present within the community. These factors affect the number and type of resources—both personnel and apparatus—necessary to mitigate an emergency. Each of these unique factors presents its own unique challenges to the District.

- Population density is a significant risk factor. In some parts of the jurisdiction, such as East Palo Alto, the number of single-family residential homes shared by multiple families is staggering. The number of persons living in a household is reported to be 3.91 persons compared to a California average of 2.96 persons.
- In parts of the District, traffic flow is severely impacted by commuter traffic and narrow streets.
- Language can be a barrier to emergency services. In East Palo Alto, over 70% of the population speak languages other than English at home (compared to a California average of 40%).
- The physical characteristics of the area and the resultant natural hazards are risk factors. Menlo Park is bordered on one side by a natural watershed and the other by wetlands and bay infill. The entire area has a significant risk of earthquakes and flash floods. The wildfire risk within Menlo Park Fire Protection District is low; however, the city is bordered by high wildfire risk to the east in the local mountains and hills.
- Land use and zoning can also affect risk. Risk can be characterized as low (e.g., agricultural and low-density housing); moderate (e.g., small commercial and office); or high (e.g., large commercial, industrial, and high-density residential).

Risk Classification

Based on the narrative descriptions of the various hazards found throughout the MPFPD response area, ESCI has developed a numerical ranking of community hazards using historical incident data, as well as an assessment of the community and its vulnerabilities. Community hazards were grouped into broad categories, as follows:

- Structure Fires
- Hazardous Materials
- Non-structure Fires
- Natural Hazards
- EMS-Medical Assist
- Technological Hazards
- Rescue
- Human Hazards

Within each category, ESCI identified specific hazards and a probability (likelihood) score between zero (representing "Not Applicable") and four (representing "Catastrophic"). Then, a severity score was developed for each of the subcategories using the same scale for impact and a reverse scale for preparedness and response. The overall scores were then used to generate a relative risk score as it applies to the MPFPD. The methodology of the Priority Risk Index (PRI) of categorical scoring is found in the following figure. The completed hazard vulnerability analysis, including relative community risk, is shown in the following figures.[1] Details of each risk category are in Appendix A.

Figure 9: PRI Score Categories

Risk Factor	Weighting Factor	Index Value	Level	Criteria
Probability	45%	1	Unlikely	< 0.1% annual
		2	Possible	0.1–1.0% annual
		3	Likely	1–10% annual
		4	Highly Likely	> 10% annual
Magnitude Severity	30%	1	Negligible	Negligible property damages, < 5% of critical and non-critical facilities and infrastructure. Injuries or illnesses treatable with first aid, no deaths. Negligible quality of life lost. Shut down of critical facilities for < 24 hours.
		2	Limited	Slight property damages > 5% and < 25% of critical and non-critical facilities and infrastructure. Injuries or illnesses no permanent disability, no deaths. Moderate quality of life lost. Shut down of critical facilities > 1 day and < 1 week.
		3	Critical	Moderate property damages > 25% and < 50% of critical and non-critical facilities and infrastructure. Injuries/illnesses result in permanent disability, at least 1 death. Shut down of critical facilities > 1 week and < 1 month.
		4	Catastrophic	Severe property damages > 50% of critical and non-critical facilities and infrastructure. Injuries or illnesses result in permanent disability and multiple deaths. Shut down of critical facilities > 1 month.

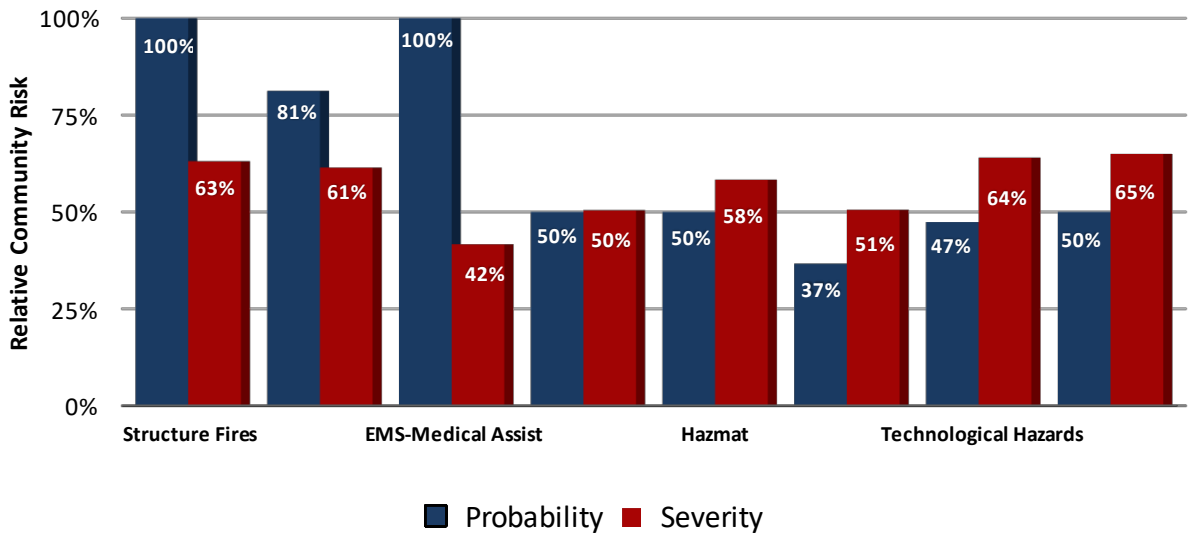
[1] *Based on reported NFIRS data January 01, 2016, to December 31, 2018, the San Mateo Hazard Mitigation Plan, personnel interviews, and onsite visits.*

Risk Factor	Weighting Factor	Index Value	Level	Criteria
Warning Time	15%	1	Long	More than 24 hours
		2	Moderate	12 to 24 hours
		3	Short	6 to 12 hours
		4	Limited	Less than 6 hours
Duration	10%	1	Limited	Less than 6 hours
		2	Short	Less than 24 hours
		3	Moderate	Less than 1 week
		4	Long	More than 1 week
Note: The highest possible PRI value is 4.0.				

Figure 10: Hazard Risk Summary

	Structure Fires	Non-Structure Fires	EMS	Rescue	Hazmat	Natural Hazards	Tech. Hazards	Human Hazards	Total
Probability	100%	81%	100%	50%	50%	37%	47%	50%	**55%**
Severity	63%	61%	42%	50%	58%	51%	64%	65%	**57%**
Relative Risk	63%	50%	42%	25%	29%	19%	30%	33%	**31%**

Figure 11: Relative Community Risk



ESCI also identified the following vulnerabilities specific to fire operations. Each is discussed in greater detail in the following pages.

- Population Density
- Physical Hazards
- At-Risk Populations
- Human-Caused Hazards

Population Density

The United States Census Bureau classifies the Menlo Park Fire Protection District as an urban area, encompassing approximately 29 square miles. The estimated population of the District is 95,263, with an estimated population density from a low of 1,428 per square mile in Atherton to a population density high of 29,519 per square mile in East Palo Alto. This density, as compared to California's average of 239 people per square mile, is significantly higher.

The population in East Palo Alto is much more concentrated than the other cities and communities in the Fire District. High-density single-family neighborhoods characterize the City. Many of these neighborhoods have multiple families living in single residents. The areas displaying the highest population density correspond to the areas with the highest service demand illustrated in the *Service Demand Analysis*, while lower-density areas are generally found to have a lower service demand.

Given the nature of commercial development within the MPFPD service area in the last few years, including the Facebook campus, the population density increases significantly during business and commuting hours. Still, it is appropriate for planning purposes to characterize the entire area as urban. To maintain consistency with well-established fire service classifications, MPFPD has chosen to use the population density classifications, as shown here.

Figure 12: Population Densities Criteria

Urban	• Population over 30,000 people; and/or • Population density over 2,500 people per square mile. • Significant commercial/industrial development, dense neighborhoods, and some mid-rise or high-rise buildings.
Suburban	• Population of 10,000 to 29,999; and/or • Population density between 1,000 and 2,500 people per square mile. • Single/multi-family neighborhoods, smaller commercial developments.
Rural	• Population of less than 10,000 people; and/or • Population density less than 1,000 people per square mile. • Low density residential, little commercial development, and significant farm or open space uses.

Figure 13: Study Area Population Density

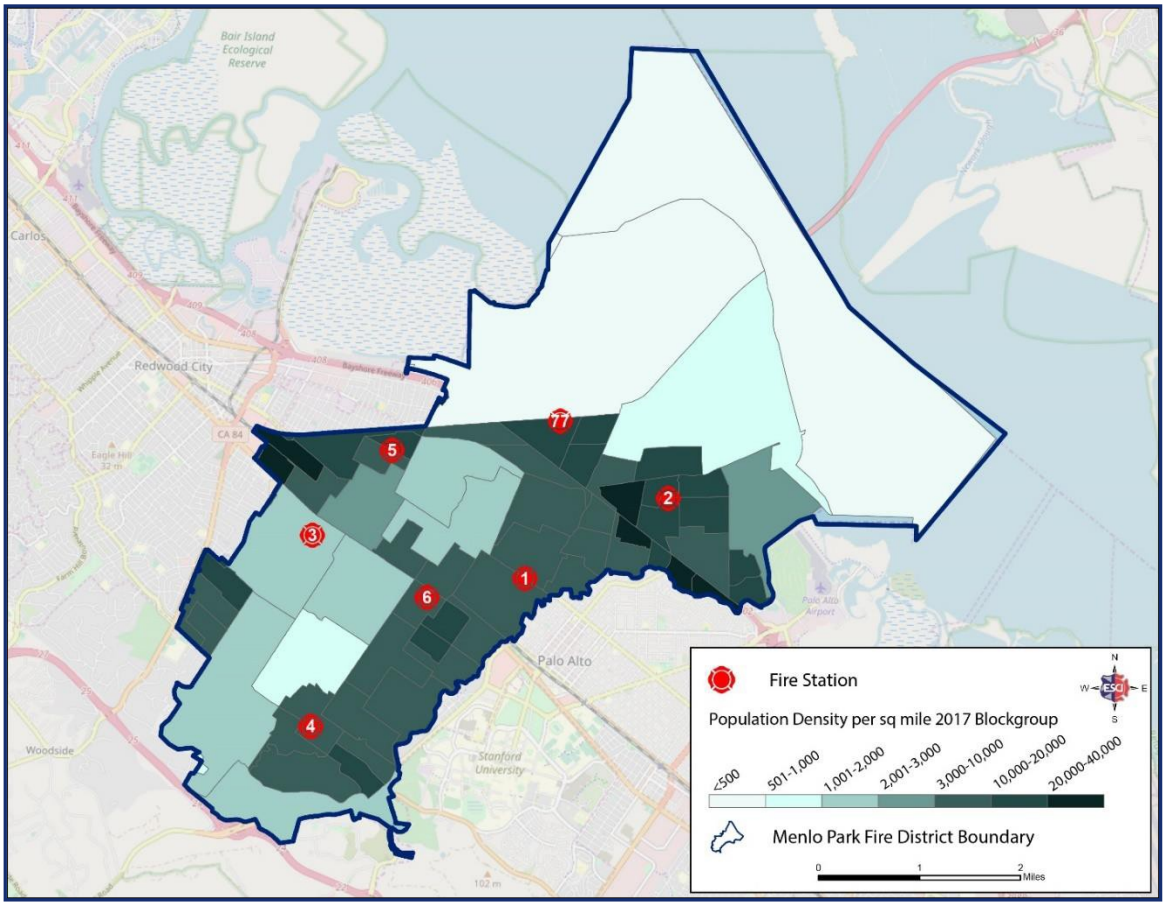


Figure 14: Population History, 2007–2018

Year	Atherton	East Palo Alto	Menlo Park	Total MPFPD[2]
2018	7,257	29,845	34,398	**95,263**
2017	7,238	29,765	34,357	**94,758**
2016	7,207	29,684	33,888	**88,733**
2015	7,167	29,662	33,449	**90,883**
2014	7,147	29,530	33,309	**89,997**
2013	7,159	29,143	33,071	**89,254**
2012	7,191	28,867	32,881	**88,591**
2011	7,043	28,532	32,496	**87,921**
2010	6,914	28,155	32,026	**95,679**
2009	7,501	33,899	30,276	**94,647**

[2] Data provided from MPFPD includes the three incorporated cities shown and the unincorporated areas.

Figure 15: Demographics for the MPFPD Service Area

Category	Number/%			
	Atherton	East Palo Alto	Menlo Park	MPFPD Average
Geography (estimates)				
Population (2018)	7,257	29,845	34,398	95,263
Land area in square miles, 2010	30			
Age and Sex (estimates)				
Persons under 5 years, 2017	5%	6.9%	8.1%	7.1%
Persons under 18 years, 2017	21.7%	27.7%	25.6%	26.4%
Persons 65 years and over, 2017	22.5%	6.4%	13.7%	10.6%
Male persons, 2017	50.3%	50.6%	49.1%	49.8%
Female persons, 2017	49.7%	49.4%	50.9%	50.1%
Race				
Hispanic or Latino	5.3%	63.2%	15.4%	36.7%
White alone	75.4%	34.4%	68.9%	53.5%
Other Races or "two or more races"	4.3%	4.3%	4.8%	4.5%
Population Characteristics				
Veterans, 2013–2017	306	526	1,141	3%
Foreign born persons, 2012–2017	20.3%	42.5%	24.6%	32.5%
Housing				
Owner-occupied housing unit rate, 2013–2017	93.4%	36%	58.3%	49%
Median value of owner-occupied housing units, 2013–2017	$2,000,000+	$600,200	$1,764,600	N/A
Median selected monthly owner costs—with a mortgage, 2013–2017	$4,000+	$2,596	$4,000+	N/A
Median selected monthly owner costs—without a mortgage, 2013–2017	$1,500+	$645	$1,028	N/A
Median gross rent, 2013–2017	$3,500 +	$1,613	$2,111	N/A
Families and Living Arrangements				
Households, 2013–2017	2,320	7,534	11,861	21,715
Persons per household, 2013–2017	2.87	3.91	2.75	3.25
Living in same house 1 year ago, persons age 1 year+, 2013–2017	84.3%	89%	83.1%	85.7%
Language other than English spoken at home, persons age 5 years+, 2013–2017	20.6%	73.3%	31.4%	50%
Education				
High school graduate or higher, persons age 25 years+, 2013–2017	96.9%	68.1%	94.1%	82.4%
Bachelor's degree or higher, persons age 25 years+, 2013–2017	77.9%	18.2%	70.7%	47%

Category	Number/%			
	Atherton	East Palo Alto	Menlo Park	MPFPD Average
Health				
With a disability, under age 65 years, 2012–2016	3.3%	4.9%	4.7%	4.7%
Persons without health insurance, under age 65 years	.8%	12.8%	3.4%	7.5%
Economy				
In civilian labor force, total, population age 16 years+, 2013–2017	51.6%	73.1%	66.1%	68.9%
In civilian labor force, female, population age 16 years+, 2013–2017	40.8%	68.3%	59.2%	62.9%
Total retail sales, 2012	$92,604,000	$270,530,000	$438,222,000	$801,356,000
Total retail sales per capita, 2012	$12,878	$9,372	$13,328	$11,859
Transportation				
Mean travel time to work (minutes), workers age 16 years+, 2013–2017	24.5	24.5	25	24.67
Income and Poverty				
Median household income (in 2017 dollars), 2013–2017	$250,000+	$58,783	$132,928	N/A
Per capita income in past 12 months (in 2017 dollars), 2013–2017	$147,828	$22,068	$77,030	$82,309
Persons in poverty	3.5%	13.7%	8.5%	10.7%
Businesses				
All firms, 2012	622	1,527	5,491	7,640
Women-owned firms, 2012	169	622	1,765	2,556
Men-owned firms, 2012	362	841	2,700	3,903
Minority-owned firms, 2012	85	1,226	1,172	2,483
Nonminority-owned firms, 2012	492	247	3,661	4,400
Veteran-owned firms, 2012	61	96	403	560
Nonveteran-owned firms, 2012	500	1373	4414	6287

AT-RISK POPULATIONS

In addition to the distribution of residents, the demographics of the population can affect the amount of service demand, and the nature of risk within a community. In urban cities, several factors that place groups of people at risk have been identified. An NFPA report has identified the groups that face a higher risk of being injured or killed in a fire as follows:[3]

- Children under 5 years of age
- Older adults over 65 years of age
- People with disabilities
- Language barriers
- People in low-income communities

According to the 2017 Census Bureau estimate, a number of the residents within the MPFPD response area are in one or more at-risk population groups. These segments of the population are more likely to use fire department services, especially EMS, than other population groups.

Age

The United States average for children under 5 years of age is 8.1% of the population as compared to an average of 7.1% in MPFPD. Older adults over 65 years of age in the United States make up 13.7% of the population compared to 10.6% in MPFPD. Neither of the factors is significantly higher or lower than the national average. Regardless, both of these populations affect the service demand and present a community risk profile that is significant.

Disabilities

People under 65 years of age with disabilities make up 4.7% of the population. These people may have difficulty or be incapable of self-preservation during an emergency. Likewise, people under 65 years of age with no health insurance are more prone to chronic illness or exhibit poor physical condition simply because they do not seek treatment promptly. Almost 7.5% of the population is under 65 and has no health insurance; thus, they may require a higher level of fire-rescue response.

Low-Income

Likewise, low-income people are more at risk from fire or medical condition; almost one-in-ten residents (or 10.7% of the total residents) are below the poverty level. The low-income category is often combined with other factors such as education, disability, and work status.

[3] *National Fire Protection Association, 2007; Urban Fire Safety Project, Emmitsburg, MD; retrieved from http://www.nfpa.org/public-education/by-topic/people-at-risk/urban-fire-safety/reports-and-presentations.*

PHYSICAL HAZARDS

Since 1965, the number of federally declared disasters in San Mateo County (20) is near average when compared to both the state (19) and national (16) averages.[4] The cause for each of these declarations is shown in the next figure. Although most of these declarations did not affect MPFPD, they are an indication of the hazards present throughout the county.

Figure 16: Federally Declared Disasters, Jan. 1965–Mar. 2018

Type	Type, Number	Type, Percent
Fire	1	6.7%
Flood	4	26.6%
Severe Storms	6	40%
Coastal Storm, Hurricane	1	6.7%
Freezing	1	6.7%
Earthquake	1	6.7%
Drought	1	6.7%
Tsunami	0	0%
Total	**15**	**100.0%**

Earthquakes

Earthquakes occur throughout California, but certain areas, including MPFPD, have a higher probability of experiencing damaging ground motions caused by seismic activity. Since 1931, over 4,352 records exist of earthquakes within 30 miles of MPFPD.[5]

The Menlo Park area has an earthquake index of 20.46. This compares very similarly to a California average of 20.8, but much higher than the national average of 1.81. A large percentage of the Menlo Park planning area's population is located in a high shaking hazard area. A high-shaking hazard area is derived from the U.S. Geological Survey (USGS) seismic hazard map, which shows the distribution of earthquake shaking levels that have a certain probability of occurring.

There are several active faults in San Mateo County, including the San Andreas fault lines. According to the San Mateo Hazard Mitigation Plan, the San Andreas Fault has a 21% chance of generating a magnitude 6.7 or greater earthquake in the next 30 years.[6] The risk of earthquake activity in the Menlo Park area is significant. The probability of a 5.0 magnitude or greater earthquake within the next 50-years is 99.5%; the probability of a 6.0 is 91%.[7] The largest earthquake within 30 miles of Menlo Park was a 6.1 magnitude in 1984.

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[4] *FEMA Disaster Declarations Summary—Open Government Dataset, U.S. Department of Homeland Security, last updated March 5, 2018. Retrieved from: https://www.fema.gov/media-library/assets/documents/28318.*

[5] *Retrieved from: https://www.homefacts.com/earthquakes/California/San-Mateo-County/Menlo-Park.html.*

[6] *San Mateo County Hazard Mitigation Plan, July 2016.*

[7] *Retrieved from: https://www.homefacts.com/earthquakes/California/San-Mateo-County/Menlo-Park.html.*

While no known faults are within the District limits, the Menlo Park area is vulnerable to seismic activity due to the presence of several active faults in the region. The closest and most prominent active fault is the San Andreas Fault, which is located about 2.5 miles west of Interstate 280. Several other faults in the region include the Monte Vista Fault, which lies roughly 3 miles to the south, the Hayward Fault, which lies roughly 13 miles to the east, and the Calaveras Fault, which is approximately 19 miles to the east.

Most losses of life and injuries resulting from an earthquake occur in or near structures. The potential for damage and collapse of structures is greatest in the downtown area due to the high number of masonry buildings. Given the history of seismic activity, the Menlo Park area has adopted several state and local regulations and codes to reduce seismic risk. As examples, the communities located within MPFPD has identified unreinforced masonry structures in the area and adopted standards to ensure each will be brought up to current standards as building permits are requested for improvements. According to MPFPD, more than 99% of unreinforced masonry buildings in the Menlo Park area have been retrofitted in this manner.

Building on soils subject to liquefaction is another concern. Liquefaction has been responsible for tremendous amounts of damage in historical earthquakes around the world. Generally, liquefaction occurs in areas where moist, fine-grained, cohesionless sediment or fill materials are found. When an earthquake occurs in these areas, the sediment can temporarily lose its stiffness and turn into an almost liquid state. The areas near the bay area of the Fire District are the most susceptible to liquefaction.

According to the 2010 San Mateo Hazard Mitigation Plan, the communities served by the MPFPD could have over $1.5 billion in damage after a 100-year probabilistic earthquake. This equates to almost 9% of the total infrastructure value in the service area.

Historical Earthquake Events

A total of 196 historical earthquake events that had recorded magnitudes of 3.5 or above were found in or near the Menlo Park area.[8] Of these, 17 of these measuring 5.0 or greater on the Richter Scale are shown in Figure 17.[9]

[8] Retrieved from: http://www.usa.com/menlo-park-ca-natural-disasters-extremes.htm.

[9] *Earthquakes that measure 6.0–6.9 on the Richter scale are considered to be strong earthquakes (VIII to X on the Mercalli intensity scale) and are expected to result in damage to a moderate number of well-built structures in populated areas. Earthquake-resistant structures survive with slight to moderate damage. Poorly designed structures receive moderate to severe damage. Strong to violent shaking in the epicenter, felt in wider areas, up to hundreds of miles/kilometers away.*

Figure 17: Earthquakes Measuring 6.0 or Greater Within 50 Miles

Distance (miles)	Date	Magnitude	Depth (km)	Latitude	Longitude
27.0	1911-07-01	6.6	N/A	37.25	-121.75
26.9	1984-04-24	6.2	8	37.32	-121.7
44.2	1979-08-06	5.9	6	37.1	-121.5
21.6	1955-09-05	5.8	N/A	37.37	-121.78
31.1	1980-01-24	5.8	8	37.83	-121.79
19.9	1943-10-26	5.5	N/A	37.4	-121.8
30.4	1980-01-27	5.4	10	37.75	-121.71
34.3	1955-10-24	5.4	N/A	37.97	-122.05
40.6	1964-11-16	5.3	N/A	37	-121.72
45.8	1959-03-02	5.3	N/A	36.98	-121.6
45.9	1954-04-25	5.3	N/A	36.93	-121.68
48.5	1949-03-09	5.3	N/A	37.02	-121.48
37.9	1967-12-18	5.2	N/A	37.01	-121.79
47.6	1954-04-22	5.2	N/A	36.9	-121.68
30.6	1980-01-24	5.1	3	37.8	-121.76
34.1	1967-09-28	5	N/A	37.22	-121.62
34.6	1967-09-28	5	N/A	37.22	-121.61

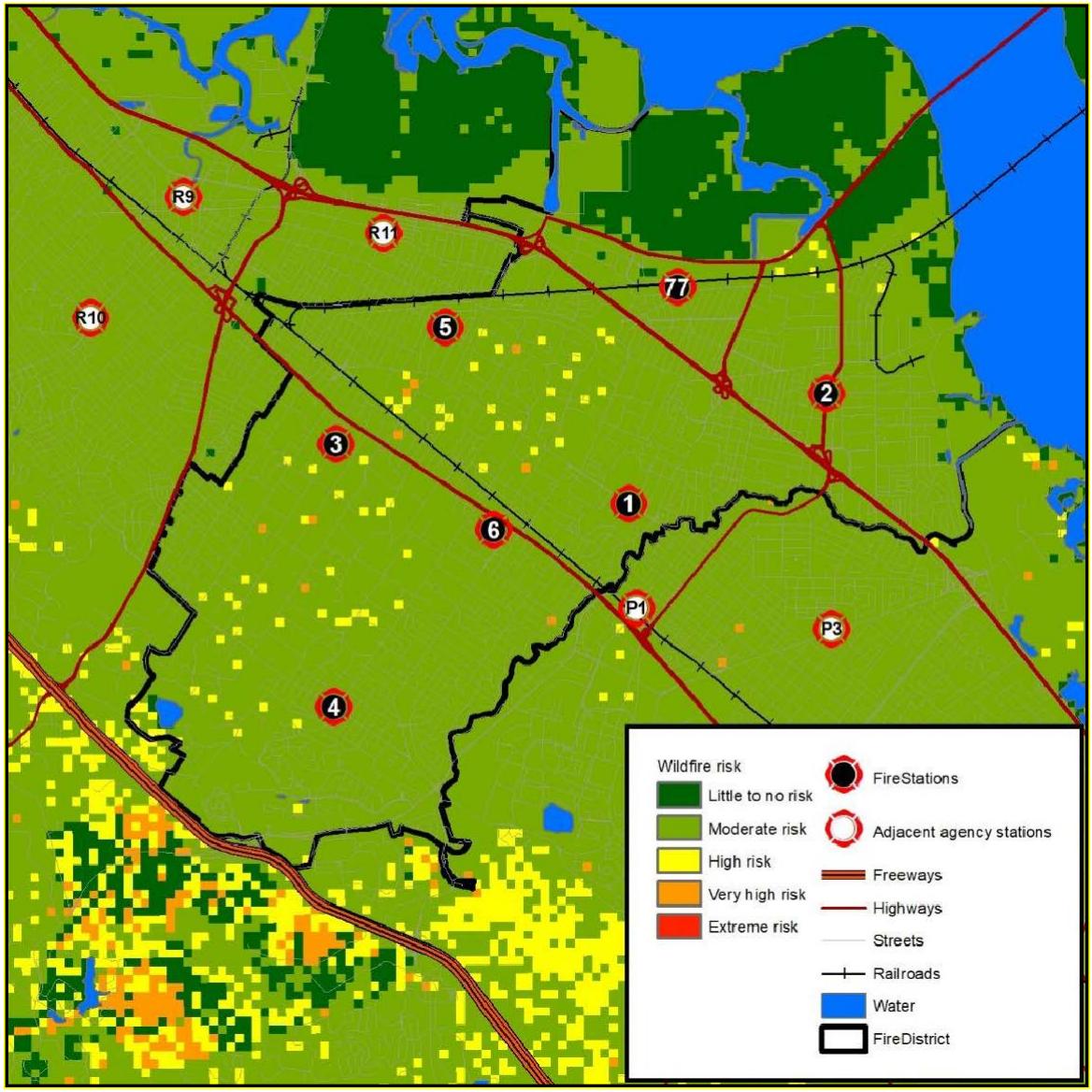
Wildfires

Like many fire jurisdictions in the Western United States, especially California, wildland fire risk is a factor in the MPFPD service area. The following figure uses CAL FIRE GIS data to examine wildland fire risk in and around MPFPD. This model produced by CAL FIRE considers vegetation, topography, weather, crown fire potential, and ember production and movement to summarize fire hazard zones as little to no risk, moderate, high, or very high. This figure demonstrates that most of the District has a moderate risk of wildfire due to urbanization, but consideration should be given to any vacant areas with cured fuels (generally grass or shrubs). A very high wildfire risk characterizes the foothills located just outside of the District boundaries to the southwest. These foothills could readily burn but will likely not result in a major threat to the jurisdiction (other than poor air quality or small spot fires near the boundaries closest to the foothills).

The vast majority of the MPFPD is an urbanized community infilled with ornamental vegetation and season grasses. The greatest fire risk is that from within the community's buildings in the urban area or smaller grass fires that may develop next to structures and spread to infrastructure before fire resources can arrive. Structural and automobile fires are the most common fire risks for residents of MPFPD.

The Menlo Park Fire Protection District participates in State- and County-level mutual aid agreements, which provide additional resources to deal with wildland fire incidents.

Figure 18: MPFPD Study Area Wildland Fire Risk



Severe Weather

Tornadoes are created when warm, moist air near the ground interacts with cooler air above and rapidly increasing winds that change direction. Tornadoes are rare in California and even more so in the Menlo Park area: The expectation of a tornado in MPFPD is almost 10 times lower than the U.S. average.

Since 1951, only two tornados have been recorded within 30 miles of Menlo Park. While both events caused some damage, only one of these events caused injuries when a tornado touched down in the Chevy Chase residential area of Sunnyvale, California, near Hwy 85. This storm survey indicates that damage to 15 homes and a large church occurred, and one woman was injured when struck by flying debris. The storm was well documented on a video shot by a person from their backyard.

Figure 19: Historical Tornado Activity

Distance (miles)	Date	Mag.	Start Lat/Long	End Lat/Long	Length	Width	Fatalities	Injuries	Prop. Damage
7.3	1/11/1951	2	37°22'N/ 122°07'W	37°25'N/ 122°02'W	5.70 Miles	33 Yards	0	0	$2.5M
10	5/5/1998	2	37°22'N/ 122°02'W	37°22'N/ 122°02'W	0.60 Miles	100 Yards	0	1	$3.8M

The following figure describes the various tornado intensities on the Enhanced Fujita Scale.

Figure 20: Tornado Intensity, Enhanced Fujita Scale

Designation	Wind Speed, mph	Typical Damage
EF-0	65–85	Minor or no damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF-0.
EF-1	86–110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2	111–135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off the ground.
EF-3	136–165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF-4	166–200	Devastating damage. Well-constructed and whole frame houses completely leveled; cars and other large objects thrown, and small missiles generated.
EF-5	> 200	Extreme damage. Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km).

