

Office of the City Manager

## **REVISED AGENDA MATERIAL for Supplemental Packet 2**

**Meeting Date:** April 19, 2022

**Item Number:** 01

**Item Description:** Fire Department Standards of Coverage and Community Risk Assessment Study

**Submitted by:** Abraham Roman, Fire Chief

Adjustments to PowerPoint slide deck:

Slide 6, Bullet 5 – Minor language change

Slide 34, Bullet 3 – Minor language change

Slide 35, Bullet 3 – Added reference to MIP program

Slide 36, Bullet 3 – Modified language to help quantify the impact to the City

# Standards of Cover and Community Risk Assessment Study Mid-Project Briefing

**City of Berkeley Fire Department**

April 6, 2022

# Today's Briefing

- Understand the analysis work conducted
- Review deployment findings and recommendations
- Questions, public comment, and Council discussion

# Risk Assessment

# Values at Risk

- **People**
  - Resident population: +/- **119,619**
  - Daytime population: +/- **144,863 (+21%)**
  - **2040 forecast: 141,000 (+18%)**
- **Buildings**
  - More than **51,000** residential housing units
- **Economic resources**
  - +/- **7,000** businesses
  - +/- **98,000** employees
- Many infrastructure **critical facilities**
- Many **cultural, historic, and natural** resources



# Berkeley Fire Department Map 2a Population Density By Block Group

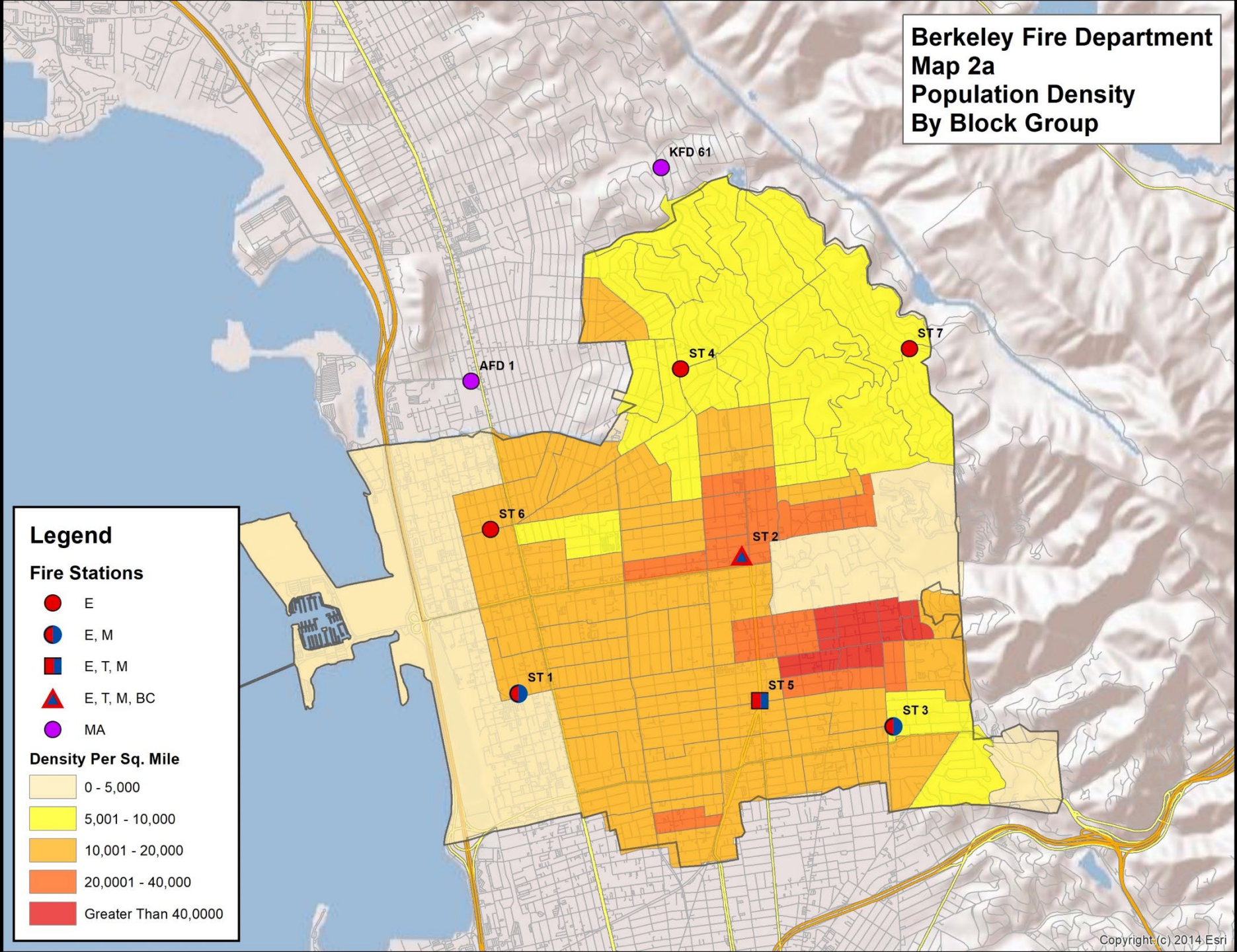
**Legend**

**Fire Stations**

- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA

**Density Per Sq. Mile**

- 0 - 5,000
- 5,001 - 10,000
- 10,001 - 20,000
- 20,0001 - 40,000
- Greater Than 40,000



# Risk Assessment Methodology

- Identify/quantify key **values at risk** by fire station area
- Identify **hazards to be evaluated** related to Berkeley services
- Determine **probability** of a hazard occurrence
  - Based on prior service demand by hazard type
- Identify *probable* **impact severity** of a hazard occurrence
- Determine **overall risk** by hazard and station district
  - Based on *probability of occurrence and impact severity*

# Risk Assessment Impact Severity

Impact Severity Category	Characteristics
Insignificant	<ul style="list-style-type: none"> <li>• No injuries or fatalities</li> <li>• No to few persons displaced for short duration</li> <li>• Little or no personal support required</li> <li>• None to inconsequential damage</li> <li>• None to minimal community disruption</li> <li>• No measurable environmental impacts</li> <li>• None to minimal financial loss</li> <li>• No wildland Fire Hazard Severity Zones (FHSZs)</li> </ul>
Minor	<ul style="list-style-type: none"> <li>• Few injuries; no fatalities; minor medical treatment only</li> <li>• Some displacement of persons for less than 24 hours</li> <li>• Some personal support required</li> <li>• Some minor damage</li> <li>• Minor community disruption of short duration</li> <li>• Small environmental impacts with no lasting effects</li> <li>• Minor financial loss</li> <li>• No wildland FHSZs</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• Medical treatment required; some hospitalizations; few fatalities</li> <li>• Localized displacement of persons for fewer than 24 hours</li> <li>• Personal support satisfied with local resources</li> <li>• Localized damage</li> <li>• Normal community functioning with some inconvenience</li> <li>• No measurable environmental impacts with no long-term effects, or small impacts with long-term effect</li> <li>• Moderate financial loss</li> <li>• Less than 25% of area in <i>Moderate</i> or <i>High</i> wildland FHSZs</li> </ul>
Major	<ul style="list-style-type: none"> <li>• Extensive injuries; significant hospitalizations; many fatalities</li> <li>• Large number of persons displaced for more than 24 hours</li> <li>• External resources required for personal support</li> <li>• Significant damage</li> <li>• Significant community disruption; some services not available</li> <li>• Some impact to environment with long-term effects</li> <li>• Major financial loss with some financial assistance required</li> <li>• More than 25% of area in <i>Moderate</i> or <i>High</i> wildland FHSZs; less than 25% in <i>Very High</i> wildland FHSZs</li> </ul>
Catastrophic	<ul style="list-style-type: none"> <li>• Large number of severe injuries requiring hospitalization; significant fatalities</li> <li>• General displacement for extended duration</li> <li>• Extensive personal support required</li> <li>• Extensive damage</li> <li>• Community unable to function without significant external support</li> <li>• Significant impact to environment and/or permanent damage</li> <li>• Catastrophic financial loss; unable to function without significant support</li> <li>• More than 50% of area in <i>High</i> wildland FHSZs; more than 25% of area in <i>Very High</i> wildland FHSZs</li> </ul>



