Prince William County, Virginia
Fire and Rescue System Apparatus Maintenance Analysis

September 4, 2020
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**TRANSMITTAL LETTER**

September 4, 2020

The Board Audit Committee of
Prince William County, Virginia
1 County Complex Court
Prince William, Virginia 22192

Pursuant to the internal audit plan for calendar year ending (“CY”) 2019 for Prince William County, Virginia (“County” / “PWC”), approved by the Board of County Supervisors (“BOCS”), we hereby present the Fire and Rescue System Apparatus Maintenance Analysis. We will be presenting this report to the Board Audit Committee of Prince William County at the next scheduled meeting on September 22, 2020.

Our report is organized into the following sections:

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>This provides a high-level overview and summary of the observations noted in this analysis.</td>
</tr>
<tr>
<td>Background</td>
<td>This provides an overview of processes surrounding the apparatus maintenance system, as well as relevant background information.</td>
</tr>
<tr>
<td>Objectives and Approach</td>
<td>The objectives of this analysis are expanded upon in this section.</td>
</tr>
<tr>
<td>Analysis</td>
<td>This section a summarization of the current maintenance practices and future state recommendations, by each Department.</td>
</tr>
<tr>
<td>Process Maps</td>
<td>This section provides a visual depiction of the workflow of key maintenance processes as currently performed at each Department.</td>
</tr>
</tbody>
</table>

We would like to thank the County’s Fire and Rescue System and all those involved in assisting our firm with this analysis.

Respectfully Submitted,

RSM US LLP

Internal Auditors
EXECUTIVE SUMMARY

**Background**
23 fire stations operate within nine distinct Departments across the County

~363 apparatus assets owned and operated the Fire & Rescue System ("System")

~$2.4M average annual spend on apparatus maintenance

**Governance**
System: the combined structure (career + volunteer) created to deliver fire, rescue and emergency management services as defined in PWC Code Chapter 9.2 (adopted August 2017)

7-Member System Executive Committee:
- 3 Volunteer Fire & Rescue Department ("VFD") Chiefs
- 3 Assistant Chiefs
- 1 Operational Medical Director

Apparatus Fleet Infrastructure and Maintenance Committee

New Fleet Manager Role: Streamline and centralize asset management

**Analysis Highlights**

**Summary:** Apparatus maintenance and management is siloed with no system-wide asset management system in place to support Fire & Rescue operations. Some fire and rescue stations within the System lacked the technological capability to produce basic asset maintenance data, which is vital to an effective apparatus management program within the System. As detailed in this report, to effectively move from the current siloed approach to a highly functioning asset management program, we recommend the System centralize maintenance management.

We also noted that third-party vendor contracts supporting the County’s apparatus maintenance program are nearing expiration. We believe this is a great opportunity to bring key System leaders together to work with the Finance Department -- Procurement Services Division to review all maintenance contracts and issue new solicitation(s), helping to harness the purchasing power of the County.

**Key Risks:**
- Limited ability to assess and confirm apparatus readiness, which is critical to safely delivering firefighting and emergency medical services to residents of the County
- Inability to quickly identify historical maintenance activities by apparatus
- Inability to quickly quantify historical maintenance costs by apparatus
- Manual tracking of online/offline status of apparatus may limit agility of the System to re-assign assets for critical needs
- Strategic planning hampered by available information, and based on incomplete data
- Disaggregated use of vendors may limit competition and increase costs

**Apparatus Analysis**

<table>
<thead>
<tr>
<th>Apparatus – as of January 1, 2020:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanker</td>
</tr>
<tr>
<td>Rescue</td>
</tr>
<tr>
<td>Marine</td>
</tr>
<tr>
<td>Truck</td>
</tr>
<tr>
<td>Specialty</td>
</tr>
<tr>
<td>Engine</td>
</tr>
<tr>
<td>Ambulance</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

~70 Vendors utilized for maintenance since 2016

5 Systems utilized to manage assets

Information readily available from Departments:

- Asset Listing: 94%
- Historical Maintenance Costs: 39%
- Work Order Detail: 33%
- Downtime: 22%
**BACKGROUND**

**Defining Asset Management**

Asset management refers to the processes that organizations use to monitor, maintain, upgrade, and replace capital assets throughout the asset lifecycle. Overall, effective asset management is the practice of managing capital assets to minimize the total cost of owning and operating assets, while maintaining the desired level of readiness. The asset lifecycle starts at the assessment of need and procurement continues with ongoing preventative and corrective maintenance, monitoring of portfolio (apparatus) health, and ends with the retirement of assets at determined thresholds. Throughout each of these processes, the collection and analysis of data is a key component to effective and informed decision-making.