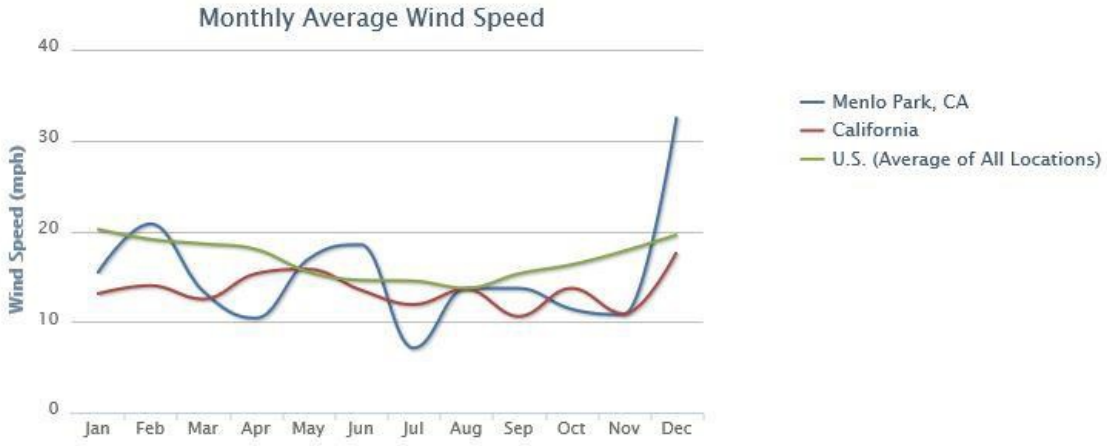
Microbursts can cause devastation similar to that caused by a tornado, but the mechanism is different. A microburst is a strong, small-scale downdraft of wind that hits the ground and spreads out; there is no rotation as there is with a tornado. Microbursts are frequently associated with strong thunderstorms.

A **macroburst** is another form of straight-line winds similar to a microburst but spread out over a larger area. These damaging downdrafts do not occur very often in and around the Menlo Park area unless associated with significant and violent thunderstorms.

Seasonal Winds

Generally, the Menlo Park area has mild winds (averaging 15.4 mph) with the month of December having a sharp increase in wind speeds.[10] Foehn winds can occur in the San Francisco Bay area in the form of Diablo Winds which occur in the spring and fall. Figure 21 shows typical seasonal winds.

Figure 21: Menlo Park area Average Monthly Wind Speeds[11]



Dam Failure

Dam failure is ranked as the lowest concern in the San Mateo County Hazard Mitigation Plan. However, a dam failure would affect 10% of the population of the City of Menlo Park and almost 5% of the population of Atherton.[12] Dam failure is a structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity, earthquakes, erosion, design flaws, or water overflow during large storms. According to the San Mateo County Hazard Mitigation Plan, almost $1.5 billion in damages could occur during a dam failure.

Flood Risk

In 1998, parts of East Palo Alto and Menlo Park experienced a significant flood along the San Francisquito Creek. This event impacted more than 1,100 homes and businesses and caused more than $28 million in damages. Last year, significant improvements were completed along the creek to prevent future floods.

All populations currently residing in sea-level rise inundation areas would be exposed to the hazard of the ocean levels increasing. It is unlikely that exposure would result in death or injury because the sea-level rise is expected to occur gradually over the years and decades; however, residents in these areas would need to relocate. According to the 2010 San Mateo Hazard Mitigation Plan, 11,725 East Palo Alto residents and 1,964 Menlo Park residents would be displaced by sea-level rise.

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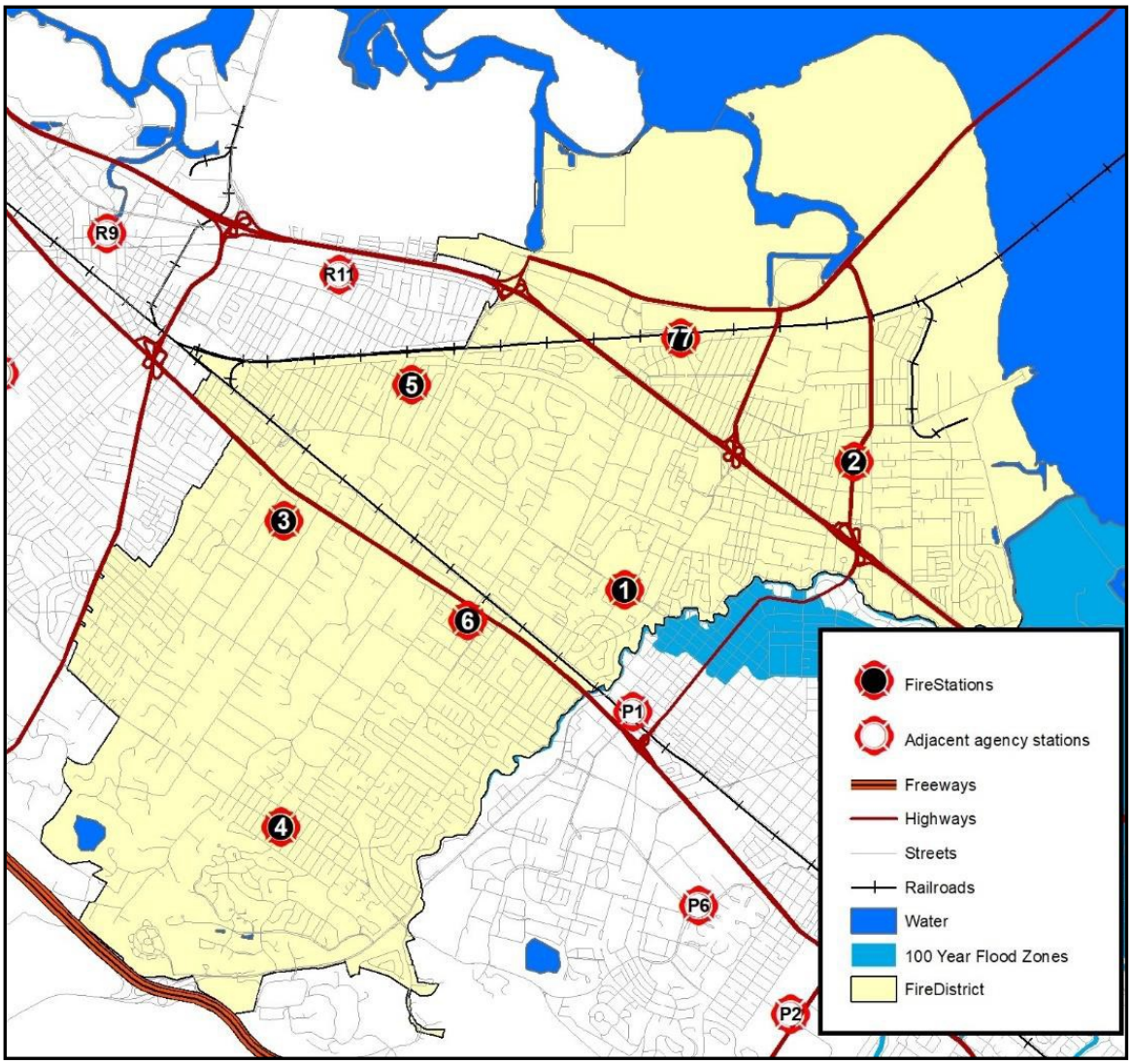
[10] Retrieved from: http://www.usa.com/menlo-park-ca-weather.htm.
[11] Retrieved from: http://www.usa.com/menlo-park-ca-weather.htm.
[12] This represents about 4,200 persons.

The flood risk is moderate within the MPFPD boundaries. Besides the risks described in the two proceeding sections, much of the area adjacent to the coast is susceptible to floods. Figure 22 demonstrates that the jurisdiction is subject to 100-year flood zones. Existing flood infrastructure must be regularly maintained to allow water runoff and distribution to pre-planned flood areas. Sea-level rise could also be a distant future concern along the MPFPD adjacent to the Bay Area.

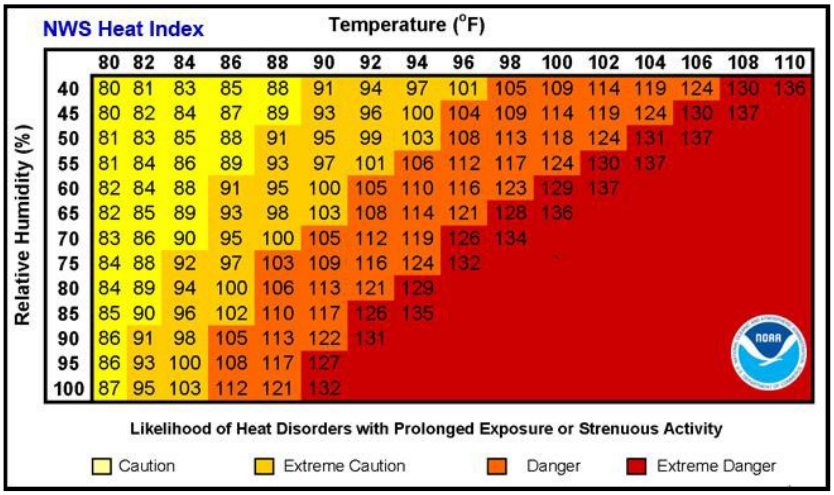
Figure 22: Flood Zones



Extreme Heat

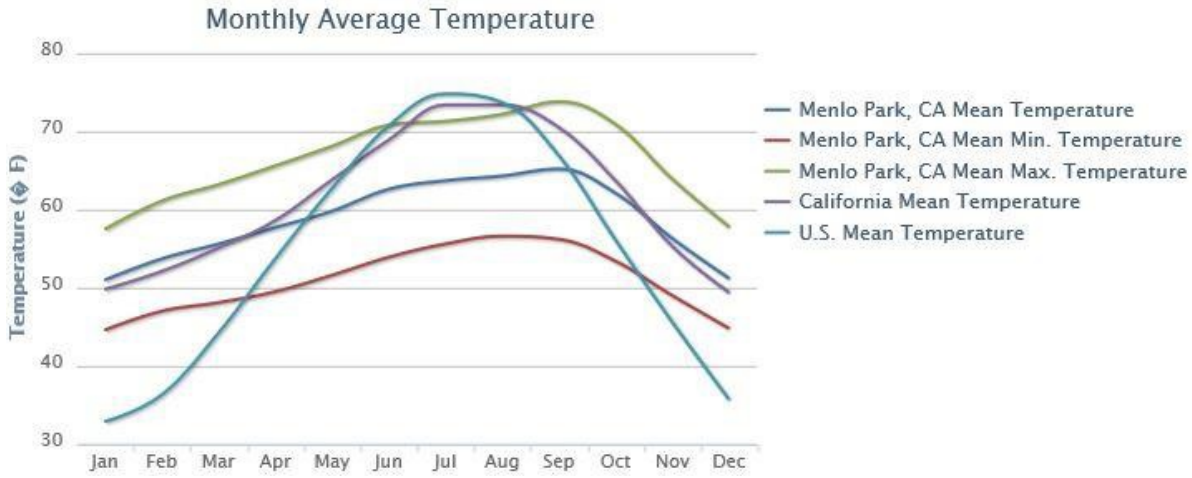
Extreme heat is any period when the temperature is high enough that overexposure can cause distress, including injury, heat-related illness, or death to humans and animals. Related to temperature is the heat index—an indicator of how hot it feels based on actual temperature and humidity. The higher the humidity, the hotter it feels due to the body's inability to cool itself. The National Weather Service (NWS) publishes a Heat Index, shown in the next figure, to help local planners prepare for and mitigate the effects of extreme temperatures.[13]

Figure 23: NWS Heat Index



While extreme temperatures are known to occur, prolonged heat waves in the Menlo Park area are rare, with a historical average of only four extreme heat days per year. Generally, the area is known for relatively mild temperatures, with a very low variation in seasonal monthly temperatures.

Figure 24: Menlo Park Area Monthly Temperatures[14]



[13] *U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service. http://www.nws.noaa.gov/om/heat/heat-images/heatindexchart.png.*

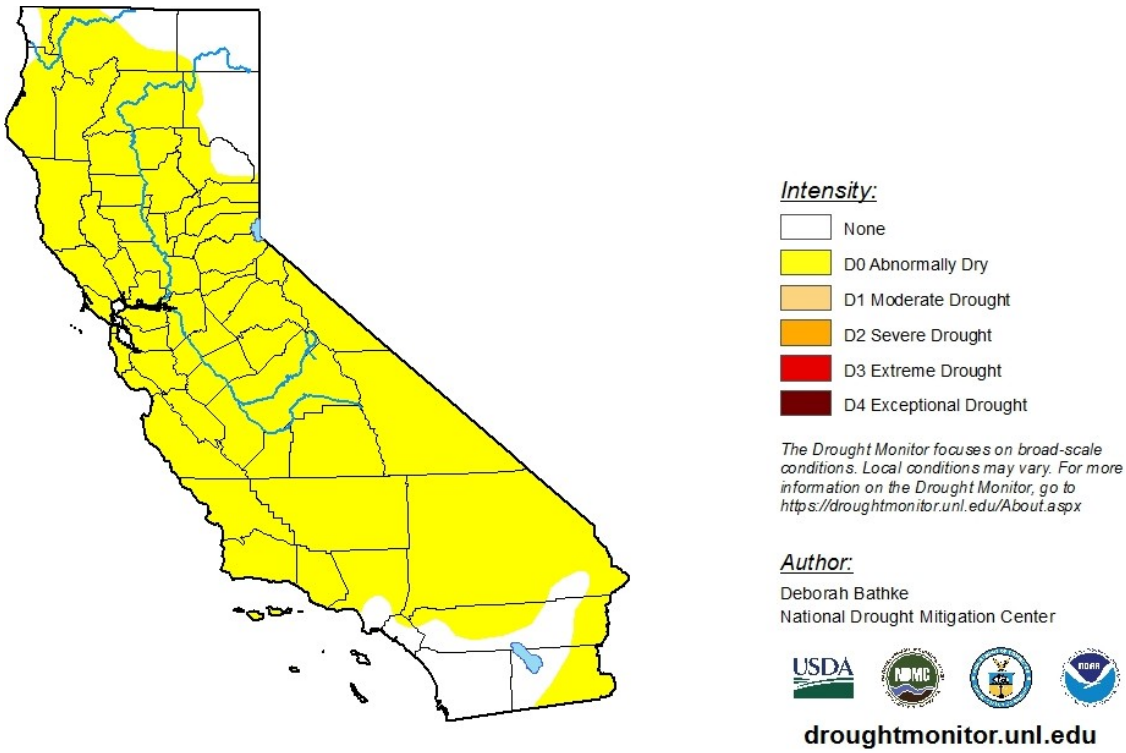
[14] *http://www.usa.com/menlo-park-ca-weather.htm.*

Drought

Drought is any period of dry weather, characterized by insufficient rain to grow crops or replenish surface water supplies. Droughts are gradual and persistent with secondary impacts on wildfire, crop production, oil and gas production, and socio-economic impact. In recent years, much of California has been in a severe drought.

Last year there was a significant recovery of the drought index. In fact, by August 2019, only a few locales in the southern San Joaquin Valley and the far southern part of the state remained in drought. The drought index changes quickly in California. In November 2019, the drought index in Figure 25 showed much of California in an "abnormally dry" (the lowest drought level on the index) state.

Figure 25: U.S. Drought Conditions, December 3, 2019



TECHNOLOGICAL (HUMAN-CAUSED) HAZARDS

The most prominent technological, or human-caused hazards faced by residents of the Menlo Park Fire Protection District include transportation emergencies, structural fires, long-time power outages, and hazardous material releases.

Transportation

Transportation corridors provide necessary, but limited, access and egress for the District. The area lacks major highways that allow for the fast distribution of vehicles; instead, traffic must negotiate narrow streets. The configuration of the transportation system affects the response capability of emergency services. Limited access freeways and rail lines can interrupt street connectivity, forcing apparatus to negotiate a circuitous route to reach an emergency scene.

Roads

Surface streets dominate the MPFPD service area. California State Route 101 is primarily a north-south highway with no major east-west connectors. The primary risk is related to over-the-road shipments of combustible and hazardous materials and vehicle accidents.

The balance of the District's service area has a mix of relatively well-interconnected street networks, but these streets are not designed for heavy traffic flows. Often, neighborhood streets are characterized by meandering roads and cul-de-sacs.

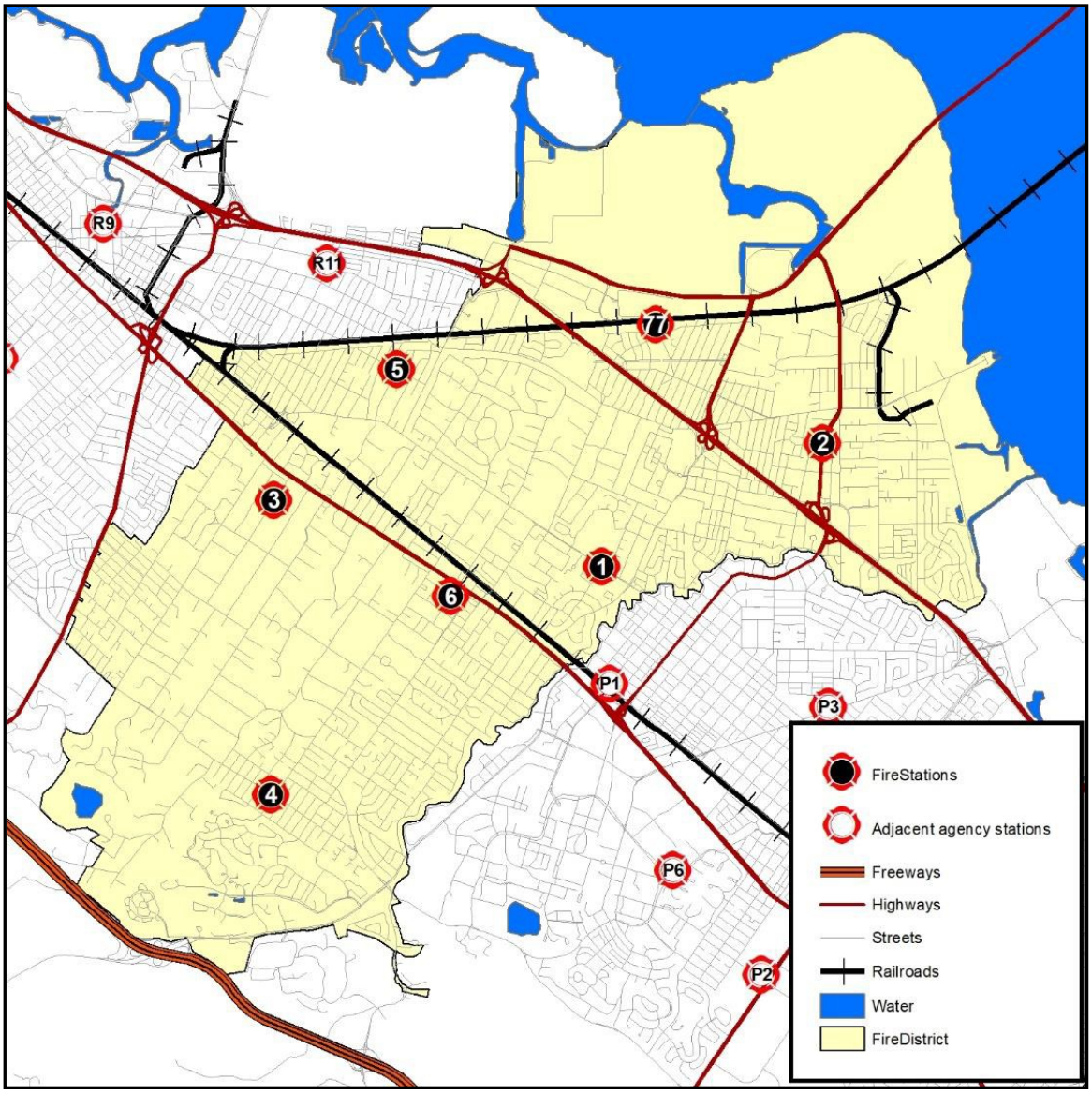
Railroads

Caltrain provides commuter rail service along the San Francisco Peninsula, through the South Bay to San Jose and Gilroy. The Caltrain rail line passes through MPFPD's service area, which includes grade crossings. Caltrain maintains a passenger station in Menlo Park and one in Atherton that is active during weekends. This can create risks for train/vehicle collisions and mass casualty incidents in the event of a collision or derailment.

A proposed Dumbarton rail-line has been in the planning stages for many years. Two segments of this rail-line would cross through MPFPD. Segment A would utilize the existing two-track Dumbarton cut-off line as a single track system with centralized traffic control. This segment would include the proposed Willow Road and Redwood City (Second Avenue) stations. The Dumbarton Rail Corridor merges with the Peninsula Corridor in Redwood City at the Redwood Junction, which is a large wye roughly bounded by Middlefield Road, Woodside Road, El Camino Real, and Dumbarton Avenue.

Segment B would reuse the existing line established for the Dumbarton Cut-off in 1910. It would be a single-track line with two sidings, one industrial siding to serve the Cargill Salt Plant, and one future siding just east of the Dumbarton Rail Bridge.

Figure 26: Rail Lines



INFRASTRUCTURE PROTECTED

Many buildings in the service area are used for purposes that create a more significant risk than others. High-occupancy buildings, facilities providing care to vulnerable populations, and others may require higher numbers of emergency response resources during an emergency. This section draws on information from MFPFD's records and other sources.

Target Hazards/Critical Infrastructure and Key Resources (CIKR)

The definition of target hazards varies among jurisdictions. For continuity, ESCI uses the FEMA definition of target hazards as "facilities in either the public or private sector that provide essential products and services to the general public, are otherwise necessary to preserve the welfare and quality of life in the community, or fulfill important public safety, emergency response, and/or disaster recovery functions."[15]

Other buildings to consider listing as target hazards could include buildings with a potential for large loss of life—such as places of public assembly, schools and childcare centers, medical and congregate-care facilities, residential care facilities, multifamily dwellings, and high-rise office buildings—or those with substantial value to the community—economic loss, replacement cost, or historical significance—that, if damaged or destroyed, would have a significant negative impact. Responses to target hazards are expected to require a substantial number of MPFPD resources during an incident. The following figure lists the inventory of critical facilities as provided by the District. ESCI purposely did not identify the location of these facilities in the interest of homeland security. Detailed information about critical facilities is kept in the Emergency Operations Center.

Figure 27: Critical Facilities

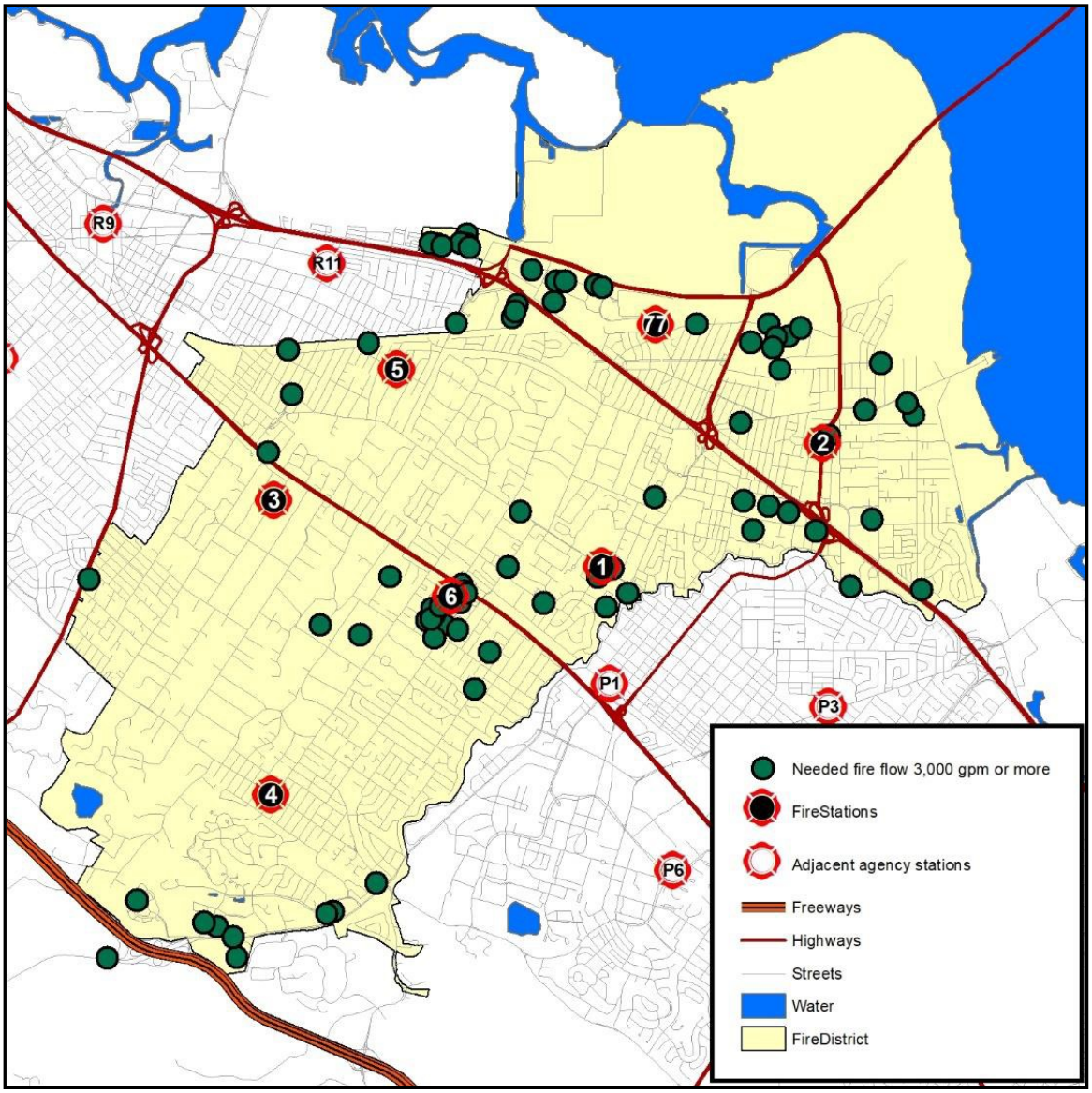
Type	Number
Airport	0
Communication Center	2
Detention Center	1
Emergency Command Center	0
Emergency Operation Center	3
Fire Department Stations	7
Health Care Facilities	3
Law Enforcement Facilities	5
Maintenance Yards	3
Residential Elderly Facilities	6
Library	6
Schools	9
Public Utilities	15
Total	**60**

[15] *Community Risk Assessment: A Guide for Conducting a Community Risk Assessment, Version 1.5, John Stouffer for Vison 20/20, 2016, page 12.*

Occupancies can be classified, according to the risk level, as low-, medium-, or high-risk factors used in assigning a risk classification to an individual occupancy include the size of the building(s), construction type, the presence or absence of fire suppression features such as sprinklers and standpipes, the needed fire flow, the risk to life, the presence of chemicals and/or hazardous processes, and the amount of water available in relation to the needed fire flow.

The ISO batch report lists the needed fire flow (the amount of water required to extinguish a fire if the building was fully involved) for every occupancy within MPFPD's service area. The following figure lists the properties with needed fire flows of 3,000 gallons per minute or greater.

Figure 28: Buildings Requiring Fire Flow over 3,000 GPM or More

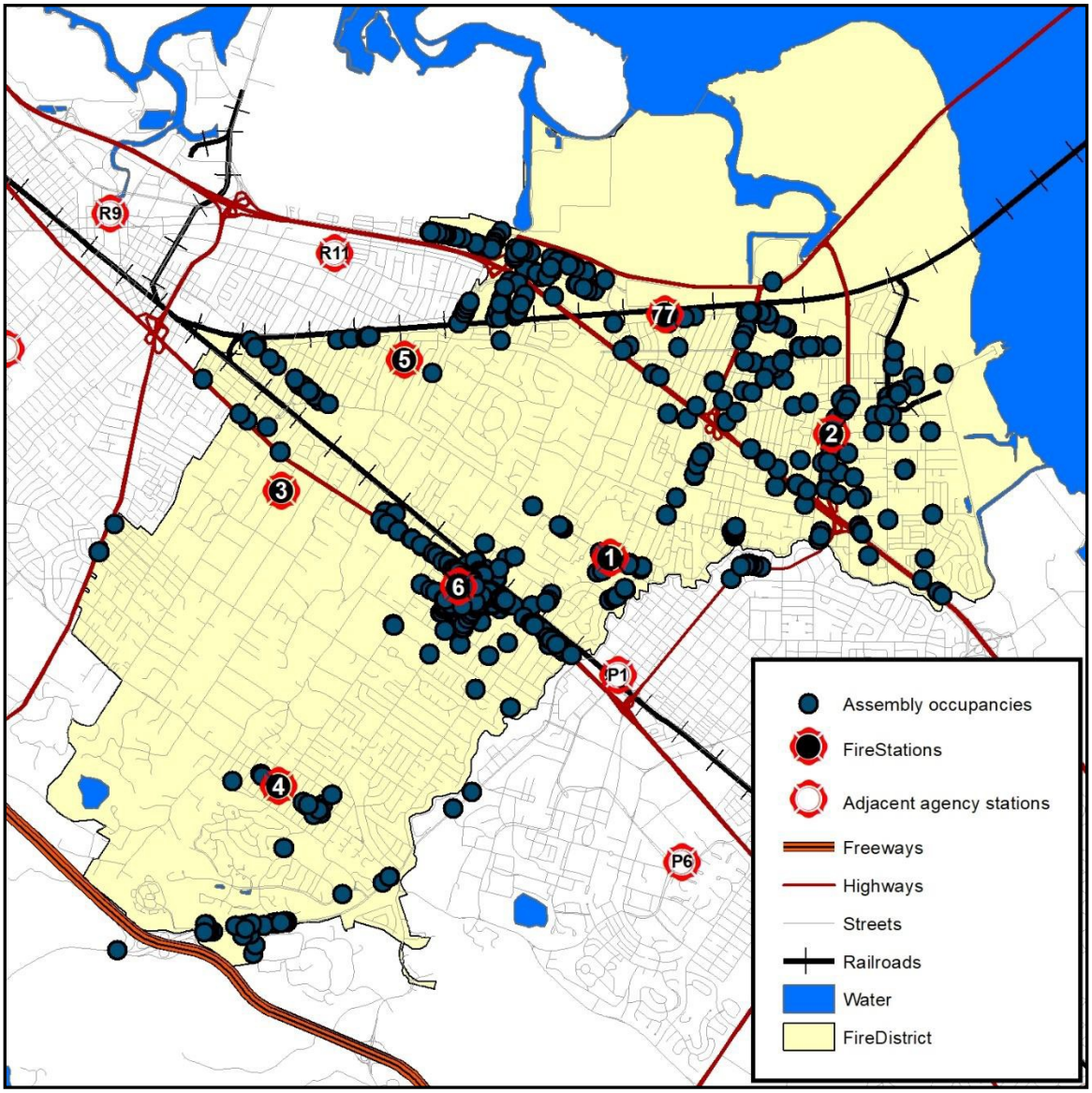


Public Assembly

Numerous buildings lie within the District in which large numbers of people gather for entertainment, worship, and such. A variety of nightclubs, theaters, and other entertainment venues exist.