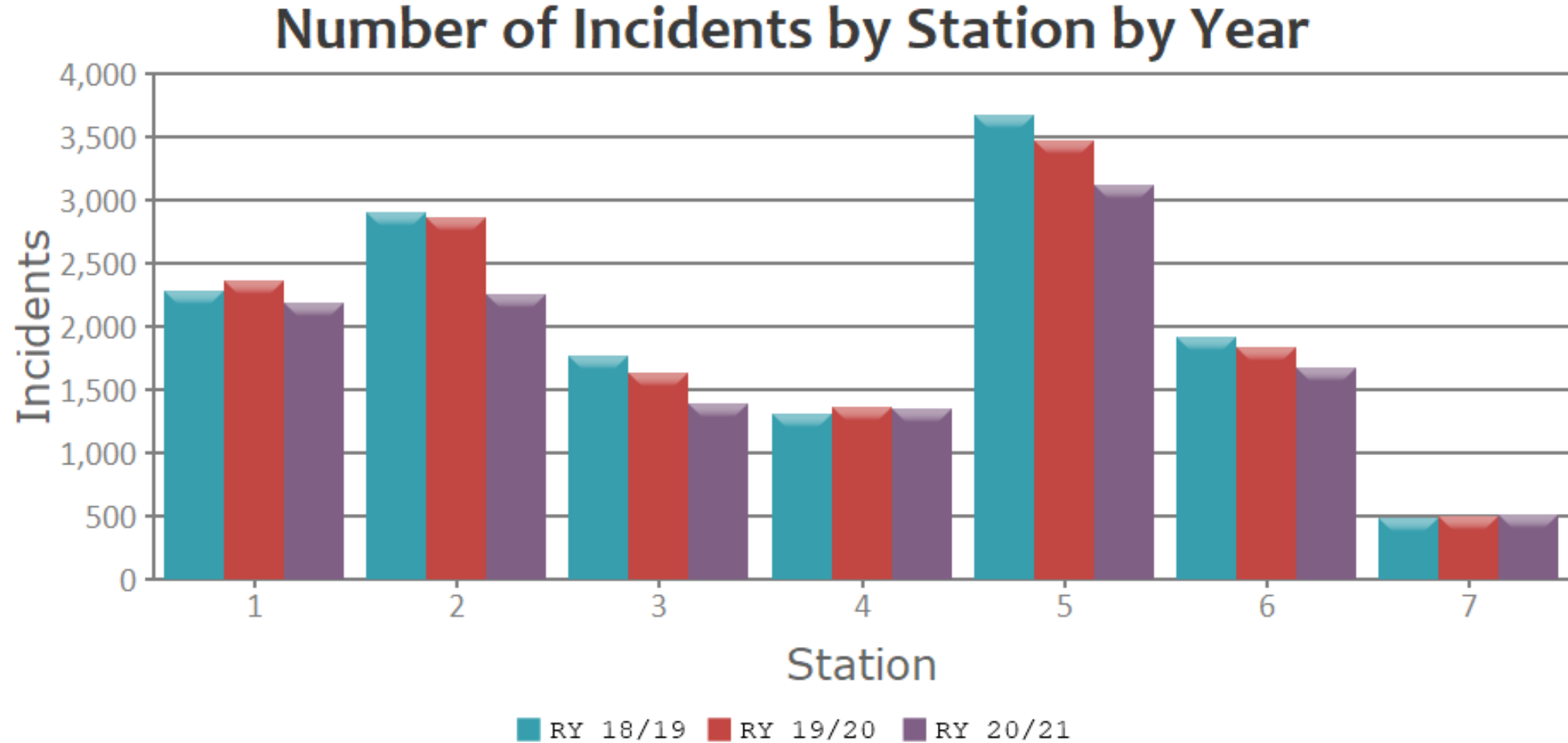
# Summary Risk Analysis

Hazard		Risk Planning Zone						
		Sta. 1	Sta. 2	Sta. 3	Sta. 4	Sta. 5	Sta. 6	Sta. 7
1	Building Fire	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
2	Vegetation/Wildland Fire	Low	Extreme	Extreme	Extreme	Moderate	Low	Extreme
3	Medical Emergency	High	High	High	High	High	High	High
4	Hazardous Materials	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
5	Technical Rescue	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low
6	Marine Incident	Moderate	Low	Low	Low	Low	Moderate	Low

