Fire Station Optimal Location Study
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Executive Summary

Overview

$49.0 million in capital funds and $5.9 million in capital maintenance is included in the City’s proposed FY 2018 to FY 2027 Capital Improvement Plan (CIP) for relocating or replacing four existing fire stations. The addition of Station 211, which was included in prior CIPs, is no longer recommended for reasons described in this report.

Due to the sizable cost of the station investments, the City Manager asked an analysis team to study this plan. The analysis team included members of the Office of Performance and Accountability (OPA), the Department of Information Technology Services (ITS) Geographic Information System (GIS) Division, and the Alexandria Fire Department. The analysis team was asked to address the question: “Where should Alexandria locate its emergency response resources to achieve the City’s Fire and EMS performance goals?” The Fire Department’s goal is to strive toward the National Fire Protection Agency’s (NFPA) guideline for a travel time of four minutes or less for 90 percent of fire and medical emergency incidents. This is defined as the time between when fire/medical units start in route to an incident and when they arrive at the scene.

It should be noted that this study’s goal was to determine optimal locations for future fire stations before substantial investments were made. This report should not be interpreted as recommending that any particular fire station be moved. Such recommendations would only occur after further analysis, community dialogue and engagement, as well as the identification of specific, available receiving sites.
Findings

To evaluate optimal station locations, a number of fire station location scenarios were developed. These scenarios were then modeled to measure the travel time, the amount of time from the location of fire stations to fire and medical incidents. For incidents from FY 2012 to FY 2014, 98.7 percent to 99.4 percent of incidents have a modeled travel time within four minutes from the fire station. Meaning, fire stations in all scenarios are generally located near most fire incidents. It should be noted that station location is not the only variable in travel times, as equipment (engine, ladder truck, ambulance), staffing levels, and availability are also determining factors in establishing desired travel times.

**Figure 1. Summary of Findings**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of Stations</th>
<th>Percent of Incidents within a Four Min Travel Time (modeled)</th>
<th>Capital Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Stations</td>
<td>10</td>
<td>98.7%</td>
<td>$49.0 million</td>
</tr>
<tr>
<td>Prior CIP Configuration¹</td>
<td>11</td>
<td>99.4%</td>
<td>$62.2 million</td>
</tr>
<tr>
<td>Optimized Scenarios</td>
<td>10</td>
<td>99.3%</td>
<td>$49.0 million²</td>
</tr>
</tbody>
</table>

Options for Next Steps

**Option 1. Consider the findings of this study as final.** This study found that the current ten station configuration is a reasonable approach due to both travel time performance and cost. To that end, the FY 2018 to FY 2027 CIP was adjusted by removing the proposed new Station 211. From a travel time perspective, all considered scenarios provide a reasonable level of service with a modeled travel time performance at or between 98.7 percent and 99.4 percent. The prior CIP configuration with Station 211 would provide only a modest modeled improvement over the current station configuration but costs $13.2 million more in capital (0.7 percent improvement in four minute travel time or almost $1.9 million in capital costs per tenth of a percent of improvement). Additionally, Station 211 would add at least an estimated $2.75 million per year in operating costs for the station with one new fire engine. Over a 20 year period this equates to at least $55 million in added operating costs, which could increase if other units (medic unit, ladder truck, etc.) were added to the station’s operations.

¹ Prior FY17 to FY26 CIP included a proposed new Station 211 be placed near the corners of Sanger and Beauregard. This Station 211 concept derived from the BRACC 133 concerns about traffic as well as redevelopment of higher intensity uses in the Beauregard corridor. The $62.2 million of capital costs in Figure 1 reflects $61.1 million from the FY17 to FY26 CIP (including $13.2 million for proposed new Station 211) and an additional $1.1 million included in the FY18 to FY27 Proposed CIP for Station 203.

² In order of magnitude of costs, it is assumed for the purposes of comparison that the optimized scenarios would have the same approximate costs as the “current” scenario; with unknown sites to be considered this is an educated guess.
Option 2. **Determine optimized scenario costs.** The optimized scenarios provide improved performance over the current station locations and similar performance with the prior CIP configuration (which included new Station 211) while requiring only ten stations. This is because of the proposed westward movement of several fire stations. While this may seem attractive, more information is needed before taking this action. Land availability, cost, and other information needs to be further researched and studied.