A high performing asset management program can provide extensive benefits, such as:

- Prolonging asset life and improving decisions about asset rehabilitation, repair, and replacement;
- Meeting purpose demands with a focus on asset availability;
- Budgeting focused on critical activities for sustained performance;
- Meeting service expectations and regulatory requirements;
- Improving responses to emergencies;
- Improving the safety of assets; and,
- Reducing overall costs for both operations and capital expenditures.

Critical to the success of a high-performing asset management program is the collection of accurate data, as access to data provides management with information necessary to make informed decisions. Whether through analysis of historical data to measure long-term performance, or through analysis of recent data to quickly identify emerging trends and issues, the consistent and accurate collection of data is crucial to providing a foundation for accurate decision-making.

**Current Capabilities**

As detailed in the pages that follow, we noted that the System currently lacks the ability to provide many of the critical data elements described above in an efficient and consistent manner. This is likely due to the current siloed approach to asset management, where each Department is responsible for the scheduling, tracking, and data collection of maintenance for the assets assigned to the Department. To fully realize the advantages of a highly functioning asset management program, the System will need to integrate and centralize several key processes.
Fire and Rescue System Overview

The Prince William County Fire and Rescue System is comprised of the County’s Department of Fire & Rescue (“DFR”) and eight Volunteer Departments. These organizations are responsible for the provision of fire, rescue, and emergency medical services programs to Prince William County. Between the nine Departments, the County provides funding for 23 fire and rescue stations. The System operates as a combination system, with flex/combined staffing at many stations to provide 24-hour services to residents of the County.

The System’s Executive Committee (“Committee”) advises and consults the System Chief on matters such as policies, procedures, strategic planning, finances, audits, training requirements, and system-wide discipline of volunteer members. The Committee is comprised of seven members: three Volunteer Chiefs; Department of Fire & Rescue Deputy Chief and two Assistant Chiefs (or other career employee designee as appointed by the System Chief); and the County’s Operational Medical Director.

With respect to the current asset management function, each Department within the System is responsible for the assets within the Department. In an effort to streamline and centralize the collection of asset information and deployment, the System recently created a Fleet Manager role. Responsibilities of this position include assisting in the coordination of maintenance and fleet activities across the System. These activities include monitoring the health of the fleet, assisting in the coordination of replacements for downtime, continuous monitoring of maintenance schedules and vendors, and assisting in gathering and analyzing fleet data to help the System make informed decisions.

The Fleet Manager role is critical to the future state recommendations noted within this report. As described above, the role will assist in the centralization of certain key functions and data collection, and act as a liaison between all Departments. As more data becomes available, the role will also be a critical component of the continuous monitoring and analysis function. As the function increases, and as recommended below, the need to expand from a single role to a team is apparent.
Fire and Rescue Apparatus

Each Department utilizes specialized equipment, which provide unique capabilities tailored to the Department’s community and location. For example, some Departments maintain boats due to close proximity to the waterways, while others maintain all-terrain vehicles (“ATVs”) to navigate through rough terrain.

Below is a chart summarizing each Department’s fire and rescue assets (apparatus), as identified during an inventory count conducted in January 2020:

<table>
<thead>
<tr>
<th>Department</th>
<th>Ambulance</th>
<th>Engine</th>
<th>Rescue</th>
<th>Tanker</th>
<th>Truck</th>
<th>Specialty**</th>
<th>Marine</th>
<th>Other***</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckhall VFD</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Dale City VFD</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td></td>
<td>2</td>
<td>4</td>
<td>19</td>
<td>4</td>
<td>39</td>
</tr>
<tr>
<td>Department of Fire &amp; Rescue</td>
<td>22</td>
<td>14</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>12</td>
<td>4</td>
<td>99</td>
<td>165</td>
</tr>
<tr>
<td>Dumfries-Triangle VFD</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Lake Jackson VFD</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nokesville FD</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>24</td>
<td>44</td>
</tr>
<tr>
<td>Owl VFD</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>30</td>
<td>55</td>
</tr>
<tr>
<td>Stonewall Jackson VFD</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Yorkshire VFD</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>44</td>
<td>8</td>
<td>8</td>
<td>13</td>
<td>33</td>
<td>12</td>
<td>193</td>
<td>357</td>
</tr>
</tbody>
</table>

*provided by the Department of Fire & Rescue, compiled during an inventory conducted in January 2020
**examples include: Air Units, Attack, Brush Trucks, Canteen, Collapse Units, Command Units, Haz-Mat Units, MCU, Rehab, SWR Tow Vehicles, TSU
***examples include: Chief’s vehicles, CIT, Emergency Management, EMS OPS, FMO, Health and Safety, Trailers, Training, Utilities

The following tables summarize the purchase costs of the apparatus assets owned by the County, as well as a count of the apparatus assets owned by the Volunteer Departments. Assets owned by the County are included within the fixed assets module within the County’s financial management system, ASCEND; however assets owned by the Volunteer Departments are excluded from accounting records. Refer to the Observation section below for details related to the variance between the 159 assets included in the inventory count, and the 125 assets included in the County’s accounting records.