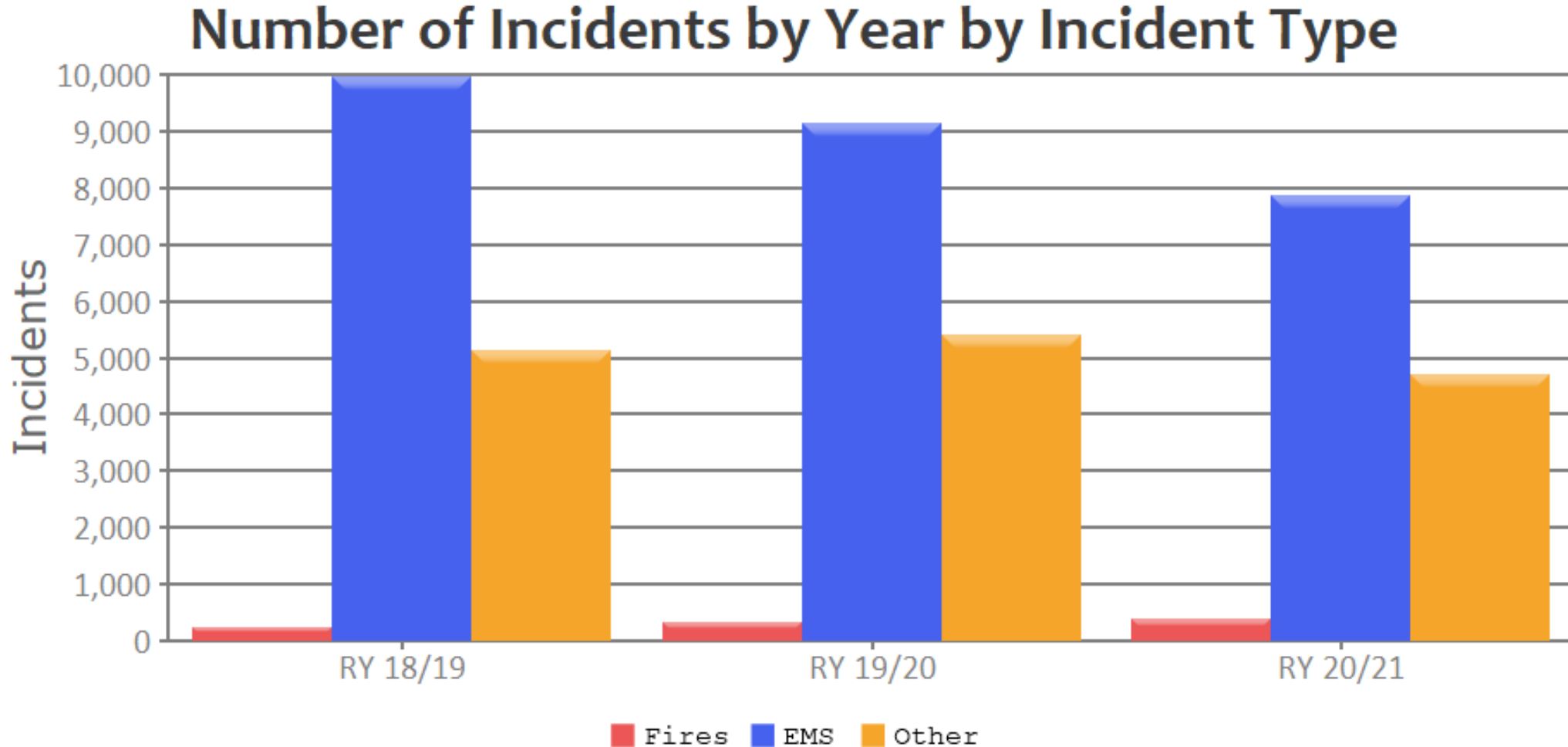


# Service Demand

# Service Demand by Station by Year



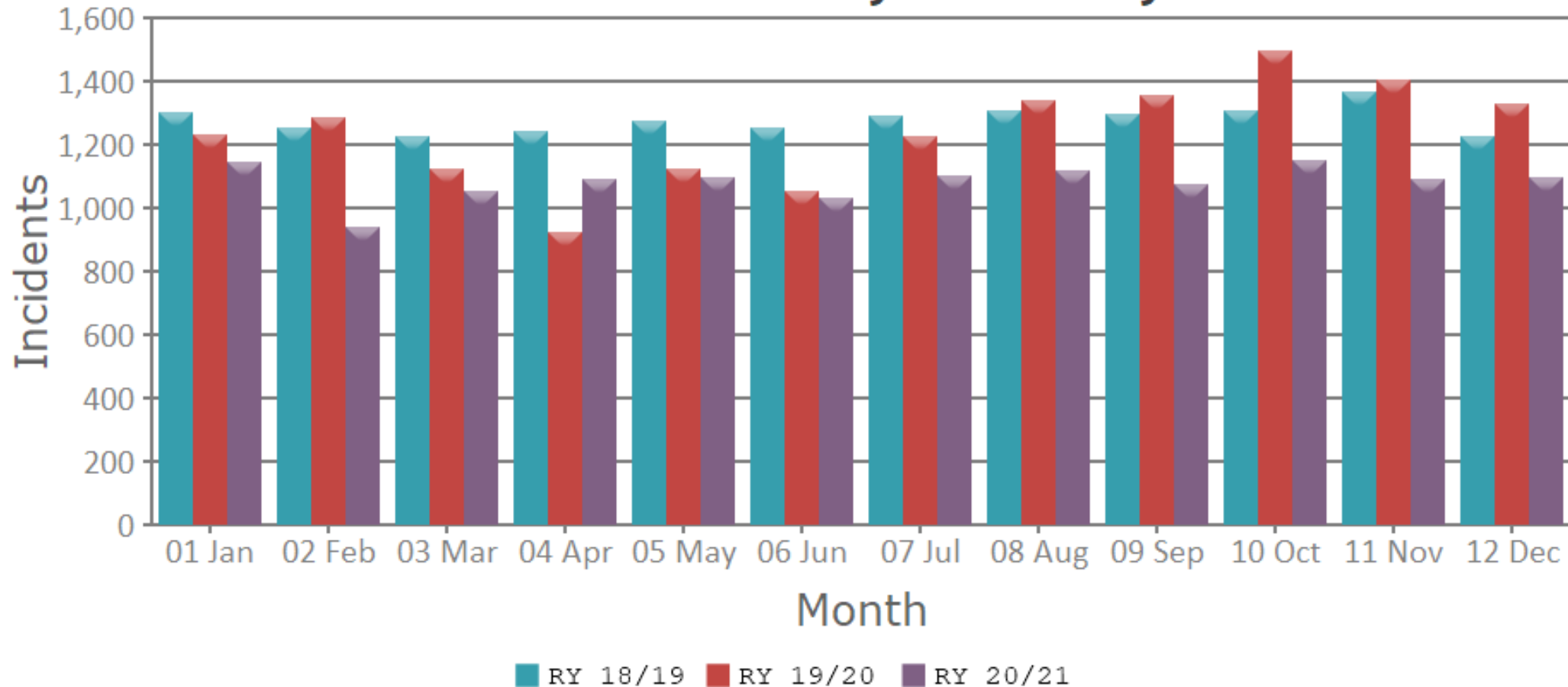
# Service Demand by Incident Type





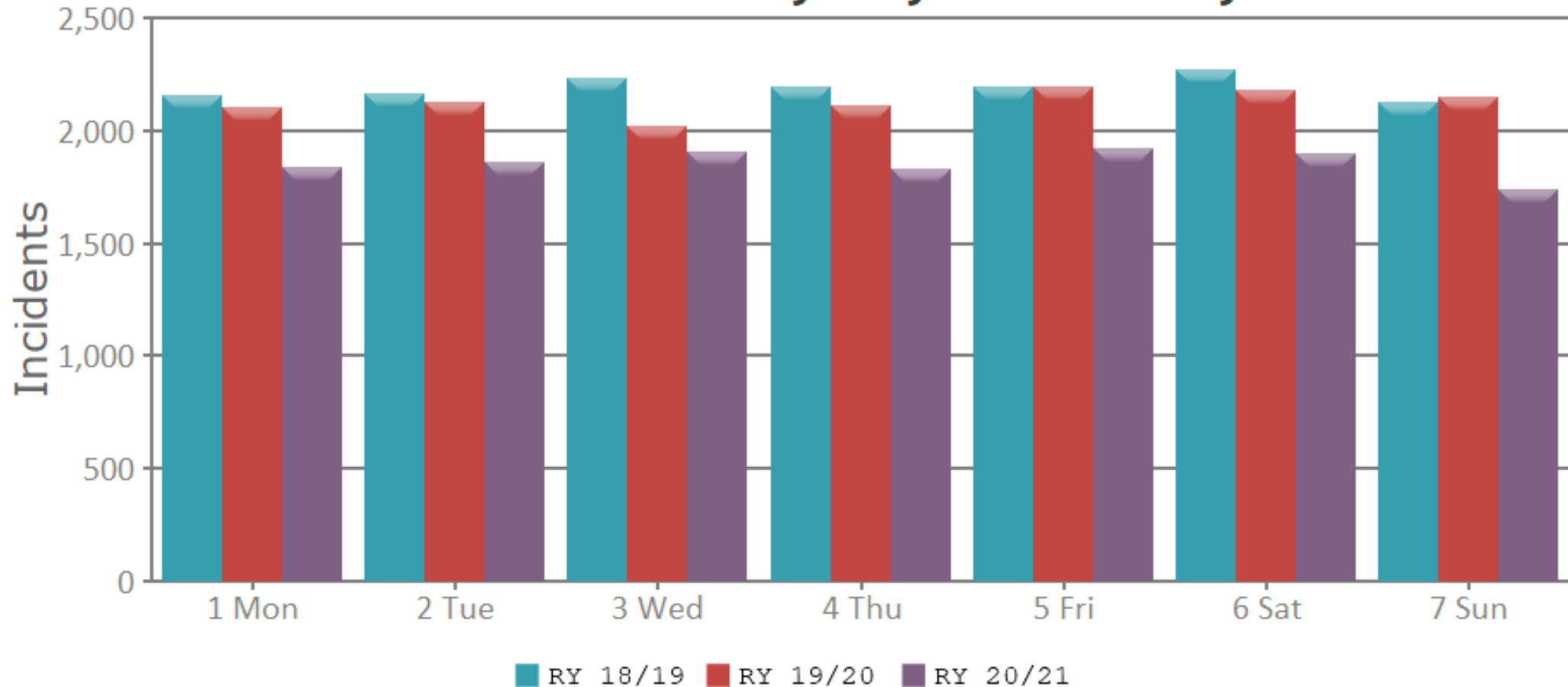
# Service Demand by Month

## Number of Incidents by Month by Year

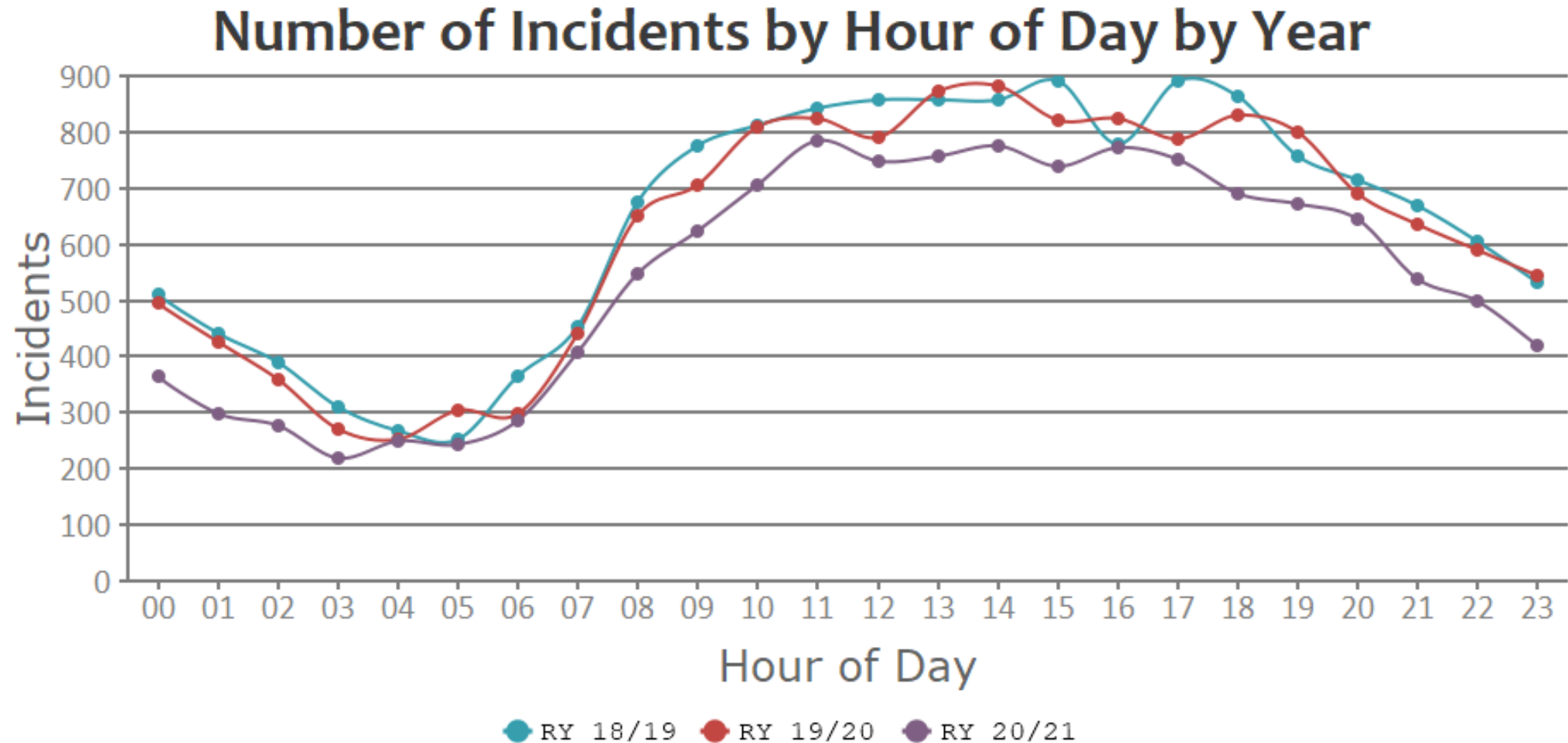


# Service Demand by Day of Week

## Number of Incidents by Day of Week by Year



# Service Demand by Time of Day



# Station Demand by Hour of Day (2020/21)

Hour	Station 5	Station 1	Station 2	Station 6	Station 4	Station 3	Station 7
00:00	21.74%	11.41%	16.63%	7.31%	8.65%	10.09%	0.20%
01:00	28.69%	7.89%	12.51%	11.30%	4.72%	9.36%	3.37%
02:00	16.63%	9.43%	9.42%	11.91%	7.34%	7.92%	1.89%
03:00	12.94%	5.73%	12.75%	6.95%	8.09%	4.70%	2.06%
04:00	11.73%	13.08%	10.10%	10.18%	6.15%	6.81%	1.69%
05:00	18.04%	6.47%	12.14%	4.66%	9.92%	4.62%	2.21%
06:00	10.51%	13.17%	9.45%	14.55%	8.50%	5.18%	2.89%
07:00	26.58%	23.15%	23.63%	13.70%	14.34%	8.93%	6.29%
08:00	31.99%	32.88%	22.55%	16.48%	21.16%	12.99%	8.69%
09:00	50.11%	34.29%	27.28%	20.21%	22.31%	11.88%	4.35%
10:00	51.53%	40.86%	34.06%	20.78%	21.47%	15.59%	8.74%
11:00	58.42%	35.57%	41.15%	30.88%	25.81%	21.49%	6.69%
12:00	49.57%	33.68%	32.07%	26.06%	23.79%	17.48%	5.85%
13:00	51.45%	41.97%	32.32%	23.90%	31.00%	24.68%	5.00%
14:00	51.21%	38.36%	31.16%	30.24%	30.13%	16.52%	10.40%
15:00	42.32%	33.61%	29.72%	29.15%	18.03%	16.48%	6.96%
16:00	52.54%	34.13%	30.53%	27.48%	25.85%	18.63%	10.64%
17:00	41.14%	33.18%	36.27%	21.31%	19.09%	18.21%	8.04%
18:00	32.67%	30.22%	30.25%	22.83%	18.58%	17.90%	10.74%
19:00	34.88%	28.75%	25.35%	26.03%	21.19%	15.74%	8.21%
20:00	26.52%	29.77%	24.02%	20.44%	16.03%	14.12%	7.31%
21:00	33.19%	19.78%	20.77%	17.04%	10.90%	13.61%	6.10%
22:00	26.09%	20.26%	17.93%	12.35%	8.98%	12.54%	4.79%
23:00	17.09%	18.52%	13.91%	17.47%	12.53%	8.43%	3.85%