Option 3. **Further analysis.** This study is a model and as such may be better informed through additional analysis. One area where the study may be refined is through updated and newly available data. Data that may prove meaningful includes records from FY 2015 to present as well as Automatic Vehicle Location (AVL) data from the new Computer Aided Dispatch and Records Management System. This may help refine and/or validate this study’s travel time assumptions as well as provide more up-to-date and accurate information on incident locations and density. A second area for analysis is modeling the travel time for the station location options using projected future demand. To accomplish this, more time and information is needed to calculate the travel times for the projected future demand. Third is to analyze the location of fire and medical units in the city. This may provide insight into analyzing and improving the actual travel interval and may help to determine the size of fire station bays that are being planned for construction. The tradeoff of further analysis is that it would require additional time and therefore would need to be undertaken and completed in the next few years since the next major station renovation replacement is scheduled to occur starting in FY 2021.
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Introduction

The Alexandria Fire Department operates ten fire stations throughout the city. These ten fire stations provide service primarily for fire and medical emergencies.

Figure 2. Current Fire Station Locations
From FY 2012 to FY 2014 48,702 fire and medical incidents occurred in the city, an average of approximately 16,000 per year. These incidents were concentrated as illustrated in Figure 3.

**Figure 3. Average Annual Incident Demand**
**Travel Time**

The amount of time for the Fire Department to respond to these incidents is best measured by what is known as the travel time. The travel time is the amount of time it takes when fire and medical responders are in route (in the vehicle and have started to be on their way) and arrive at the scene. This includes responders from both the City as well as regional responders through mutual aid including Fairfax and Arlington Counties.

The Fire Department’s goal is to achieve a four minute travel time for 90 percent of responses, which is consistent with guidelines established by the National Fire Protection Agency (NFPA 1710, established in 2001). Figure 4 illustrates that the Fire Department has improved since FY 2012 toward the four minute travel time goal for 90 percent of responses to incidents.

![Figure 4. Actual Travel Time for 90 Percent of Incidents](chart)

The travel time is not to be confused with response time. The travel time is only a segment of the total response time a 911 caller experiences. Figure 5 illustrates the general steps that occur from the start of the process, 911 call dialed, to the end of the process, help has arrived. These steps are the responsibility of both the Fire Department and Department of Emergency Communications (DEC).

![Figure 5. Generic Response Time Flowchart](chart)
It is important to note that DEC dispatches the closest available unit to the incident. This may not always be at the closest fire station or an Alexandria unit. For example, if there is a fire emergency and the nearest station’s fire engine is not available because it is responding to another incident, the next closest station with a unit would be sent. Another example of this situation is if an ambulance is returning from the hospital and a medical incident is on its return route and is closer than a medical unit at the station, it will be sent instead.

**Fire Stations in the Capital Improvement Plan**

The City’s proposed CIP includes $49.0 million in capital costs (FY18 to FY27) for individual fire station projects plus $5.9 million in capital maintenance funds. Specifically, these funds are planned to be used to rehabilitate three out of the ten existing fire stations (205, 206, and 207) and construct a new replacement fire Station 203.

**Figure 6. Capital Funding Schedule in the FY 2018 to FY 2027 Proposed CIP for Fire Stations (in millions)**

<table>
<thead>
<tr>
<th>Stations</th>
<th>Thru FY17</th>
<th>FY18</th>
<th>FY19</th>
<th>FY20</th>
<th>FY21</th>
<th>FY22</th>
<th>FY23</th>
<th>FY24</th>
<th>FY25</th>
<th>FY26</th>
<th>FY27</th>
<th>Total (18-27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>203</td>
<td>1.60</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.00</td>
</tr>
<tr>
<td>205</td>
<td></td>
<td>0.25</td>
<td>3.15</td>
<td>7.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.27</td>
</tr>
<tr>
<td>206</td>
<td></td>
<td></td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.53</td>
</tr>
<tr>
<td>207</td>
<td></td>
<td>3.50</td>
<td></td>
<td>14.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18.20</td>
</tr>
<tr>
<td>Total</td>
<td>1.60</td>
<td>8.00</td>
<td>-</td>
<td>-</td>
<td>3.50</td>
<td></td>
<td></td>
<td>14.95</td>
<td>3.87</td>
<td>7.87</td>
<td>10.81</td>
<td>49.00</td>
</tr>
</tbody>
</table>
**Approach**

