



CITY OF RICHMOND  
CITY AUDITOR

**DATE:** March 1, 2019

**TO:** Mrs. Selena Cuffee-Glenn  
Chief Administrative Officer

**FROM:** Louis Lassiter *LL*  
City Auditor

**SUBJECT:** Richmond Fire Department (RFD)  
Fire Apparatus & Equipment Audit

The City Auditor's Office has completed the RFD Fire Apparatus & Equipment audit and the final report is attached.

We would like to thank the Richmond Fire Department staff for their cooperation and assistance during this audit.

Attachment

cc: The Richmond Audit Committee  
The Richmond City Council  
Chief Melvin Carter, RFD

**Intentionally left blank**



2019-09

# Richmond Fire Department Fire Apparatus and Equipment Audit

City of Richmond, VA  
City Auditor's Office  
March 1, 2019

---



Executive Summary.....	i
Background, Objectives, Scope, Methodology .....	1
Findings and Recommendations .....	3
Management Response .....	Appendix A

# Highlights

*Audit Report to the Audit Committee, City Council, and the Administration*

## Why We Did This Audit

The Office of the City Auditor conducted this audit as part of the FY19 audit plan approved by the Audit Committee.

This audit was at the request of the Richmond Fire Chief to evaluate the documented performance checks of the apparatus, tools, and equipment used by the Richmond Fire Department (RFD) and to confirm that critical mission equipment is adequately checked and operating.

## What We Recommend

The RFD Fire Chief:

- Require daily operational checks that are signed and retained for a minimum of 3 years.
- Develop a standard apparatus checklist that will comply with NFPA standard 1911.
- We recommend that RFD and Fleet services implement Apparatus Life Cycle costing to aid in making future decisions around investing labor hours and money in older equipment vs. making purchase decisions.
- We recommend that RFD work with Fleet Services to identify the aging fleet and to identify actions which need to occur in the Capital Improvement Program to replace apparatuses as they approach the retirement age.



## Richmond Fire Department Fire Apparatus and Equipment

### Background

The Richmond Fire Department (RFD) was established in 1858 and had an adopted budget for FY18 of approximately \$50 million, which consisted of staffing of 443 funded positions (10 vacancies). The RFD is divided into four Battalions with six companies assigned in each. Additionally, Administration; Safety and Response Operations; Office of Emergency Management; and Support Services (to include Prevention, Investigations, Training; Budget; and Logistics) comprise four internal divisions that are located at their Headquarters on Franklin Street.

The City's Firefighters operate out of 20 Fire Stations that are located within 62.5 square miles and nine Districts. RFD provides fire and life safety response to approximately 220,000 residents and over 400,000 workers and visitors each day.

Their mission is to provide high-quality emergency and non-emergency services to City residents and visitors. The goal of the Operations Section is to operate safely, effectively and efficiently while protecting against injury, loss of life, and/or property damage from all hazards to include fire, medical, and other emergencies.

**Commendation** - All staff encountered during the audit from the fire stations and central office personnel were extremely helpful and knowledgeable about the apparatus inspections performed, and we received complete cooperation and professional assistance from all staff.

### Needs Improvements

#### Finding #1 – Apparatus Inspection Documentation

We tested four months' worth of apparatus inspection sheets from four fire stations for CY2018. Of these 16 months, ten months had partial completions, two months were missing (Station 19, March & July), and four months were 100% completed.

#### Finding #2 –Apparatus Checklist Does not Meet NFPA Standard 1911

Standardization across RFD does not exist for the apparatus checklist. This was evidenced by the testing results from five fire stations — the outcomes measured at 67% of the National Fire Protection Association (NFPA) standard. Two local peer fire departments benchmarked against met the NFPA standards.

#### Finding #3 – Apparatus In-Service Time

We reviewed apparatus in service time for CY2018 and it was at 92%. Our results did not find a strong correlation between age, out of service time and cost of repairs. This lack of correlation may be due to the fact that all apparatuses tested are 20 years old or less, and do not exceed NFPAS's standard of replacing equipment after 25 years or other factors.