# Unit-Hour Utilization – Engines (2020/21)

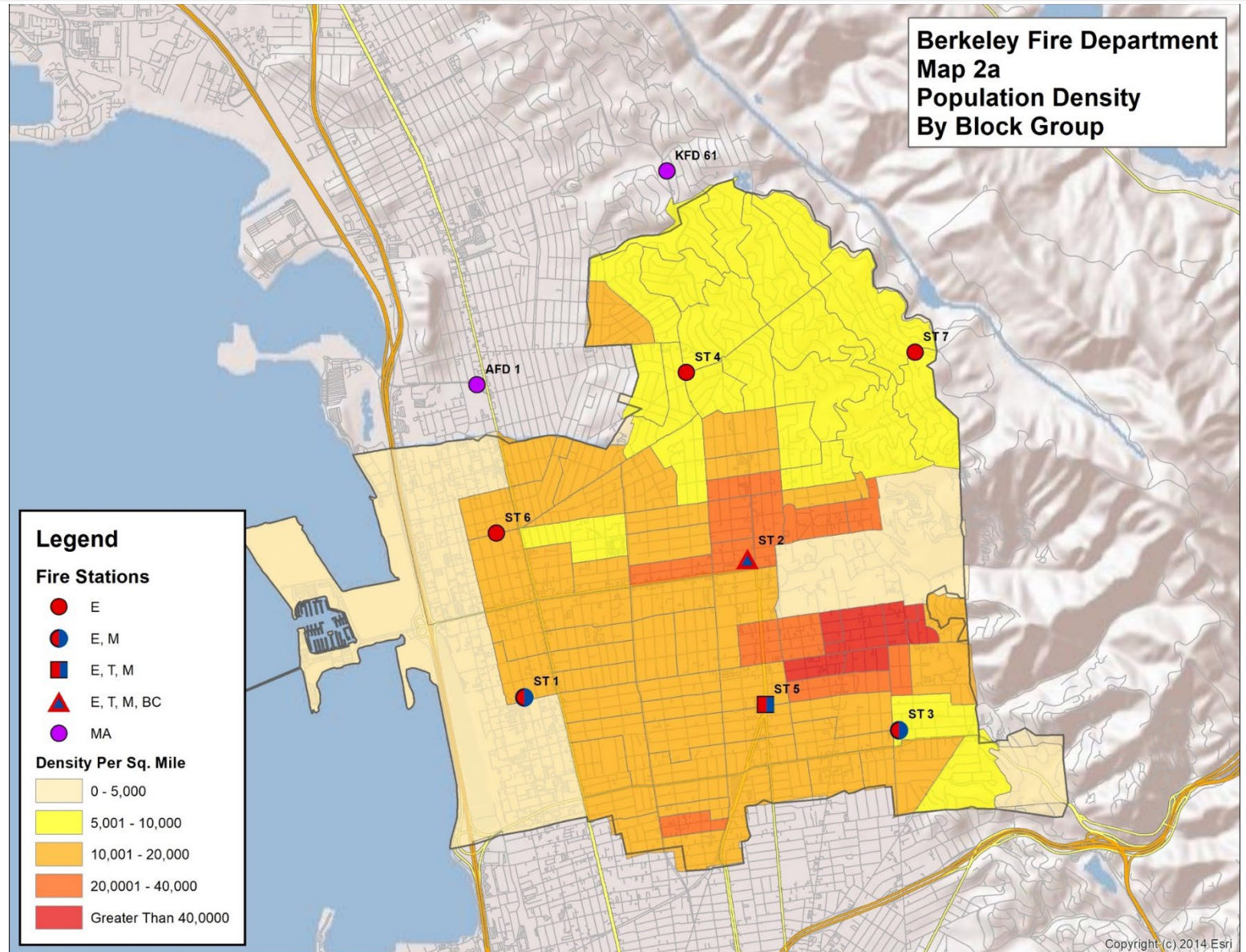
Hour	Engine 5	Engine 1	Engine 2	Engine 6	Engine 4	Engine 3	Engine 7
00:00	23.23%	15.11%	17.16%	9.62%	10.14%	11.33%	0.58%
01:00	25.88%	10.21%	15.51%	11.19%	6.41%	9.09%	3.37%
02:00	18.81%	12.81%	10.79%	11.12%	9.66%	7.74%	3.56%
03:00	13.47%	6.63%	12.40%	6.71%	7.76%	4.40%	2.06%
04:00	11.55%	13.59%	10.26%	10.62%	7.61%	7.62%	1.69%
05:00	15.01%	6.44%	7.62%	3.69%	9.87%	4.93%	2.59%
06:00	11.08%	19.01%	10.05%	9.78%	13.02%	5.63%	3.00%
07:00	25.01%	21.97%	20.84%	18.37%	13.97%	8.97%	6.10%
08:00	30.47%	31.19%	22.80%	20.58%	20.92%	13.10%	5.44%
09:00	38.00%	31.75%	22.75%	28.75%	21.67%	14.57%	5.65%
10:00	41.58%	42.32%	28.32%	23.47%	25.77%	19.88%	11.49%
11:00	52.86%	31.20%	35.07%	41.62%	28.02%	23.70%	7.28%
12:00	49.05%	28.41%	31.70%	34.37%	20.78%	18.56%	9.29%
13:00	53.48%	43.37%	30.66%	31.32%	31.70%	29.91%	7.95%
14:00	45.24%	43.90%	39.12%	34.42%	36.53%	25.40%	15.68%
15:00	38.09%	38.93%	32.49%	31.93%	20.30%	18.31%	7.38%
16:00	47.27%	34.35%	34.50%	28.96%	22.18%	20.99%	12.14%
17:00	44.46%	33.94%	34.26%	22.25%	22.90%	20.69%	8.62%
18:00	32.84%	31.45%	30.75%	22.85%	23.40%	20.74%	11.46%
19:00	29.80%	30.92%	25.06%	29.59%	21.39%	18.51%	10.09%
20:00	25.59%	32.76%	23.66%	24.96%	20.72%	15.76%	9.20%
21:00	29.23%	20.37%	20.49%	18.23%	12.64%	12.76%	6.77%
22:00	26.99%	21.79%	16.67%	12.63%	9.51%	12.90%	4.69%
23:00	19.81%	24.27%	15.45%	21.47%	16.11%	8.64%	3.85%

# Unit-Hour Utilization – Ladder Trucks (2020/21)

Hour	Truck 5	Truck 2
00:00	6.87%	5.07%
01:00	4.84%	4.42%
02:00	4.63%	3.45%
03:00	1.68%	1.41%
04:00	3.10%	3.53%
05:00	1.95%	2.76%
06:00	4.25%	6.36%
07:00	3.96%	7.08%
08:00	7.73%	11.87%
09:00	20.38%	14.38%
10:00	24.35%	18.19%
11:00	26.10%	15.98%
12:00	14.58%	13.39%
13:00	23.15%	20.47%
14:00	20.43%	13.91%
15:00	16.57%	12.32%
16:00	22.90%	13.25%
17:00	24.16%	12.88%
18:00	14.36%	13.44%
19:00	11.24%	8.43%
20:00	9.11%	11.14%
21:00	6.00%	6.70%
22:00	6.74%	7.34%
23:00	4.05%	8.37%

# Unit-Hour Utilization – Ambulances (2020/21)

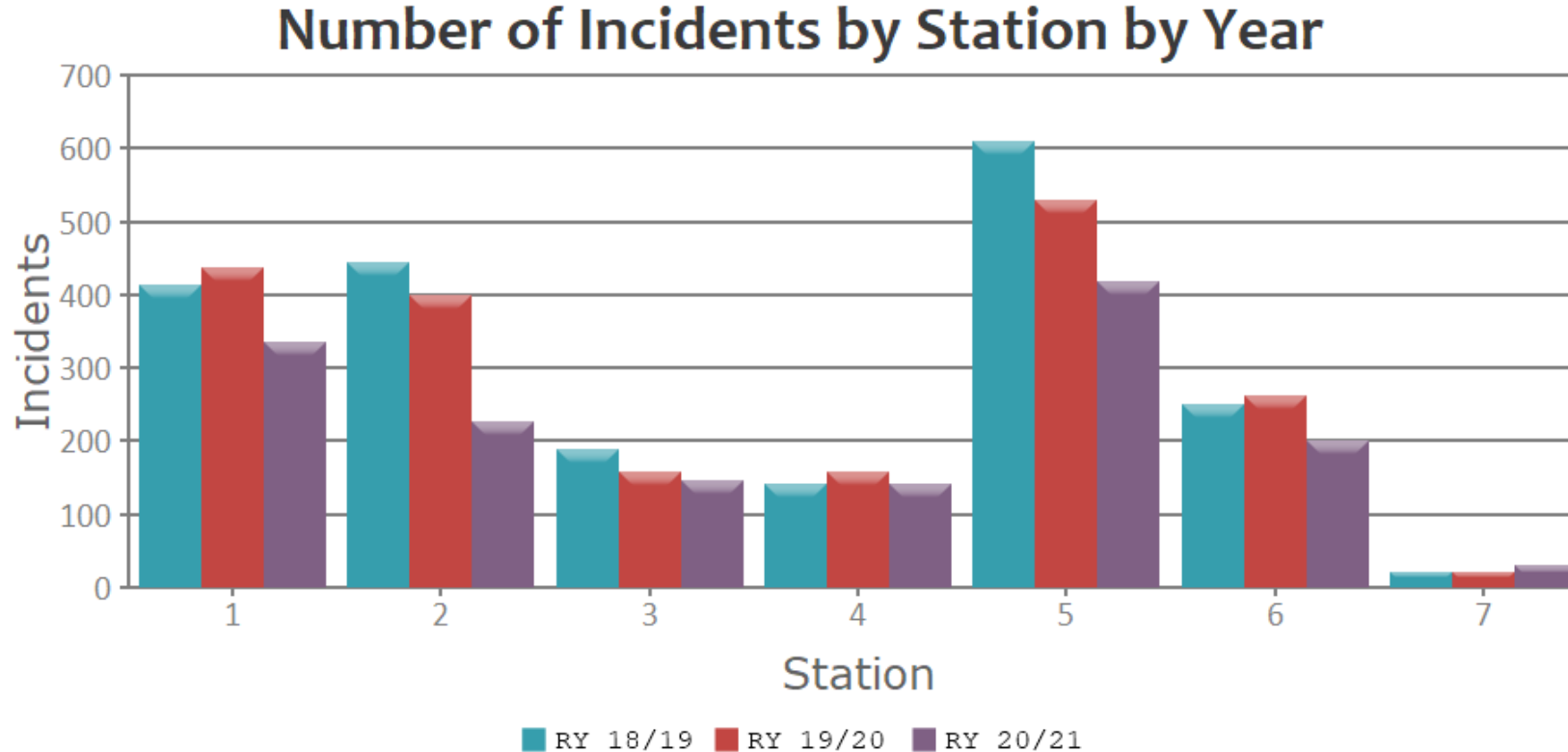
Hour	M5	M2	M1	M3
00:00	22.87%	17.48%	12.56%	9.32%
01:00	22.85%	15.75%	19.46%	9.27%
02:00	17.34%	16.40%	17.53%	7.35%
03:00	13.61%	16.98%	10.92%	4.04%
04:00	8.71%	14.86%	18.86%	6.86%
05:00	13.06%	14.24%	8.26%	3.46%
06:00	8.95%	13.17%	16.14%	2.94%
07:00	25.50%	34.83%	33.70%	12.56%
08:00	48.33%	29.77%	33.16%	15.43%
09:00	44.71%	39.61%	38.97%	27.70%
10:00	48.82%	45.75%	42.94%	33.54%
11:00	51.40%	60.08%	41.92%	34.01%
12:00	49.60%	55.48%	42.34%	27.61%
13:00	51.46%	44.70%	54.43%	42.82%
14:00	65.37%	47.39%	56.38%	36.85%
15:00	45.36%	37.26%	52.01%	28.99%
16:00	52.28%	54.10%	44.79%	36.74%
17:00	41.93%	46.57%	42.89%	27.86%
18:00	48.24%	46.87%	35.45%	25.95%
19:00	31.61%	34.82%	42.09%	19.44%
20:00	30.19%	34.40%	38.01%	15.91%
21:00	22.49%	30.65%	26.78%	17.02%
22:00	26.16%	22.41%	23.65%	11.37%
23:00	21.09%	26.63%	25.70%	6.88%