Due to the sizable cost of the station investments, the City Manager asked an analysis team to study this plan and the optimal locations of fire stations. Therefore, this analysis explored and modeled how the number and location of fire stations impact the travel time. Specifically, this study focuses on the current station locations, the prior CIP configuration (which includes proposed Station 211), and potential optimization scenarios.

**Method**

The travel time utilized a dataset from the Alexandria Fire Department’s Records Management System (RMS) containing all emergency incidents occurring in Alexandria between FY 2012 and FY 2014. The locations of these incidents were plotted using ArcGIS, as were the location of fire stations within the City of Alexandria and nearby regional stations. For each incident, ArcGIS identified the closest station and calculated the amount of time to travel from that station to the incident. This includes nearby regional stations at Ronald Reagan Washington National Airport as well as Arlington and Fairfax Counties (accounts for 5.1 to 5.5 percent of incidents in the models). Additionally, calculated travel times are based on modified speeds of the road network. Details of the methodology can be found in Appendix A.

This model was applied to several scenarios. First, it was applied to the current station locations. Second, it was applied to the prior CIP configuration (which included proposed Station 211). Then several optimized scenarios were considered for stations in the proposed FY 2018 to FY 2027 CIP. However, Station 203 was excluded because design and construction planning had already begun. Additionally, Station 208 was included because of the opportunity for redevelopment in the Landmark area. Once the optimized scenarios were modeled, the Fire Department selected those scenarios they felt were the most reasonable for service delivery which were further refined and presented in this report.

To compare the performance of these scenarios, the travel time was measured in three different ways: (1) the percent of emergency incidents in which the first-due response unit could travel from its host station to the site of an incident within four minutes (this aligns with NFPA guideline 1710); (2) the percent of emergency incidents in which the first-due response unit could travel from its host station to the site of an incident within two minutes; and (3) the average travel time.

**Limitations**

There are four key limitations of note. First, the model is based on data from the City’s recently replaced Computer Aided Dispatch (CAD) system and Records Management System (RMS). Newly available data including from FY 2015 to present may help further refine this model including providing a fuller history of incidents while the new Automatic Vehicle Location (AVL) data would help to test and tune the historical travel speeds used in this study.
The second limitation is that this analysis does not calculate actual travel times, it is a model. This model assumes that all units are available at all times and begin at their home fire stations. While this approach is helpful to identify locations of fire stations, it does not reflect reality. Actual travel times are based on many variables including the starting point of a fire or medical unit and the availability of the fire or medical units. To evaluate actual travel times a unit analysis would also need to be conducted. Further, knowing the number of units needed in an area would help inform the size of renovated, relocated, and/or new fire stations.

The third limitation impacts the optimization scenarios. The optimization scenarios show potential relocations of stations. Finding parcels can be difficult especially with the ever-changing real estate market. Therefore, estimating capital costs is also challenging for the optimized scenarios, and thus excluded. That is why on the optimized scenarios a general area is used as represented by a geographic circle.

Fourth and finally, this analysis does not calculate travel times using the 2036 development projections (Figure 19). To complete this work, additional time and data are needed to refine the projected model.
Findings

This study focuses on: (1) current station locations; (2) prior CIP configuration (with proposed Station 211); and (3) potential optimization options.

Current Station Locations

There are ten fire stations in the city. Figure 7 illustrates four minute travel time response zones based on current station locations.

Figure 7. Existing Stations with Four Minute Travel Time Response Zones

How to read Figure 7: Each color corresponds to one station, such that all incidents captured within a particular color zone are most quickly reached by a unit departing from that corresponding station. Importantly, the figure does not identify areas of overlap, and many incidents included in the figure could be responded to within four minutes by units leaving from multiple fire stations.
Figure 8 illustrates the density of incident demand in the city. As you can see in Figure 8, stations currently are located relatively near higher incident areas. The western border of the city is one area of note where there are fewer stations and relatively high demand.