These facilities present additional risk, primarily for mass casualty incidents. Fire, criminal mischief, and potentially terrorism could cause a major medical emergency requiring significant emergency service resources. The following figure shows the locations of buildings identified as public assembly facilities within MPFPD's service area.

Figure 29: Public Assembly Facilities

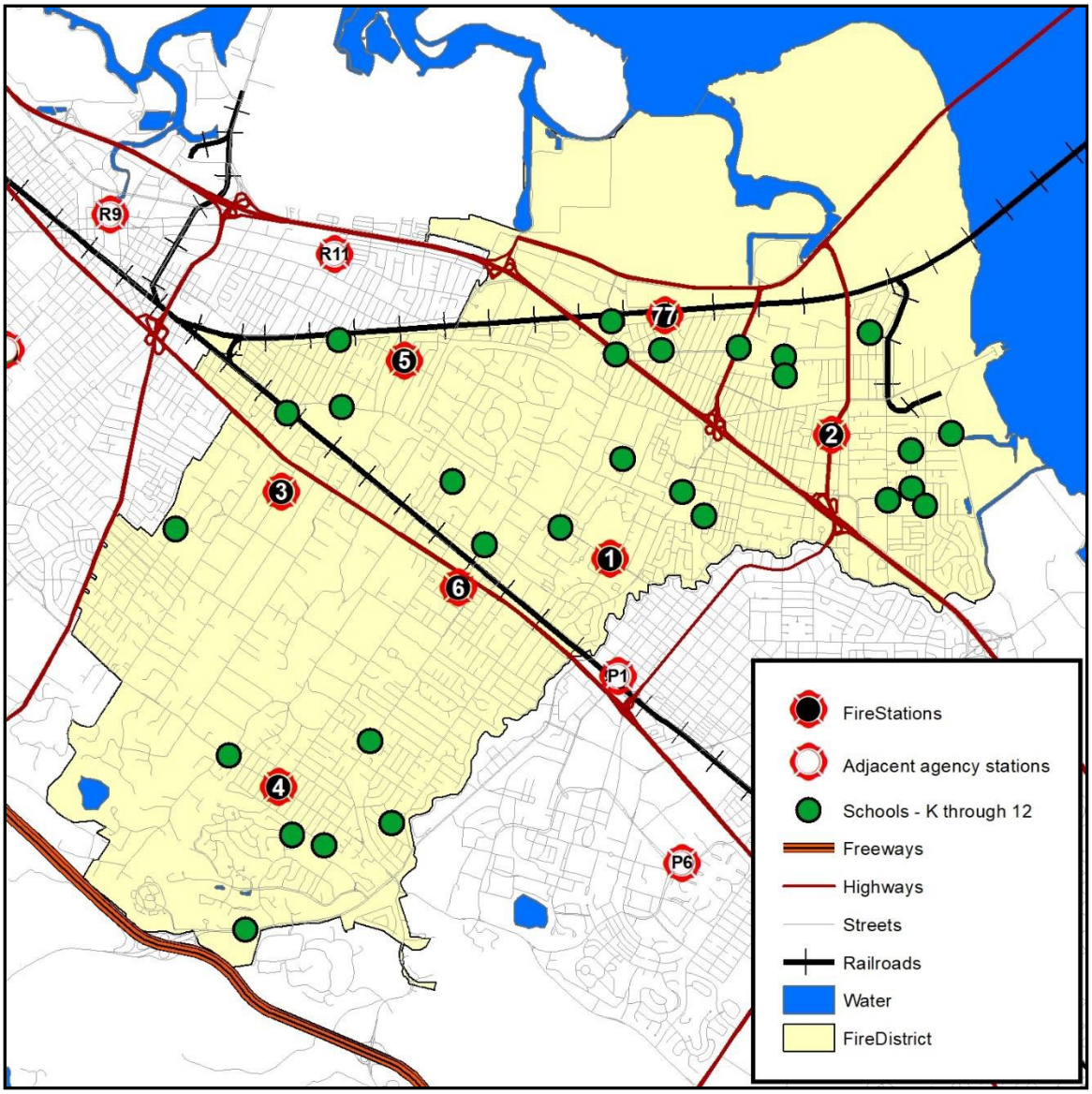


Schools

The Menlo Park Elementary School District serves parts of Menlo Park, Atherton, and unincorporated San Mateo County. There are 2,930 students, preschool through 8th grade, enrolled in the four schools and the English Learning Center in the District. Menlo, Atherton, and East Palo Alto high school students are served by the Sequoia Union High School District annually serves 9th to 12th-grade students through its four distinguished comprehensive high schools, including Menlo-Atherton and a dependent charter school East Palo Alto Academy.

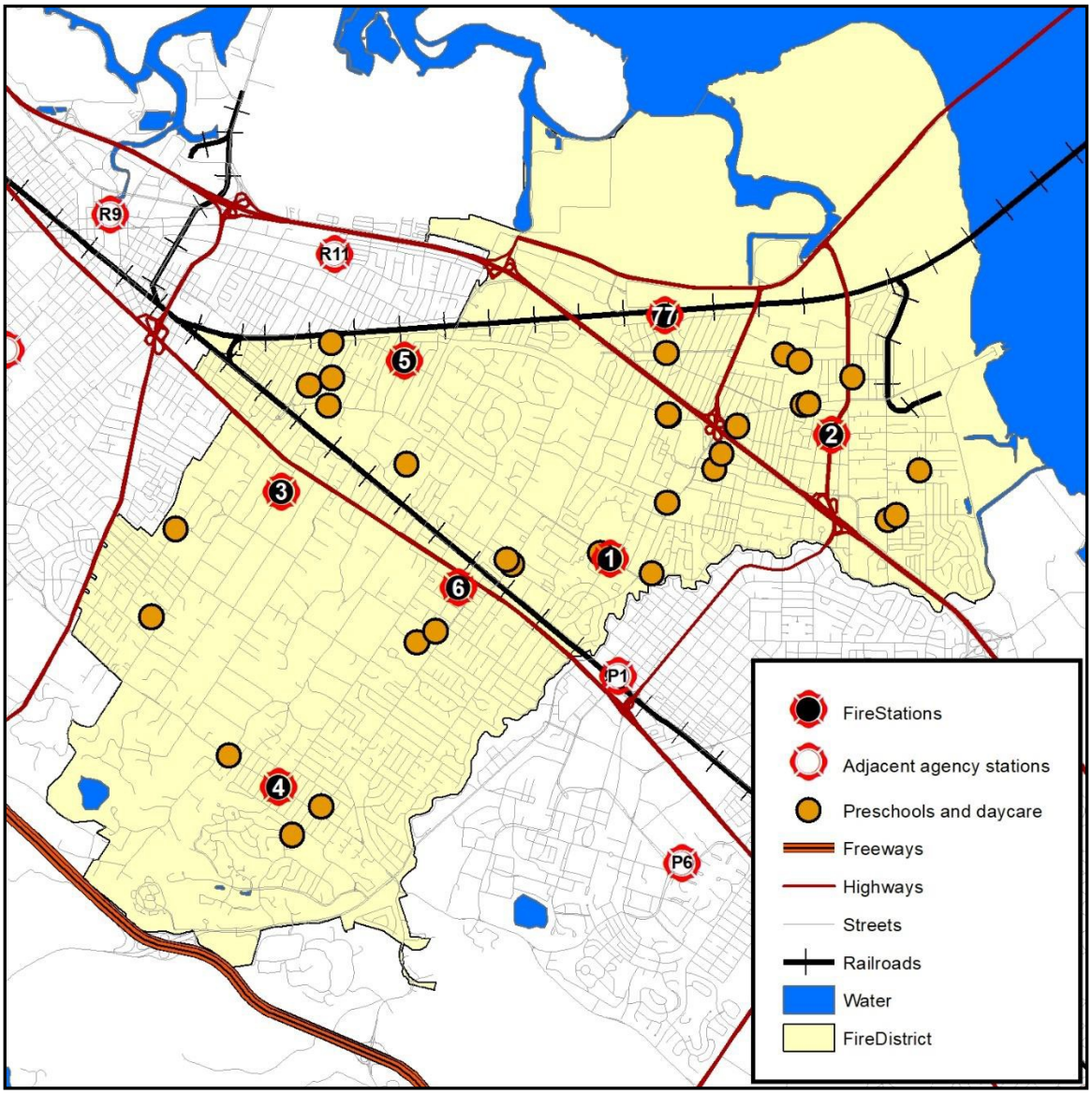
Several private institutions also exist in the service area, including the Eastside College Preparatory school and the Mid-Peninsula High School. The following figure shows the locations of public and private K-12 school facilities inside or nearby the MPFPD area.

Figure 30: K-12 School Locations



The next figure shows the locations of daycares and preschools.

Figure 31: Daycare and Preschools



OTHER CRITICAL INFRASTRUCTURE

In this section, ESCI discusses other types of infrastructure critical to a community in general terms. It is important that the District plan for emergencies at any of these facilities.

Communications

Emergency communication centers and the associated transmitting and receiving equipment are essential facilities for emergency response. The San Mateo County Office of Public Safety Communications dispatches the Menlo Park Fire Protection District. This communication center is equipped with a state-of-the-art computer-aided-dispatch system and has the primary responsibility to receive and process 9-1-1 calls for service and coordinate the response of emergency equipment and personnel.

The communication center staffs full-time dispatchers supplemented by professional firefighters. It provides emergency fire and medical dispatch service for the entire County, dispatching for 24 agencies (including 12 different fire agencies), one paramedic ambulance provider (AMR) as well as coordinates dispatch services for 11 other agencies.

The communication center is well prepared to answer calls from callers who speak various worldwide languages. The State of California provides transfer numbers for translation services for 9-1-1 telephone calls in foreign languages (Spanish, Vietnamese, and Mandarin Chinese) or via telecommunications devices for the deaf.

There are other communication facilities and equipment that are equally important to the community and government operations. These are the telephone company central offices and the transmission lines of local telephone service providers. Internet service providers, along with wireless cellular communication providers, provide essential communication capabilities for the community as well as emergency personnel through their facilities and equipment.

Energy

Previously discussed community services, from communications to traffic signals to normal operations, require the use of energy. Whether it is electricity generation and transmission systems, fuel distribution and storage tanks, or natural gas pipelines and regulator stations, the community is dependent upon energy sources.

Water Distribution

The most obvious concern to the fire department is the water reservoir, water main, and fire hydrant system. Providing enough storage, distribution, and access to this valuable firefighting resource through well-distributed fire hydrants is very important. As shown in the next figure, hydrants are generally well-distributed through portions of the area; however, it should be noted that many areas lack the necessary fire flow to support current infrastructure, let alone future developments.

Several water districts and systems exist in the MPFPD service area.

Menlo Park Municipal Water provides water to approximately 16,000 residents through 4,000 service connections within two service areas: the Upper Zone (providing water to the Sharon Heights area) and the Lower Zone (providing water to areas east of El Camino Real).

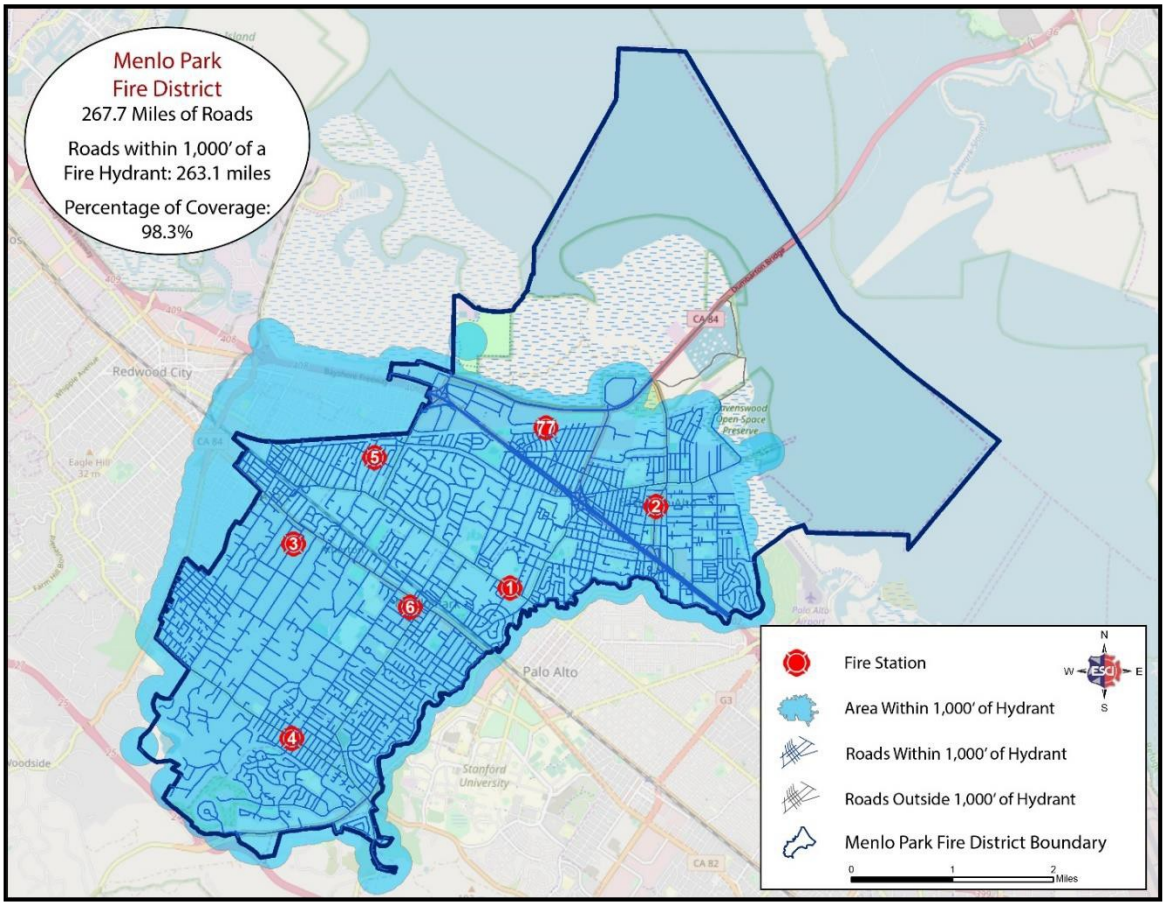
The American Water Enterprises supplies 3,985 connections and 26,000 residents in East Palo Alto.

The California Water Service provides service through its Bear Gulch District. This district is in southern San Mateo County and serves the communities of Atherton, Portola Valley, Woodside, parts of Menlo Park, parts of unincorporated Redwood City, and adjacent unincorporated portions of San Mateo County, including West Menlo Park, Ladera, North Fair Oaks, and Menlo Oaks.

O'Connor Tract Co-operative Water Company is a non-profit organization founded to supply water to certain areas of East Palo Alto and Menlo Park. The company serves 343 connections, of which 37 are apartment buildings.

The Palo Alto Mutual Water Company serves a few residents in the District. The Palo Alto Park Mutual Water Company is a privately held company serving about 680 connections in the MPFPD.

Figure 32: Fire Hydrants



STRUCTURAL RISKS

Certain buildings, their contents, functions, and size present a greater firefighting challenge and require special equipment, operations, and training. ESCI drew information for this section from MPFPD records and the Insurance Services Office (ISO) database.

Very Large Homes

Within the Town of Atherton and other areas of the District, there exists a significant number of very large homes. For years these homes—some the size of commercial buildings—were built without the benefit of fire sprinkler systems. Many of these homes have large basements, also not protected with fire sprinkler systems. Basements, because of limited accessibility, present a unique hazard to firefighters.

In 2007, the District implemented a District-wide residential sprinkler ordinance. Since the implementation of the ordinance, all new homes are protected with fire sprinkler systems greatly minimizing the risk to occupants and firefighters. However, a significant inventory of these large, unprotected homes still exists.

Hazardous Materials

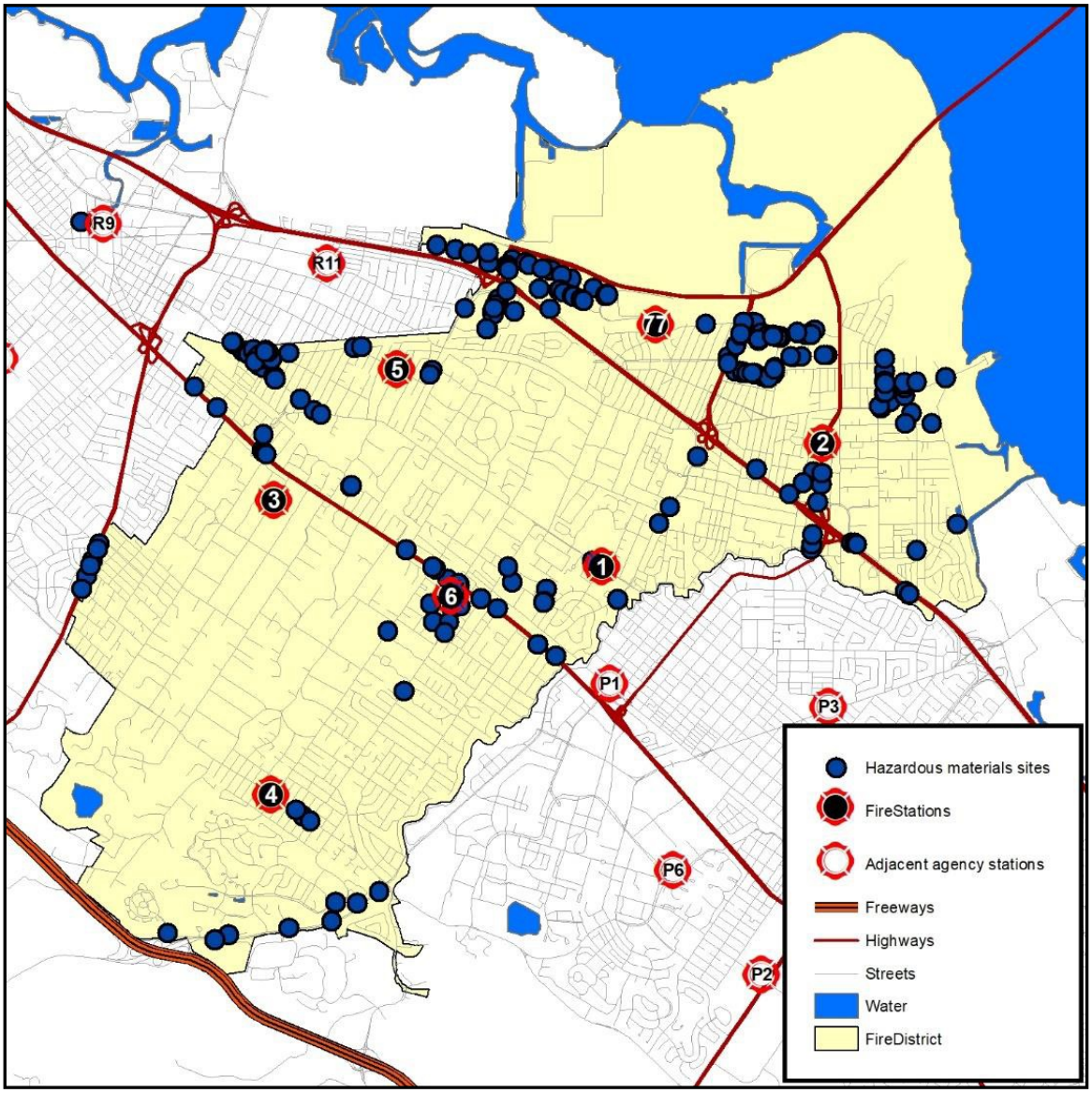
Buildings that have been identified as containing hazardous materials can create a dangerous environment for the community as well as the firefighters during a spill or fire. Special equipment, such as protective clothing and sensors, along with specialized training, are necessary to mitigate a hazardous materials incident successfully. Any location that has on-site, for any day in a calendar year, an amount of a hazardous chemical equal to or greater than the following threshold limits established by the EPA must file information, known as Tier II reports, about each material and the on-site amount with local authorities, planning committees, and the State's Emergency Response Commission under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), commonly known as SARA Title III:

- Ten-thousand pounds for hazardous chemicals
- Lesser of 500 pounds or the threshold planning quantity for extremely hazardous substances

The State of California established a five-tiered program for authorizing the treatment and storage of hazardous waste at many businesses required to have State authorization, but not federal authorization (i.e., authorization under the federal Resource Conservation and Recovery Act or RCRA). The Department of Toxic Substance Control (DTSC) regulates Full and Standardized Permitted facilities, and San Mateo County Environmental Health Services Division regulates facilities in the lower tiers: Permit by Rule (PBR), Conditionally Authorized (CA), and Conditionally Exempt (CE).

According to the San Mateo County Health Department, there are 964 facilities in the Menlo Park Fire Protection District area with Extremely Hazardous Substances (EHS); these EHS include only the 356 chemicals listed under Section 302 of the Emergency Planning and Community Right-to-Know Act. Most of these facilities store large amounts of ammonia; the following figure shows the location of those facilities. In addition to facilities with EHS, many Tier II facilities exist (not shown in the figure) that are required to have Safety Data Sheets (SDS) for products stored on site. Most of these facilities store crop management products—fertilizers, insecticides, and weed control. Normally, SDS are available both on-site and on the company's website.

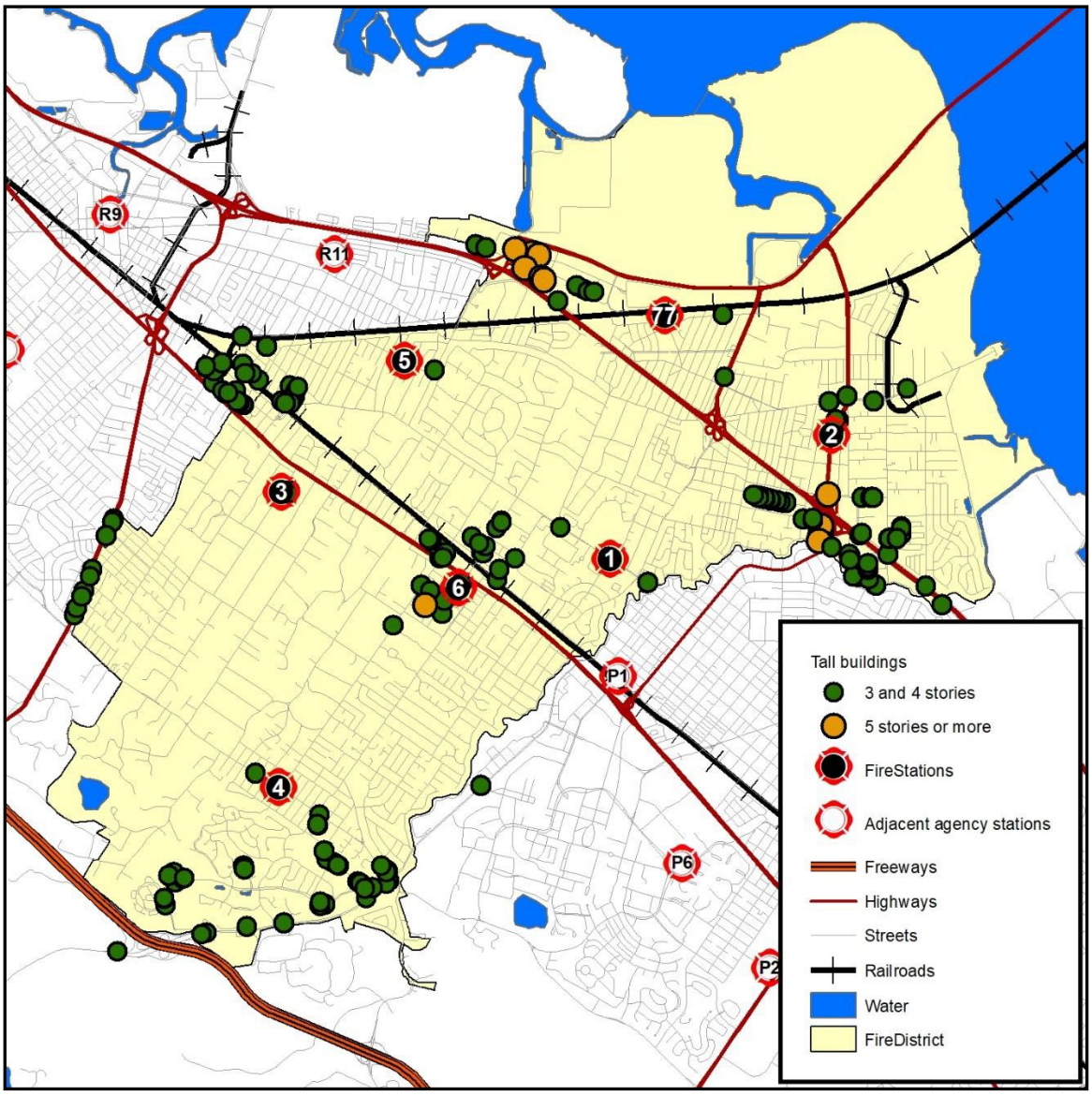
Figure 33: Hazardous Material Tier II Locations



Buildings Three or More Stories in Height

The Insurance Services Office calls for a ladder truck within 2.5 miles of developed areas containing buildings three or more stories in height. Accessing the upper floors and roofs of buildings this tall typically requires ladder truck capability as ground ladders may not provide access. The following figure shows the locations of buildings that are three to more stories in height.

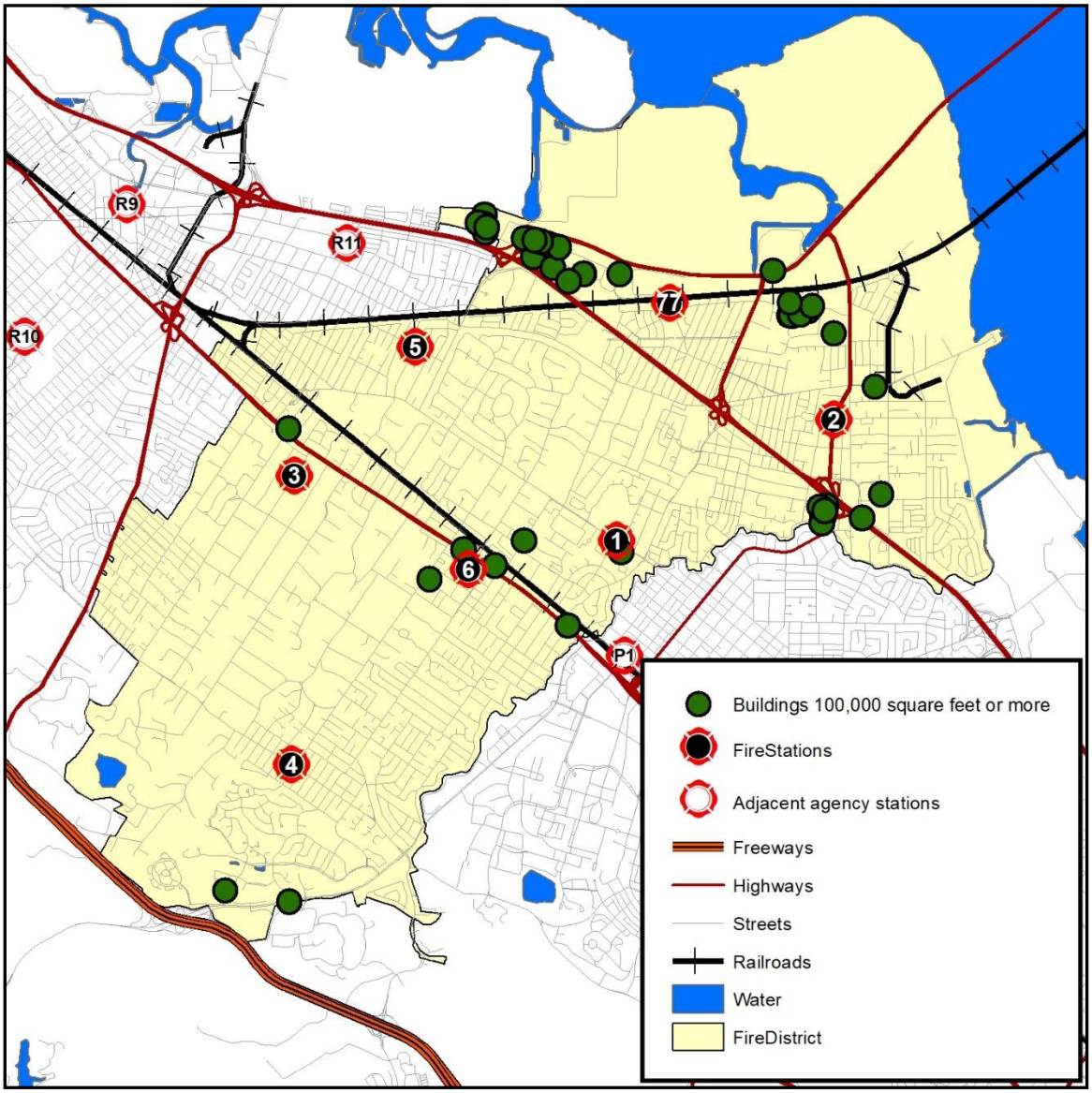
Figure 34: Buildings Three or More Stories in Height



Large Square Footage Buildings

Large buildings, such as warehouses, malls, and large "box" stores, require greater volumes of water for firefighting and require more firefighters to advance hose lines long distances into the building. The following figure shows the locations for buildings 100,000 square feet and larger.