#### Finding #4 –Aging Equipment

The city is facing an aging RFD fleet, and in five years 46% of the fire apparatus will be 25 years old. Other factors such as mileage, preventive maintenance can limit service life to much lower than the 25 years. As each piece of equipment can cost 500K or more, this will require significant capital funding in five years costing approximately \$10 million.

Management concurred with 4 of 4 recommendations. We appreciate the cooperation received from management and staff while conducting this audit.

## BACKGROUND, OBJECTIVES, SCOPE, METHODOLOGY, MANAGEMENT RESPONSIBILITY and INTERNAL CONTROLS

This audit was conducted in accordance with the Generally Accepted Government Auditing Standards promulgated by the Comptroller General of the United States. Those Standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for their findings and conclusions based on the audit objectives. We believe that the evidence obtained provides a reasonable basis for their findings and conclusions based on the audit objectives.

### BACKGROUND

---

#### Overview

The Richmond Fire Department (RFD) was established in 1858 and had an adopted budget for FY2018 of \$49,853,362 which consisted of staffing of 443 funded positions.

Currently, there are 433 filled sworn and non-sworn staff. RFD is divided into four Battalions with six companies assigned in each. In addition Administration; Safety and Response Operations; Office of Emergency Management; and Support Services (to include Prevention, Investigations, Training; Budget; and Logistics) that make up four internal divisions that are located at their Headquarters on 201 E. Franklin Street.

The City's Firefighters operate out of 20 Fire Stations that are located within 62.5 square miles and nine Districts. The Department provides fire and life safety response to approximately 220,000 residents and over 400,000 workers and visitors each day.

### OBJECTIVES

---

The objective of this audit was to evaluate the documented performance checks of the apparatus, tools, and equipment used by RFD to confirm that critical mission equipment is adequately checked and operating.

## SCOPE

---

Our scope included the twelve months ending December 31, 2018 and the current operating environment.

## METHODOLOGY

---

The auditors performed the following procedures to complete this audit:

- Interviewed management and staff;
- Reviewed and evaluated relevant policies and procedures and tested for compliance;
- Reviewed hard copy files; and
- Performed other tests, as deemed necessary.

## MANAGEMENT RESPONSIBILITY

---

City management is responsible for ensuring resources are managed properly and used in compliance with laws and regulations; programs are achieving their objectives; and services are being provided efficiently, effectively, and economically.

## INTERNAL CONTROLS

---

According to the Government Auditing Standards, internal control, in the broadest sense, encompasses the agency's plan, policies, procedures, methods, and processes adopted by management to meet its mission, goals, and objectives. Internal control includes the processes for planning, organizing, directing, and controlling program operations. It also includes systems for measuring, reporting, and monitoring program performance. An effective control structure is one that provides reasonable assurance regarding:

- Efficiency and effectiveness of operations; and
- Compliance with laws and regulations.

Based on the audit test work, the auditors concluded that internal controls for the Fire Department's Apparatus check process while functioning needs improvement. Improvements are needed with standardization of forms, consistency of inspections and maintenance of documentation which are discussed throughout the report.

## FINDINGS and RECOMMENDATIONS

### What Works Well

On January 24, 2019 we conducted unannounced observations at four fire stations to observe the apparatus checks performed and to obtain documentation of prior inspections. Additionally we visited five other fire stations and worked with central office staff gathering information for the audit and received complete cooperation and professional assistance from all staff. Throughout the audit, RFD staff were extremely helpful and knowledgeable about the inspections performed.