**Figure 8. Current Fire Station Locations with Demand**

The result of this configuration is that these ten fire stations are located to allow for a four minute or less travel time for 98.7 percent of incidents that occurred between FY 2012 to FY 2014. Additionally, the travel time averages 1.60 minutes and fire stations are within a two minute travel time for 70.9 percent of incidents.

**Figure 9. Modeled Incident Coverage and Travel Times**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of Stations</th>
<th>Percent of Incidents within a Four Min Travel Time</th>
<th>Average Travel Times in Mins</th>
<th>Percent of Incidents within a Two Min Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Stations</td>
<td>10</td>
<td>98.7%</td>
<td>1.60</td>
<td>70.9%</td>
</tr>
</tbody>
</table>
Prior Capital Improvement Plan (CIP) Configuration

The prior CIP included a potential new Station 211 in the Beauregard corridor as well as funds to renovate or replace four of the ten stations in their current locations. Figure 10 illustrates four minute travel time response zones based on this configuration.

Figure 10. Prior CIP Configuration Four Minute Travel Time Response Zones

How to read Figure 10: Each color corresponds to one station, such that all incidents captured within a particular color zone are most quickly reached by a unit departing from that corresponding station. Importantly, the figure does not identify areas of overlap, and many incidents included in the figure could be responded to within four minutes by units leaving from multiple fire stations.
Figure 11 illustrates the density of incident demand in the city as compared with the prior CIP configuration. As you can see in Figure 11, stations currently are located relatively near higher incident areas. The addition of Station 211 is positioned near areas of relatively high demand.

**Figure 11. Incident Demand and Fire Station Locations from the Prior CIP Configuration**

This configuration results in 99.4 percent of incidents within a four minute travel time of a station. Additionally, 76.8 percent of incidents are within a two minute travel time as well as 1.48 minutes on average. This model is an improvement over the current station location configuration.

**Figure 12. Modeled Incident Coverage and Travel Times**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of Stations</th>
<th>Percent of Incidents within a Four Min Travel Time</th>
<th>Average Travel Times in Mins</th>
<th>Percent of Incidents within a Two Min Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Stations</td>
<td>10</td>
<td>98.7%</td>
<td>1.60</td>
<td>70.9%</td>
</tr>
<tr>
<td>Prior CIP Configuration</td>
<td>11</td>
<td>99.4%</td>
<td>1.48</td>
<td>76.8%</td>
</tr>
</tbody>
</table>
**Optimization**

With $49.0 million in capital funding planned to renovate four stations and a prior CIP proposal to add new Station 211, this study tested if there were potentially more optimal station locations. While many permutations are possible and were considered two are described below.

**Optimization Scenario 1: Stations 205, 206, 207, and 208**

Optimization 1 is a westward move of Stations 205, 206, 207, and 208. Because of this westward move, especially by Stations 206 and 208, proposed new Station 211 in this option was not included. Stations 205, 206, and 207 are included in the CIP to be renovated. Station 208 was included because of the opportunity that new development in the Landmark Mall site brings (regarding a more optimal location combined with site availability). Figure 13 below illustrates four minute travel time response zones based on this configuration.

**Figure 13. Optimization Scenario 1 Configuration Four Minute Travel Time Response Zones**

How to read Figure 13: Each color corresponds to one station, such that all incidents captured within a particular color zone are most quickly reached by a unit departing from that corresponding station. Importantly, the figure does not identify areas of overlap, and many incidents included in the figure could be responded to within four minutes by units leaving from multiple fire stations.
As you can see in Figure 14, the shift of stations to the west coincides with incident demand. This is most notable with Stations 206 and 208’s movement to the western border of the city.