### System Assets Titled to County***

| Total owned | 125 |
| Total original cost | $18,153,984 |
| Average original cost | $145,231 |

***provided by PWC Finance Department – Financial Reporting and Control Division, Capital Assets team

### System Assets Titled to Volunteer Departments

| Total Owned | 204 |
| Total Original Cost**** | $34,729,512 |
| Average Original Cost**** | $170,243 |

****estimates provided by DFR Administrative Division
Fire and Rescue Apparatus Maintenance

Apparatus maintenance activities can be generally categorized as either preventative or corrective. Preventative maintenance includes those tasks performed on a piece of equipment in order to reduce the chance of failure or need for future corrective maintenance. Preventative maintenance includes procedures such as oil changes, fluid checks, and annual inspections. Corrective maintenance is work performed on a piece of equipment that has already failed and requires repair to bring the asset back to service.

Currently, each Department has individual processes for handling and tracking the preventative and corrective maintenance for their apparatus.

<table>
<thead>
<tr>
<th></th>
<th>AssetWorks</th>
<th>VMS</th>
<th>IRONS</th>
<th>In-House System</th>
<th>Manual System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckhall VFD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dale City VFD</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Department of Fire &amp; Rescue</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dumfries-Triangle VFD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Jackson VFD</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Nokesville VFD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OWL VFD</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Stonewall Jackson VFD</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yorkshire VFD</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Monitoring Fire and Rescue Apparatus Maintenance

Currently, each Department has individual systems and processes for managing the preventative and corrective maintenance for their apparatus. Many of the Departments utilize software tools to assist in asset management efforts; however, the functionality of each Department's software varies, depending on the tools utilized, and the level of implementation.

Many of the Volunteer Departments use a system called Volunteer Management System ("VMS"). VMS is a web-based management system that was designed specifically to help volunteer fire departments manage their day-to-day operations. The system can be used to track recruiting, training programs, duty schedules, certifications, assets, and asset maintenance. Using an individual login, any member of the department can open the status board to view the status of any apparatus that is waiting for maintenance or view the tickets that have been opened in the past that are now closed.

The County’s Department of Fire & Rescue coordinates with the County’s Fleet Management Division (within Department of Facilities & Fleet Management) and external vendors to perform apparatus maintenance. The Fleet Management Division uses AssetWorks to track the work completed by Fleet Management including the work completed on DFR vehicles & equipment. AssetWorks is an asset management software used to track assets throughout its entire life. AssetWorks contains a module specifically for fleet management. The module oversees many aspects including maintenance schedules, work orders, and parts requests. Additionally, it contains a data analytics tool and administrative capabilities that can be used to track information related to billing, warranties, and procurement contracts.

IRONS is a module within, Podio, a web-based system used to organize team communication, business processes, data, and content in project management workspaces according to project needs. Currently, the IRONS module is used to track maintenance work orders and allows vendors to integrate with the system but has numerous project management capabilities.

OWL VFD utilizes an internally developed ticketing software that allows an apparatus user to submit a ticket whenever corrective maintenance is needed. The system automatically alerts the appropriate personnel when a ticket is submitted, allowing mechanics to fix the problem in a timely basis. Because OWL has their own maintenance facility, preventative maintenance is tracked manually in their shop.
Data Tracking

Tracking data in a way that can be efficiently and effectively analyzed is an important part of any organization. Tracking costs and maintenance issues can help departments when making decisions about future apparatus purchases, building maintenance schedules, determining the biggest maintenance problems faced by each department and the related costs, and in allocating resources across departments in the event of an apparatus being down for longer than expected.

RSM requested data System-wide, including historical data regarding costs and problem tracking, to be used in our analysis. The requested items were based off what was able to be pulled from the respective maintenance record-keeping systems. The graphic below depicts the information each Department was able to provide out of their current maintenance tracking system. Refer to the Individual Department Analysis section below for further detail.