Figure 35: Buildings 100,000 Square Feet and Larger



Comparison of Fire Risk in Other Communities

Using the information provided by MPFPD, recent NFPA reports, and other sources, ESCI compared fire risk in the District with fire risk of communities of comparable populations across the U.S. and in the Western Region. ESCI based the information contained in this section on the latest data reported to the NFPA and other sources. As such, the information **does not reflect recommended rates or some defined fire protection standard,** and is provided for illustrative, benchmark purposes only.

For additional context, United States fire departments responded to an estimated 1,319,500 fires in 2017. These fires resulted in 3,400 civilian fire fatalities, 14,670 civilian fire injuries, and an estimated $23 billion in direct property loss (this figure includes a $10 billion loss in Northern California wildfires). There was a civilian fire death every 2 hours, 34 minutes, and a civilian fire injury every 36 minutes in 2017. Home fires caused 2,630, or 77%, of the civilian fire deaths.

Figure 36: Fire Losses by Region and Size of Community, 2017

Community Size 150,000–199,999	Number of Fires Per Thousand Population	Property Loss Per Capita
Menlo Park Fire Protection District	1.8	$28.75
West	2.3	$46.90[16]
U.S.	3.1	$42.20

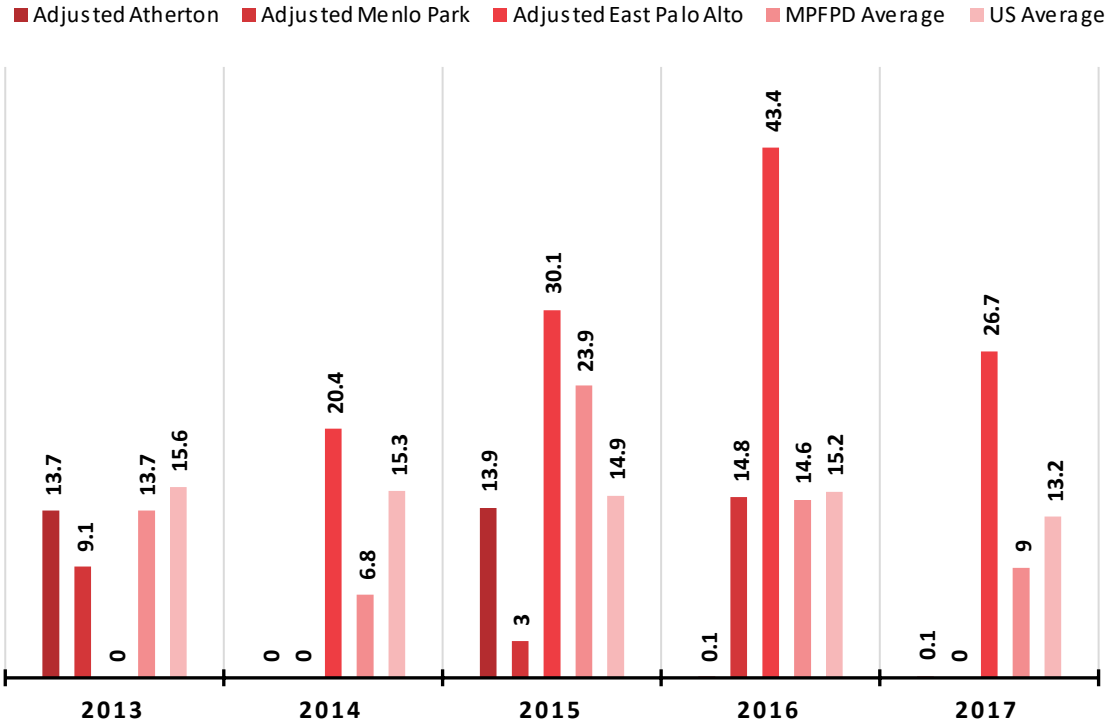
In smaller communities, even a single fire death can greatly affect the number of deaths per million population. Therefore, this large number should be considered in that context.

[16] *West and U.S. data retrieved from "Fire Loss in the United States" October 2018, NFA.*

Arson

As a District, MPFPD nearly matches the national average of arson as measured per 100,000 population. However, when broken into cities, East Palo Alto has generally exceeded the average. This high arson rate in East Palo Alto greatly raises the average of the entirety of the District.

Figure 37: Arson Rate per 100,000 Population[17]



[17] *Retrieved from the FBI crime database found at https://ucr.fbi.gov/crime-in-the-u.s/2017/crime-in-the-u.s.-2017/topic-pages/arson.*

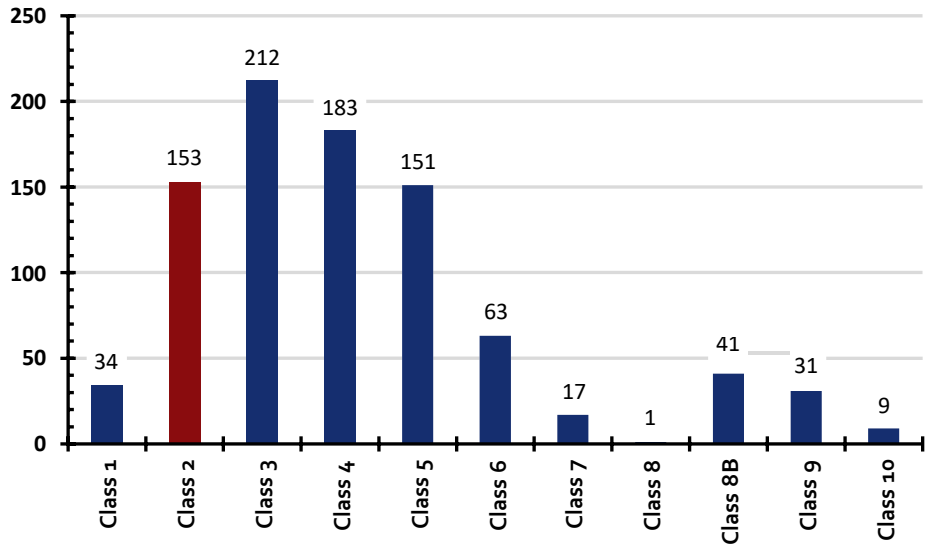
ISO Fire Protection Class Rating

The Insurance Services Office (ISO), a subsidiary of Verisk Analytics, is a national data analytics provider that evaluates fire protection for communities across the country. According to ISO's Public Protection Classification program, or PPC, its rating "is a proven and reliable predictor of future fire losses." All other factors being equal, commercial property insurance rates are expected to be lower in areas with lower (better) ISO PPC Class rating.

At the time of the most recent ISO survey, the ISO Fire Suppression Rating Schedule (FSRS) measured three primary elements of a community's fire protection system: **Emergency Communications** (max 10 points); **Fire Department** (max 50 points); and **Water Supply** (max 40 points). In addition, the ISO grants 5.5 points for **Community Risk Reduction** activities for a maximum possible total of 105.5 points. After the points are accumulated, the ISO then assigns a grade using a scale of 1 to 10, with Class 1 representing the highest level of fire protection, and Class 10 is a fire suppression program that does not meet ISO's minimum criteria.

In 2014, the Menlo Park Fire Protection District was assigned an ISO rating of Class 2. MPFPD is one of 153 communities out of 895 communities surveyed across the State to achieve a Class 2 rating and ranks in the top quartile of all communities surveyed, as shown in the following figure.

Figure 38: Comparison of ISO Class Ratings, California

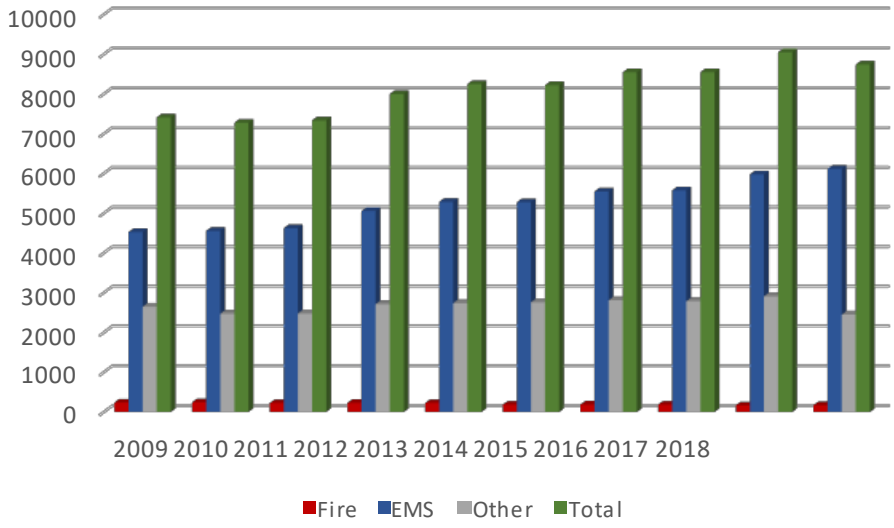


Historic System Response Workload

Before ESCI conducts a full response-time analysis, it is essential to first examine the level of workload (service demand) that the fire department has experienced. Higher service demands can strain the resources of a department and can result in a negative effect on response-time performance.

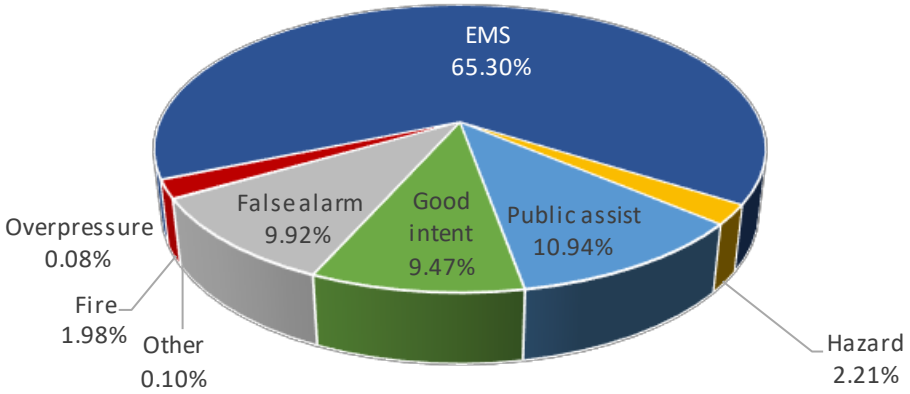
The following figure shows the response workload for the last 10 years. The total response workload has increased by 17.9% over the 10 years, primarily driven by the increase in emergency medical responses. As of 2018, MPFPD has a population of 95,263. The community utilization rate of District services was 91.7 incidents per 1,000 population.

Figure 39: Response Workload History, 2009–2018



The next figure shows responses by type of incident in 2018. Emergency medical type responses (EMS and motor vehicle accidents) are the most common at 65.3% of total responses.

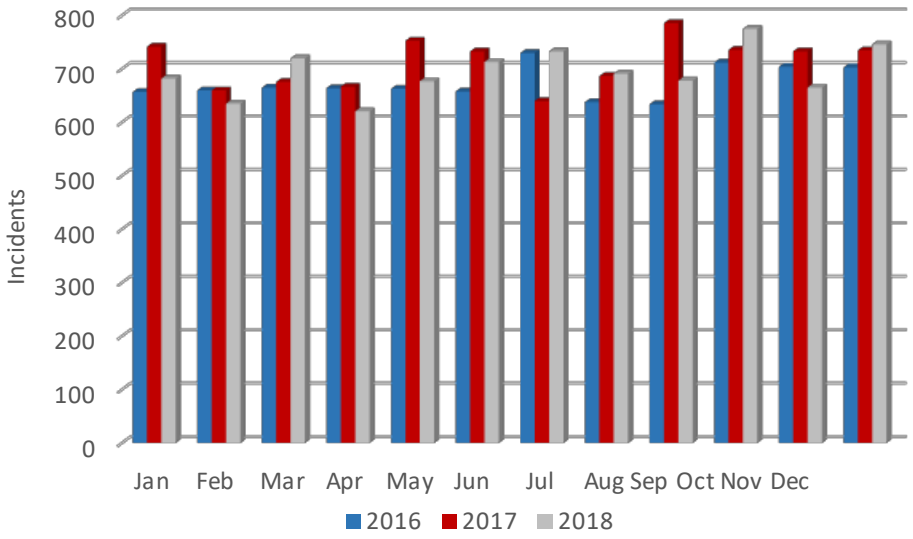
Figure 40: Responses by Type of Incident, 2018



TEMPORAL ANALYSIS

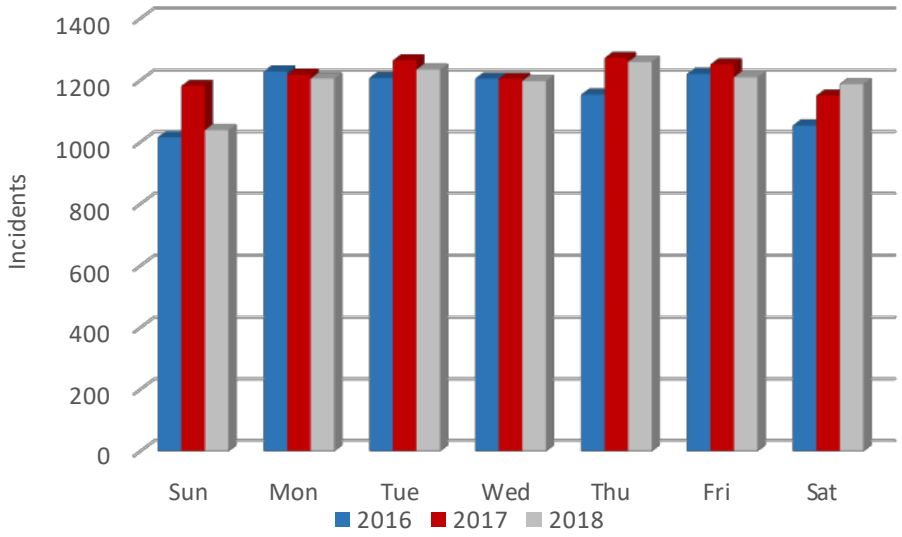
A temporal analysis also reveals when the greatest response demand is occurring. The following figures show how activity and demand change for MPFPD by month of the year, day of the week, and time of the day. The following figure shows response activity during 2016, 2017, and 2018 (the study period) by month. There is little variation by month.

Figure 41: Monthly Response Workload, 2016–2018



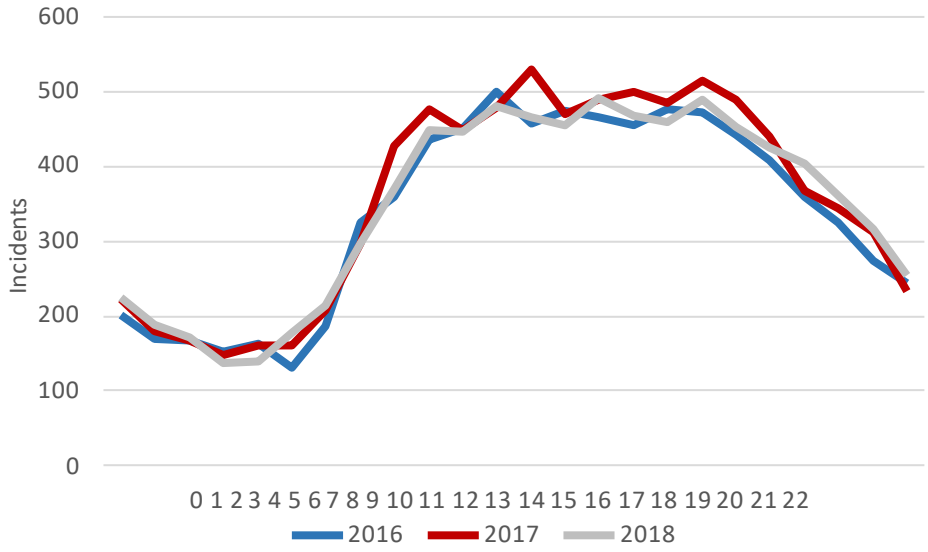
Next, response workload is compared by the day of week. Again, there is little variation in response workload by day of the week.

Figure 42: Daily Response Workload, 2016–2018



The time analysis that always shows a significant variation is response activity by the hour of day. Response workload directly correlates with the activity of people, with workload increasing during daytime hours and decreasing during nighttime hours, as shown in the following figure. Incident activity is at its highest between 9:00 a.m. and 9:00 p.m.

Figure 43: Hourly Response Workload, 2016–2018

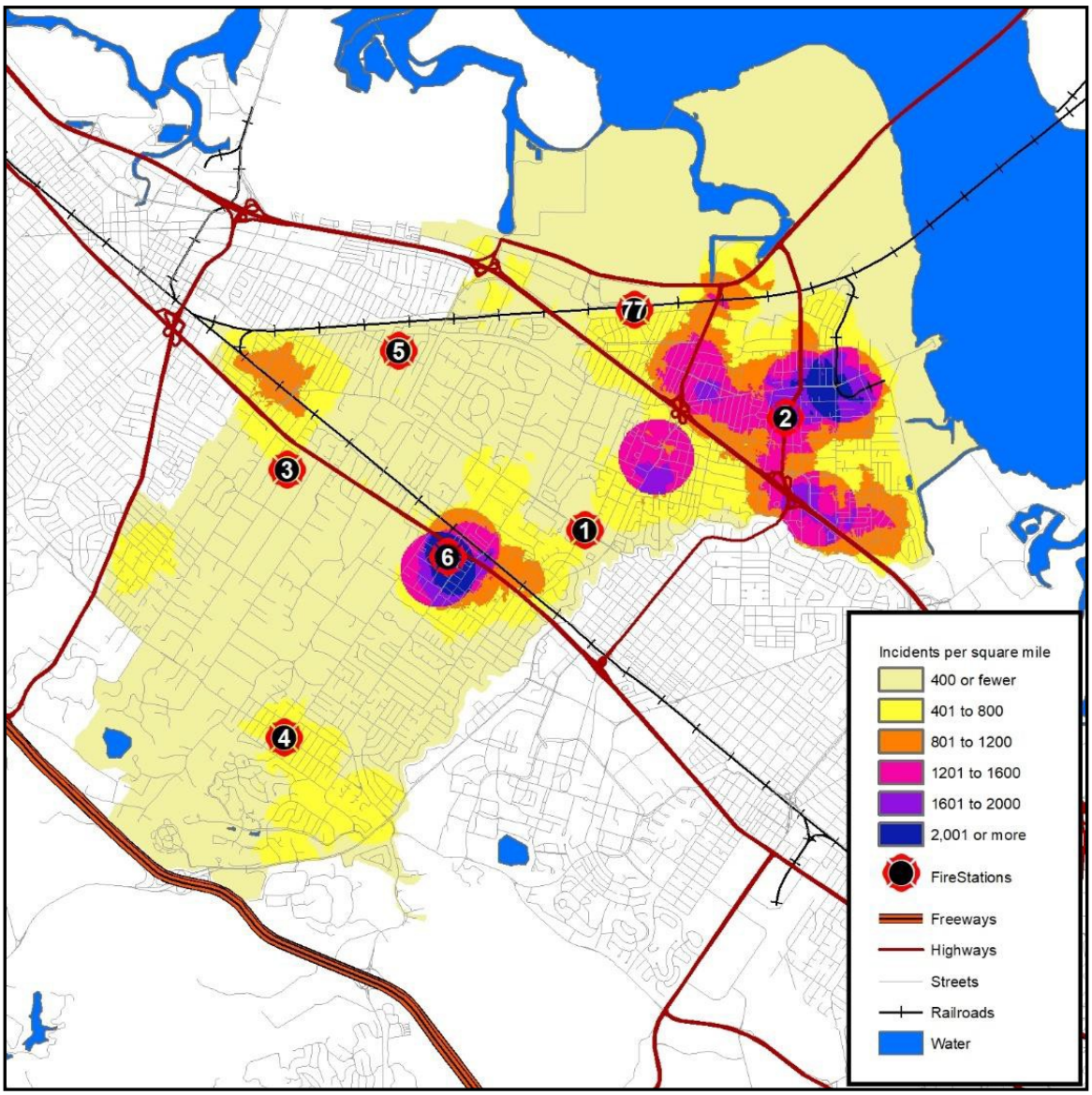


SPATIAL ANALYSIS

In addition to the temporal analysis, it is useful to examine the geographic distribution of service demand. The following figures indicate the distribution of emergency incidents in MPFPD during 2018.

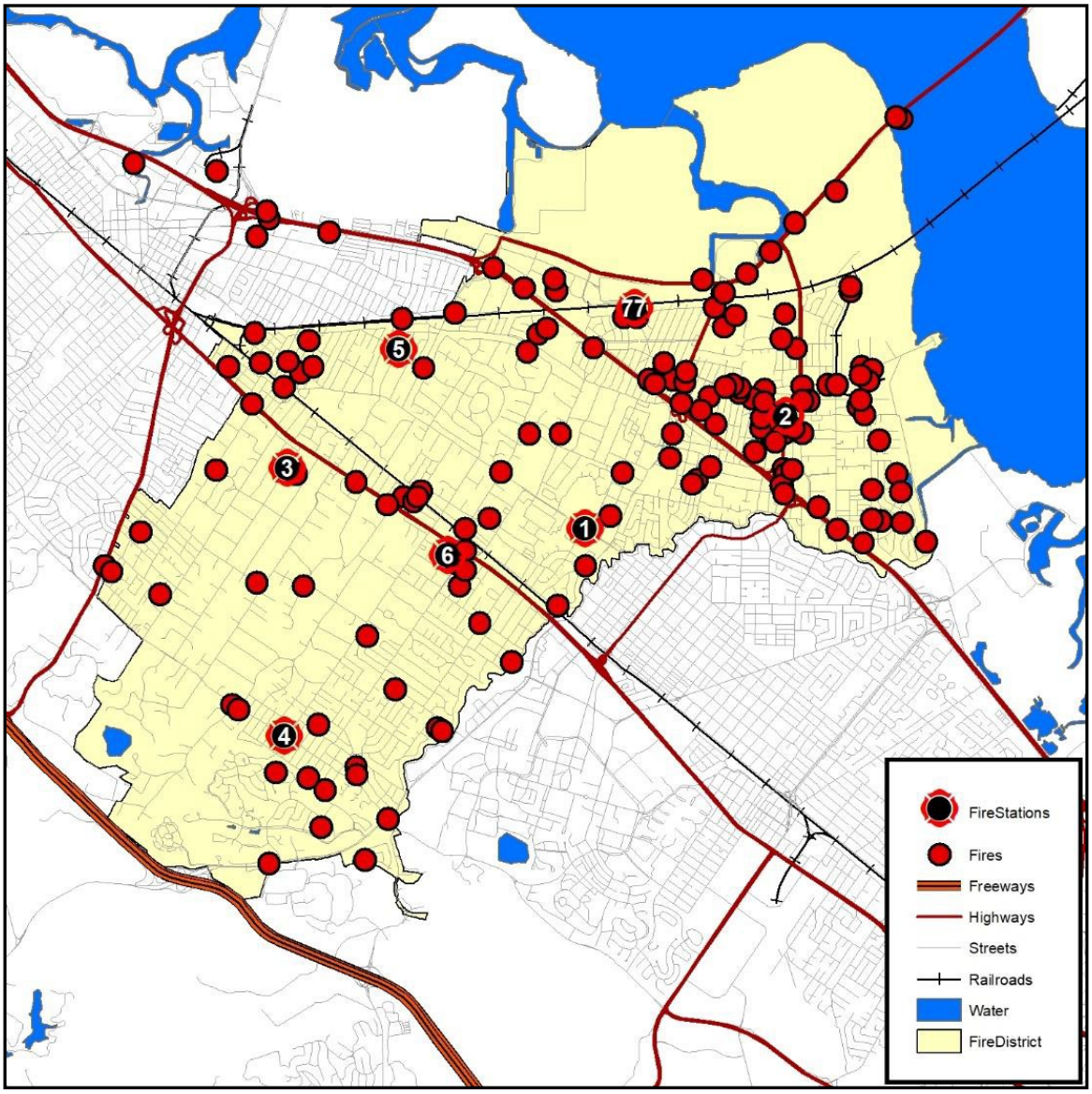
The first figure displays the number of incidents per square mile within various parts of the District.

Figure 44: Incidents per Square Mile, 2018



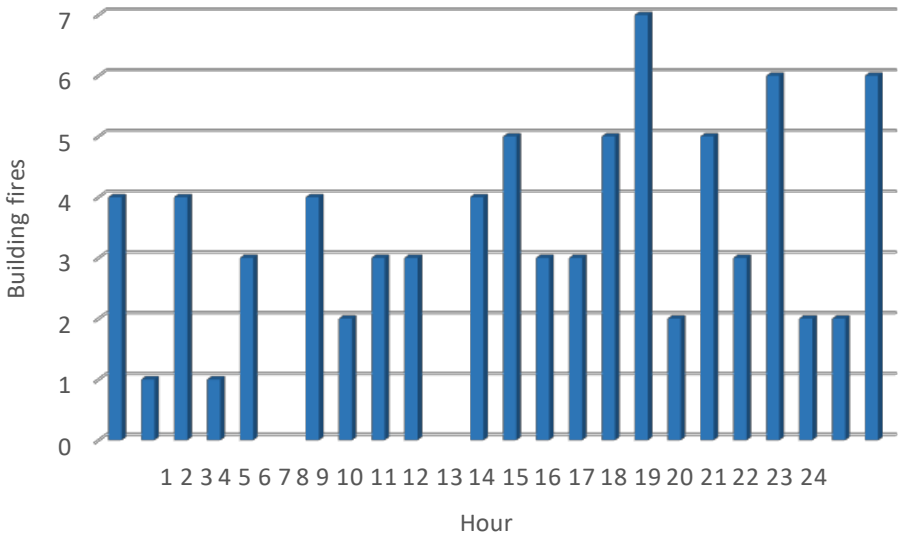
The preceding figure reflects all calls within the District. Service demand can vary by area based on incident type. The following figure displays the location of fires occurring within the MPFPD service area during 2018.

Figure 45: Fires, 2018



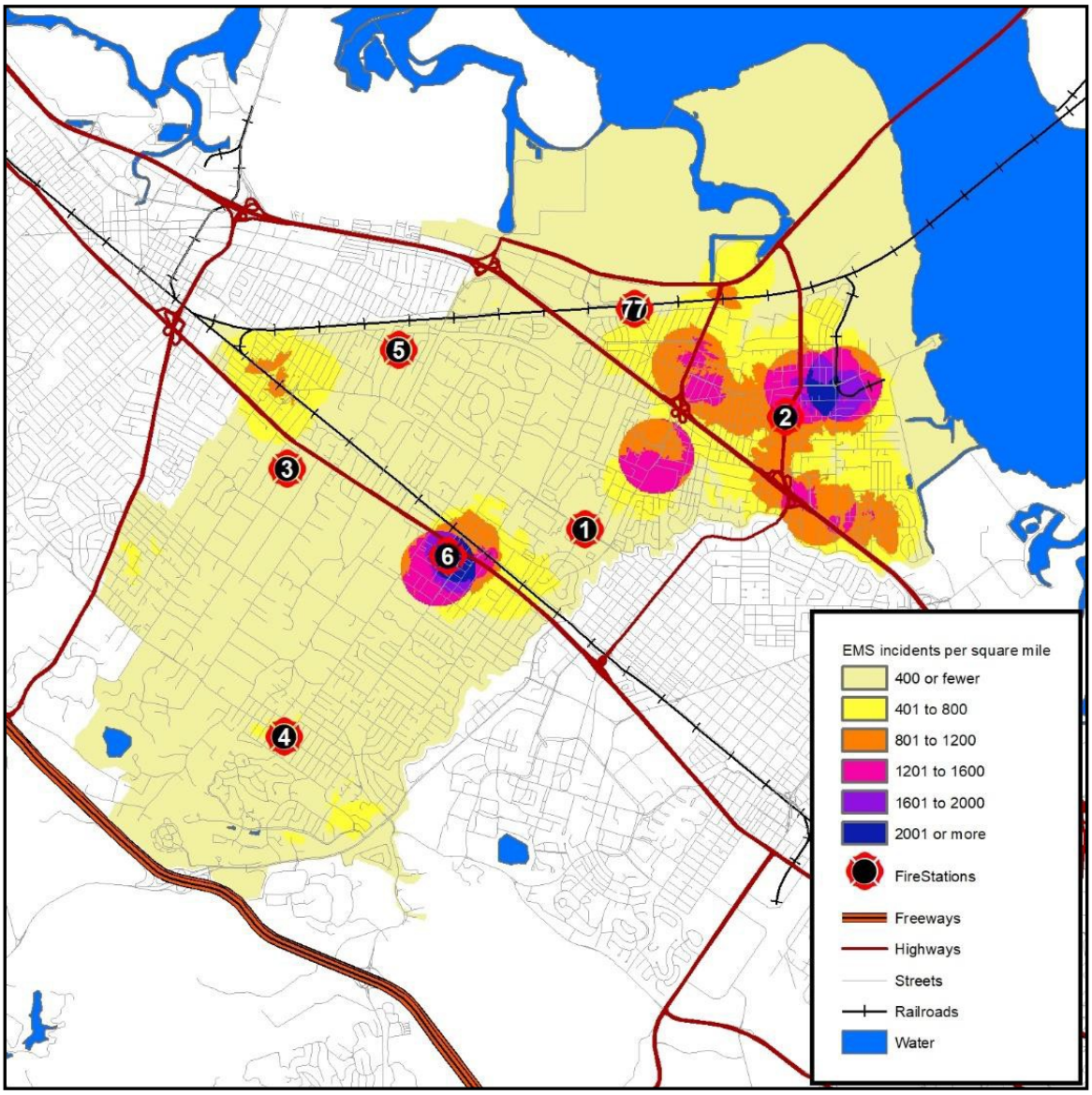
The following figure illustrates building fires by the hour of day during the study period.