### What Needs Improvement

#### Finding #1 – Apparatus Inspection Documentation

We tested four months' worth of apparatus inspection sheets from four fire stations for CY2018. Of these 16 months, ten months had partial completions, two months were missing (Station 19, March & July), and four months were 100% completed. A compilation for each station's daily completion rates are shown below:

<b>Stations</b>	<b>15</b>	<b>17</b>	<b>19</b>	<b>23</b>
<b>Total Shift A</b>	100%	68%	27%	85%
<b>Total Shift B</b>	100%	88%	37%	100%
<b>Total Shift C</b>	92%	88%	38%	100%
<b>Total Completion</b>	<b>97%</b>	<b>81%</b>	<b>34%</b>	<b>95%</b>

Source: Auditor Prepared

Additionally we gathered sheets for Dec 2018 for five other stations. A compilation for each station daily completion rates for Dec 2018 is as shown below and noted.

<b>Stations</b>	<b>1</b>	<b>10</b>	<b>12</b>	<b>16</b>	<b>21</b>
<b>Total Shift A</b>	36%	91%	100%	45%	73%
<b>Total Shift B</b>	9%	100%	45%	82%	91%
<b>Total Shift C</b>	100%	100%	22%	67%	100%
<b>Total Completion</b>	<b>45%</b>	<b>97%</b>	<b>58%</b>	<b>65%</b>	<b>87%</b>

Source: Auditor Prepared

National Fire Protection Association (NFPA) standard 1911, Annex C.3 states the operations checks are to be performed at the start of each day, shift, or week and are best documented with a check sheet to be used by the station crew. Also, Standard 1911, Annex C.2 states that the firefighters and drivers/operators who operate the equipment on a regular basis can, perform daily or weekly operational checks.

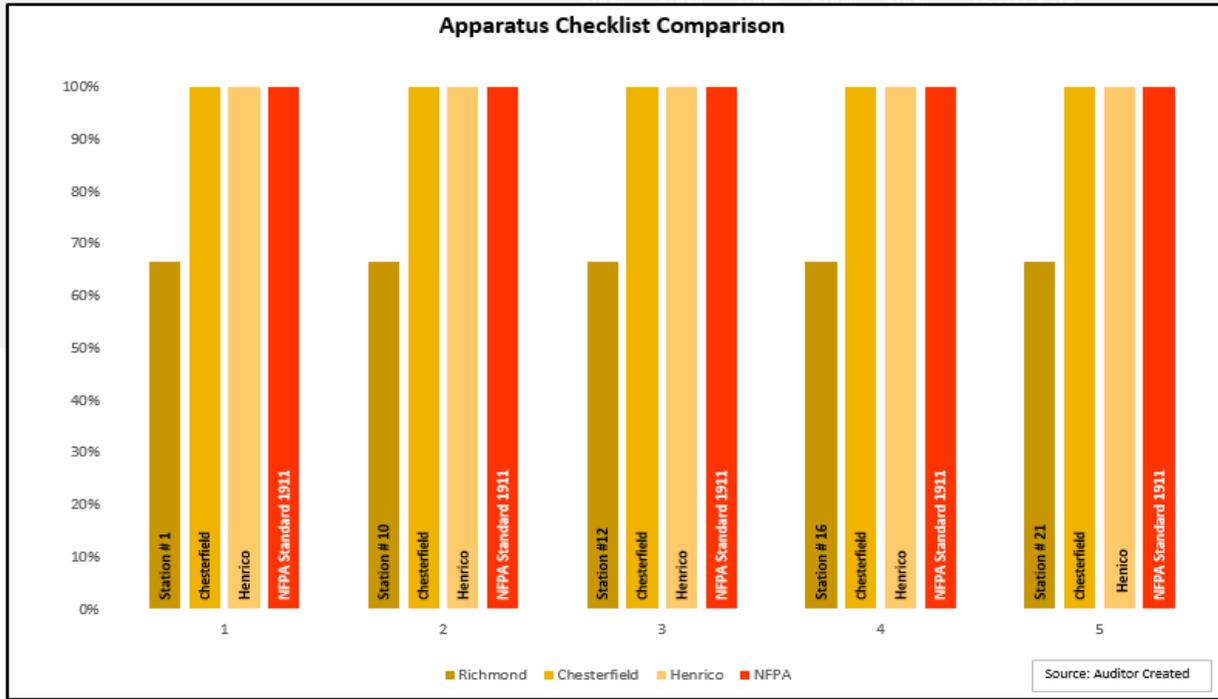
While inspections may have occurred, evidence to support that is not consistently maintained by the Fire Dept. In the event of an accident, an accident investigation will include a review of all records. Also, equipment failures may not be detected or prevented in a timely manner. When failures occur evidence to support and research may not be readily available. Not all staff were aware they needed to maintain the documentation of the inspections.