<table>
<thead>
<tr>
<th>Department</th>
<th>Asset Listing</th>
<th>Historical maintenance costs of each apparatus by:</th>
<th>Maintenance ticket / work order details including:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Vendor</td>
<td>Labor</td>
</tr>
<tr>
<td>PWC DFR</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Buckhall VFD</td>
<td>Y</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Dale City VFD</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Dumfries Triangle VFD</td>
<td>Y</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Lake Jackson VFD</td>
<td>Y</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Nokesville VFD</td>
<td>P</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>OWL VFD</td>
<td>Y</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Stonewall Jackson VFD</td>
<td>Y</td>
<td>Y/M</td>
<td>Y/M</td>
</tr>
<tr>
<td>Yorkshire VFD</td>
<td>Y</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

**Legend**

- **Yes** - The data/attribute is readily available and the information was provided to RSM
- **Partial** – The cost data/attribute is available and was provided to RSM for certain items, but not all maintenance activities
- **Walkthrough** – Based on our walkthroughs, we understand the system has capability to track this data; however, the information was not provided to RSM
- **Vendor** – The data/attribute is not tracked by the department electronically, but may be available from vendors
- **Manual** – The data/attribute is not tracked electronically, and gathering would require substantial manual effort
Vendor Utilization

Departments may use vendors that are directly contracted with Prince William County, or through a cooperative contract (where several municipalities procure a contract together). Three Departments do not use contracted vendors to perform the maintenance of their apparatus:

- OWL VFD employs mechanics for apparatus maintenance but utilize vendors for parts.
- Dumfries-Triangle VFD performs maintenance with an in-house mechanic after warranties expire.
- Approximately 100 of the County’s DFR apparatus are maintained by the County’ Fleet Management Division, with the remaining 60 maintained by a contracted vendor.

Regardless of Department and vendor, all invoices are processed through the ASCEND financial management system. The following table summarizes the largest maintenance contracts, including procurement and pricing structure, and payments made from fiscal year ending (“FY”) June 30, 2017 through January 2020.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Total Spent*</th>
<th>Award Date</th>
<th>Expiration Date</th>
<th>Initiating Locality</th>
<th>Procurement Methodology</th>
<th>Pricing Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOUDOUN SERVICES INC</td>
<td>$2,114,624</td>
<td>7/1/2017</td>
<td>6/30/2020</td>
<td>Prince William County</td>
<td>Competitive Bid Only 1 bidder</td>
<td>Labor: $1,000/annual service $90/hour for non-contract services Parts: No discount</td>
</tr>
<tr>
<td>FIRST VEHICLE SERVICES</td>
<td>$1,643,339</td>
<td>6/17/2016</td>
<td>12/31/2019</td>
<td>Loudoun County</td>
<td>Cooperative Procurement</td>
<td>Labor: $225-$1,597/Service for inspections and preventative maintenance (Depending on apparatus and service) $99/hour (Labor rate for business hours repairs, pickup and delivery rate, and travel time rate) $123.75/hour (Labor rate for non-business hours repairs) Parts: Not Specified</td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS &amp; EQUIPMENT REPAIR</td>
<td>$1,557,477</td>
<td>11/17/2015</td>
<td>11/16/2020</td>
<td>Prince William County</td>
<td>Competitive bid 5 bidders 1 contract awarded</td>
<td>Labor: $110/hour (Shop rate and business hours field rate) $126/hour (After-hours field rate) Parts: 15% discount (for applicable manufacturers per contract)</td>
</tr>
<tr>
<td>WILLIAMS EMERGENCY VEHICLE SERVICES</td>
<td>$529,827</td>
<td>12/1/2017</td>
<td>3/1/2020</td>
<td>Houston-Galveston Area Council of Govts</td>
<td>Cooperative Procurement</td>
<td>This contract is for the purchase of Seagrave apparatus, not the maintenance of an apparatus so the pricing largely depends on the type of apparatus and specifications requested by the department. Pricing sheet lists prices between $121,043 and $1,197,352</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$211,699</td>
<td>2/22/2017</td>
<td>2/20/2020</td>
<td>Dinwiddie County</td>
<td>Competitive bid 4 bidders 3 contracts awarded</td>
<td>Labor: $870.35-$1,004/Service (Depending on apparatus and service) $100.94/hour (Labor rate for repairs) Parts: 10% discount</td>
</tr>
<tr>
<td></td>
<td>$621,591</td>
<td>12/30/2019</td>
<td>1/1/2021</td>
<td>Prince William County</td>
<td>Competitive Bid</td>
<td>Labor: $111-$142/hour (Depending on site and time) Annual Inspections: $138.60-$4,179.30/apparatus (Depending on type of inspection) Parts: 10% discount</td>
</tr>
</tbody>
</table>

* Unaudited totals provided by the Finance Department – Procurement Services Division
Vendor Utilization - Continued

Since October 2016, the System has used over 70 different vendors, excluding Procurement Cared ("P-Card") transactions. The top ten vendors account for approximately 84% of the total maintenance costs incurred, with the top three vendors accounting for approximately 65% of the total maintenance costs incurred.