Figure 46: Building Fires by Hour of Day, 2016–2018



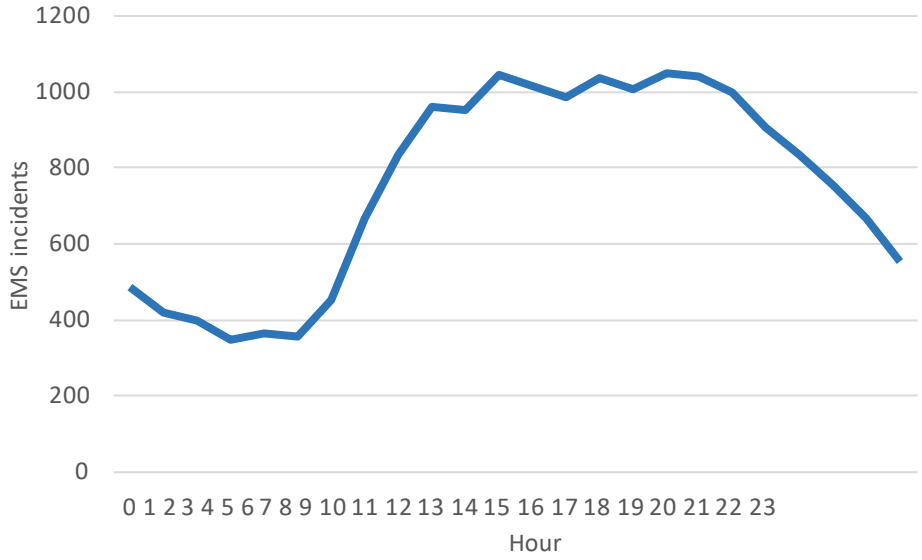
Similarly, emergency medical incidents also occur in greater concentration in areas of higher population density. The following figure displays emergency medical incidents per square mile during 2018. Incident concentration follows population density.

Figure 47: EMS Incidents per Square Mile, 2018



EMS response workload also varies by the hour of day. The following figure illustrates EMS incidents by the hour during the study period. It closely follows the total workload by the hour of day.

Figure 48: EMS Incidents by Hour of Day, 2016–2018



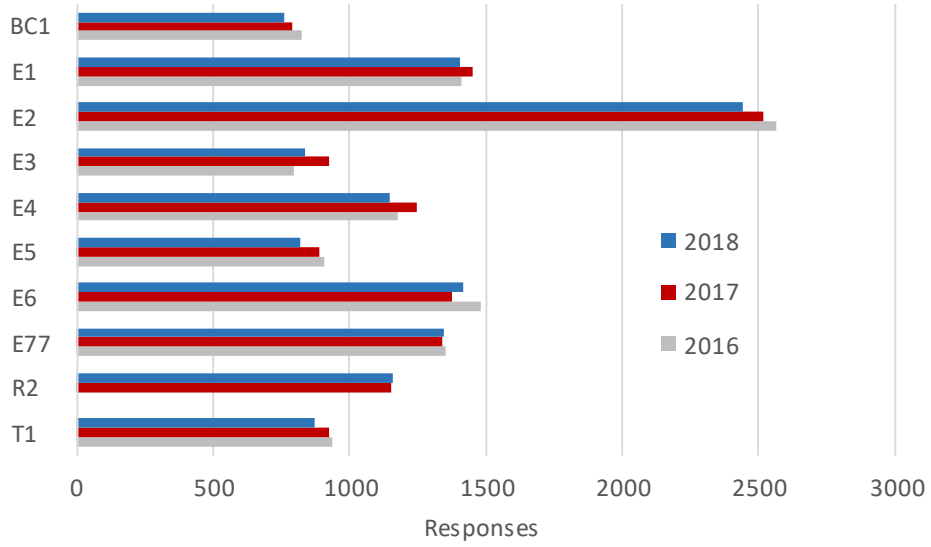
UNIT WORKLOAD ANALYSIS

A review of workload by response unit can reveal much about response-time performance. Although fire stations and response units may be distributed in a manner to provide quick response, that level of performance can only be obtained when the response unit is available in its primary service area. If a response unit is already on an incident and a concurrent request for service is received, a more distant response unit will need to be dispatched. This will increase response times.

Response Unit Workload

The workload on individual response units during the study period is shown in the following figure. The individual response unit workload can be greater than the workload in its home station area. Many incidents, such as structure fires, require more than one response unit. Engine 2 is the busiest engine in the system. In January 2019, the District placed a second truck in service at Station 2 and moved Rescue 2 to Station 77 as Rescue 77.

Figure 49: Response Unit Workload, 2016–2018



The amount of time a given unit is committed to an incident is also an important workload factor. The following figure illustrates the average time each unit was committed to an incident, from initial dispatch until it was available for another incident.

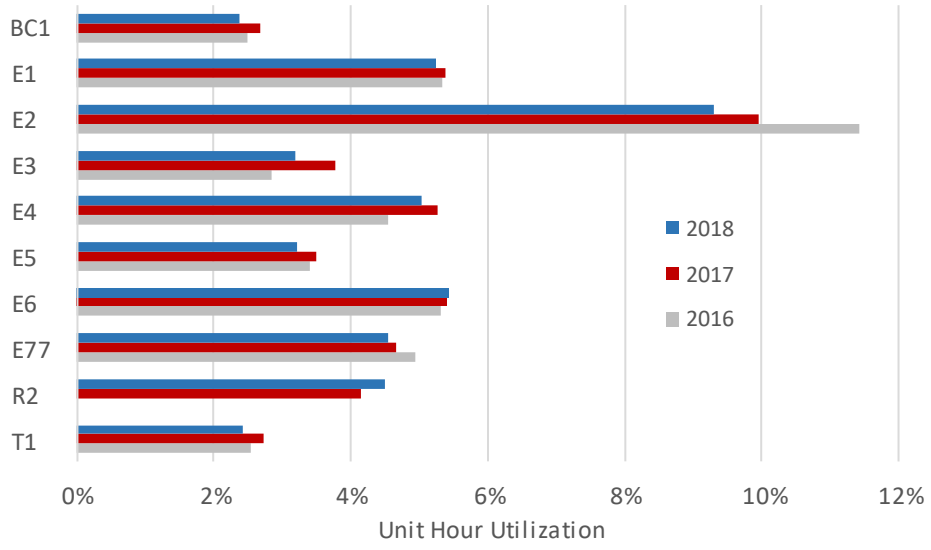
Figure 50: Average Time Committed to an Incident by Unit, 2016–2018

Unit	2016	2017	2018
BC1	15:53	17:55	16:28
E1	19:51	19:32	19:38
E2	23:26	20:49	20:03
E3	18:49	21:31	20:02
E4	20:18	22:12	23:03
E5	19:42	20:40	20:41
E6	18:51	20:40	20:11
E77	19:15	18:17	17:44
R2	N/A	18:57	20:20
T1	14:13	15:26	14:34

Unit-hour utilization (UHU) is an important workload indicator. It is calculated by dividing the total time a unit is committed to all incidents during a year divided by the total time in a year. Expressed as a percentage, UHU describes the amount of time a unit is not available for response because it is already committed to an incident. The larger the percentage, the greater a unit's utilization, and the less available it is for assignment to an incident.

UHU is an important statistic to monitor for those fire agencies using percentile-based performance standards, as does MPFPD. In MPFPD's case, where performance is measured at the 90th percentile, a response unit with greater than 10% utilization will not be able to provide an on-time response to its 90% target even if response is its only activity. Engine 2 is very near 10% utilization.

Figure 51: Unit-Hour Utilization, 2016–2018

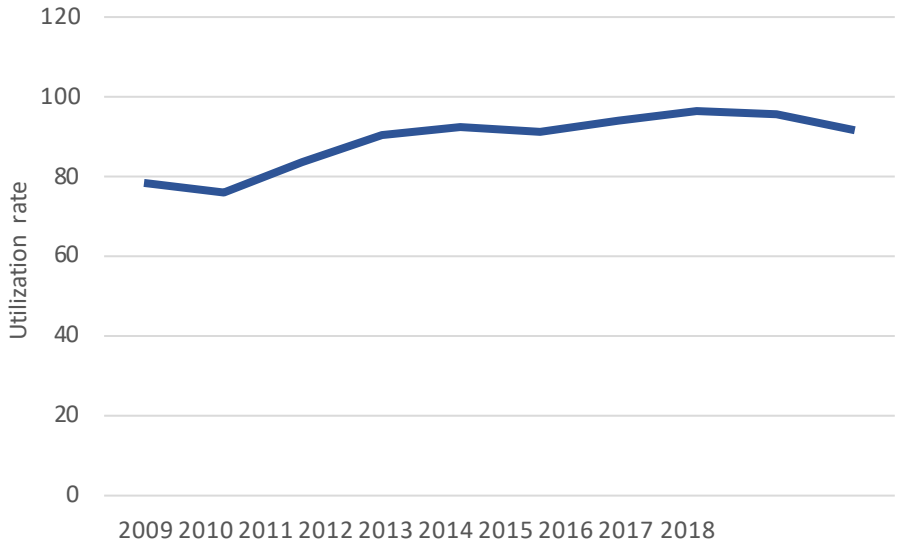


Population and Incident Workload Projections

The most significant predictor of future incident workload is population; 100% of requests for emergency medical services are people-driven. The National Fire Protection Association reports that approximately 70% of all fires are the result of people either doing something they should not have (i.e., misuse of an ignition source) or not doing something they should have (i.e., failure to maintain equipment). It is reasonable to use forecast population growth to predict future fire department response workload.

The current utilization rate for fire department services is 91.7 incidents per 1,000 population. This is comparable to similar-sized communities. The total utilization rate has increased by 2% per year over the past 10 years. The following figure illustrates that growth.

Figure 52: Service Utilization Rate, 2009–2018



If the utilization growth rate of the past 10 years continues, the total utilization rate could reach 120.7 incidents per 1,000 population by 2040. The increased utilization rate, plus expected population growth, could increase the MPFPD's workload to over 12,700 incidents per year by 2040, driven primarily by requests for emergency medical services.

Critical Tasking and Alarm Assignments

The MPFPD service area is a highly populated urban environment and, as such, contains an elevated number, density, and distribution of risk. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished, and certain numbers and types of apparatus should be dispatched.

Tasks that the District must perform at a fire can be broken down into two key components: life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety-related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the commanding officer must prioritize the tasks and complete some in chronological order, rather than concurrently. These tasks include the following:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Medical assistance
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention

Critical task analyses also apply to non-fire-type emergencies, including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to control an emergency effectively. The District's ability to muster needed numbers of trained personnel quickly enough to make a difference is critical to successful incident outcomes.

The following figure illustrates the minimum emergency incident staffing recommendations of the Commission on Fire Accreditation International (CFAI). The following definitions apply to the figure:

- **Low Risk**: Minor incidents involving small fires (fire flow less than 250 gallons per minute), single patient non-life-threatening medical incidents, minor rescues, small fuel spills, and small wildland fires without unusual weather or fire behavior.
- **Moderate Risk**: Moderate-risk incidents involving fires in single-family dwellings and equivalently sized commercial office properties (fire flow between 250 gallons per minute to 1,000 gallons per minute), life-threatening medical emergencies, hazardous materials emergencies requiring specialized skills and equipment, rescues involving specialized skills and equipment, and larger wildland fires.
- **High Risk**: High-risk incidents involving fires in larger commercial properties with sustained attack (fire flows more than 1,000 gallons per minute), multiple patient medical incidents, major releases of hazardous materials, high-risk rescues, and wildland fires with extreme weather or fire behavior.

Figure 53: Staffing CFAI Recommendations Based on Risk

Incident Type	High Risk	Moderate Risk	Low Risk
Structure Fire	29	15	6
Emergency Medical Service	12	4	2
Rescue	15	8	3
Hazardous Materials	39	20	3

The MPFPD has developed the following Critical Task Analysis using the risk matrices included in the Critical Task Section for various incident types. Further, it has defined, based on current unit staffing levels, the number and type of apparatus needed to deliver sufficient numbers of personnel to meet the critical tasking identified. ESCI's review of the Critical Task Analysis concludes that all are generally in keeping with industry standards and provide the minimum number of personnel needed for effective incident operations.

Establishing resource levels needed for various types of emergencies is a uniquely local decision. Factors influencing local decisions for incident staffing include the type of equipment operated, training levels of responders, operating procedures, geography, traffic, and the nature of buildings and other risks protected.

Critical Tasking

Critical tasks are those activities that must be conducted early on and in a timely manner by firefighters at emergency incidents in order to control the situation, to stop loss, and to perform necessary tasks required for a medical emergency. MPFPD is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner. These are the minimum number of personnel needed by incident type. More personnel will be needed for incidents of increased complexity or size.

Figure 54: Structure Fire

Task	Number of Personnel
Command	1
Safety	1
Pump Operations	4
Attack Line	4
Back up Line	4
Search and Rescue	2
Ventilation	2
RIT	3
Total	**21**

Figure 55: High-Rise Structure Fire (75+ Feet in Height)

Task	Number of Personnel
Command/Safety	3
Pump Operations	2
Attack Line	6
Search and Rescue	4
Ventilation	4
RIC	3
Backup Line	5
Total	**27**

Figure 56: Wildland Fire—Low Risk

Task	Number of Personnel
Command/Safety	1
Pump Operation/Lookout	3
Attack Line	4
Exposure	2
Total	**10**

Figure 57: Wildland Fire—High Risk

Task	Number of Personnel
Command	2
Safety	1
Pump Operations/Lookout	6
Attack Line	6
Structure Protection/Exposures	6
Water Supply	2
Total	**23**

Figure 58: Hazardous Materials—Low Risk

Task	Number of Personnel
Command	1
Liaison	1
Decontamination	4
Research/Support	2
Entry Team and Backup Team	6
Total	**14**

Figure 59: Hazardous Materials—High Risk

Task	Number of Personnel
Command	1
Safety	1
Decontamination	3
Research Support	2
Team Leader, Safety, Entry Team, and Backup Team	6
Total	**13**

Figure 60: Emergency Medical Aid (Life Threatening)

Task	Number of Personnel
Patient Management	1
Patient Care	4
Documentation	1
Total	**6**

Figure 61: Major Medical Response (10+ Patients)

Task	Number of Personnel
Incident Command	1
Safety	1
Triage	3
Treatment Manager	1
Patient Care	4
Transportation Manager	1
Documentation	1
Total	**12**

Figure 62: Motor Vehicle Accident (Non-Trapped)

Task	Number of Personnel
Scene Management/Documentation	1
Patient Care/Extrication	2
Total	**3**

Figure 63: Motor Vehicle Accident (Trapped)

Task	Number of Personnel
Command	1
Safety	1
Patient Care	3
Extrication/Vehicle Stabilization	4
Pump Operator/Suppression Line	1
Total	**10**

Figure 64: Technical Rescue—Water

Task	Number of Personnel
Command/Safety	1
Rescue Team	3
Backup Team	3
Patient Care	1
Rope Tender	3
Upstream Spotter	1
Downstream Safety	2
Total	**14**

Figure 65: Technical Rescue—Rope

Task	Number of Personnel
Command/Safety	2
Rescue Team	4
Backup Team	4
Patient Care	2
Rope Tender	2
Total	**14**

Figure 66: Technical Rescue—Confined Space

Task	Number of Personnel
Command/Safety	3
Rescue Team	4
Documentation	1
Monitoring	1
Backup/Support Team	3
Patient Care	3
Rope Tender	4
Total	**19**

Alarm Assignments

To ensure sufficient personnel and apparatus are dispatched to an emergency event, the following first alarm response assignments have been established. "Total Staffing Needed" is the number identified in the previous Critical Tasking Analysis. The number of personnel and apparatus required to mitigate an active and complex working incident will require additional resources above and beyond the numbers listed next. With currently available resources, MPFPD is able to staff a number of incident types in accordance with its Critical Tasking Analysis.

Figure 67: Structure Fire

Unit Type	Number of Units	Total Personnel
Engine	5	15
Truck	1	4
Air Supply	0	0
Battalion Chief	2	1
Total Staffing Provided		**21**
Total Staffing Needed		**22**

Figure 68: High-Rise Structure Fire (75+ Feet)

Unit Type	Number of Units	Total Personnel
Engine	5	15
Truck	2	8
Air Supply	0	0
Battalion Chief	3	3
Total Staffing Provided		**24**
Total Staffing Needed		**26**

Figure 69: Wildland Fire—Low Risk

Unit Type	Number of Units	Total Personnel
Engine	3	9
Battalion Chief	1	1
Total Staffing Provided		**10**
Total Staffing Needed		**10**

Figure 70: Wildland Fire—High Risk

Unit Type	Number of Units	Total Personnel
Engine	6	9
Battalion Chief	1	1
Total Staffing Provided		**10**
Total Staffing Needed		**23**

Figure 71: Hazardous Materials—High Risk

Unit Type	Number of Units	Total Personnel
Engine	3	9
Truck	1	4
Battalion Chief	1	1
Hazardous Materials Unit	County	
Total Staffing Provided		**14**
Total Staffing Needed		**18**

Figure 72: Emergency Medical Service (Life Threatening)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Total Staffing Provided		**6**
Total Staffing Needed		**6**

Figure 73: Major Medical Response (10+ Patients)

Unit Type	Number of Units	Total Personnel
Engine	4	12
Battalion Chief	1	1
Truck	1	4
Total Staffing Provided		**16**
Total Staffing Needed		**16**

Figure 74: Motor Vehicle Accident (Non-Trapped)

Unit Type	Number of Units	Total Personnel
Engine	1	3
Truck	1	4
Battalion Chief	1	1
Total Staffing Provided		**8**
Total Staffing Needed		**8**

Figure 75: Motor Vehicle Accident (Trapped)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Truck	1	4
Battalion Chief	1	1
Total Staffing Provided		**11**
Total Staffing Needed		**11**

Figure 76: Technical Rescue—Water

Unit Type	Number of Units	Total Personnel
Boat	1	3
Truck	1	4
Battalion Chief	1	1
Total Staffing Provided		**8**
Total Staffing Needed		**8**

Figure 77: Technical Rescue—Rope

Unit Type	Number of Units	Total Personnel
Engine	3	9
Truck	1	4
Squad	1	2
Battalion Chief	1	1
Total Staffing Provided		**16**
Total Staffing Needed		**16**

Figure 78: Technical Rescue—Confined Space

Unit Type	Number of Units	Total Personnel
Engine	3	9
Truck	1	4
Battalion Chief	1	1
Total Staffing Provided		**14**
Total Staffing Needed		**18**

Figure 79: Technical Rescue—Trench

Unit Type	Number of Units	Total Personnel
Engine	3	9
Truck	1	4
Battalion Chief	1	1
Total Staffing Provided		**14**
Total Staffing Needed		**16**

Figure 80: Mutual Aid Resources, Including Resources Available Through 3rd Alarm

Department	Resources		
	Engines	Ladders Trucks	Total Available Staffing
Redwood City	7	1	25
Woodside Fire Protection District	3	0	9
Palo Alto	6	1	22
Totals	**16**	**2**	**56**

Review of Historical System Performance

Incident data for the period between January 1, 2016, and December 31, 2018, were evaluated in detail to determine MPFPD's current performance. ESCI obtained data from MPFPD's incident reports and the dispatch center's computer-aided dispatch system.

ESCI included priority incidents occurring within the MPFPD service area in the analysis only. Priority incidents involve emergencies to which the fire department initiated a "code 3" (using warning lights and sirens) response (5,865 incidents during 2016; 6,152 during 2017; and 6,118 incidents during 2018). ESCI excluded non-emergency public assistance requests. Performance is reported based on the initial type of incident as dispatched. Three categories are used to report performance:

- **Fire and Special Operations**—Responses to a report of fire or other emergency requiring full personal protective equipment.
- **Emergency Medical**—All emergency medical incidents.
- **Other**—Any other incident to which the fire district responded with lights and sirens.

Each phase of the incident response sequence was evaluated to determine the current performance. This allows an analysis of each phase to determine where opportunities might exist for improvement.

The total incident response-time continuum consists of several steps, beginning with the initiation of the incident and concluding with the appropriate mitigation of the event. The time required for each of the components varies. The policies and practices of the District directly influence some of the steps.

ESCI compared MPFPD's response performance to its adopted performance goals. The following figure summarizes the performance goals as adopted by the MPFPD Board of Directors.

Figure 81: MPFPD Performance Goals

Incident Interval	Performance Goal
Call process time (time from acceptance at the dispatch center until notification of response units).	Within 1 minute, 90% of the time.
Turnout time (time from notification of response personnel until the initiation of movement towards the incident).	Within 2 minutes, 90% of the time.
First unit travel time (time from initiation of response until the arrival of the first unit at the incident).	Within 4 minutes, 90% of the time.
First unit total response time (time from receipt of the call at dispatch until the arrival of the first unit at the incident).	Within 7 minutes, 90% of the time.
Full effective response force travel time (Time from receipt of the call at dispatch until all units initially dispatched arrive at the incident).	Within 11 minutes, 90% of the time.

In keeping with MPFPD's performance goals, all response-time elements are reported at a given percentile. Percentile reporting is a methodology by which response times are sorted from least to greatest, and a "line" is drawn at a certain percentage of the calls to determine the percentile. The point at which the "line" crosses the 90th percentile, for example, is the percentile time performance. Thus, 90% of the times were at or less than the result; Only 10% were longer.

Percentiles differ greatly from *averages*. Averaging calculates response times by adding all response times together and then dividing the total number of minutes by the total number of responses (mean average). Measuring and reporting average response times is not recommended. Using averages does not give a clear picture of response performance because it does not clearly identify the number and extent of events with times beyond the stated performance goal.

What follows is a detailed description and review of each phase of the response-time continuum. All phases will be compared to MPFPD's performance goals.

Detection

The detection of a fire (or medical incident) may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period. The time for this phase begins with the inception of the emergency and ends when the emergency is detected. It is largely outside the control of the fire department and not a part of the event sequence that is reliably measurable.

Call Processing

Most emergency incidents are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the incident from persons who are apt to be excited. A citizen well trained in how to report emergencies can reduce the time required for this phase. The dispatcher must identify the correct units based on incident type and location, dispatch them to the emergency, and continue to update information about the emergency while the units respond. This phase begins when the 9-1-1 call is answered at the primary public safety answering point (PSAP) and ends when response personnel are notified of the emergency. This phase, which has two parts, is labeled "call processing time."

San Mateo County Office of Public Safety (PSC) is the PSAP and dispatch service provider for MPFPD. It answers the call, processes the information, and dispatches MPFPD response units. PSC is the primary PSAP for the City of East Palo Alto and the secondary PSAP for the cities of Atherton and Menlo Park.

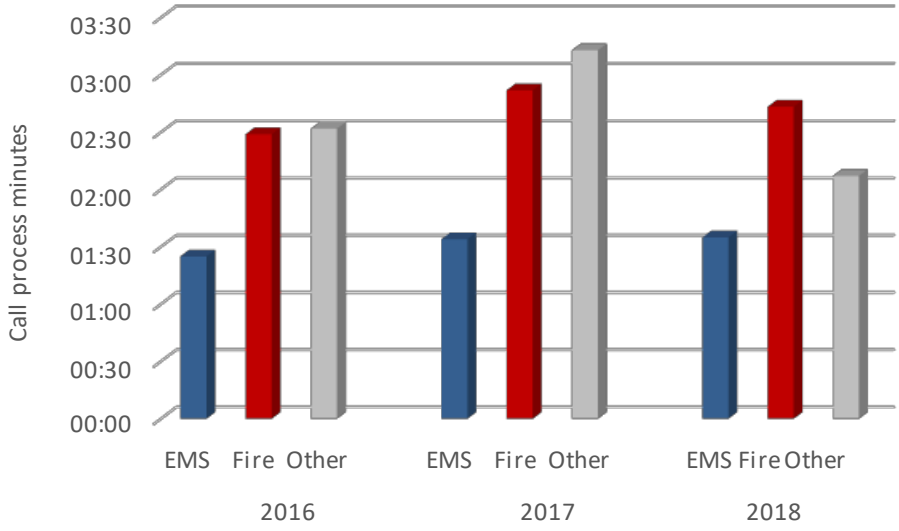
The cities of Atherton and Menlo Park Police Departments maintain their own primary PSAPs and transfer requests for fire-based services to PSC. In addition, cell-based 9-1-1 calls that originate within proximity to highways may go direct to CHP. These calls will be routed to the appropriate primary PSAP and may result in considerable delays.

National Fire Protection Association Standard 1221 recommends that 9-1-1 calls be answered within 15 seconds, 95% of the time (within 40 seconds, 99% of the time). Call answer and transfer times from Atherton and Menlo Park were not provided.

The second part of call processing time, dispatch time, begins when the call is received at the dispatch center (PSC) and ends when response units are notified of the incident. MPFPD's goal prescribes that this phase should occur within 1 minute, 90% of the time.

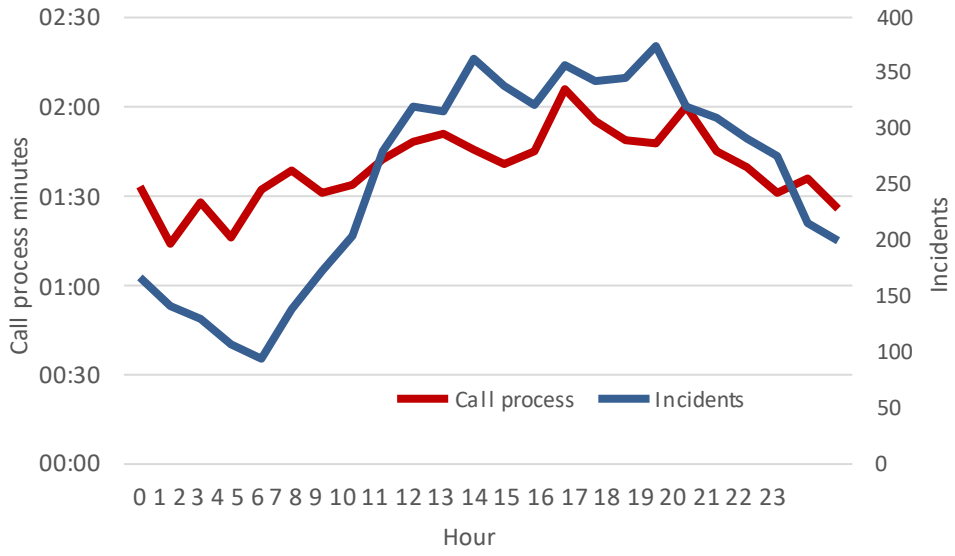
The following figure illustrates performance by PSC from the time it receives the call until it notifies response units. Performance during 2018 for all incidents was within 1 minute, 45 seconds, 90% of the time.

Figure 82: PSC Dispatch Time Performance



The workload at the dispatch center can influence call processing performance. The following figure illustrates performance at different times of the day compared to the District's response workload. Given that call processing time increases with higher call volume and decreases during periods of lower call volume, it appears that workload may be impacting dispatch center performance.

Figure 83: Call Processing Time by Hour of Day, 2018

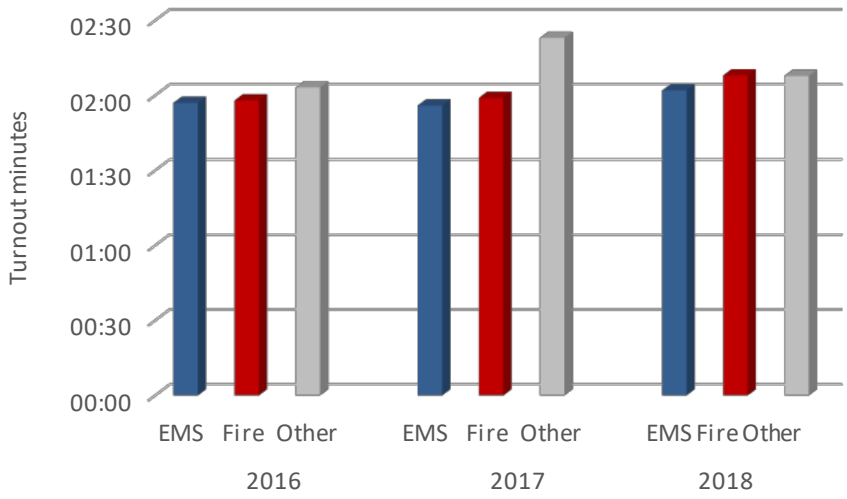


Turnout Time

Turnout time is a response phase controllable by the fire district. This phase begins at the notification of an emergency in progress by the dispatch center and ends when personnel and apparatus begin to move towards the incident location. Personnel must don appropriate equipment, assemble on the response vehicle, and begin travel to the incident. Good training and proper fire station design can minimize the time required for this step.

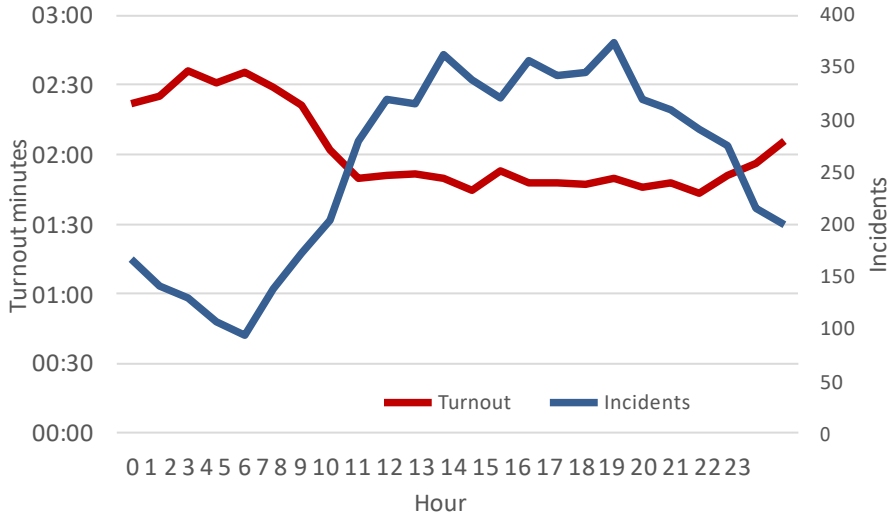
The performance goal for turnout time is within 2 minutes, 90% of the time. The following figure lists turnout time by specific incident types. Overall turnout time during 2018 was within 2 minutes, 3 seconds, 90% of the time.

Figure 84: Turnout Time Performance



Turnout time can vary by hour of day. For MPFPD, turnout times are longer at night than during the day.