Figure 14. Incident Demand and Fire Station Locations of Optimization Scenario 1
The result of this configuration is 99.3 percent of incidents have a travel time from stations within four minutes. Additionally, this results in an average travel time of 1.47 minutes and a two minute travel time for 77.4 percent of incidents. This model is an improvement over the current station location configuration and provides about same level of performance as the prior CIP configuration. In effect with this configuration Station 211 is not needed as the movement of Stations 205, 206, 207, and 208 provides adequate response coverage. This will result in an annual estimated cost avoidance of at least $2.75 million per year, which equals $55 million over a 20 year period.

**Figure 15. Modeled Incident Coverage and Travel time Times**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of Stations</th>
<th>Percent of Incidents within a Four Min Travel Time</th>
<th>Average Travel Times in Mins</th>
<th>Percent of Incidents within a Two Min Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Stations</td>
<td>10</td>
<td>98.7%</td>
<td>1.60</td>
<td>70.9%</td>
</tr>
<tr>
<td>Prior CIP Configuration</td>
<td>11</td>
<td>99.4%</td>
<td>1.48</td>
<td>76.8%</td>
</tr>
<tr>
<td>Optimized 1</td>
<td>10</td>
<td>99.3%</td>
<td>1.47</td>
<td>77.4%</td>
</tr>
</tbody>
</table>
Optimization Scenario 2: Stations 205, 206, and 208

Optimization 2 moves Stations 205, 206, and 208 to the west. Additionally, because of Stations 206’s and 208’s movement to the west, this scenario does not include a new Station 211. Stations 205 and 206 are in the CIP to be renovated. Station 208 was included because of the opportunity that new development in the Landmark Mall site brings (regarding a more optimal location combined with site availability). Figure 16 below illustrates four minute travel time response zones based on this configuration.

Figure 16. Optimization Scenario 2 Configuration Four Minute Travel Time Response Zone

How to read Figure 16: Each color corresponds to one station, such that all incidents captured within a particular color zone are most quickly reached by a unit departing from that corresponding station. Importantly, the figure does not identify areas of overlap, and many incidents included in the figure could be responded to within four minutes by units leaving from multiple fire stations.
As seen below in Figure 17, the movement of Stations 205, 206, and 208 to the west aligns with incident density. This is most notable with Stations 206 and 208’s movement to the western border of the city.

Figure 17. Incident Demand and Fire Station Locations of Optimization Scenario 2
The result of this configuration is that 99.3 percent of incidents are within a four minute travel time. Additionally, 75.2 percent of incidents are within a two minute travel time and an average travel time of 1.50 minutes. This scenario is roughly the same as the prior CIP and optimized scenario 1 but improved over the current station locations. In effect with this configuration, Station 211 is not needed as the movement of Stations 205, 206, and 208 provides adequate response coverage. This will result in an estimated annual cost avoidance of at least $2.75 million per year which equates to $55 million over a 20 year period.

**Figure 18. Modeled Incident Coverage and Travel Times**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Number of Stations</th>
<th>Percent of Incidents within a Four Min Travel Time</th>
<th>Average Travel Times in Mins</th>
<th>Percent of Incidents within a Two Min Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Stations</td>
<td>10</td>
<td>98.7%</td>
<td>1.60</td>
<td>70.9%</td>
</tr>
<tr>
<td>Prior CIP</td>
<td>11</td>
<td>99.4%</td>
<td>1.48</td>
<td>76.8%</td>
</tr>
<tr>
<td>Optimized 1</td>
<td>10</td>
<td>99.3%</td>
<td>1.47</td>
<td>77.4%</td>
</tr>
<tr>
<td>Optimized 2</td>
<td>10</td>
<td>99.3%</td>
<td>1.50</td>
<td>75.2%</td>
</tr>
</tbody>
</table>

**Future Demand**

In addition to understanding the current distribution of fire and medical incidents, estimating where incident demand will occur in the future is also valuable in the examination of station locations. Using the City’s future development data as the foundation, a predictive model was developed to estimate the future demand of fire and medical incidents. This was accomplished by reviewing incident data for FY 2012 to FY 2014 and exploring patterns in the data. It was calculated that buildings of different types such as single family residential homes, commercial office space, or senior assisted living centers generated different amounts of demand for fire and medical services.