<table>
<thead>
<tr>
<th>Vendor Utilization - Continued</th>
<th>FY 2017</th>
<th>FY 2018</th>
<th>FY 2019</th>
<th>FY 2020**</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOUDOUN SERVICES INC</td>
<td>$562,398</td>
<td>$499,533</td>
<td>$615,097</td>
<td>$679,104</td>
<td>$2,356,132</td>
</tr>
<tr>
<td>FIRST VEHICLE SERVICES</td>
<td>$672,018</td>
<td>$478,736</td>
<td>$386,638</td>
<td>$290,814</td>
<td>$1,828,206</td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$346,888</td>
<td>$508,147</td>
<td>$450,966</td>
<td>$476,742</td>
<td>$1,782,742</td>
</tr>
<tr>
<td>WILLIAMS EMERGENCY VEHICLE SERVICES LLC</td>
<td>$103,245</td>
<td>$49,042</td>
<td>$339,371</td>
<td>$623,769</td>
<td>$833,254</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$67,135</td>
<td>$78,173</td>
<td>$64,176</td>
<td>$267,847</td>
<td>$759,504</td>
</tr>
<tr>
<td>DONALD B. RICE TIRE CO. INC.</td>
<td>$38,794</td>
<td>$52,499</td>
<td>$81,764</td>
<td>$69,676</td>
<td>$242,733</td>
</tr>
<tr>
<td>CUMMINS POWER SYSTEMS LLC</td>
<td>$19,394</td>
<td>$143,870</td>
<td>$38,503</td>
<td>-</td>
<td>$201,767</td>
</tr>
<tr>
<td>WOODDALE AUTOMOTIVE SPECIALISTS INC.</td>
<td>$36,279</td>
<td>$53,906</td>
<td>$32,055</td>
<td>$36,582</td>
<td>$139,474</td>
</tr>
<tr>
<td>P-CARD CHARGES</td>
<td>$10,216</td>
<td>$30,817</td>
<td>$55,157</td>
<td>$28,820</td>
<td>$138,630</td>
</tr>
<tr>
<td>MCCARTHY TIRE SERVICE CO OF VIRGINIA INC</td>
<td>$32,888</td>
<td>$359,785</td>
<td>$375,865</td>
<td>$137,922</td>
<td>$1,224,244</td>
</tr>
<tr>
<td>OTHER (includes 65 vendors)</td>
<td>$329,888</td>
<td>$359,785</td>
<td>$375,865</td>
<td>$137,922</td>
<td>$1,224,244</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$2,222,676</td>
<td>$2,295,708</td>
<td>$2,471,781</td>
<td>$2,654,763</td>
<td>$9,644,928</td>
</tr>
</tbody>
</table>

*unaudited totals provided by DFR Administrative Division
Vendor Utilization – Continued

The following charts show top 10 vendors by total spend, and top three vendors each year from FY 2017 – January 2020:
The charts included herein represent data currently available, are only provided for informational purposes, and are not intended to present an analysis or comparison of the System's Departments. Cost variances noted between Departments are likely attributable to a combination of variables such as the average age of apparatus, mix of heavy equipment vs. light duty vehicles, and sophistication of preventative maintenance programs, among many other variables.

While the data currently available from the System does not include key attributes necessary for performing a detailed analysis, the recommendations included in this report endeavor to significantly expand the availability of data. When available, this data will provide the System with the information and allow for the development of tools and metrics necessary to perform deep analysis of the apparatus maintenance program.

*OWL and Dumfries-Triangle costs do not include the cost of labor ($253,530 and $111,789, respectively as provided by DFR Administrative Division).
### Top Three Vendors (by amount spent) for Each Department