Figure 85: Turnout Time by Hour of Day, 2018

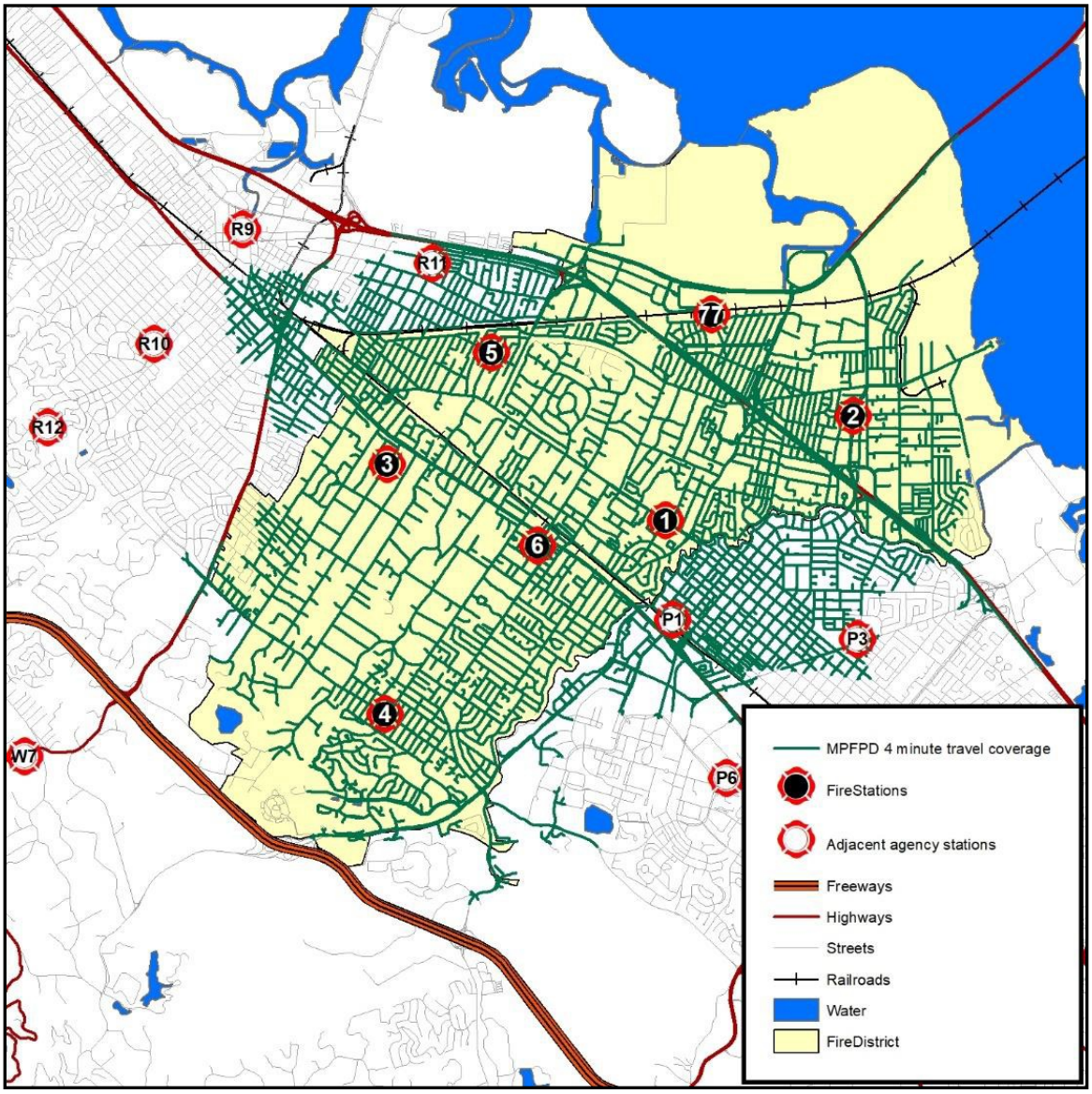


Distribution and Initial Arriving Unit Travel Time

Travel time is potentially the longest of the response phases. The distance between the fire station and the location of the emergency influences response time the most. The quality and connectivity of streets, traffic, driver training, geography, and environmental conditions are also factors. This phase begins with the initial apparatus movement towards the incident location and ends when response personnel and apparatus arrive at the emergency's location. Within the performance goal, 4 minutes is allowed for the first response unit to arrive at an incident.

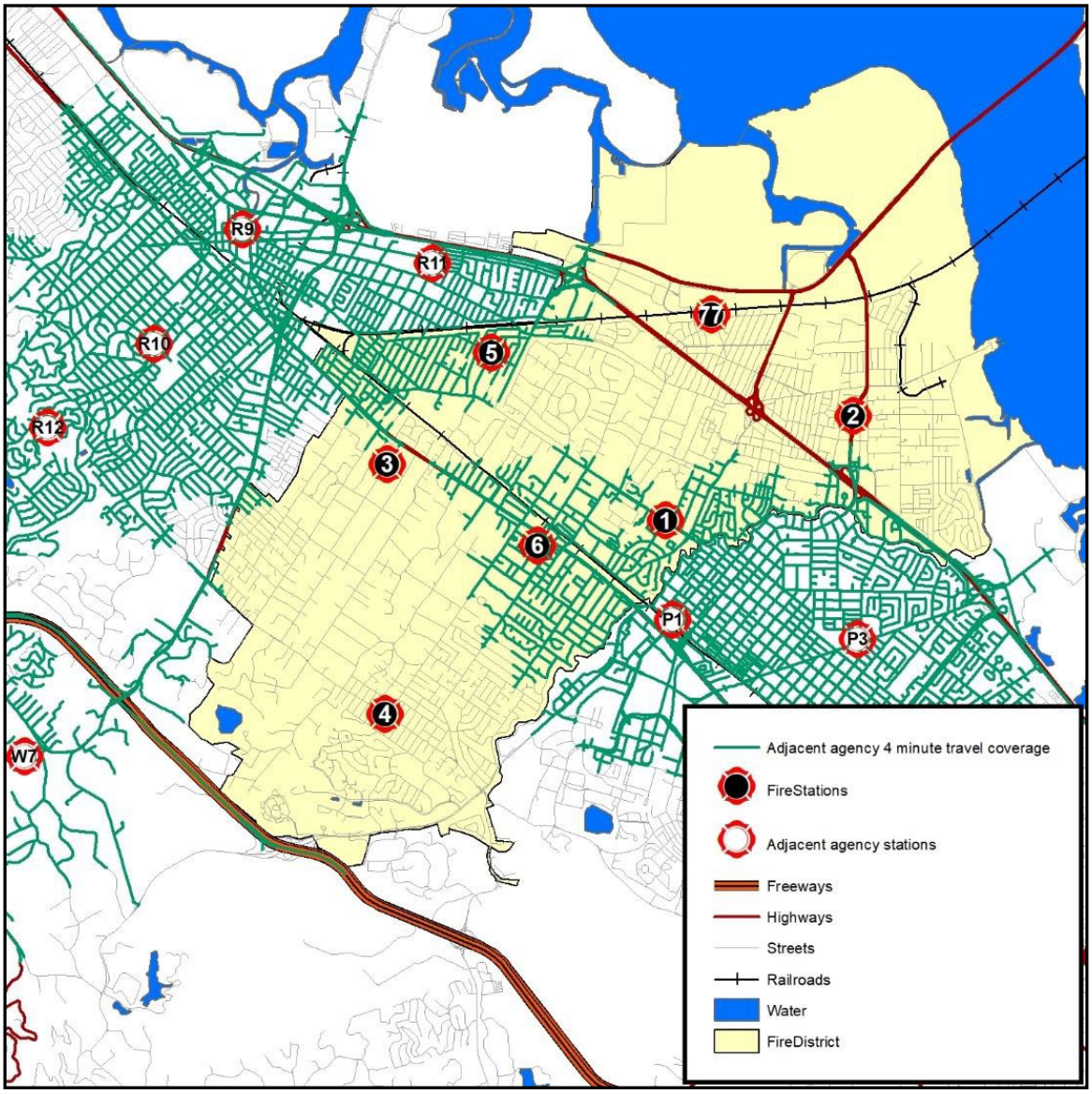
The following figure illustrates the street sections that can be reached from all MPFPD fire stations in 4 minutes of travel time. It is based on posted road speeds modified to account for turning, stops, and acceleration. Existing stations serve the MPFPD service area well.

Figure 86: MPFPD 4-Minute Travel Coverage



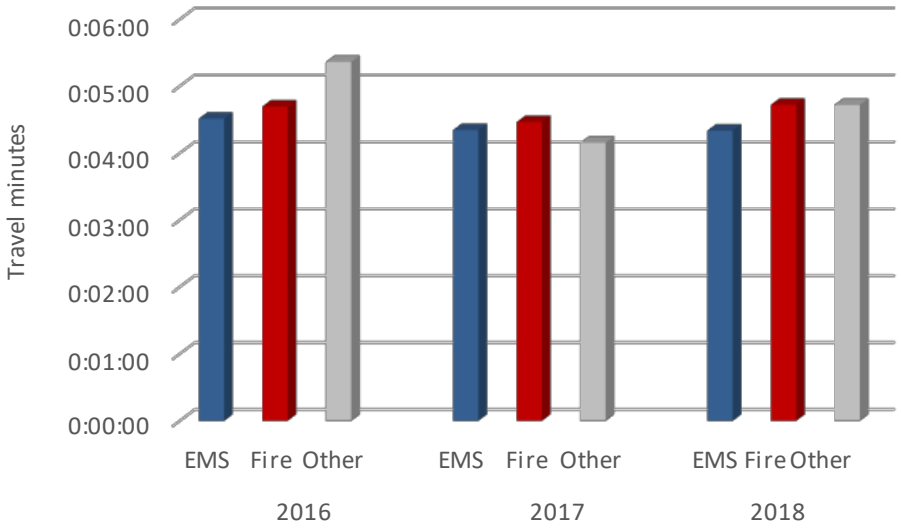
The next figure shows the 4-minute travel coverage from adjacent agency stations. Some 4-minute coverage is provided in the center of the jurisdiction. Most adjacent agency stations are beyond 4 travel minutes of MPFPD.

Figure 87: Adjacent Agency 4-Minute Travel Coverage



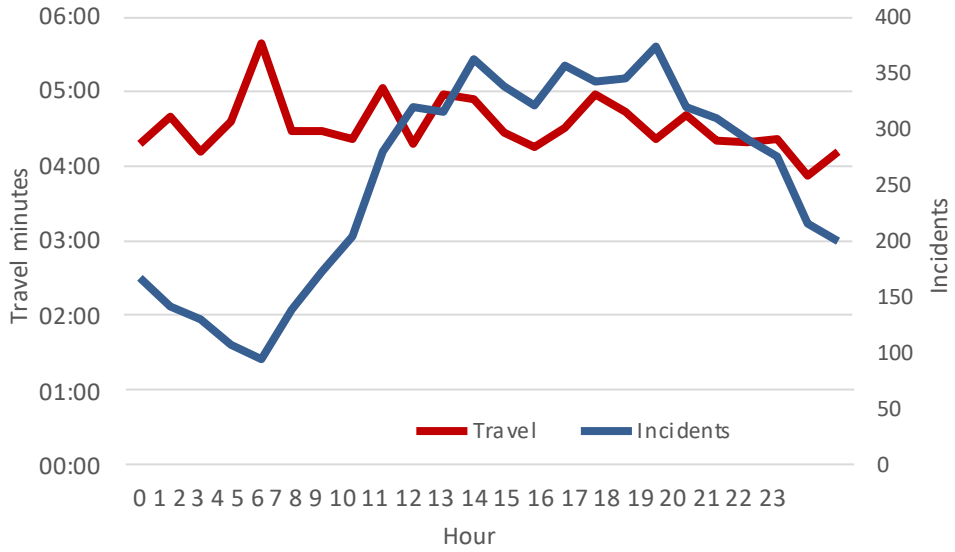
The following figure lists travel time by specific incident types. Overall travel time during 2018 was within 4 minutes, 24 seconds, 90% of the time.

Figure 88: Travel-Time Performance, First Arriving Unit



Travel time can vary considerably by the time of day. Heavy traffic at morning and evening rush hours can slow fire district response. Concurrent incidents can also increase travel time because units from more distant stations would need to respond. Except for an unusual spike between 3:00 a.m. and 4:00 a.m., travel times are relatively consistent across the day.

Figure 89: Travel Time by Hour of Day, 2018



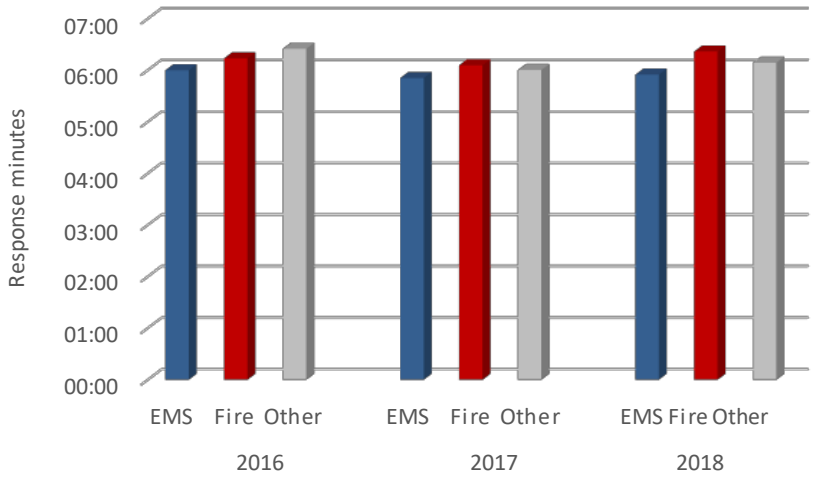
To provide an on-time response, a response unit must be within 4 travel minutes of the incident. Incidents were reviewed to identify how many occurred within 4 travel minutes of a fire station. During 2018, 6,056 of the 6,118 priority incidents inside the District (98.9%) occurred within 4 travel minutes of a fire station.

First Arriving Unit Response Time

Response time is defined as that period between the notification of response personnel by the dispatch center that an emergency is in progress until the arrival of the first fire department response unit at the emergency. The MPFPD goal for response time is within 6 minutes, 90% of the time.

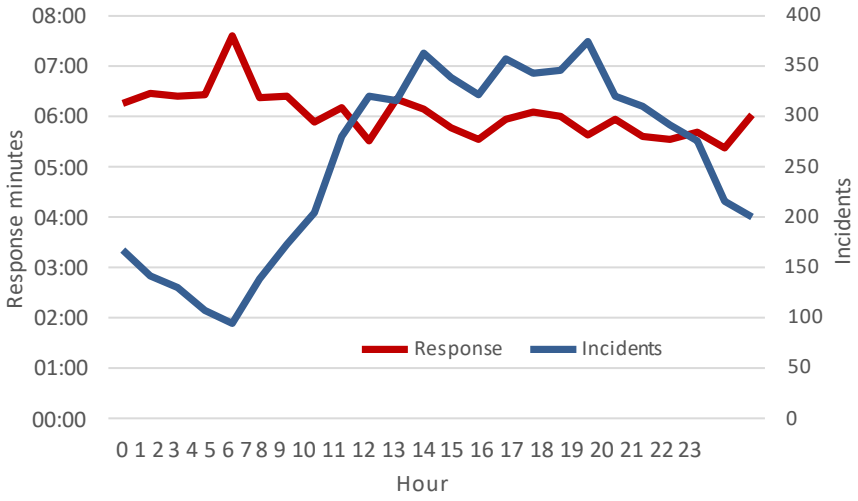
The following figure illustrates the response time for specific incident types. Overall response time during 2018 was within 5 minutes, 59 seconds, 90% of the time.

Figure 90: Response-Time Performance, First Arriving Unit



The next figure shows response time and the number of incidents by the hour of day for all incidents.

Figure 91: Response Time by Hour of Day, 2018

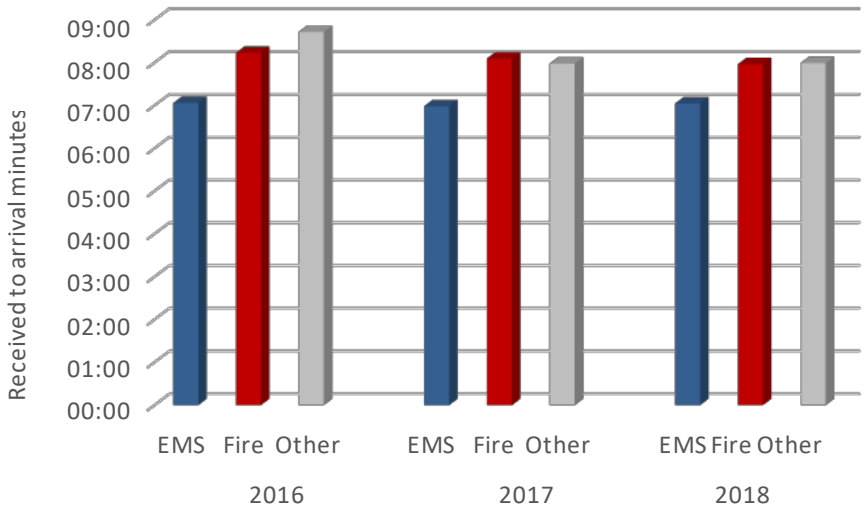


First Arriving Unit Received to Arrival Time

From the customer's standpoint, response time begins when the emergency occurs. Their first contact with emergency services is when they call for help, usually by dialing 9-1-1. Received to arrival time combines answer/transfer, call processing, turnout, and travel time. MPFPD has set its received to arrival goal (total response time) within 7 minutes, 90% of the time.

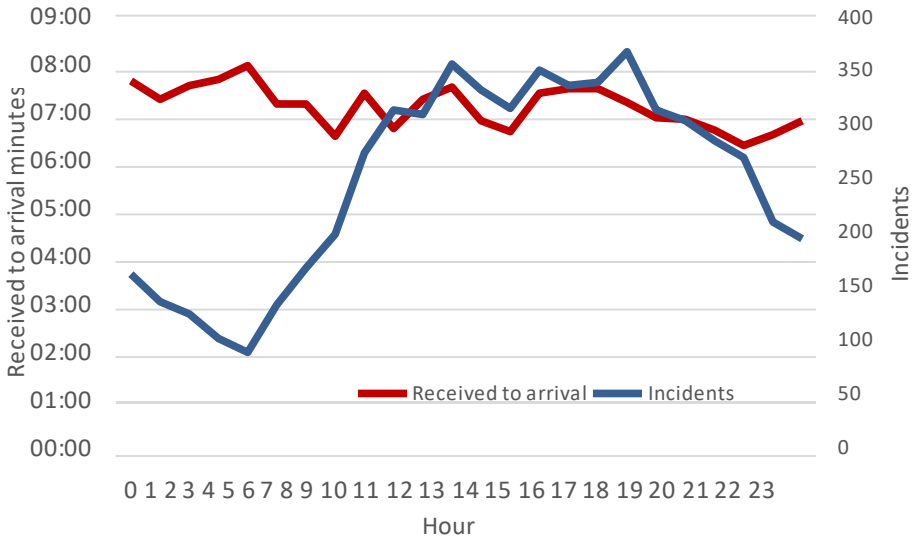
The next figure shows received to arrival performance for priority incidents within the MPFPD service area during the study period. Overall, received to arrival time was within 7 minutes, 17 seconds, 90% of the time during 2018.

Figure 92: Received to Arrival Time, First Arriving Unit



The next figure shows received to arrival performance compared to incident activity by time of the day.

Figure 93: Received to Arrival Time by Hour, 2018



Concentration and Effective Response Force Capability Analysis

Effective Response Force (ERF) is the number of personnel and apparatus required to be present on the scene of an emergency incident to perform the critical tasks in such a manner to effectively mitigate the incident without unnecessary loss of life and property. The ERF is specific to each type of incident and is based on the critical tasks that must be performed.

The response-time goal for the delivery of the full ERF to a moderate-risk building fire is within 11 minutes, 90% of the time from the time the call is received at the dispatch center. MPFPD has defined the minimum full effective response force for low-rise building fires as five fire engines, one truck, and two Battalion Chiefs with a total of 21 firefighters. For high-rise building fires, the minimum force is five fire engines, two trucks, three Battalion Chiefs, and 26 firefighters. The apparatus and staffing complement for this response type are all that is immediately available to MPFPD without using mutual or automatic aid.

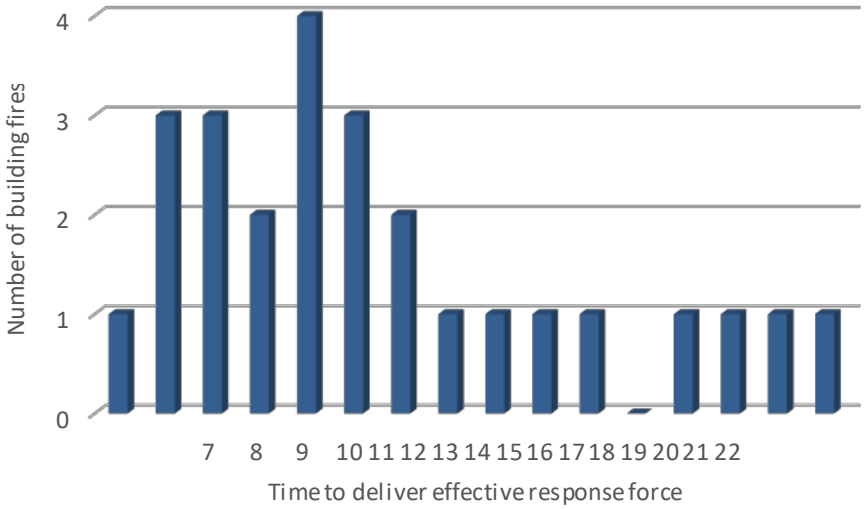
No data are available to identify building fires by type of risk (low rise, high-risk commercial, etc.). All building fires have been evaluated using the low-rise effective response force criteria. The following figure illustrates effective response performance during the study period. The effective response force was delivered to 27 building fires during the study period.

Figure 94: Effective Response Force Performance

	2016	2017	2018
Number of fires with full ERF	6	10	11
Time to deliver the full ERF	16:18	19:47	21:23

The following figure illustrates the frequency distribution of the response times experienced during the study period. Response times between 8 and 13 minutes occurred for 55.5% of those building fires that received the full effective response force.

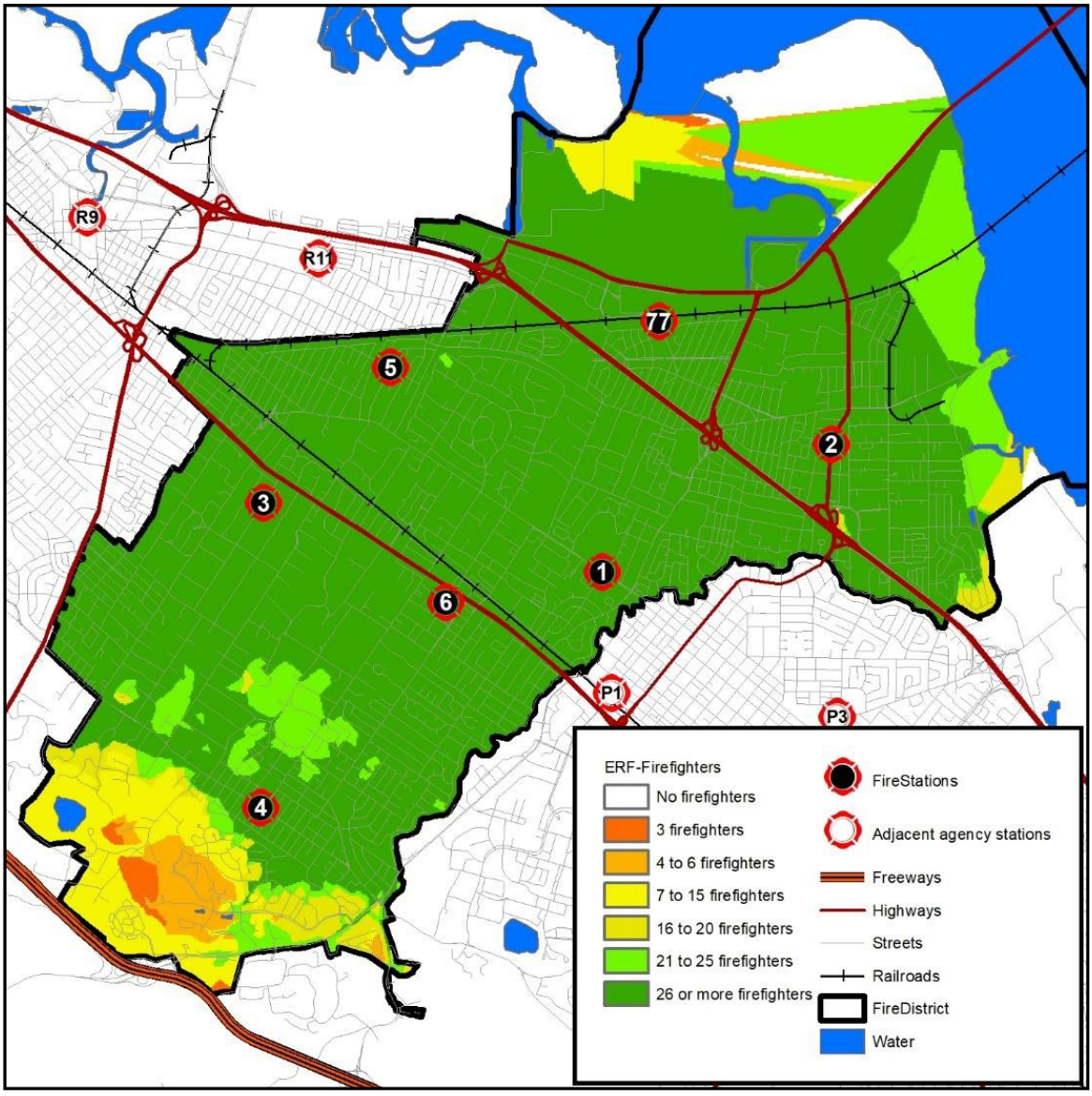
Figure 95: Frequency Distribution of Response Time for Full ERF Arrival



A concentration analysis reviews the physical capability of MPFPD's resources to achieve its target ERF travel time to its service area. The following figures depict the physical capability of MPFPD and its neighboring automatic aid partners to assemble apparatus and firefighters by area within an 8-minute travel time. The modeled analysis shown assumes that all response units are available.

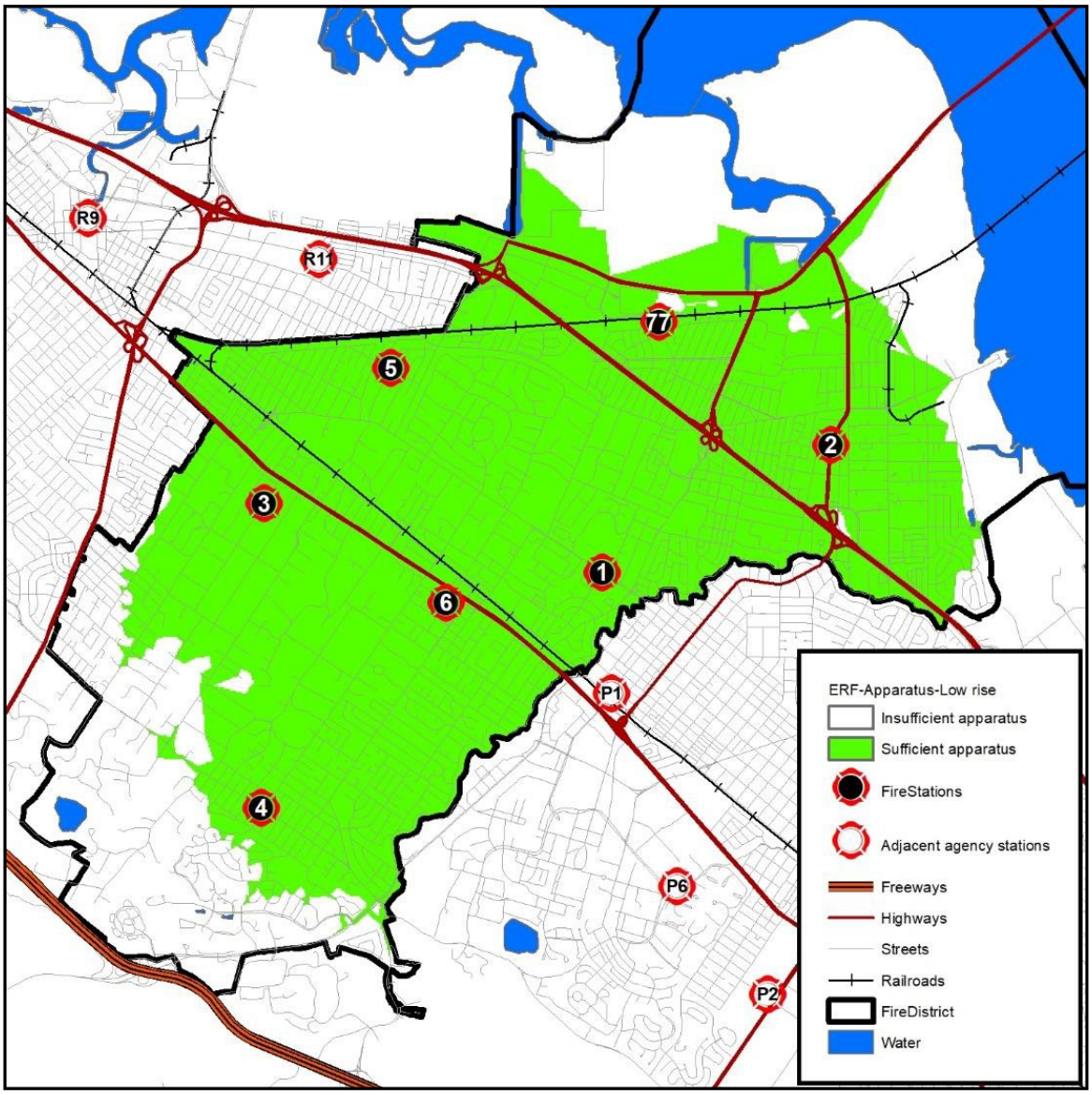
The first figure shows the area that can be reached by the various numbers of firefighters. Most of the MPFPD service area can be provided with sufficient firefighters to manage a high rise building fire.