**Recommendation**

- 1. We recommend that the RFD Fire Chief develop an SOP that requires each driver/operator to perform daily operational checks, sign off on the completed checklist and that the checklists are retained for a minimum of three years.***

**Finding #2 – Apparatus Checklist Did Not Meet NFPA Standard 1911**

We compared the apparatus checklists used by the five RFD stations tested to NFPA Standard 1911 and the Fire Departments in Henrico and Chesterfield Counties. We noted RFD is 67% compliant in comparison to the benchmarked localities and NFPA Standard 1911. The local peer fire stations of Chesterfield and Henrico Counties met 100% of the minimum requirement suggested by NFPA. The results are depicted below:



The auditors noted NFPA standard 1911, Section 4.5.3 requires that a schedule should be developed and implemented for the operational checking and inspections of fire apparatuses.

**Recommendation**

2. We recommend that the RFD Richmond Fire Chief develop an SOP of best practices for creating a standardize apparatus checklist that will comply with NFPA standard 1911, Section 4.5.3. The standardization of the checklist will ensure that all fire station companies will adopt the same methodology.

**Finding #3 – Apparatus In-Service Time**

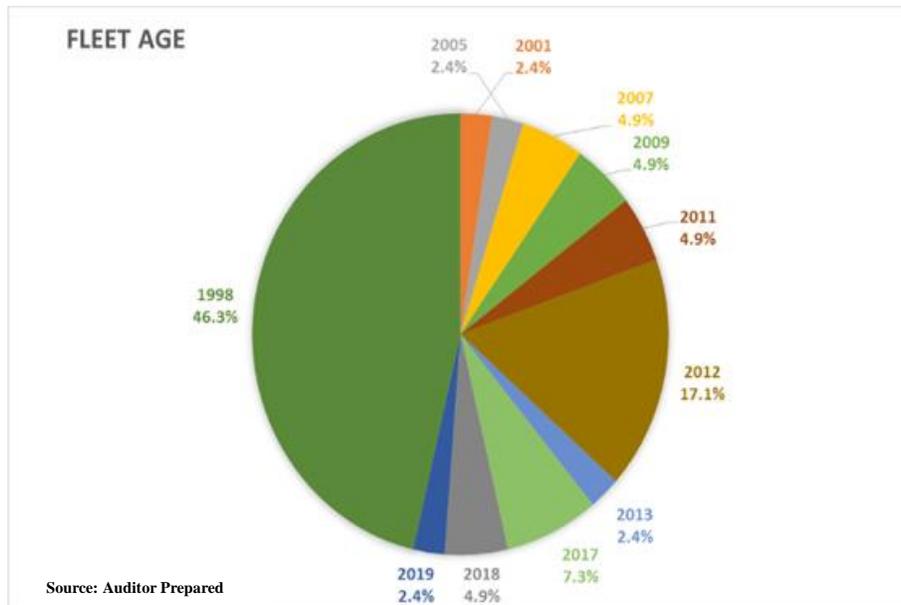
There were 41 apparatuses reviewed that averaged 29.32 days out of service. We reviewed their in-service time for CY2018 and noted it was at 92%.