<table>
<thead>
<tr>
<th>Vendor Name</th>
<th>Amount Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Department of Fire &amp; Rescue</strong></td>
<td></td>
</tr>
<tr>
<td>LOUDOUN SERVICES INC</td>
<td>$2,356,132</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$646,956</td>
</tr>
<tr>
<td>DONALD B. RICE TIRE CO. INC.</td>
<td>$241,438</td>
</tr>
<tr>
<td><strong>Buckhall Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$173,153</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$46,622</td>
</tr>
<tr>
<td>MCCARTHY TIRE SERVICE CO OF VIRGINIA INC</td>
<td>$19,532</td>
</tr>
<tr>
<td><strong>Dale City Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>FIRST VEHICLE SERVICES</td>
<td>$1,643,339</td>
</tr>
<tr>
<td>WILLIAMS EMERGENCY VEHICLE SERVICES LLC</td>
<td>$475,410</td>
</tr>
<tr>
<td>LAAKE ENTERPRISES INC.DBA FESCO EMERGENC</td>
<td>$67,202</td>
</tr>
<tr>
<td><strong>Dumfries Triangle Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>CUMMINS POWER SYSTEMS LLC</td>
<td>$71,634</td>
</tr>
<tr>
<td>COWLES FORD INC</td>
<td>$32,683</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$28,872</td>
</tr>
<tr>
<td><strong>Lake Jackson Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$215,454</td>
</tr>
<tr>
<td>C.W. WILLIAMS &amp; CO</td>
<td>$33,490</td>
</tr>
<tr>
<td>WESTERN BRANCH DIESEL INC</td>
<td>$19,266</td>
</tr>
<tr>
<td><strong>Nokesville Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$772,188</td>
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<tr>
<td>MCCARTHY TIRE SERVICE CO OF VIRGINIA INC</td>
<td>$59,533</td>
</tr>
<tr>
<td>PATRIOT FIRE LLC</td>
<td>$29,136</td>
</tr>
<tr>
<td><strong>OWL Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>WOODDALE AUTOMOTIVE SPECIALISTS INC.</td>
<td>$138,446</td>
</tr>
<tr>
<td>CUMMINS POWER SYSTEMS LLC</td>
<td>$133,247</td>
</tr>
<tr>
<td>JPMORGAN CHASE BANK N.A.</td>
<td>$116,226</td>
</tr>
<tr>
<td><strong>Stonewall Jackson Volunteer Fire Department</strong></td>
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</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$211,554</td>
</tr>
<tr>
<td>ATLANTIC EMERGENCY SOLUTIONS</td>
<td>$124,544</td>
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<tr>
<td>MCCARTHY TIRE SERVICE CO OF VIRGINIA INC</td>
<td>$27,312</td>
</tr>
<tr>
<td><strong>Yorkshire Volunteer Fire Department</strong></td>
<td></td>
</tr>
<tr>
<td>FINLAY FIRE APPARATUS AND EQUIPMENT RPR</td>
<td>$163,814</td>
</tr>
<tr>
<td>MCCARTHY TIRE SERVICE CO OF VIRGINIA INC</td>
<td>$14,467</td>
</tr>
<tr>
<td>FIREHOSECARE INC</td>
<td>$8,002</td>
</tr>
</tbody>
</table>
OBJECTIVES AND APPROACH

Objectives

The objective of this analysis was to evaluate and assess the current structure of the System’s fire and rescue apparatus maintenance practices and provide recommendations for improvement.

Approach

Our approach to this analysis was as follows:

Current State Analysis

Analysis of the current state consisted primarily of inquiry to obtain an understanding of the System’s current structure and maintenance practices. The following procedures were conducted:

- Conducted interviews with each System Department to identify current practices for apparatus maintenance, including:
  - Identification of need (corrective and preventative)
  - Prioritization and scheduling
  - Performance of maintenance
  - Utilization of internal labor vs vendors
  - Vendor agreements and pricing
  - Documentation of maintenance performed
- In conjunction with the interviews described above, we also worked with the System to identify the complete listing of equipment recognized/maintained at each fire and rescue station, and the historical costs of maintenance (5-year lookback)
- After we obtained an understanding of current state, we conducted an analysis to identify recommended actions, in accordance with best practices, for the County to consider during implementation of a future-state work order driven maintenance software and processes. This included analyzing controls within the following key areas:
  - Utilization of technology applications
  - Completeness and accuracy of data entry (time and materials costs)
  - Segregation of duties
  - Utilization of internal labor and vendors
  - Reporting and monitoring

Reporting

At the conclusion of this phase, we summarized the results of our analysis into this report. We conducted exit meetings with the System Executive Committee and the Board Audit Committee.
### Observation 1. Apparatus Inventory Variance

#### High

During our analysis, we noted discrepancies between the fire and rescue apparatus inventory count conducted by the Department of Fire & Rescue, and the asset listing provided by the County’s Finance Department – Financial Reporting and Control Division, Capital Assets team. Specifically, the inventory count identified 34 assets at DFR stations that were not included in the fixed asset listing within the County’s ASCEND financial management system. Through further discussions, we understand these assets were likely inherited from the County’s absorption of a prior Volunteer Department, which were never entered into ASCEND.

In addition to the items identified during our analysis, we also understand that other discrepancies were previously identified within the fixed asset listing in ASCEND. During the County’s financial statement audit for the fiscal year ended June 30, 2018, a material weakness was identified in internal controls over financial reporting, as the County’s accounting records improperly capitalized assets owned by Volunteer Departments. Although the assets were purchased with the County’s fire levy, the title to the assets only listed the respective VFD, and not the County. As a result of the finding, the County removed 87\(^1\) capital assets valued at $10.6M ($14.3M purchase costs)\(^2\) from its accounting records. Since then, we understand the County has taken efforts to dual-title assets purchased with fire levy funds, so the assets can be recorded in ASCEND.