Figure 96: Effective Response Force, Firefighters



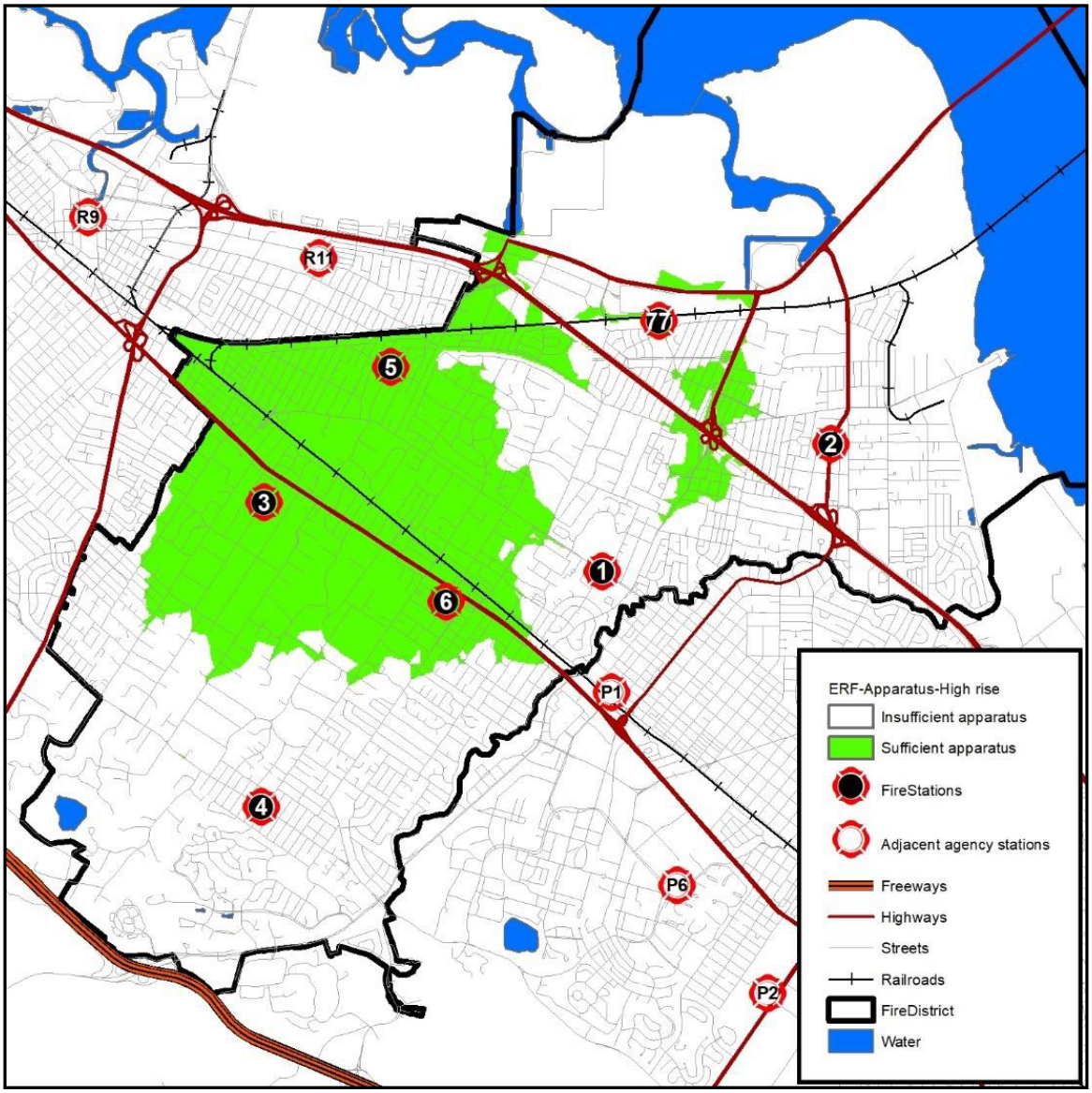
The next figure shows the area to which five fire engines, one ladder truck, and two Battalion Chiefs can respond within 8 minutes of travel time, the standard for a low-rise building fire. Most of the MPFPD service area can be provided sufficient apparatus to manage a low-rise building fire.

Figure 97: Effective Response Force, Apparatus—Low-Rise Building Fire



The next figure shows the area to which five fire engines, two ladder trucks, and three Battalion Chiefs can respond within 8 minutes of travel time, the standard for a high-rise building fire. Effective response force coverage is substantially diminished due largely to the limited number of Battalion Chiefs and ladder trucks in the system.

Figure 98: Effective Response Force, Apparatus—High-Rise Building Fire



Second Unit Arrival Time

MPFPD staffs fire engines with three personnel and ladder trucks with four personnel. Safety regulations require that at least four firefighters be on-scene before firefighters can enter a burning building. The only exception is if it is known that a person is inside the building and needs rescue. Current staffing levels on engines require the arrival of a second response unit before non-rescue interior firefighting activities can be initiated.

Incident data for building fires during the study period were reviewed to determine the time the second response unit arrived on the scene. According to the data, the second unit arrived on the scene of a structure fire within 2 minutes, 47 seconds, 90% of the time after the arrival of the first unit (1 minute, 25 seconds on average).

Incident Concurrency and Reliability

When evaluating the effectiveness of any resource deployment plan, it is necessary to assess the workload of the individual response units to determine to what extent their availability for dispatch is affecting the response-time performance. In simplest terms, a response unit cannot make it to an incident across the street from its own station in 4 minutes if it is unavailable to be dispatched to that incident because it is committed to another call.

Concurrency

One way to look at resource workload is to examine the number of times multiple incidents happen within the same time frame. ESCI examined incidents during the study period to determine the frequency of concurrent events. This is important because concurrent incidents can stretch available resources and delay response to other emergencies. This factor significantly impacts total response times to emergencies in the jurisdiction.

The following figure shows the number of times during the study period that one or more incidents transpired concurrently.

Figure 99: Incident Concurrency

Concurrent Incidents	2016	2017	2018
1	5,125	5,311	5,219
2	2,274	2,489	2,331
3	589	608	624
4	86	119	131
5	12	19	25
6	2	2	6

It is also useful to review the number of times one or more response units are committed to incidents at the same time. The following figure shows the number of times one or more MPFPD response units were committed to incidents.

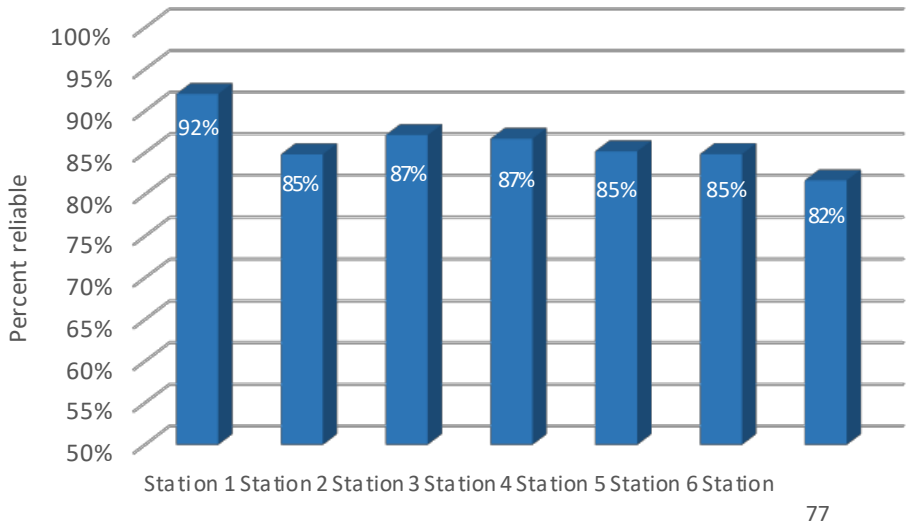
Figure 100: Unit Concurrency

Concurrent Unit Responses	2016	2017	2018
1	5,722	5,902	5,773
2	2,619	2,999	2,878
3	1,290	1,522	1,420
4	936	951	930
5	563	714	692
6	226	341	327
7	75	132	129
8	19	37	43
9	0	9	6
10	0	0	1

Reliability

The ability of a fire station's first-due unit(s) to respond to an incident within its assigned response area is known as *unit reliability*. The reliability analysis is normally done by measuring the number of times response units assigned to a given fire station were available to respond to a request for service within that station's service area. The following figure illustrates station reliability during the study period.

Figure 101: Station Reliability



Performance Objectives and Performance Measures

Dynamics of Fire in Buildings

Most fires within buildings develop predictably unless influenced by highly flammable material or a well-ventilated environment. Ignition, or the beginning of a fire, starts the sequence of events. It may take several minutes or even hours from the time of ignition until a flame is visible. This smoldering stage is very dangerous, especially during times when people are sleeping, because large amounts of highly toxic smoke may be generated during this phase.

Once flames do appear, the sequence continues rapidly. Combustible material adjacent to the flame heat and ignite, which, in turn, heats and ignites other adjacent materials if sufficient oxygen is present. As the objects burn, heated gases accumulate at the ceiling of the room. Some of the gases are flammable and highly toxic.

The spread of the fire from this point continues quickly. Soon, the flammable gases at the ceiling, as well as other combustible material in the room of origin, reach ignition temperature. At that point, an event termed "flashover" occurs; the gases and other material ignite, which, in turn, ignites everything in the room. Once flashover occurs, damage caused by the fire is significant, and the environment within the room can no longer support human life. Flashover usually occurs about 5 to 8 minutes from the appearance of flames in typically-furnished and ventilated buildings. Because flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover occurs.

Although modern codes tend to make fires in newer structures more infrequent, today's energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally ignite more quickly and burn hotter (due to synthetics). In the 1970s, scientists at the National Institute of Standards and Technology found that after a fire broke out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is as short as 3 minutes.[18] The necessity of effective early warning (smoke alarms), early suppression (fire sprinklers), and firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

The prompt arrival of at least four personnel is critical for structure fires. Federal regulations (CFR 1910.120) require that personnel entering a building involved in fire must be in groups of two. Further, before personnel can enter a building to extinguish a fire, at least two personnel must be on-scene and assigned to conduct search and rescue in case the fire attack crew becomes trapped. This is referred to as the two-in, two-out rule.

[18] *National Institute of Standards and Technology, Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings, Bukowski, Richard, et al.*

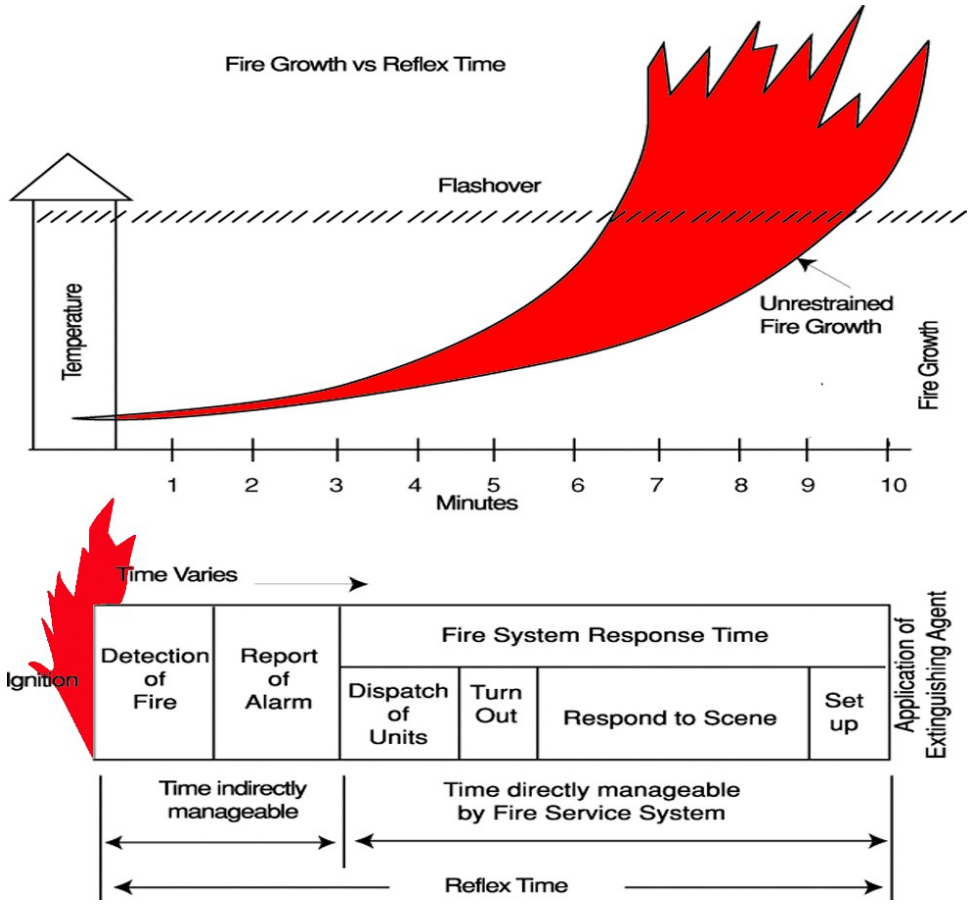
However, if it is *known* that victims are trapped inside the building, a rescue attempt can be performed without additional personnel ready to intervene outside the structure. Further, there is no requirement that all four arrive on the same response vehicle. Many fire departments rely on more than one unit arriving to initiate an interior fire attack.

Perhaps as important as preventing flashover is the need to control a fire before it does damage to the structural framing of a building. Materials used to construct buildings today are often less fire-resistive than the heavy structural skeletons of older frame buildings. Roof trusses and floor joists are commonly made with lighter materials that are more easily weakened by the effects of fire. "Lightweight" roof trusses fail after 5 to 7 minutes of direct flame impingement. Plywood I-beam joists can fail after as little as 3 minutes of flame contact. This creates a dangerous environment for firefighters.

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerates fire spread and increases the amount of water needed to control a fire effectively. All of these factors make the need for early application of water essential to a successful fire outcome.

The following figure illustrates the sequence of events during the growth of a structure fire over time.

Figure 102: Fire Growth versus Reflex Time



As is apparent by this description of the sequence of events, the application of water in time to prevent flashover is a serious challenge for any fire department. It is critical, though, as studies of historical fire losses can demonstrate.

The National Fire Protection Association found that fires contained to the room of origin (typically extinguished prior to or immediately following flashover) had significantly lower rates of death, injury, and property loss when compared to fires that had an opportunity to spread beyond the room of origin (typically extinguished post-flashover). As evidenced in the following figure, fire losses, casualties, and deaths rise significantly as the extent of fire damage increases.

Figure 103: Consequence of Fire Extension in Residential Structures—United States, 2011–2015

Extension	Rates per 1,000 Fires		
	Civilian Deaths	Civilian Injuries	Average Dollar Loss Per Fire
Confined to the room of origin or smaller	1.8	24.8	$4,200
Confined to floor of origin	15.8	81.4	$36,300
Confined to building of origin or larger	24.0	57.6	$67,600

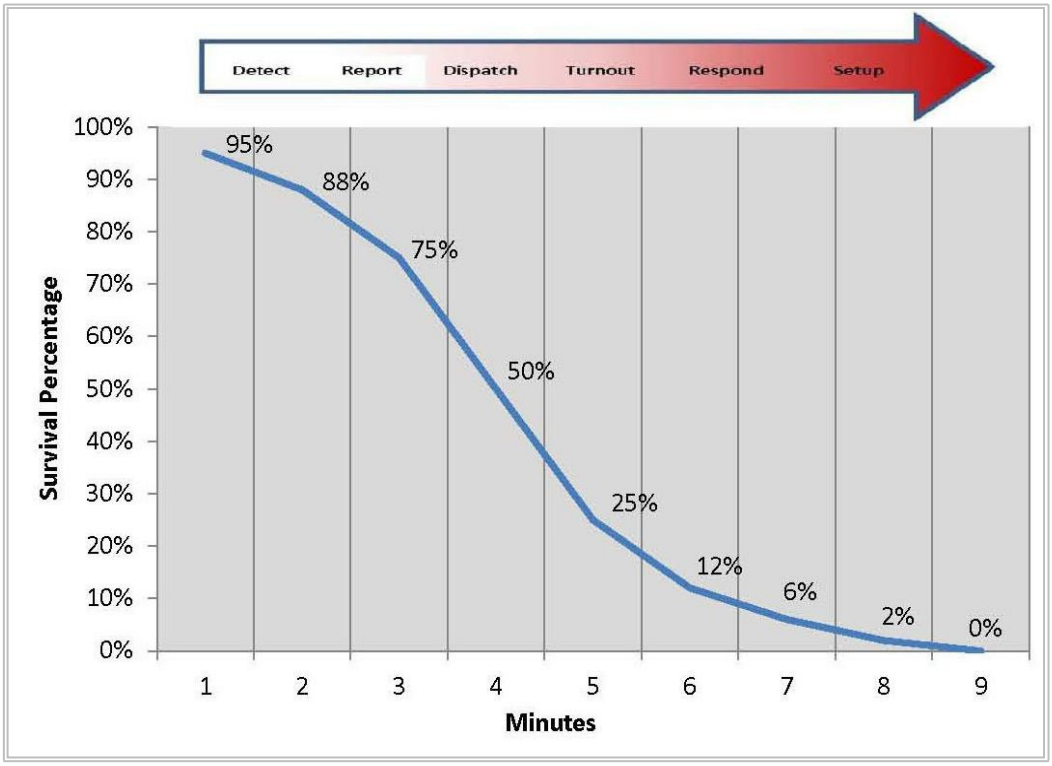
Source: National Fire Protection Association

EMERGENCY MEDICAL EVENT SEQUENCE

Cardiac arrest is the most significant life-threatening medical event in emergency medicine today. A victim of cardiac arrest has mere minutes in which to receive lifesaving care if there is to be any hope for resuscitation. The American Heart Association (AHA) issued a set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims and to increase the likelihood of survival. The AHA guidelines include goals for the application of cardiac defibrillation to cardiac arrest victims. Cardiac arrest survival chances fall by 7 to 10% for every minute between collapse and defibrillation. Consequently, the AHA recommends cardiac defibrillation within 5 minutes of cardiac arrest.

As with fires, the sequence of events that lead to emergency cardiac care can be graphically illustrated, as in the following figure.

Figure 104: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. The stages of medical response are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain medications as a means of improving the opportunity for successful resuscitation and survival.

PEOPLE, TOOLS, AND TIME

Time matters a great deal in the achievement of an effective outcome to an emergency event. Time, however, is not the only factor. Delivering sufficient numbers of properly trained, appropriately equipped personnel within the critical time period completes the equation.

For medical emergencies, this can vary based on the nature of the event. Many medical emergencies are not time critical. However, for serious trauma, cardiac arrest, or conditions that may lead to cardiac arrest, a rapid response is essential.

Equally critical is delivering enough personnel to the scene to perform all of the concurrent tasks required to provide quality emergency care. For a cardiac arrest, this can be up to six personnel; two to perform CPR, two to set up and operate advanced medical equipment, one to record the actions taken by emergency care workers, and one to direct patient care.

Thus, for a medical emergency, the real test of performance is the time it takes to provide the personnel and equipment needed to deal effectively with the patient's condition, not necessarily the time it takes for the first person to arrive.

Fire emergencies are even more resource critical. Again, the true test of performance is the time it takes to deliver sufficient personnel to initiate the application of water to a fire. This is the only practical method to reverse the continuing internal temperature increases and ultimately prevent flashover. The arrival of one person with a portable radio does not provide fire intervention capability and should not be counted as an "arrival" by the fire department.

Overview of Compliance Methodology

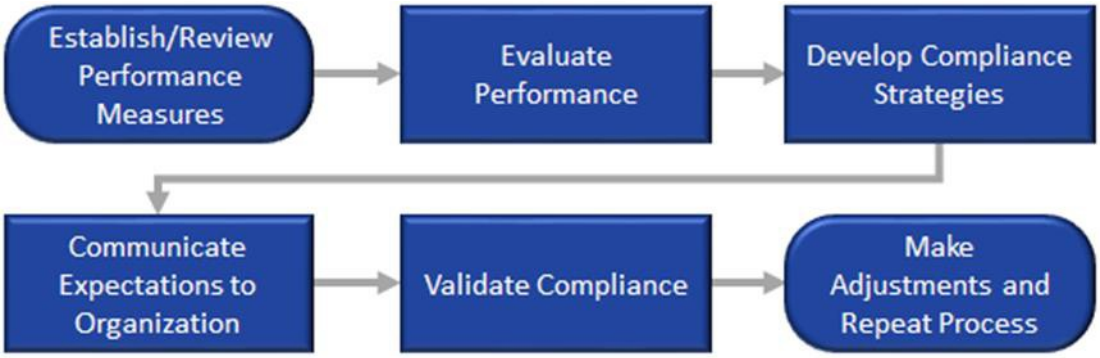
The preceding sections of this report provide a detailed analysis of the historical performance of the Menlo Park Fire Protection District. For this evaluation to prove beneficial to the District and its policymakers, a continual analysis should be performed routinely.

MPFPD is committed to a continual process of analyzing and evaluating actual performance against the adopted Standards of Cover and will enhance the data collection procedures of field operations personnel. A periodic review of the District's records management system reports will be necessary to ensure compliance and reliability of data.

Compliance Model

Compliance is best achieved through a systematic approach. ESCI has identified the following six-step compliance model for the District's consideration.

Figure 105: Six-Step Compliance Model



Phase 1—Establish/Review Performance Measures

Complete the initial Standards of Cover process. Conduct a full review of the performance measures every five years:

- Identify services provided.
- Define levels of service.
- Categorize levels of risk.
- Develop performance objectives and measures:
  - By incident type
  - By geographic demand zone
  - Distribution (first on scene)
  - Concentration (arrival of full first alarm)

Phase 2—Evaluate Performance

Performance measures are applied to the actual service provided:

- System-level
- First-due area level
- Unit level
- Full effective response force (ERF)

Phase 3—Develop Compliance Strategies

Determine issues and opportunities:

- Determine what needs to be done to close the gaps.
- Determine if resources can/should be reallocated.
- Seek alternative methods to provide service at the desired level.
- Develop budget estimates as necessary.
- Seek additional funding commitment as necessary.

Phase 4—Communicate Expectations to Organizations

Communicate expectations:

- Explain the method of measuring compliance to personnel who are expected to perform services.
- Provide feedback mechanisms.
- Define the consequences of noncompliance.

Train personnel:

- Provide appropriate levels of training/direction for all affected personnel.
- Communicate consequences of noncompliance.
- Modify (remediate) business processes, business application systems, and technical infrastructure as necessary to comply.

Phase 5—Validate Compliance

Develop and deploy verification tools and/or techniques that can be used by subsections of the organization on an ongoing basis to verify that they are meeting the requirements:

- Monthly evaluation:
  - Performance by unit
  - Overall performance
  - Review of performance by division/section management
- Quarterly evaluation:
  - Performance by unit
  - Performance by first-due
  - Overall performance
  - Review of performance by executive management

Phase 6—Make Adjustments/Repeat Process

Review changes to ensure that service levels have been maintained or improved. Develop and implement a review program to ensure ongoing compliance:

- Annual review and evaluation:
  - Performance by unit
  - Performance by first-due
  - Overall performance
  - Review of performance by governing body
  - Adjustment of performance standards by governing body as necessary
- Five-year update of Standards of Cover:
  - Performance by unit
  - Performance by first-due
  - Full effective response force
  - Overall performance
  - Adoption of performance measures by the governing body
- Establish management processes to deal with future changes in the MPFPD service area.

Overall Evaluation, Conclusions, and Recommendations

Overall Evaluation

This Community Risk Assessment: Standards of Cover is based on the *CFAI Standards of Cover, 6th Edition.* It required the completion of an intensive analysis of all aspects of the MPFPD deployment policies. The analysis used various tools to review historical performance, evaluate risk, validate response coverage, and define critical tasking and alarm assignments. The analysis relied on the experience of staff officers and their historical perspective combined with historical incident data captured by both the dispatch center and MPFPD's in-house records management system.

The *Description of Community Served* section provided a general overview of the organization, including governance, lines of authority, finance, and capital and human resources, as well as an overview of the service area, including population and geography served. The *Review of Services Provided* section detailed the core services the organization provides based on general resource/asset capability and basic staffing complements.

An overview of community risk was provided to identify the risks and challenges faced by the fire department. Geospatial characteristics, topographic and weather risks, transportation network risks, physical assets, and critical infrastructure were reviewed and then identified as medical incidents, structure fires, and rescues as the primary risks within the community. As a factor of risk, ESCI evaluated community populations and demographics against historical and projected service demand. Population and service demand has increased over the past decade and will continue to increase in the future.

Evaluating risk using advanced geographic information systems (GIS) provided an increased understanding of community risk factors and led to an improved deployment policy.

During the analysis of service level goals, critical tasking assignments were completed for incident types ranging from a basic medical emergency to a high-rise structure fire. Critical tasking required a review of on-scene staffing requirements to mitigate the effects of an emergency. These tasks ultimately determine the resource allocation necessary to achieve successful operation.

The review of historical system performance evaluated each component of the emergency incident sequence. These included call processing, turnout, and travel time. Beyond the response time of the initial arriving units, ESCI evaluated the additional components of concentration and effective response force, reliability, and call concurrency.

The analysis completed during this study revealed many significant findings. These include the following:

- The total response workload has increased by 17.9% over the past seven years.
- The current fire department utilization rate is 91.7 incidents per 1,000 population. This is comparable to similar communities.
- Requests for emergency medical services are 65.3% of all responses.
- Response workload is the highest around Fire Stations 2 and 6.
- Engine 2 is very near 10% utilization (UHU).
- The addition of the second truck company has resulted in the current daily staffing being at the upper limit of the recommended span of control for the one Battalion Chief per shift configuration.
- MPFPD lacks a District-wide program that fully identifies and pre-plans responses to target hazards.
- The amount of time PSC takes to dispatch fire department response units exceeds the MPFPD performance goal and national standards.
- The amount of time that response personnel take to assemble on apparatus and initiate response exceeds the MPFPD performance goal and national standards.
- The amount of time that units spend traveling to an incident exceeds the MPFPD performance goal and national standards.
- MPFPD provided an effective response force to 27 building fires during the study period. It delivered the effective response force to only 9 of those fires within the time defined in the MPFPD performance goals.
- MPFPD is quite dependent on neighboring agencies to deliver an effective response force.
- MPFPD has adopted written financial guidelines and practices.
- Population density is increasing steadily with multiple families living in single-family residences. Training and effective response force assignments should consider difficulties encountered by overcrowding in residences.
- Traffic will continue to increase in the region, impacting MPFPD streets and roadways. Peak traffic times may decrease the MPFPD ability to gather an effective response force within the recommended guidelines.
- Buildings are increasing in vertical size. This will increase the response times to the incident as firefighters must travel vertically before they arrive at the patient or fire location.
- There are numerous large residential structures in the district, some of which lack residential fire sprinklers.
- Natural disasters can occur in the service area. MPFPD should continue to work with the local community to ensure community resilience and preparedness.
- While very few unreinforced masonry buildings still remain, these buildings remain a concern during seismic and fire activity.
- The District's financial statements are audited, and its submission of its Comprehensive Annual Financial Report (CAFR) has resulted in its receipt of the Certificate of Achievement for Excellence in Financial Reporting from the Government Finance Officers Association.
- The District has a detailed calendar for the preparation and adoption of its annual budget.

- The District follows sound business practices accounting for its operations through the use of four major funds; General Fund, US&R Special Revenue Fund, Capital Improvement Projects Fund, and Debt Service Fund.
- The District has established an Apparatus and Equipment Replacement Plan to ensure adequate funds are available for the replacement of apparatus and equipment.
- MPFPD has experienced an average of 6.1% increase in assessed property valuation between FY 17/18 and FY 08/09; increasing from $20,911,498,219 in FY 08/09 to $34,832,408,120 in FY 17/18.
- The CalPERS Classic pension plans were closed to new employees on January 1, 2013. Employees hired after January 1, 2013, are eligible to enroll in the PEPRA plans.

RECOMMENDATIONS

During the course of this study, ESCI identified a number of issues, concerns, and opportunities. The following recommendations are described as goals, and MPFPD should implement them as funding allows. Each will improve MPFPD's ability to provide effective service to the community.

Recommendation A: Continue to maintain adequate cash reserves to provide for emergency purchases or economic downturns.

The Board of Directors should continue to place a high priority on closely monitoring the financial impact of changing economic conditions on the District's ability to maintain service levels, fund infrastructure needs, and maintain sufficient reserve balances. The Board should continue to follow its budget process of requiring recurring expenses to be paid with recurring revenue and to fund deferred compensation amounts annually.

Cost to Implement: Staff Time

Recommendation B: Continue to maintain the apparatus and equipment replacement plan and ensure sufficient funds are available to replace apparatus and equipment.

The Board of Directors should continue with the established policies on the creation and maintenance of various capital expenditure plans and related reserve funds. Planning and setting aside funds for future capital expenditures allows for the replacements to be purchased with minimal impact on the funding for the delivery of services. These funds are currently in various accounting classifications, including "restricted," "committed," and "assigned," and can only be used for the stated purpose as determined by the Board of Directors.

Cost to implement: Staff Time

Recommendation C: Continue to evaluate growth within the District to take advantage of opportunities to use specially designated tax revenues to fund stations or other capital assets.

The Board of Directors should continue to seek alternative revenue sources, including grants or specially designated tax revenues. Funding assistance from any source outside the existing revenue stream reduces stress to improve service, replace apparatus, or build new stations on that existing revenue stream.

Cost to Implement: Staff Time

Recommendation D: Add a second Battalion Chief per shift for a total of three additional Battalion Chiefs.

MPFPD currently staffs each operational shift with one Battalion Chief. The Battalion Chief's duties include coordination of all on-shift response personnel and supervision of response crews, ensuring coverage is balanced across the District, and assuming command of larger incidents. Typically, agencies staff with one Battalion Chief for every five response units. MPFPD's single on-shift Battalion Chief is managing nine response units. Adding a second Battalion Chief will improve overall shift management and enhance the District's effective response force.

Cost to Implement: $978,152

Recommendation E: Implement a standardized program for pre-incident target hazard planning for operations personnel.

Pre-incident planning is designed to provide information for responding personnel to assist with strategies and tactics during an event and provides building familiarization to operations staff. MPFPD should institute a standardized pre-incident target hazard planning program as soon as possible for operations personnel and develop a system to access the plans during an event.