# Simultaneous Incident Activity

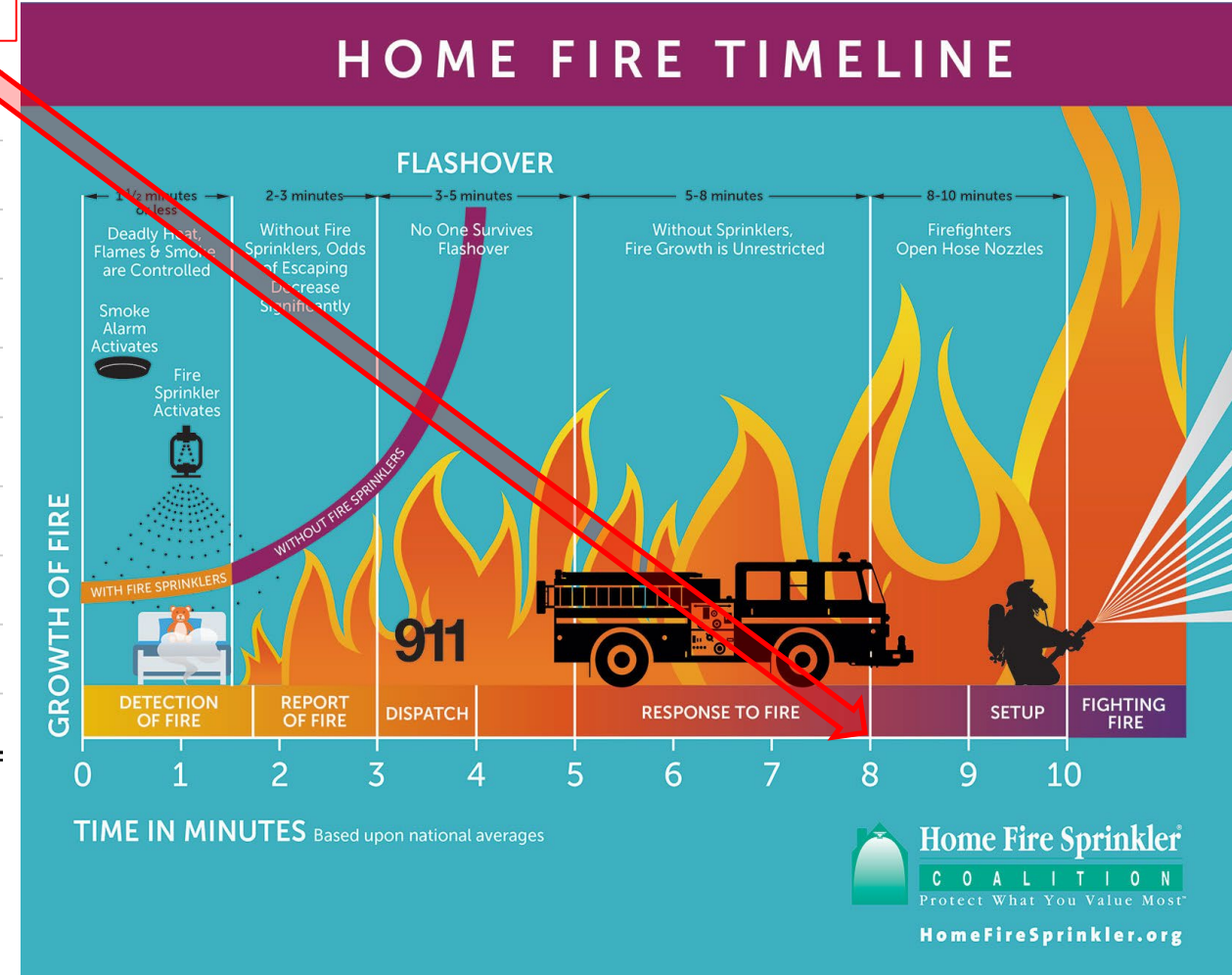
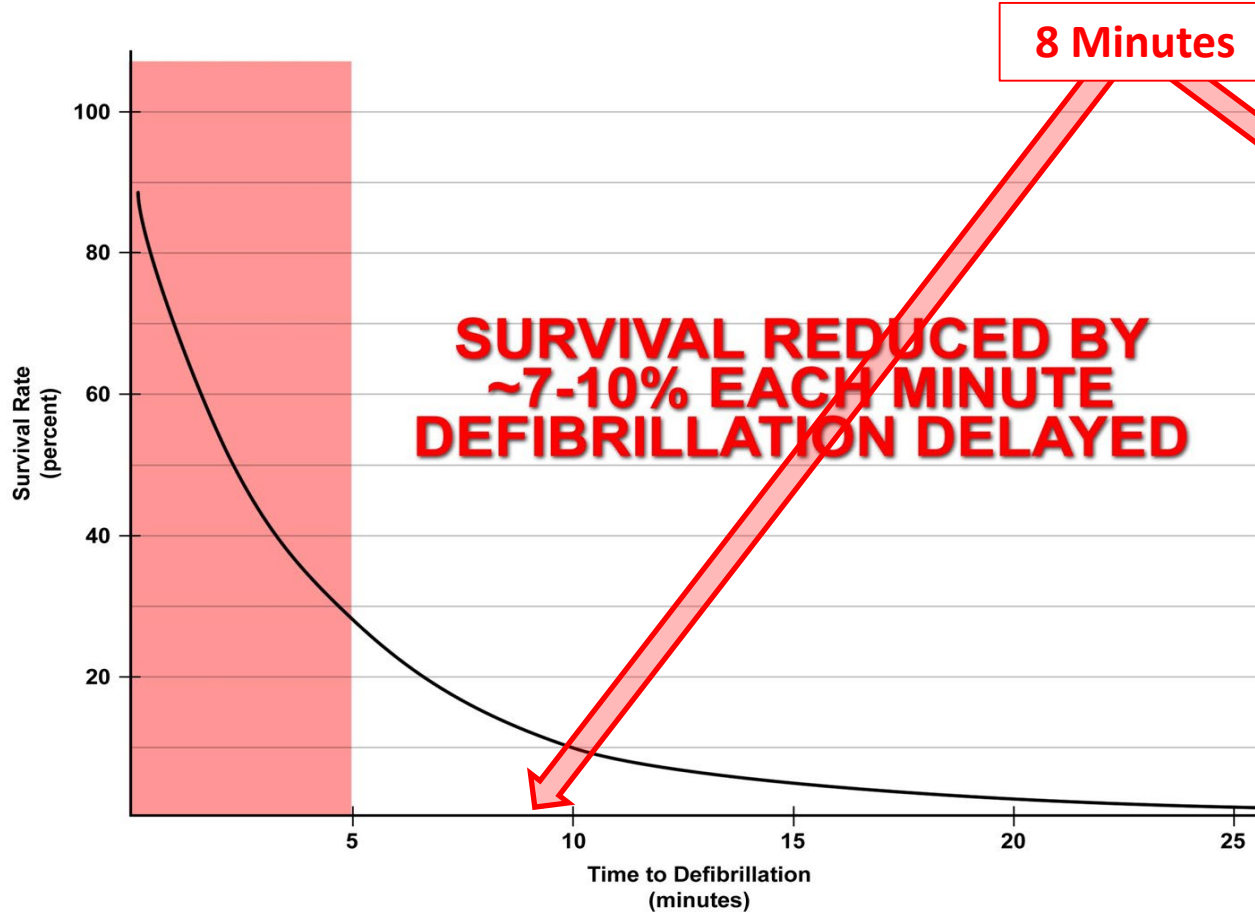
- 2 or more simultaneous incidents: **77.31%**
- 3 or more simultaneous incidents: **47.18%**
- 4 or more simultaneous incidents: **23.49%**





# Response Time Performance

# Emergency Timeline Targets



# Response Performance to Fire/EMS Calls (2020/21)

Response Component	Best Practice		90 <sup>th</sup> Percentile Performance	Time Difference
	Time	Reference		
<b>Call Processing / Dispatch</b>	1:30	NFPA	2:29*	<b>+ 0:59</b>
<b>Crew Turnout</b>	2:00	Citygate	2:05	<b>+ 0:05</b>
<b>First-Due Travel</b>	4:00	NFPA Citygate	5:53	<b>+ 1:53</b>
<b>First Unit Call to Arrival</b>	7:30	Citygate	9:32	<b>+ 2:02</b>
<b>1<sup>st</sup> Alarm Travel</b>	8:00	NFPA Citygate	15:24	<b>+ 7:24</b>
<b>1<sup>st</sup> Alarm Call to Arrival</b>	11:30	Citygate	17:28	<b>+ 5:58</b>

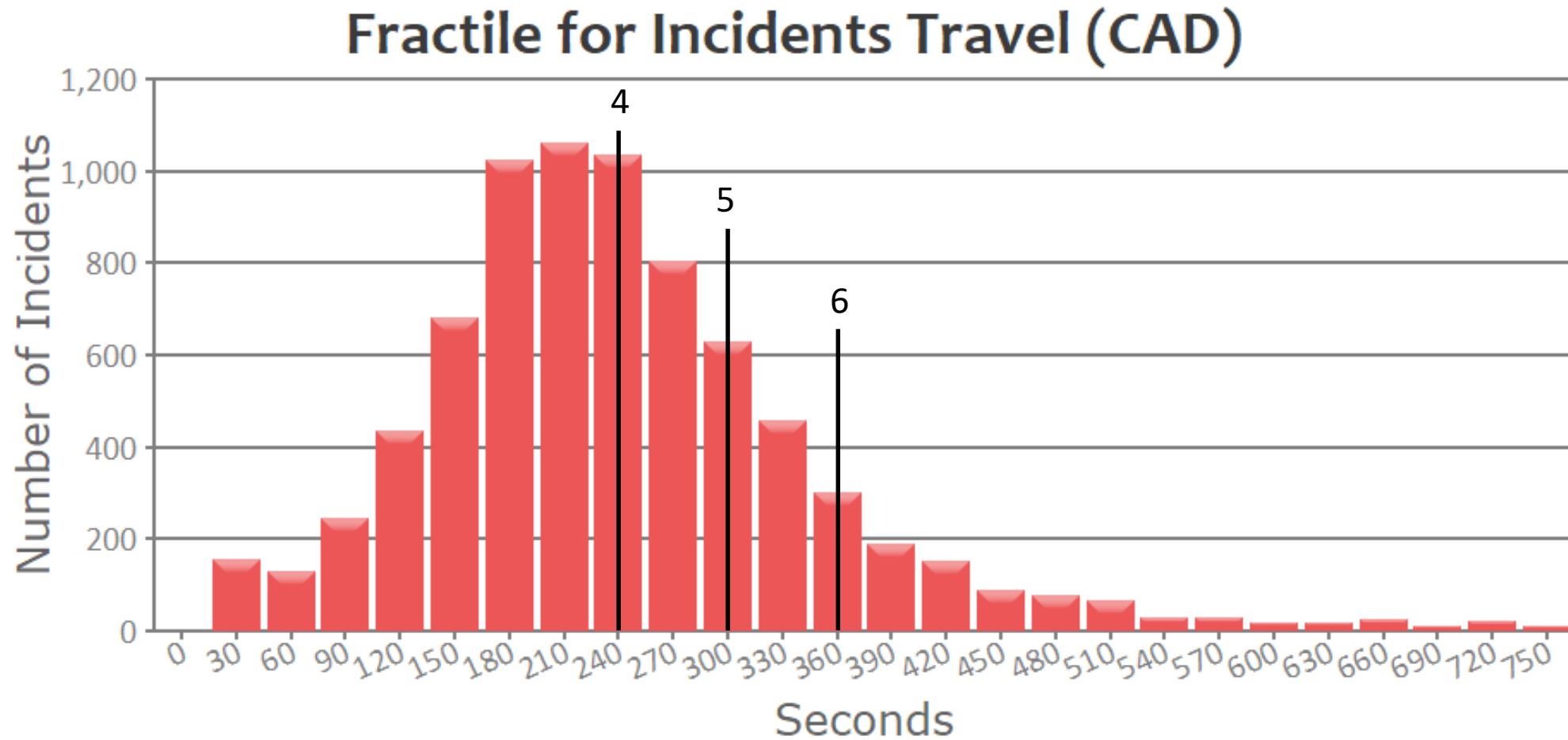
*\* Dispatch time does not include 9-1-1 call answered to first data entry keystroke*