Knowing this, for each type of building a fire and medical incident “generation rate” was developed using a combination of building square footage, unit information, and, incident counts at the building level (refer to Appendix B). These rates are so named because they attempt to quantify the number of emergency incidents a particular building will “generate” over a given period of time. These rates were applied and estimates were aggregated to the Traffic Analysis Zones (TAZ), see Figure 19.

According to this model, increases in demand for fire and medical emergency services are expected to occur in Potomac Yard, Beauregard, and the Van Dorn/Landmark areas of the city. In the areas of greatest development potential, the City either has new stations in place (Station 209 is Potomac Yard and Station 210 on Eisenhower Avenue) or if stations (205, 206, 207, 208) are moved, as shown in this report, westward at their time of reconstruction then the newly constructed stations will be closer to these major redevelopment areas.

It should be noted that this study’s goal was to determine optimal locations for future fire stations before substantial investments were made. This report should not be interpreted as recommending
that any particular fire station be moved. Such recommendations would only occur after further analysis, community dialogue and engagement, as well as the identification of specific, available receiving sites.

Figure 19. Projected Future Change in Incidents with Current Station Locations
Appendix

Appendix A: Fire Station Location Analysis Methodology Details

This section outlines the GIS based methodology used to analyze the City’s fire station. The current station locations were analyzed against a series of hypothetical station location scenarios using a travel time of four minutes and incident data from FY 2012 to FY 2014. Details regarding the data used, methods, and results from the analysis are described below.

Data:
The following GIS datasets were used for this optimization analysis (1) point dataset of Fire and EMS incident data from FY2012 – FY2014, (2) a road network that contains distance and travel times for routing, (3) point dataset that contains the locations of the existing fire stations within the City of Alexandria as well as nearby regional stations and (4) a point dataset of potential station locations.

Methods:
This analysis takes a GIS-based approach by using the data described in the previous section and importing them into ArcGIS Network Analyst where they serve as inputs for the optimization models. The methodology consists of the following steps:

1. **Build Road Network:** A road network was built in ArcGIS using the road network provided by Fire. A travel time variable was calculated for each road segment using the ‘tuned’ speed limit (provided by Fire) and length attributes. For example, a 6000ft road segment with a tuned speed of 25mph equates to a time variable of: 1.14 miles/25 mph = 0.0456 * 60 minutes = 2.7 minutes to travel that segment of road.

2. **Import Fire/EMS Incident Data:** After the network was created, only the EMS/Fire incidents that occurred within the city limits were used for the analysis and they were imported into ArcGIS Network Analyst as Demand. Each incident type was weighted the same.

3. **Import Current/Potential Fire Station Locations:** After the incident data was loaded, then the current and potential fire station locations were imported in ArcGIS as Facilities. The potential station data was created to represent all the potential locations a fire station could be in the future. Points within water bodies, railroads, floodplains, and large interstates were removed.

4. **Apply Location Allocation Solution Procedure:** Integrated within ArcGIS are location allocation solvers that can be used to solve optimization problems such as this. These solvers identify the number and location of facilities (fire stations) required in order to maximize the amount of demand covered (incidents) according to some constraint (travel time). Each scenario was evaluated through the solver top generating optimized results which include the locations of the stations and the number of incidents each station covers.
## Appendix B: Building Use Generation Rates