Cost to Implement: Staff Time

Recommendation F: Limit the use of traffic "calming" and other measures that increase travel time.

Speed humps, hard medians, curb extensions, and other measures can slow traffic and improve highway safety—however, these also slow emergency response vehicles.

Cost to Implement: Staff time to develop the plan.

Recommendation G: Work with the cities of Atherton, Menlo Park, and East Palo Alto to designate primary emergency access routes.

The designation and marking of emergency access routes will enhance emergency response times during highly congested commute times.

Cost Implement: Staff time to develop a plan and the cost of street signage.

Recommendation H: Continue to work with the cities of Atherton, Menlo Park, and East Palo Alto to coordinate and, where appropriate, enhance emergency preparedness planning and response efforts.

Where possible, the District should work to eliminate duplication of efforts and provide support to the City's emergency preparedness planning and emergency operations center design and development.

Cost to Implement: Staff time and possible hardware and software upgrades

Recommendation I: Improve the efficiency of response to emergency medical incidents.

MPFPD's current practice is to send a fire engine to all emergency medical incidents regardless of severity. Response protocols should be modified to eliminate fire unit response to low-risk or ambulance-only responses.

Many dispatch centers, including PSC, will query the caller with a standardized list of questions that can differentiate between a life-threatening incident and a non-life-threatening incident, or between emergent and nonemergent. The response (or other alternative) to a medical incident is based on the results of this query.

PSC currently does a complete triage of medical events to determine the degree of life threat posed by the patient's condition. However, MPFPD does not use this information to differentiate the response to a medical event.

Cost to Implement: Staff time to modify response guidelines.

Recommendation J: Review dispatch processes to reduce call processing time.

PSC's call processing times are long as compared to national standards. Current overall call processing times are within 1 minute, 45 seconds, 90% of the time. For fire incidents, it is even longer within 2 minutes, 43 seconds, 90% of the time. National standards (NFPA 1221) recommend that call processing time for most calls should be within 64 seconds, 90% of the time. If medical dispatch triage questions are asked, as is the case here, the time is within 90 seconds, 90% of the time.

PSC often provides a pre-alert to response personnel of an incident; however, this action has some irregularities and is not resulting in better call processing performance. A pre-alert system should notify response personnel of the emergency once the basic nature of the call (EMS, house fire, etc.) and the location are known. This should typically be within the first 10 to 15 seconds of the conversation.

There are computer-based systems that can be implemented that broadcast this information via computer-generated voice to responders that can be integrated into the computer-aided dispatch system. High-performance dispatch centers using this pre-alert process are notifying responders within 30 to 40 seconds, 90% of the time, a significant overall response time savings versus PSC's current performance.

Cost to implement: None unless computer assisted pre-alert is implemented.

Recommendation K: Reduce the turnout time interval.

Turnout time is the period between when dispatchers notify response personnel of the incident and when response crews begin to travel towards the incident location. MPFPD's performance goal for turnout time is currently within 2 minutes, 90% of the time. MPFPD's overall turnout time performance is currently within 2 minutes, 3 seconds, 90% of the time.

National standards (NFPA Standard 1710) specifies turnout time should be within 80 seconds, 90% of the time for fire and special operations incidents and within 60 seconds, 90% of the time for all other incidents. MPFPD should adopt this standard as its own and then take steps to meet it.

A review of fire station design should be conducted to identify and remove impediments to quick response. This can include station alerting systems, pathways from quarters to apparatus, multiple floors of travel to the apparatus bay, and the like.

District management should regularly prepare information that describes current turnout time performance by individual response crews (by shift and by unit). Performance expectations should be reinforced, and periodic monitoring conducted to determine if improvements are being made and sustained. Response personnel should avoid activities that extend turnout times. Response personnel must make serious efforts to improve their turnout time performance for the benefit of the community.

Cost to Implement: Dependent upon the cost of improvements to or modifications of internal pathways for rapid egress.

Recommendation L: Closely monitor the impact of new development on fire department workload.

There exists developable land within MPFPD's service area and areas that can and will be redeveloped to more intense uses. Response workload will increase because of rising population and service utilization rates.

MPFPD should continuously monitor new development and calculate the potential impact each will have on the delivery of service. New workload can be reasonably predicted by applying expected new population against the current utilization rate to determine the expected increase in responses. These increases can be applied to current response units to determine if unit utilization rates are reaching the maximum of 10 percent.

There are two important ways to monitor the system's ability to manage workload. Earlier in this report a discussion of unit hour utilization was made along with current unit hour utilization percentages of response apparatus. As demonstrated, no unit currently exceeds 10% utilization. As units begin to approach 10% utilization consideration should be made to add another unit in that station during periods of high incident activity.

Another way to review capability is to use a process called queueing analysis. This process utilizes probability analysis to determine the number of units needed in each station area to reduce the likelihood that a response unit would not be available to serve an incident to 10% or less. It uses the variables incidents per hour, number of available response units, and average time committed per incident.

Though very useful to this effort, queuing analysis has some limitations. It assumes that customers (incidents) arrive at a constant rate. This is not always true in emergency services. It also assumes that each customer requires an equal amount of time from servers (response units). While the average time committed to an incident was used for service time, some incidents require less or substantially more than the average.

Peak workload periods occur every day of the week. The following figure illustrates workload by station and by time of day during the study period. The workload is based on responses made by each unit assigned to the station.

Figure 106: Incidents by Station and Period of Day, 2018

Station	Incidents 9:00 a.m.–8:59 p.m.	Incidents 9:00 p.m.–8:59 a.m.	Incidents per hour 9:00 a.m.–8:59 p.m.	Incidents per hour 9:00 p.m.–8:59 a.m.
1	764	413	0.17	0.09
2	1793	1010	0.41	0.23
3	391	197	0.09	0.04
4	703	347	0.16	0.08
5	400	187	0.09	0.04
6	846	396	0.19	0.09
77	573	299	0.13	0.07

The following figure illustrates the current deployment (as it exists since the changes made in January 2019) for both daytime (9:00 a.m. to 8:59 p.m.) and nighttime (9:00 p.m. to 8:59 a.m.) based on current station locations and staffing. The figure includes the current and proposed probability of wait analysis based on the current number of stations. No stations exceed the recommended probability of wait; however, this will likely change over time.

Figure 107: Current and Proposed Response Units

Station	Current Units Day	Current Units Night	Current Probability of Wait—Day	Current Probability of Wait—Night
1	2	2	0.2%	0.1%
2	2	2	1.2%	0.4%
3	1	1	3.6%	1.8%
4	1	1	6.4%	3.2%
5	1	1	3.7%	1.7%
6	1	1	7.7%	3.6%
77	2	2	0.1%	0.0%

Cost to Implement: Staff time to conduct analyses.

Recommendation M:

Consider relocating Station 77 to a new site.

MPFFPD is considering relocating Station 77 to a new location near the 1200 block of Willow Road in Menlo Park. Current and proposed first-due coverage was evaluated for both sites to determine if this relocation would provide a benefit.

Figure 108 and Figure 109 compare four-minute travel coverage for both sites.

Figure 108: Current Station 77 4-Minute Travel Coverage

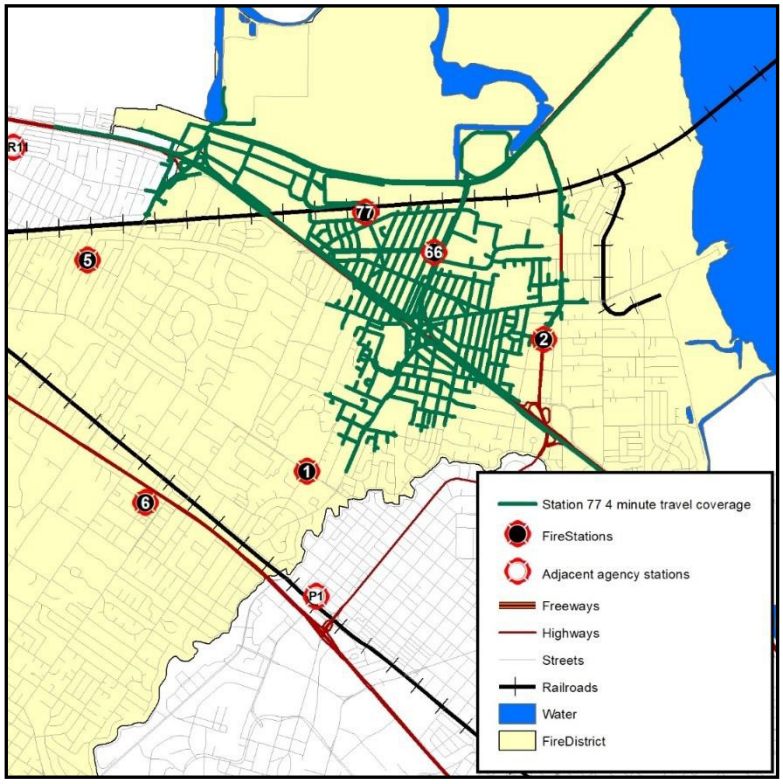
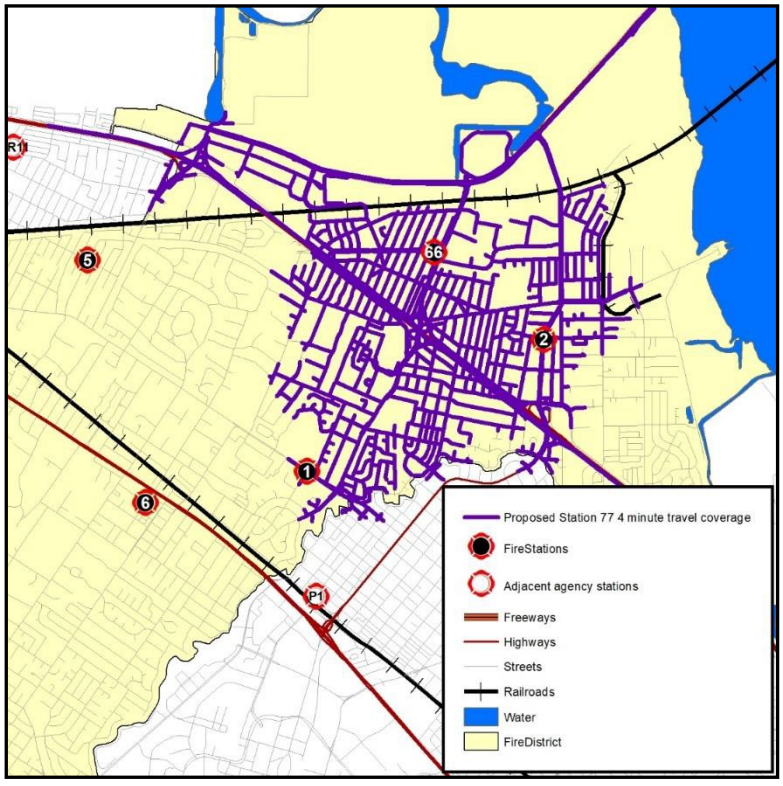


Figure 109: Proposed Station 77 4-Minute Travel Coverage



There is an improvement in first-due coverage, but only in areas already well served by Stations 1 and 2. MPFFPD will need to evaluate the cost of the new location in land and building against the limited improvement in first-due coverage.

Cost to Implement: Dependent on the relocation decision.

Recommendation N: Move Rescue 77 to Station 6.

Rescue 77 was moved to Station 77 in January 2019. Moving this unit to Station 6 will provide a better result for the system. Station 6 is much busier than Station 77. Station 77 sits adjacent to two other stations (1 and 2) that house two response units each.

Moving Rescue 77 to Station 6 will also provide some improvement in the effective response force coverage in the District's southwest area.

Cost to Implement: None.

Appendix A—Hazard Vulnerability Risk Tables

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL

STRUCTURE FIRES

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Moderate Risk Urban	4	3	3	3	3	2	2	**67%**
High Risk Urban	4	4	4	3	3	2	2	**75%**
Moderate Risk Suburban	4	3	3	2	3	2	2	**63%**
High Risk Suburban	4	3	3	3	3	2	2	**67%**
Moderate Risk Rural	4	2	2	2	3	2	2	**54%**
High Risk Rural	4	3	3	3	3	2	2	**67%**
Low Risk Rural	4	2	2	2	2	2	2	**50%**
AVERAGE SCORE	**4.00**	**2.86**	**2.86**	**2.57**	**2.86**	**2.00**	**2.00**	**63%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL

NON-STRUCTURE FIRES

EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
High Risk Urban	4	3	3	3	2	2	3	**67%**
Moderate Risk Urban	4	3	3	2	2	2	3	**63%**
Low Risk Urban	4	3	3	2	2	2	3	**63%**
Urban/Wildland Interface	1	3	1	1	2	3	3	**14%**
AVERAGE SCORE	**3.25**	**3.00**	**2.50**	**2.00**	**2.00**	**2.25**	**3.00**	**50%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
EMS-MEDICAL ASSISTS								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
High Risk	4	3	1	1	1	1	3	**42%**
Moderate Risk	4	3	1	1	1	1	3	**42%**
Low Risk	4	3	1	1	1	1	3	**42%**
AVERAGE SCORE	**1.71**	**1.29**	**0.43**	**0.43**	**0.43**	**0.43**	**1.29**	**42%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
RESCUE								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Rescue - MVA	4	3	1	0	2	1	3	**42%**
Rescue - Structural Collapse	2	3	3	3	3	2	3	**35%**
Rescue - Trench	2	3	1	1	4	2	3	**29%**
Rescue - Low/High Angle	2	3	1	1	4	2	3	**29%**
Rescue - Confined Space	2	3	1	1	4	2	3	**29%**
Rescue - Swiftwater	2	3	1	1	4	2	3	**29%**
Rescue - Stillwater	2	3	1	1	3	2	3	**27%**
Rescue - Ice	0	0	0	0	0	0	0	**0%**
Rescue - Other	2	3	2	1	2	2	3	**27%**
AVERAGE SCORE	**1.71**	**2.57**	**1.00**	**0.86**	**3.00**	**1.71**	**2.57**	**25%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
HAZARDOUS MATERIALS								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
High Risk Hazmat - Urban	2	4	4	4	2	2	2	**38%**
Moderate Risk Hazmat - Urban	2	3	3	3	2	2	2	**31%**
Low Risk Hazmat - Urban	2	2	2	2	2	2	2	**25%**
High Risk Hazmat - Suburban	2	3	4	4	2	2	2	**35%**
Moderate Risk Hazmat - Suburban	2	2	3	3	2	2	2	**29%**
Low Risk Hazmat - Suburban	2	1	2	2	2	2	2	**23%**
High Risk Hazmat - Rural	2	3	4	3	2	2	2	**33%**
Moderate Risk Hazmat - Rural	2	2	3	2	2	2	2	**27%**
Low Risk Hazmat - Rural	2	1	2	1	2	2	2	**21%**
AVERAGE SCORE	2.00	2.00	2.86	2.43	2.00	2.00	2.00	**29%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
NATURALLY OCCURRING EVENTS								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat*
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Tornado	1	2	4	4	2	2	2	**17%**
Severe Thunderstorm	2	2	4	4	2	2	2	**33%**
Snow Fall	0	0	0	0	2	2	2	**0%**
Blizzard	0	0	0	0	2	2	2	**0%**
Ice Storm	0	0	0	0	2	2	2	**0%**
Earthquake	2	3	3	3	2	2	2	**31%**
Tidal Wave	0	0	0	0	2	2	2	**0%**
Temperature Extremes	3	2	3	3	2	2	2	**44%**
Drought	3	2	3	3	2	2	2	**44%**
Flood, External	3	4	4	3	2	2	2	**53%**
Wild Fire	2	1	1	1	2	2	2	**19%**
Landslide	2	2	2	2	2	2	2	**25%**
Dam Inundation	2	4	4	4	2	2	2	**38%**
Volcano	0	0	0	0	3	3	3	**0%**
Epidemic	2	4	4	4	2	2	2	**38%**
AVERAGE SCORE	2.00	2.43	2.57	2.43	2.14	2.14	2.14	**19%**

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
TECHNOLOGIC EVENTS								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 - N/A 1 - Low 2 - Moderate 3 - High 4 - Very High	0 - N/A 1 - Low 2 - Moderate 3 - High 4 - Catastrophic	0 - N/A 1 - Low 2 - Moderate 3 - High 4 - Catastrophic	0 - N/A 1 - Low 2 - Moderate 3 - High 4 - Catastrophic	0 - Very High 1 - High 2 - Moderate 3 - Low 4 - None	0 - Very High 1 - High 2 - Moderate 3 - Low 4 - None	0 - Very High 1 - High 2 - Moderate 3 - Low 4 - None	*0 - 100%*
Electrical Failure	2	2	2	3	1	3	3	29%
Generator Failure	2	2	2	2	2	3	3	29%
Transportation Failure	2	2	2	3	2	2	2	27%
Fuel Shortage	2	3	1	4	3	3	3	35%
Natural Gas Failure	2	3	2	4	3	3	3	38%
Water Failure	2	4	4	4	3	3	3	44%
Sewer Failure	2	3	2	4	3	3	3	38%
Steam Failure	0	0	0	0	0	0	0	0%
Fire Alarm Failure	2	2	2	2	2	2	2	25%
Communications Failure	2	3	2	2	2	2	2	27%
Medical Gas Failure	2	4	1	3	3	3	3	35%
Medical Vacuum Failure	2	4	1	2	3	3	3	33%
HVAC Failure	2	2	2	2	3	3	3	31%
Information Systems Failure	2	3	2	4	3	3	3	38%
Fire, Internal	2	3	4	4	2	2	2	35%
Flood, Internal	2	3	4	4	2	2	2	35%
Hazmat Exposure, Internal	2	3	4	4	2	2	2	35%
Supply Shortage	2	3	2	4	3	3	3	38%
Structural Damage	2	3	4	4	2	2	2	35%
AVERAGE SCORE	2.00	2.86	3.14	3.71	2.43	2.43	2.43	30%

ESCI HAZARD AND VULNERABILITY ASSESSMENT TOOL								
HUMAN RELATED EVENTS								
EVENT	PROBABILITY	SEVERITY = IMPACT - MITIGATION)						RISK
		COMMUNITY IMPACT			MITIGATION CAPACITY			
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	*Relative threat**
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Very High	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = N/A 1 = Low 2 = Moderate 3 = High 4 = Catastrophic	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	0 = Very High 1 = High 2 = Moderate 3 = Low 4 = None	*0 - 100%*
Mass Casualty Incident (trauma)	2	3	1	1	2	2	2	**23%**
Mass Casualty Incident (medical/infectious)	2	3	1	1	2	2	2	**23%**
Terrorism	2	4	3	3	2	2	2	**33%**
VIP Situation	2	3	4	4	2	2	2	**35%**
Infant Abduction	2	3	1	2	3	3	3	**31%**
Hostage Situation	2	4	2	3	3	3	3	**38%**
Civil Disturbance	2	4	4	4	3	3	3	**44%**
Labor Action	2	4	3	4	3	3	3	**42%**
Forensic Admission	2	2	2	2	3	3	3	**31%**
Bomb Threat	2	2	2	2	2	2	2	**25%**
AVERAGE SCORE	2.00	3.14	2.57	3.00	2.71	2.71	3.57	**33%**

Appendix B—Fire Stations/Capital Assets

CAPITAL ASSETS AND IMPROVEMENTS

Three basic resources are required to successfully carry out the mission of a fire department—trained personnel, firefighting equipment, and fire stations. No matter how competent or numerous the firefighters, if appropriate capital equipment is not available for use by responders, it is impossible for a fire department to deliver services effectively. The capital assets that are most essential to the provision of emergency response are facilities and apparatus (response vehicles). The following figures summarize the fire stations operated by the Menlo Park Fire Protection District.

Fixed Facilities

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

Consideration should be given to a fire station's ability to support the jurisdiction's mission as it exists today and into the future. The activities that take place within the fire station should be closely examined to ensure the structure is adequate in both size and function.

ESCI associates conducted walk-through inspections of the District's Administrative Headquarters, fire stations, and fleet maintenance facility. ESCI utilized a standard checklist at each facility inspection.

ESCI paid special attention to the building's location, future use viability in terms of serving the community, and the capability of accommodating an increase in staffing levels and emergency response apparatuses in the future.

Figure 110: Fire Station Condition Definitions

Excellent	Like new condition. No visible structural defects. The facility is clean and well maintained. 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.
Good	The exterior has a good appearance with minor or no defects. Clean lines, good workflow design, and only minor wear of the building interior. Roof and apparatus apron are in good working order, absent any significant full-thickness cracks or crumbling of apron surface or visible roof patches or leaks. Building design and construction match the building's purposes.
Fair	The building appears to be structurally sound with weathered appearance and minor to moderate nonstructural 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.
Poor	The building appears to be cosmetically weathered and worn with potentially structural defects, although not imminently dangerous or unsafe. Large, multiple full-thickness cracks and crumbling of concrete on apron may exist. The roof has evidence of leaking and/or multiple repairs. The interior is poorly maintained or showing signs of advanced deterioration with moderate to significant nonstructural defects. Problematic age-related maintenance and/or major defects are evident. May not be well suited to its intended purpose.

The following figures depict the results of ESCI's inspections:

Figure 111: Menlo Park FPD Fire Station 1

Station Name/Number:	**Menlo Park Station 1**					
Address/Physical Location:	300 Middlefield Road, Menlo Park, CA 94025					
	**General Description:** This station originally housed crews and the District's headquarters staff. The station currently houses an Engine Company, Ladder (quint), and Battalion Chief. To the rear of the station are a classroom and a limited training area. This station needs a fairly extensive remodel.					
Structure						
Construction Type	Ordinary					
Date of Construction	1955					
Seismic Protection	Yes, 1996					
Auxiliary Power	Yes, generator					
General Condition	Fair to poor					
Number of Apparatus Bays	1	Drive-through bays	2	Back-in bays		
Special Considerations (ADA, etc.)	ADA complaint elevator					
Square Footage	11,869					
Facilities Available						
Separate Rooms/Dormitory/Other	9	Bedrooms	10	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	10 line personnel					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes, 4 total					
Training/Meeting Rooms	Yes					
Washer/Dryer	yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes, Biohazard Disposal System					
Security	Parking gates only					
Apparatus Exhaust System	Yes, Plymovent					

Figure 112: Menlo Park FPD Fire Station 2

Station Name/Number:	**Menlo Park Station 2**					
Address/Physical Location:	2290 University Ave, East Palo Alto, CA 94303					
	**General Description:** This station was constructed in 2016, houses an Engine Company, USAR 102, and Tiller Ladder. The station is in excellent shape and should serve the District for many years to come.					
Structure						
Construction Type	Steel Frame Cinder Block – Type II					
Date of Construction	2016					
Seismic Protection	Earthquake Warning System					
Auxiliary Power	Yes Generator					
General Condition	New – Excellent					
Number of Apparatus Bays	3	Drive-through bays			0	Back-in bays
Special Considerations (ADA, etc.)	ADA compliant ramp & elevator					
Square Footage	12,562					
Facilities Available						
Separate Rooms/Dormitory/Other	8	Bedrooms	8	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	8					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Yes					
Apparatus Exhaust System	Yes, Plymovent					

Figure 113: Menlo Park FPD Fire Station 3

Station Name/Number:	**Menlo Park Station 3**					
Address/Physical Location:	32 Almendral Ave, Atherton, CA 94027					
	**General Description:** This station was built in 1998, houses one Engine Company, and, while fairly new, has limited space as constructed for expansion. The District owns property next to this station that could accommodate future expansion.					
Structure						
Construction Type	Ordinary Type 5					
Date of Construction	1998					
Seismic Protection	None					
Auxiliary Power	Generator					
General Condition	Good					
Number of Apparatus Bays	0	Drive-through bays	1	Back-in bays		
Special Considerations (ADA, etc.)	Ada compliant, all ground floor					
Square Footage	3,600					
Facilities Available						
Separate Rooms/Dormitory/Other	3	Bedrooms	3	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	No					
Shower Facilities	Yes					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Yes					
Apparatus Exhaust System	Yes, Plymovent					

Figure 114: Menlo Park FPD Fire Station 4

Station Name/Number:	**Menlo Park Station 4**					
Address/Physical Location:	3322 Alameda de Las Pulgas, Menlo Park, CA 94025					
	**General Description:** This station was constructed in 1949, houses an Engine Company, a Type 5 Brush Engine, and a reserve Engine. The age and design of this station limit future expansion and viability.					
Structure						
Construction Type	Ordinary Type 5					
Date of Construction	1949					
Seismic Protection	Yes					
Auxiliary Power	Generator					
General Condition	Fair to Poor					
Number of Apparatus Bays	0	Drive-through bays	3	Back-in bays		
Special Considerations (ADA, etc.)	No					
Square Footage	4,200					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	4	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	4					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes, 2					
Training/Meeting Rooms	No					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	None					
Apparatus Exhaust System	Yes, Plymovent					

Figure 115: Menlo Park FPD Fire Station 5

Station Name/Number:	**Menlo Park Station 5**					
Address/Physical Location:	4101 Fair Oaks Avenue, Menlo Park, CA 94025					
	**General Description:** This station was built in 1998 and houses one Engine Company. Although it is a bit dated, the station is well maintained. The size of the station limits any expansion.					
Structure						
Construction Type	Ordinary Type 5					
Date of Construction	1998					
Seismic Protection	Yes					
Auxiliary Power	Generator					
General Condition	Goodo					
Number of Apparatus Bays	0	Drive-through bays			1	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	2,900					
Facilities Available						
Separate Rooms/Dormitory/Other	3	Bedrooms	3	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	3					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes, 3					
Training/Meeting Rooms	0					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	No					
Apparatus Exhaust System	Yes, Plymovent					

Figure 116: Menlo Park FPD Fire Station 6

Station Name/Number:	**Menlo Park Station 6**					
Address/Physical Location:	700 Oak Grove Avenue, Menlo Park, CA 94025					
	**General Description:** This state-of-the-art fire station was built in 2018, houses one Engine Company and the Fire District museum. While the station is state-of-the-art, its size and location limit future expansion for other than an additional Shift Battalion Chief.					
Structure						
Construction Type	Steel Frame, Masonry					
Date of Construction	2018					
Seismic Protection	Yes					
Auxiliary Power	Yes					
General Condition	Excellent/New					
Number of Apparatus Bays	1	Drive-through bays	1	Back-in bays		
Special Considerations (ADA, etc.)	Compliant; elevator					
Square Footage	8,335					
Facilities Available						
Separate Rooms/Dormitory/Other	6	Bedrooms	6	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	6					
Exercise/Workout Facilities	Yes					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes					
Training/Meeting Rooms	Yes					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Yes					
Apparatus Exhaust System	Yes, Plymovent					

Figure 117: Menlo Park FPD Fire Station 77

Station Name/Number:	**Menlo Park Station 77**
Address/Physical Location:	1467 Chilco St., Menlo Park, CA 94025
	**General Description:** This station was built in 1998, houses an Engine Company, staffed Rescue, and the District's water Rescue program, along with mechanical shops to the rear. The size and age of this station limit its ability to meet the expanding needs of the area.

Structure						
Construction Type	Ordinary Type 5					
Date of Construction	1998					
Seismic Protection	No					
Auxiliary Power	Generator					
General Condition	Good					
Number of Apparatus Bays	1	Drive-through bays			1	Back-in bays
Special Considerations (ADA, etc.)	No					
Square Footage	4,400					
Facilities Available						
Separate Rooms/Dormitory/Other	4	Bedrooms	5	Beds	0	Beds in dormitory
Maximum Station Staffing Capability	5					
Exercise/Workout Facilities	Apparatus floor					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	Yes					
Shower Facilities	Yes 2					
Training/Meeting Rooms	Not in the station – rear building					
Washer/Dryer	Yes					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	Yes					
Security	Yes					
Apparatus Exhaust System	Yes, Plymovent					

Figure 118: Menlo Park FPD Administration

Station Name/Number:	**Menlo Park Administration Building**					
Address/Physical Location:	170 Middlefield Road, Menlo Park, CA 94025					
	**General Description:** Based on ESCI's observations, the District has outgrown the available space of this facility. In fact, some of the administrative staff are being housed in a District-owned structure to the rear of the Administrative Building.					
Structure						
Construction Type	Ordinary Type 5					
Date of Construction	2009					
Seismic Protection	Yes					
Auxiliary Power	Generator					
General Condition	Good					
Number of Apparatus Bays	0	Drive-through bays	0	Back-in bays		
Special Considerations (ADA, etc.)	Compliant elevator					
Square Footage	6,094					
Facilities Available						
Separate Rooms/Dormitory/Other	0	Bedrooms	0	Beds	0	Beds in dormitory
Maximum Station Staffing Capability						
Exercise/Workout Facilities	No					
Kitchen Facilities	Yes					
Individual Lockers/Storage Assigned	some					
Shower Facilities	Yes, 1					
Training/Meeting Rooms	Yes, 1					
Washer/Dryer	No					
Safety & Security						
Sprinklers	Yes					
Smoke Detection	Yes					
Decontamination/Biohazard Disposal	No					
Security	Yes cameras & card ley*					
Apparatus Exhaust System	No					

Facilities Summary

The eight facilities (fire stations) range in age from 70 to 1 years old. Several have undergone varying levels of remodel/upgrades since their construction date and, some stations need expansion. Due to the size of the stations' footprint on the lots, expansion is limited or not possible.

Although all structures require routine maintenance, fire stations require even more because they are staffed with three or more firefighters operating 24 hours per day. In addition to the routine maintenance needs, there are safety standards that should be reviewed. For example, there are diesel emission removal systems within each station however, their effectiveness is compromised by doors from living areas to the apparatus bays being propped open. In addition, some of the stations have their workout areas within the apparatus bays and are exposed to diesel exhaust.

Stations have a minimum of two to a maximum of four shower facilities. The majority of the fire stations are ADA compliant except for Station 4, constructed in 1949, Stations 5 and 77, both constructed in 1998.

A positive *and impressive* note is that despite many of the stations being aged and some in need of repair or update(s), personnel display a true sense of pride in what they have.

In summary, of the eight facilities inspected, one of which is the Administration Headquarters, two stations were ranked as "excellent or excellent/new," four were ranked "good," and two were ranked as "fair to poor" condition. Five of the stations have seismic protection, with two of those stations having an Earthquake Warning System.