# Travel Time at 90% to Fire/EMS Calls

Station	RY 20/21
<b>Department-Wide</b>	<b>5:53</b>
Station 1	6:19
Station 2	5:13
Station 3	5:23
Station 4	6:51
Station 5	5:09
Station 6	6:18
Station 7	8:05

Best practice is **4:00** minutes

# Travel Time by Minute at 90% to Fire/EMS Calls





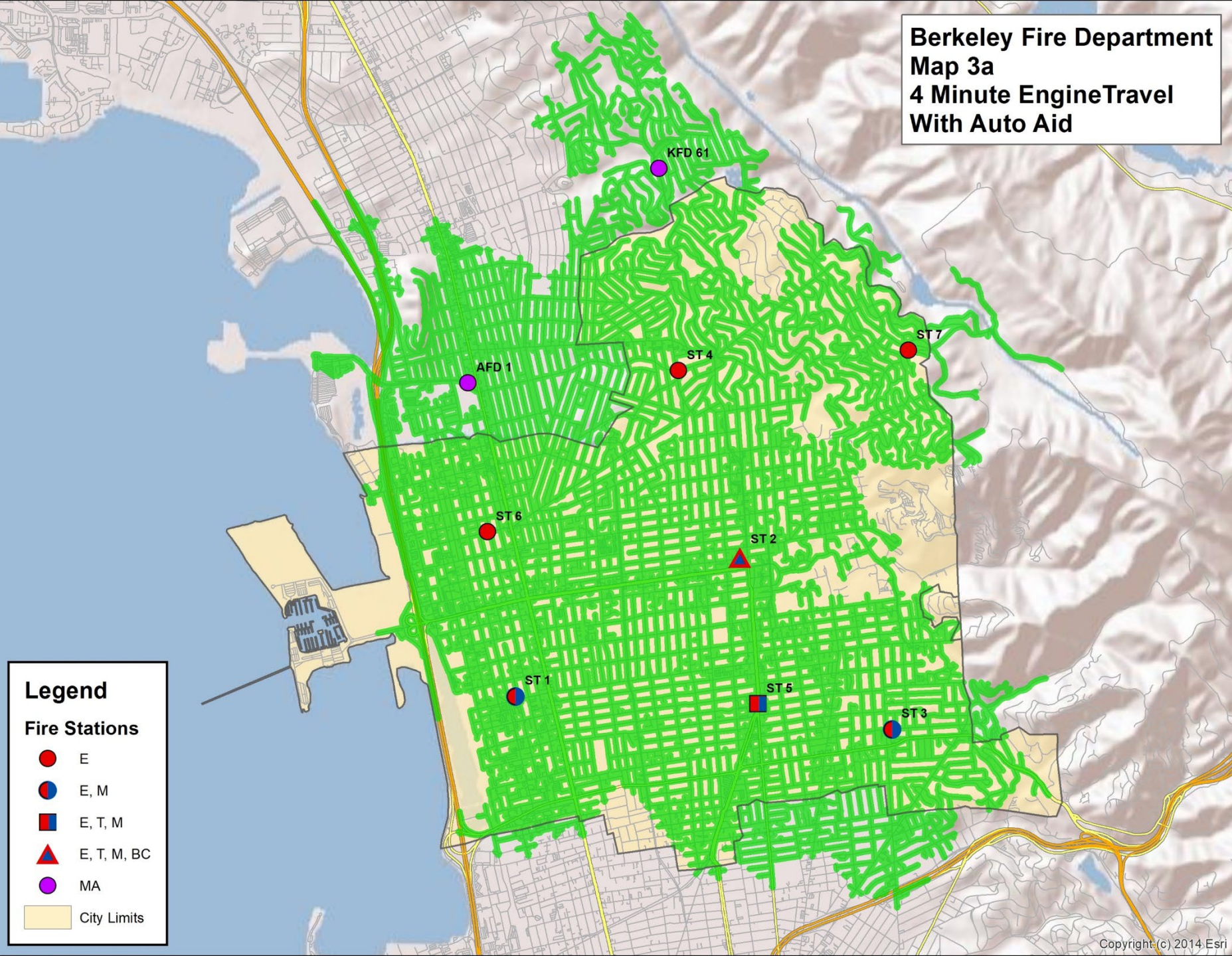
# Geographic Coverage Analysis

**Berkeley Fire Department  
Map 3a  
4 Minute Engine Travel  
With Auto Aid**

**Legend**

**Fire Stations**



- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA
- City Limits











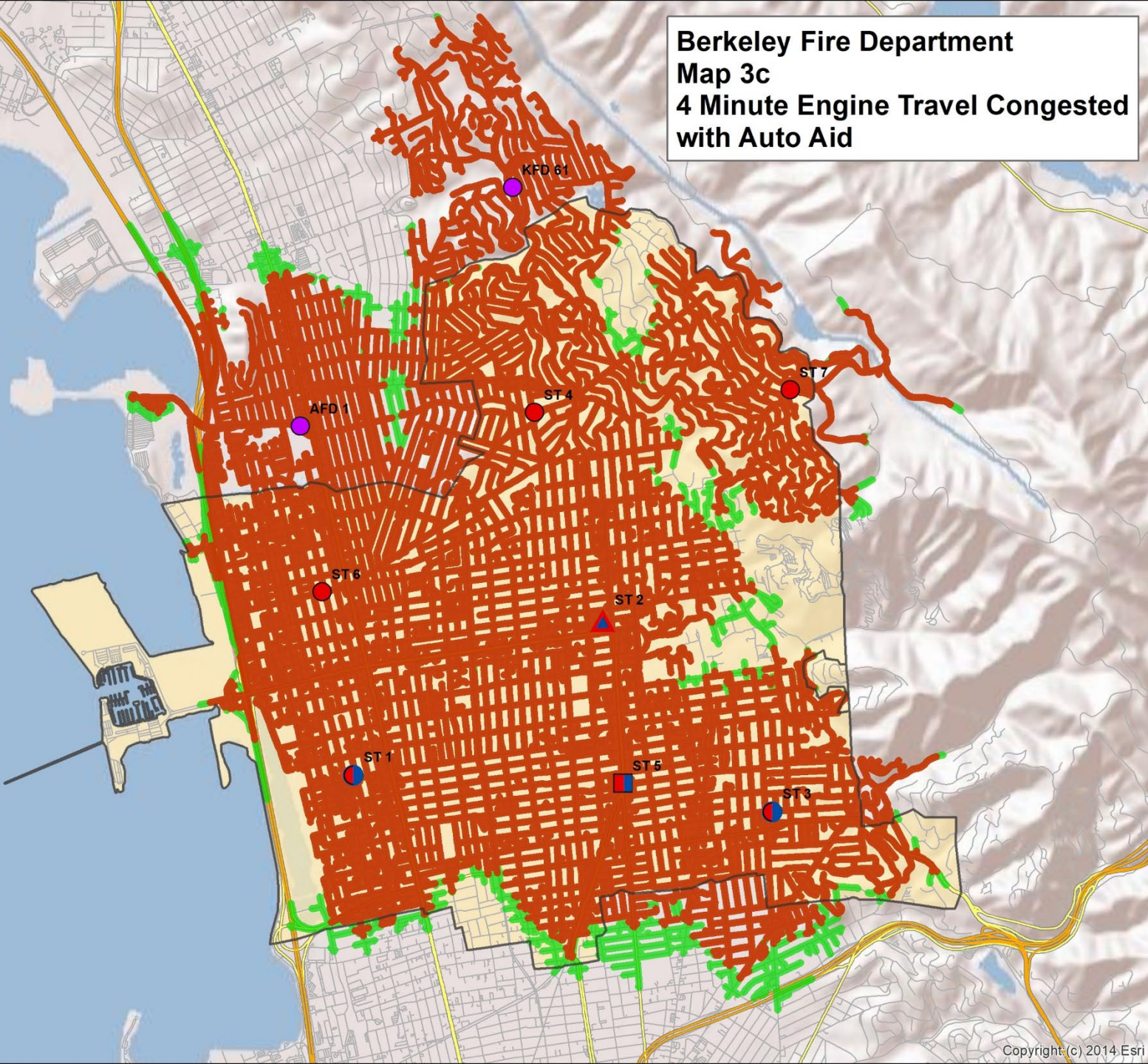
**Berkeley Fire Department  
Map 3c  
4 Minute Engine Travel Congested  
with Auto Aid**