---

**Richmond City Auditor's Report# 2019-09**  
*Richmond Fire Department - Fire Apparatus and Equipment*  
*March 1, 2019*

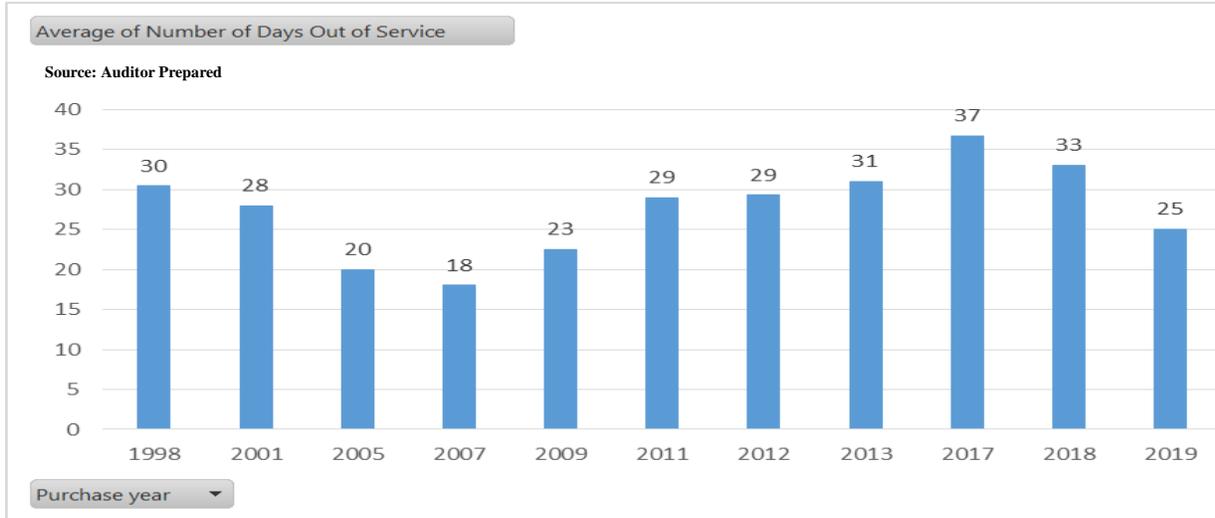
---

The auditors obtained a listing of RFD's apparatuses by age and noted 46% were 20 years or older. The age of the apparatuses is depicted below:

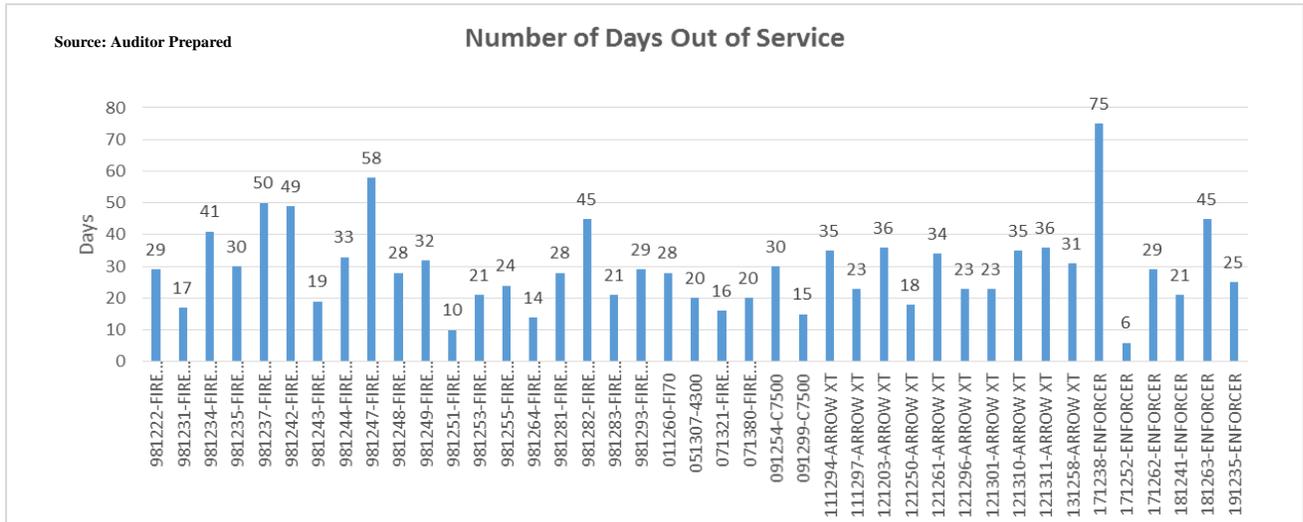


**Richmond City Auditor's Report# 2019-09**  
 Richmond Fire Department - Fire Apparatus and Equipment  
 March 1, 2019

The auditors noted that the fleet purchased in 1998 averaged 30 days out of service in CY2018.

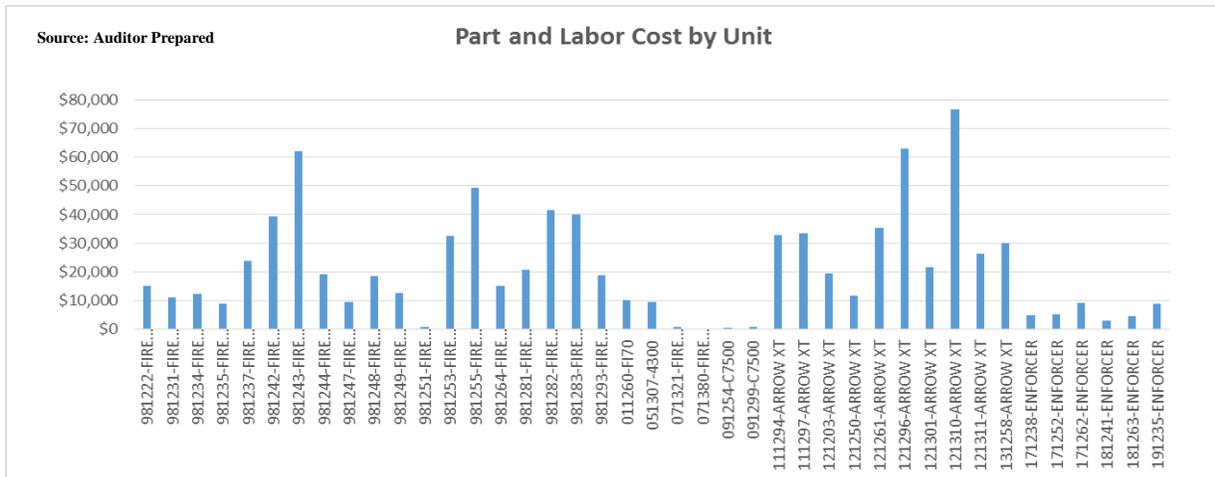
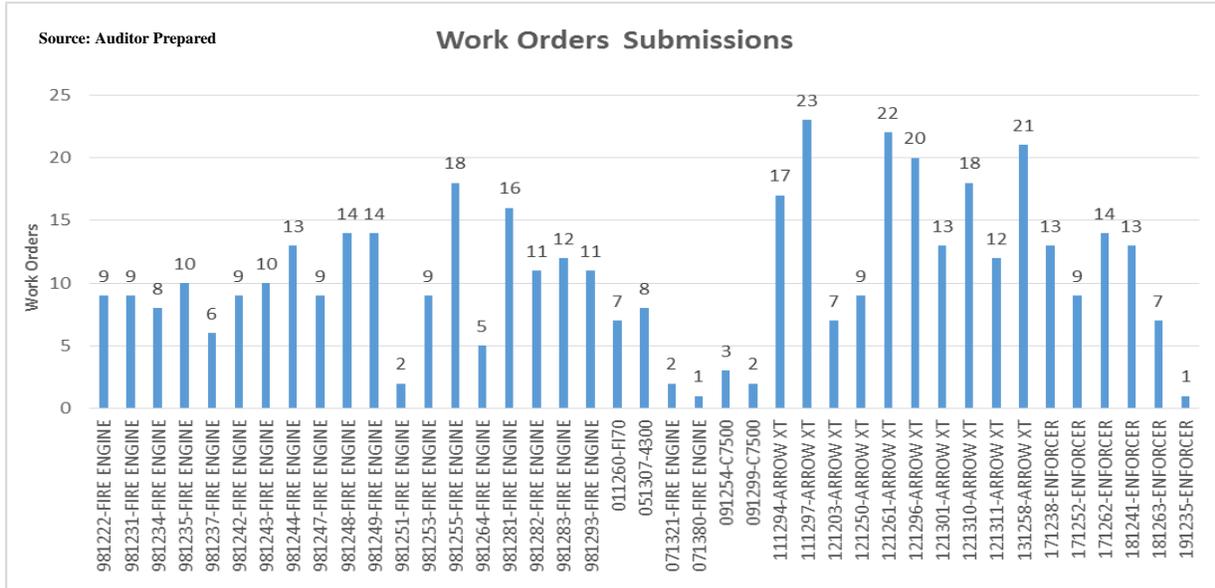