In discussions with representatives throughout the System and the Financial Reporting and Control Division, Capital Assets team, we noted that uncertainty exists regarding the completeness and accuracy of the County’s capital asset records related to fire and rescue apparatus. Considering the variance noted during our analysis, coupled with the prior finding noted during the financial statement audit, the County’s financial records may not accurately reflect the portfolio of fire and rescue apparatus.

Accurate accounting of assets is the first step in creating a functioning asset management program. Without a comprehensive understanding of the County’s fire and rescue fleet, budgeting, operating, and capital planning decisions may be made based on incorrect or incomplete information. A complete listing of assets is also critical for the County to produce and maintain accurate financial reporting.

#### Recommendation

We recommend the County perform a comprehensive analysis to identify title ownership of all fire and rescue capital assets and perform a reconciliation of those records to the assets listed in ASCEND. After the reconciliation is performed, ASCEND should be appropriately updated to reflect assets titled to the County.

As detailed in the pages that follow, we also recommend the County begin a robust program of tracking asset maintenance in a centralized database. To track maintenance activity by asset, details of all fire and rescue assets held by the System Departments must also be entered into the Asset Works maintenance software. When utilizing the recent asset inventory count to develop and/or reconcile the asset listing within the maintenance software, the County may also consider adding an attribute to track title status of the asset. This will allow for a recurring (annual) reconciliation between the maintenance software and ASCEND to validate that asset information remains complete and accurate within ASCEND, while also maintaining a record of all fire and rescue assets held by the System Departments in a centralized location.

---

\(^1\) Per data provided by Financial Reporting and Control Division, Capital Assets team  
**Observations Matrix – Continued**

<table>
<thead>
<tr>
<th>Observation</th>
<th>1. Apparatus Inventory Variance – continued</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management’s Action Plan</strong></td>
<td><strong>Response</strong>: The Fire and Rescue System concurs with the findings of the report. On July 16, 2020, I gave the FRS Executive Committee guidance to develop a system wide apparatus maintenance program and they have established task groups to assist with this work. The findings of this report will be shared with the FRS Executive Committee and associated task groups to accomplish their work in developing a system wide apparatus maintenance program. Updates will be provided to the FRS System Chief on a monthly basis. <strong>Responsible Party</strong>: FRS System Chief <strong>Estimated Completion Date</strong>: TBD</td>
</tr>
</tbody>
</table>
Each System Department manages apparatus maintenance in different ways. While the majority of the Departments use a ticketing system that contains historical ticket information, few Departments have the ability to easily track costs related to specific apparatus. Because the ticket systems and the financial data are not linked, there is no visibility into the type of apparatus that require the most corrective work or what the problems that have driven historical costs. A significant portion of spending by these Departments is related to the purchase of new apparatus and the costs associated with the maintenance. By providing the County with visibility into each of these different asset management systems, a periodic analysis of maintenance vendors, costs, problems, and downtimes can be performed, helping both the County and the Departments work together to make decisions. Access to complete data will also provide the County with the ability to conduct analyses used to drive strategic decisions in regards to maintenance of apparatus, for example whether continued utilization of vendors or development of an in-house service team is most advantageous.

**Vendor Management Strategy**
- Develop metrics for objective evaluation of vendor performance
  - Analyze current vendors by:
    - spend
    - performance
    - Identify overlap in parts / scope with discrepancies in cost
    - location / accessibility
  - Develop strategy for procurement of expiring contracts, with consideration of:
    - county-wide service and buying power
    - vendor pools
    - non-specialized vs. specialized requirements

**Centralize Data**
- Centralize data for comprehensive analysis through:
  - When not previously captured, begin entry of data into existing systems
  - Development of integrations for use in future data uploads from external sources to central record
  - Migration of historical data from volunteer-owned systems to central record
  - Migration of historical data from vendor systems to central record

**Create Performance Metrics**
- Create performance metrics for evaluation of the maintenance program
  - Use metrics to drive daily, weekly, monthly, quarterly, annual, multi-year reporting
  - Examples of metrics may include reporting of the following:
    - cost per mile / hour
    - average down time
    - maintenance frequency
    - average maintenance activity cost
  - Above metrics may be further segregated by:
    - manufacturer
    - department
    - equipment type
    - vendor

**Use Data and Metrics to Drive Decisions**
- Utilize performance metrics to drive enterprise level decisions such as:
  - fleet age
  - fleet health
  - total cost of ownership
  - apparatus replacement lifecycle
  - manufacturer performance
  - vendor performance
  - asset reliability
  - down time
  - long-term cost and feasibility projections
  - dispose, or maintain analysis
  - cost proposal vs historical cost analysis

Future analyses to drive strategic vision for maintenance and utilization of vendors versus in-house
The chart below summarizes the major tasks and example timeline relevant to implementing the recommended actions included within this report.