**Legend**

-  Congested
-  Uncongested

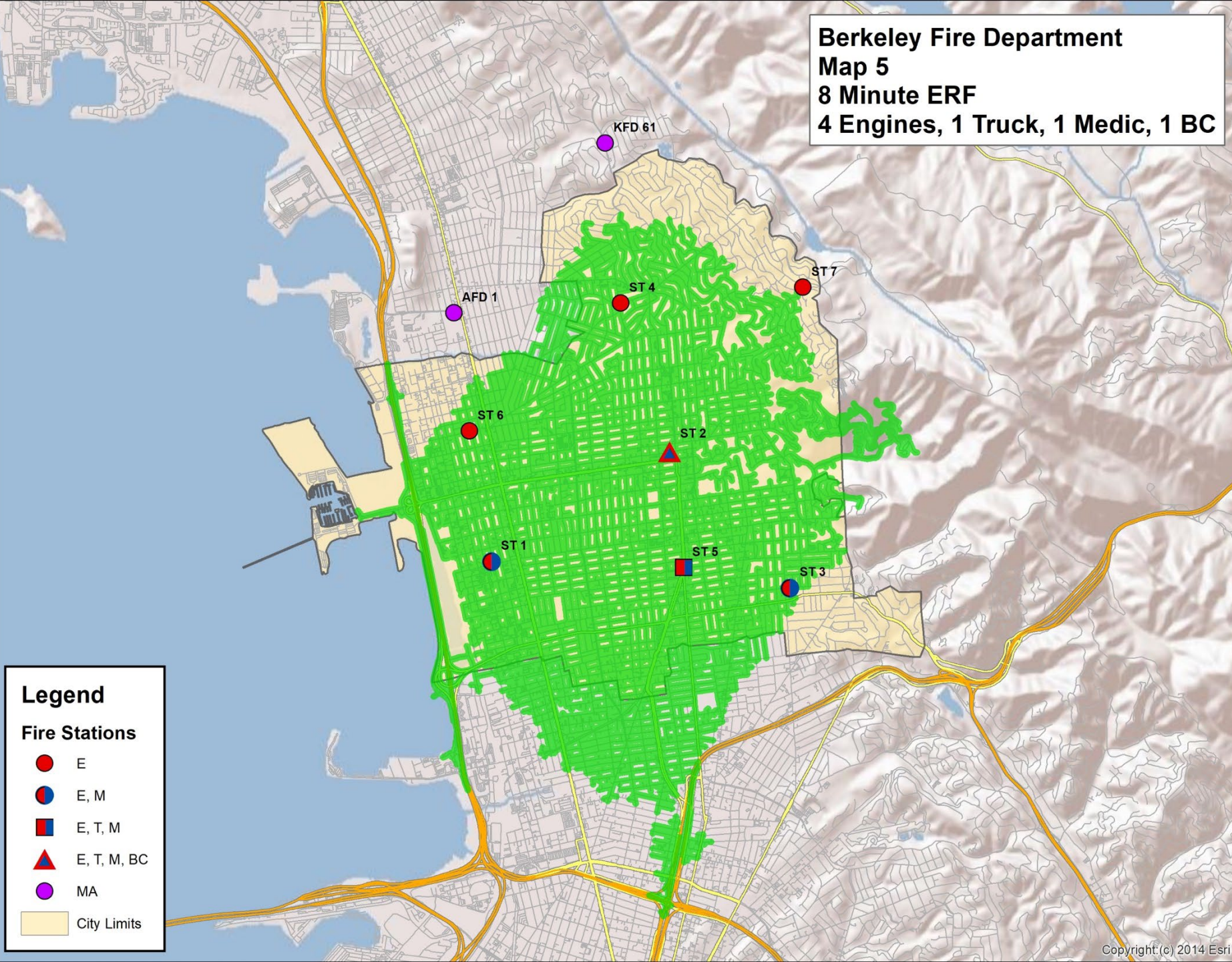
**Fire Stations**

-  E
-  E, M
-  E, T, M
-  E, T, M, BC
-  MA
-  City Limits





**Berkeley Fire Department  
Map 5  
8 Minute ERF  
4 Engines, 1 Truck, 1 Medic, 1 BC**



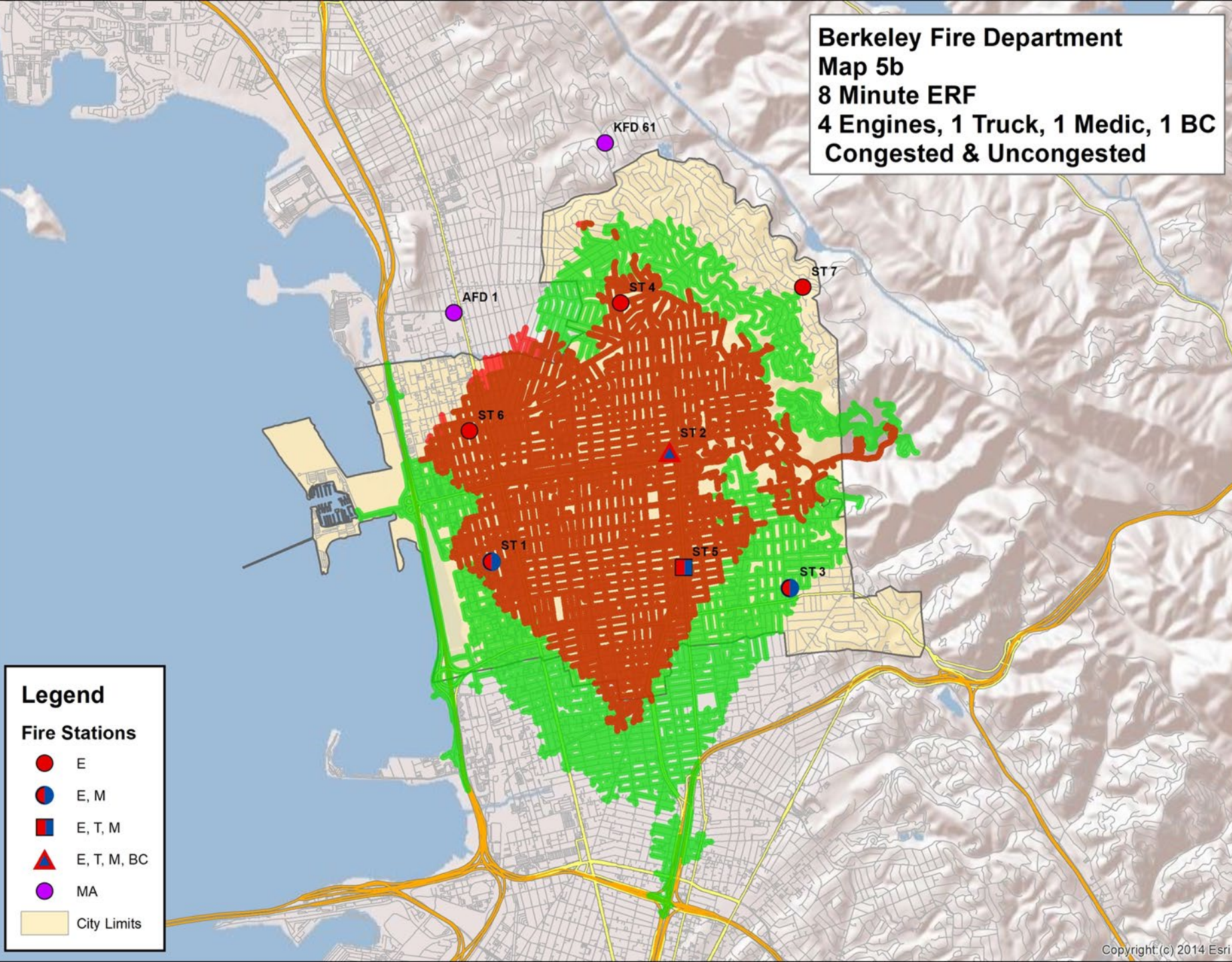
**Legend**

**Fire Stations**

- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA
- City Limits



**Berkeley Fire Department  
Map 5b  
8 Minute ERF  
4 Engines, 1 Truck, 1 Medic, 1 BC  
Congested & Uncongested**



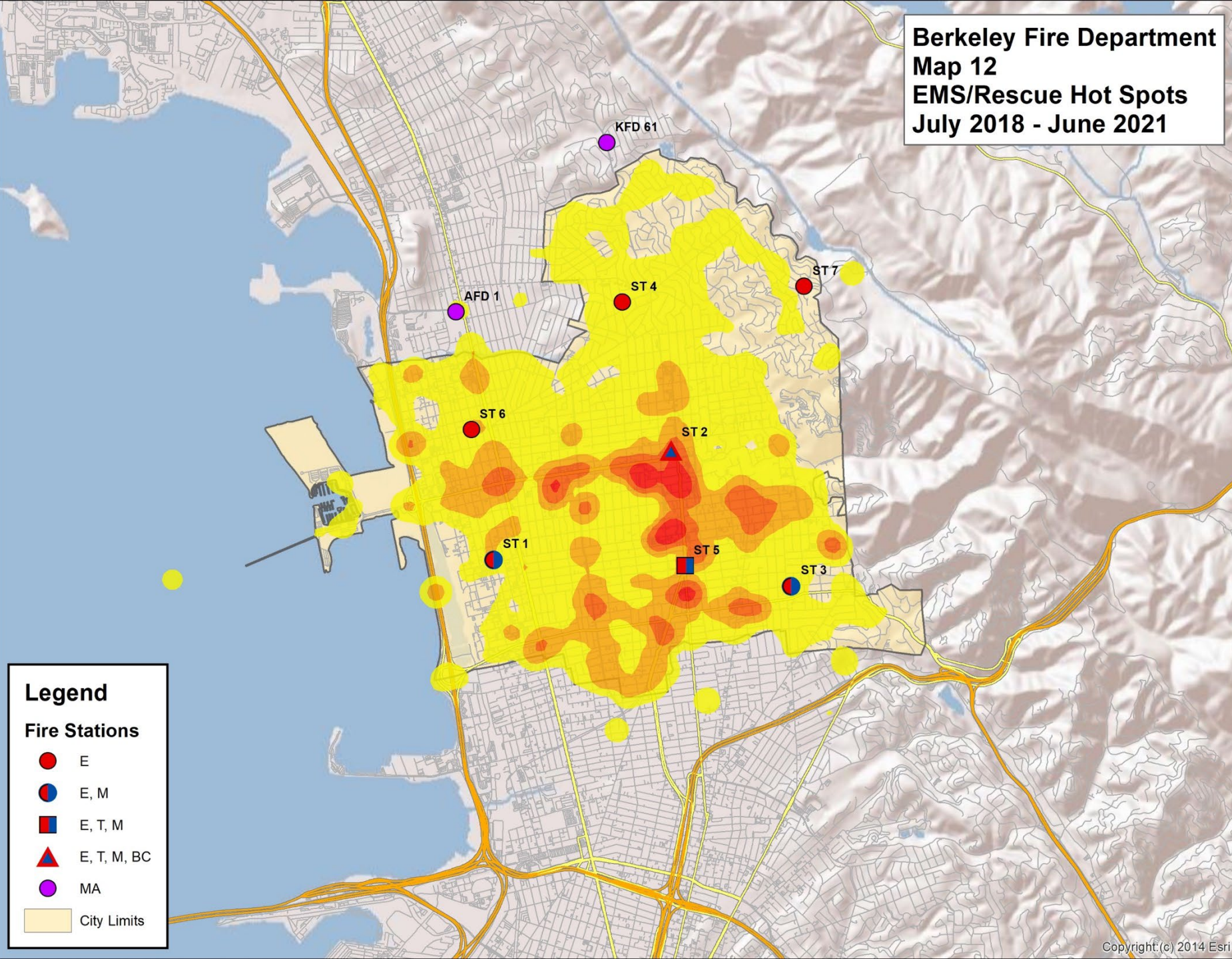
**Legend**

**Fire Stations**

- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA
- City Limits



**Berkeley Fire Department  
Map 12  
EMS/Rescue Hot Spots  
July 2018 - June 2021**



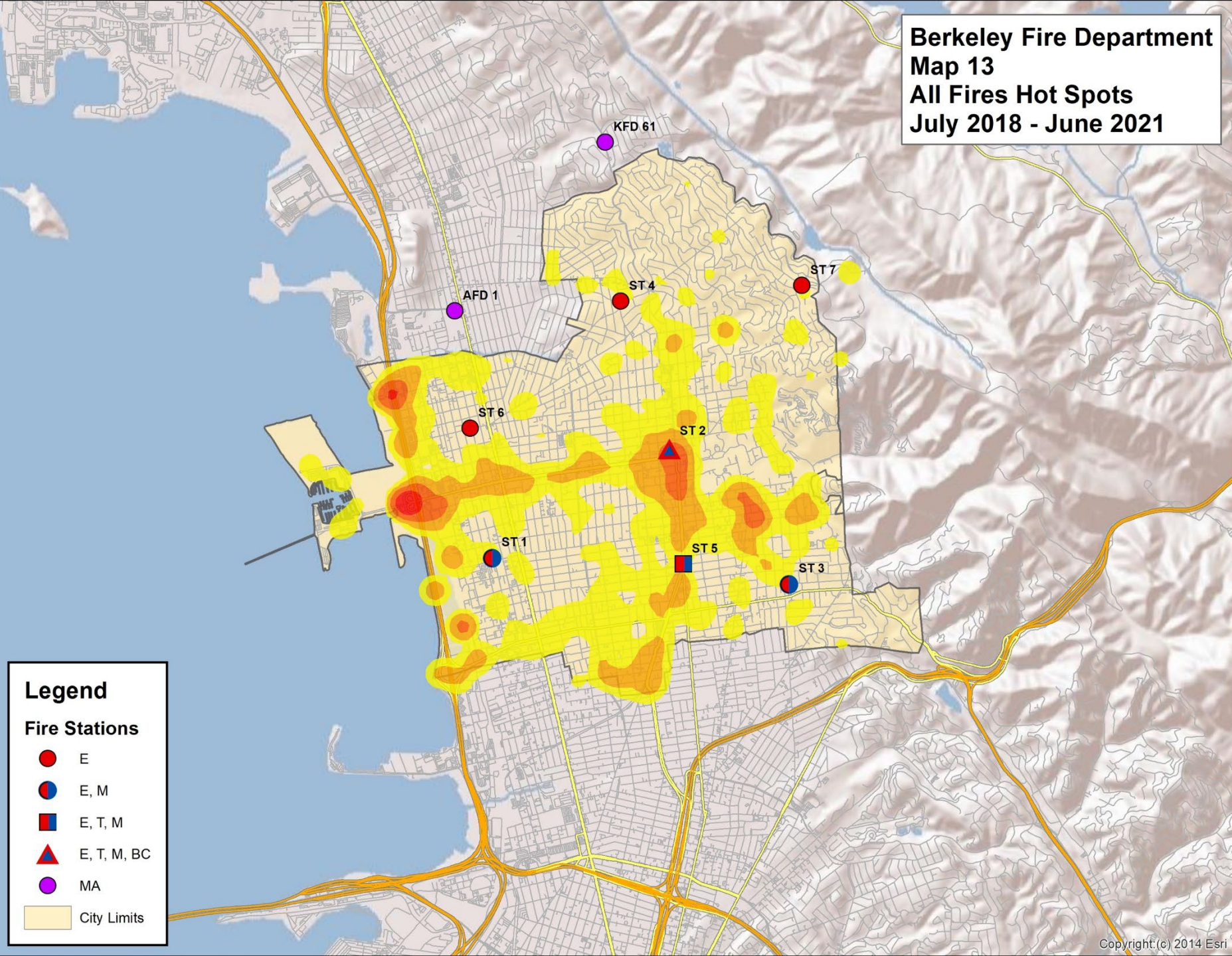
**Legend**

**Fire Stations**

- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA
- City Limits



**Berkeley Fire Department  
Map 13  
All Fires Hot Spots  
July 2018 - June 2021**



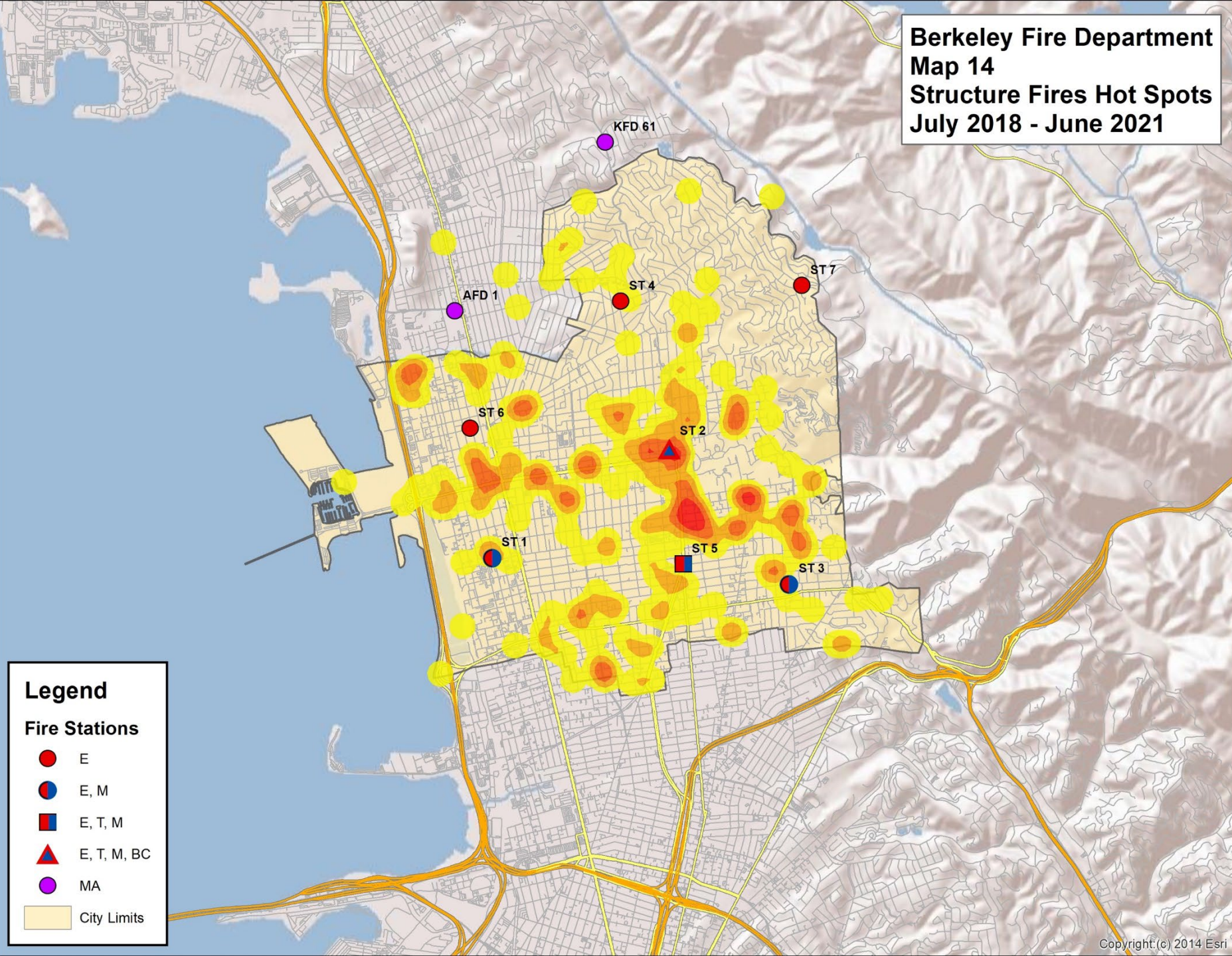
**Legend**

**Fire Stations**

- E
- E, M
- E, T, M
- ▲ E, T, M, BC
- MA
- City Limits









**Berkeley Fire Department  
Map 14  
Structure Fires Hot Spots  
July 2018 - June 2021**



**Legend**

**Fire Stations**

-  E
-  E, M
-  E, T, M
-  E, T, M, BC
-  MA
-  City Limits

# Road Mile Coverage

Travel Time Measure	Total Public Road Miles	Miles Covered Non-Congested	Percent of Total Miles Covered	Miles Covered Congested	Percent of Total Miles Covered	Percent Difference
<b>4:00-Minute 1<sup>st</sup>-Due</b>	327	<b>285</b>	<b>87%</b>	<b>274</b>	<b>84%</b>	-3.36%
<b>8:00-Minute ERF</b>	327	<b>257</b>	<b>79%</b>	<b>172</b>	<b>53%</b>	-25.99%

ERF = 4 Engines, 1 Truck, 1 Medic Unit, 1 Battalion Chief



# Deployment Summary

- Time of day and day of week indicate need for 24/7/365 minimum service
- Dispatch time needs urgent improvement
- Crew turnout times need continuing focus and improvement
- Travel time is excessive, more so when multiple units are needed