### Non-Residential Rates:

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Calls (All 3 FYs)</th>
<th>Mean Total Rate</th>
<th>Mean Rate EMS Calls</th>
<th>Mean Rate Fire Calls</th>
<th>Mean Rate Other Calls (Service, False Alarms, Hazardous Conditions, Good Intent, Other)</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Libraries (Per 1000 Sqft)</td>
<td>47</td>
<td>0.24</td>
<td>0.16</td>
<td>&lt; 0.00</td>
<td>0.08</td>
<td>Beatley, Barrett, Burke and Duncan</td>
</tr>
<tr>
<td>School (Per 1000 Sqft)</td>
<td>702</td>
<td>0.11</td>
<td>0.04</td>
<td>&lt; 0.00</td>
<td>0.11</td>
<td>Includes All ACPS, Episcopal High School, St Agnes. SQFT for Episcopal &amp; St Agnes were estimated (Stories * Shape Area)</td>
</tr>
<tr>
<td>Shopping Centers (Per 1000 Sqft)</td>
<td>996</td>
<td>0.21</td>
<td>0.13</td>
<td>0.01</td>
<td>0.07</td>
<td>Includes Landmark, Van Dorn Plaza, Bradlee Shopping Center, and Strip Malls</td>
</tr>
<tr>
<td>Office (Per 1000 Sqft)</td>
<td>3,453</td>
<td>0.08</td>
<td>0.03</td>
<td>&lt; 0.00</td>
<td>0.04</td>
<td>Offices</td>
</tr>
<tr>
<td>Medical Related (Per 1000 Sqft)</td>
<td>749</td>
<td>1.42</td>
<td>1.24</td>
<td>&lt; 0.00</td>
<td>0.17</td>
<td>Long Term/Short Term Medical Care, Shelters, Substance Abuse Centers, Hospital - NO SENIOR CARE</td>
</tr>
<tr>
<td>Mass Assembly (Per 1000 Sqft)</td>
<td>755</td>
<td>0.16</td>
<td>0.10</td>
<td>&lt; 0.00</td>
<td>0.06</td>
<td>Churches, Entertainment, Social, Rec Centers [Not already counted by Schools]</td>
</tr>
<tr>
<td>Industrial (Per 1000 Sqft)</td>
<td>508</td>
<td>0.05</td>
<td>0.02</td>
<td>&lt; 0.00</td>
<td>0.03</td>
<td>Utilities, Warehouses, Manufacturing, Warehouse Supply Service, Fleet Maintenance, Construction, WMATA Bus Garage (excludes Storage Units)</td>
</tr>
<tr>
<td>Hotel/Motel (Per Unit)</td>
<td>1342</td>
<td>0.10</td>
<td>0.07</td>
<td>&lt; 0.00</td>
<td>0.03</td>
<td>Includes Hotels, Motels</td>
</tr>
<tr>
<td>Senior Care (Per 1000 Sqft)</td>
<td>5224</td>
<td>2.0</td>
<td>1.58</td>
<td>0.02</td>
<td>0.4</td>
<td>Retirement Communities, Sunrise, Annie B Rose, The Fountains</td>
</tr>
<tr>
<td>Commercial (Per 1000 Sqft)</td>
<td>2,191</td>
<td>0.25</td>
<td>0.16</td>
<td>&lt; 0.00</td>
<td>0.09</td>
<td>Service, Goods, Restaurants, Grocery, Auto Dealer</td>
</tr>
</tbody>
</table>
### Residential Rates:

| Category               | Total Calls | Mean Total Rate | Mean Rate EMS Calls | Mean Rate Fire Calls | Mean Rate Other Calls (Service, False Alarms, Hazardous Conditions, Good Intent, Other) | Detailed Description                  |
|------------------------|-------------|-----------------|---------------------|----------------------|------------------------------------------------------------------------------------------------|
| Multi-family Residential | 19,302      | 0.11            | 0.07                | < 0.00               | 0.04                                                                                         | Condos, Apartments, Townhouses        |
| ARHA                   | 1500        | 0.61            | 0.49                | 0.01                 | 0.11                                                                                         | Includes all ARHA owned property, except Annie B Rose |
| Duplex/Detached House  | 3855        | 0.14            | 0.09                | < 0.00               | 0.05                                                                                         |                                                                                       |

### Mass Transit - Metro & VRE:

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Calls (All 3 Yrs)</th>
<th>Mean Calls (Per FY)</th>
<th>Mean EMS Calls (Per FY)</th>
<th>Mean Fire Calls (Per FY)</th>
<th>Mean Rate Other Calls (Service, False Alarms, Hazardous Conditions, Good Intent, Other) – Per FY</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro &amp; VRE</td>
<td>522</td>
<td>35</td>
<td>30</td>
<td>1</td>
<td>4</td>
<td>King St Station, Braddock Road, Eisenhower, Van Dorn and Amtrak/VRE Station.</td>
</tr>
</tbody>
</table>