The auditors noted that the longest number of days for a single unit to be out of service was 75 days (2017 model).



**Richmond City Auditor's Report# 2019-09**  
 Richmond Fire Department - Fire Apparatus and Equipment  
 March 1, 2019

As noted below, there was not a strong correlation between the age of the apparatus, the number of work orders submitted, and the cost of repairs.



As noted above, our results also show that there was not a strong correlation between age, out of service time and cost of repairs. However, none of the apparatuses tested was older than the 25-year NFPA standard 1911 to consider equipment replacement.

Apparatus Life Cycle costing is a tool that could aid both RFD and Fleet services when making future decisions around investing labor hours and money in older equipment vs. making

purchase decisions. Currently, all apparatuses tested are 20 years old or less and do not exceed the 25-year old replacement standard. However, since 46% of the fleet is 20 years old, this data should be monitored closely moving forward. While in CY2018, there is no strong correlation presently between age, out of service time, and cost; this data is provided for management's information.

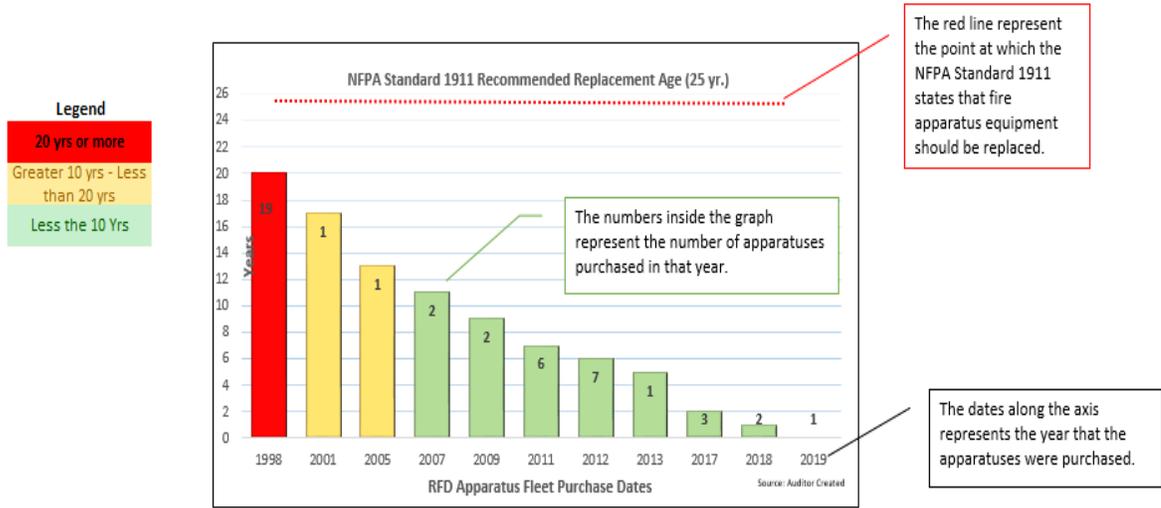
***Recommendation***

- 3. We recommend Apparatus Life Cycle costing be considered by both Richmond Fire Department and Fleet Services as part of ongoing apparatus replacement plans.***