  - Streets layout, hills, traffic congestion, traffic calming, and simultaneous incidents
- Station locations provide baseline coverage, but not always the capacity for added response units where unit workload is saturated
- Engine and ambulance crew utilization hourly is at *excessive* saturation and needs *immediate* attention
- Low-acuity *medical* incident demand is lengthening travel time and causing high crew workloads



# Deployment Recommendations

- The expanded ambulance program to start later this year is essential
- The City needs a minimum of six full-time ambulances
- The City needs to implement a non-fire unit alternative response team for non-acute, non-9-1-1 *medical* calls
  - Successful pilot project - the Mobile Integrated Health unit
- Mental health patients need their own appropriate clinical response – the City’s envisioned Specialty Care Unit (SCU)

# Deployment Recommendations

- 9-1-1 fire/EMS dispatch times must shorten to best practices
- Implement the recommendations of the 9-1-1 dispatch center study when complete to enable pre-arrival instructions and Medical Priority Dispatch for non-acute response
- If the alternative non-acute programs do not substantially lower demand on engine crews, then the City needs at least three added peak-hour engine crews, which would require *new cooperative methods* in scheduling and adding at least 27 firefighters

# Next Steps

- **Near Term**

- Discuss how the added ambulances already in progress can be used more to add capacity, not only provide paramedic relief
- Fund costs and implementation for medical priority dispatch
- Implement several low-acuity EMS non-9-1-1 response teams
- Citygate to prepare a full project report with exhibits

- **Longer Term**

- Ensure engines and ladder crews still have capacity for fire/rescue incidents during periods of high EMS incidents
- Consider a heavy rescue squad in the western City

# Discussion