**Finding #4 – Aging Equipment**

NFPA Standard 1911, Annex D recommends that fire apparatuses that are over 25 years old should be replaced. Also, it states that manufactured equipment before 1991 that is less than 25 years old, that has been adequately maintained, and that is still in serviceable condition should be placed in a reserved status. NFPA Standard 1911, Annex D2 notes that other contributing factors such as; mileage, engine hours, preventive maintenance and the quality of driver training contribute to apparatus life expectancy. These factors can limit serviceable life to 8-10 years but also there are apparatus that were manufactured with quality components that have had excellent maintenance and responded to minimum number of incidents that are in serviceable condition after 20 years.

We obtained a listing of RFD's critical apparatuses from Fleet Services. The chart below represents the age of the equipment, the number of apparatuses by age and a heat map to illustrate the equipment that is approaching the NPFA 1911 replacement standard.



The City does not have defined capital funding sources to address the aging fleet. Also, the replacement decision for purchasing a new fleet apparatus lies within the Department of Public Works (Fleet Services).

The City is facing an aging RFD fleet, and in five years 46% of their apparatuses will be 25 years old. Depending on age, mileage, engine hours, preventive maintenance and other factors, some apparatuses may need replacement before 25 years. As each piece of equipment can cost 500K or more, this will require significant capital funding in five years, costing approximately \$10 million.

**Recommendation**

4. We recommend that RFD work with Fleet Services to identify the aging fleet and to identify actions which need to occur in the Capital Improvement Program to replace apparatuses as they approach the retirement age.

**APPENDIX A: MANAGEMENT RESPONSE FORM  
2019-09 RFD - Fire Apparatus & Equipment audit**

#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
1	We recommend that the RFD Fire Chief develop an SOP that requires each driver/operator to perform daily operational checks, sign off on the completed checklist and that the checklists are retained for a minimum of three years.	Y	The FD will develop a process that requires the driver/operator to perform daily operational checks. The checklist document will be retained for a minimum of three years.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Chief of Operations		05/01/19
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
2	We recommend that the RFD Richmond Fire Chief develop an SOP of best practices for creating a standardize apparatus checklist that will comply with NFPA standard 1911, Section 4.5.3. The standardization of the checklist will ensure that all fire station companies will adopt the same methodology.	Y	The FD will consult with industry experts and best practices to establish a standardized apparatus check list that complies with NFPA standard 1911, Section 4.5.3. To ensure consistency within the Department the checklist will be implemented at all Fire Stations.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Chief of Operations		05/01/19
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
3	We recommend Apparatus Life Cycle costing be considered by both Richmond Fire Department and Fleet Services as part of ongoing apparatus replacement plans.	Y	Fire Department will consult with Fleet Services to derive a plan for Apparatus Life Cycle costing to assist with timely apparatus replacement.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Batt Chief of Admin & Logistics		08/31/19
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION
#	RECOMMENDATION	CONCUR Y/N	ACTION STEPS
4	We recommend that RFD work with Fleet Services to identify the aging fleet and to identify actions which need to occur in the Capital Improvement Program to replace apparatuses as they approach the retirement age.	Y	The Fire Department will present to Fleet Services a complete list of apparatus that has reached the end of serviceable life; in addition we will provide a list of vehicles that are nearing the end of serviceable life. The FD will make specific written recommendations to Fleet Services and the Budget Office that details the need for Capital Improvement Program funding to replace aged apparatus.
	TITLE OF RESPONSIBLE PERSON		TARGET DATE
	Deputy Chief of Support Services		08/31/19
	IF IN PROGRESS, EXPLAIN ANY DELAYS		IF IMPLEMENTED, DETAILS OF IMPLEMENTATION