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Management</strong></td>
<td></td>
</tr>
<tr>
<td>Establish steering committees for project management, vendor</td>
<td>1</td>
</tr>
<tr>
<td>management strategy, data collection, key performance indicator</td>
<td>2</td>
</tr>
<tr>
<td>(KPI) establishment and future planning</td>
<td>3</td>
</tr>
<tr>
<td>Develop overall strategy implementation timeline</td>
<td>4</td>
</tr>
<tr>
<td>Define committee reporting cadence</td>
<td>5</td>
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<td>11</td>
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<tr>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>1+</td>
</tr>
<tr>
<td><strong>Vendor Management</strong></td>
<td></td>
</tr>
<tr>
<td>Conduct analysis of current vendor pool: assess performance,</td>
<td></td>
</tr>
<tr>
<td>current contract requirements, and identify available data.</td>
<td></td>
</tr>
<tr>
<td>Identify opportunities to consolidate contract requirements, and</td>
<td></td>
</tr>
<tr>
<td>define scopes for future procurements</td>
<td></td>
</tr>
<tr>
<td>Establish timeline and begin (re)procurement of contracts</td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Data Collection</strong></td>
<td></td>
</tr>
<tr>
<td>Compile asset inventory upload to system. Define required data</td>
<td></td>
</tr>
<tr>
<td>points and identify vendors with ability to provide historical data</td>
<td></td>
</tr>
<tr>
<td>Meet with vendors that currently have historical data and develop</td>
<td></td>
</tr>
<tr>
<td>plan and timeline for migration of historical data</td>
<td></td>
</tr>
<tr>
<td>Migrate and validate available historical data into central system</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KPIs and Future Planning</strong></td>
<td></td>
</tr>
<tr>
<td>Define KPIs based on currently available data and develop</td>
<td></td>
</tr>
<tr>
<td>reporting cadence</td>
<td></td>
</tr>
<tr>
<td>Define data required for currently unmeasurable KPIs</td>
<td></td>
</tr>
<tr>
<td>Refine KPI as availability and quality of data increases</td>
<td></td>
</tr>
</tbody>
</table>

Color Legend: Planning | Implementation
**Summary Analysis – Continued**

The pages that follow contain an outline of the current state of technologies, vendors, and monitoring efforts related to apparatus maintenance, with a corresponding future state recommendation and action plan for how to centralize data.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Current State</th>
<th>Future State Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AssetWorks</strong> - The County’s Department of Fire &amp; Rescue utilizes AssetWorks to track maintenance activities and associated costs.</td>
<td>To realize the benefits associated with a highly functioning asset management program, the System will eventually require full centralization of data collection and maintenance in a capable Computerized Maintenance Management System (CMMS). For this, we recommend utilization of AssetWorks, considering the software’s functionality allows for the achievement of recommendations outlined herein, and as several apparatus are already tracked within the AssetWorks system.</td>
<td></td>
</tr>
<tr>
<td><strong>Volunteer Management System (“VMS”)</strong> - Many Volunteer Departments utilize VMS, though to varied degrees. VMS has the capability to track noted issues and status by equipment but is not utilized to track maintenance activity or costs.</td>
<td>If pursued by the System Chief after consultation with the Executive Committee, the shift to a fully centralized CMMS will require significant effort, time, and the collaboration of all nine Departments. We recommend collection of data from existing sources when available, until full centralization can occur.</td>
<td></td>
</tr>
<tr>
<td><strong>IRONS</strong> – One VFD uses IRONS to track maintenance activities and associated costs.</td>
<td>To facilitate the entry of data to the CMMS, we recommend the Fleet Manager work with each Department to develop an approach to obtaining Department data, either from Department software or from vendors and incorporating the data into AssetWorks. The following data points should be collected, at minimum:</td>
<td></td>
</tr>
</tbody>
</table>
| **Internally Developed** - One VFD uses internally developed software to track noted issues and status by equipment. The system tracks some maintenance data but does not include costs. | • Apparatus / VIN  
• Apparatus mileage/hours  
• Dates apparatus in/out of service  
• Dates service begin/end  
• Type/description of service  
• Parts/materials costs  
• Labor costs  
• Sub-vendor costs |
| **Manual** – One VFD uses manual (paper) records as historical information for maintenance and cost data. | We understand that certain third-party vendors maintain maintenance records by each asset. As such, relevant key data including maintenance activity, parts and labor costs may be available from these vendors in a format usable by System Management. This considered, we recommend collection of historical data from the various Departments and third-parties, as available. This historical data, coupled with centralization of data going forward, will provide management with key information needed to establish a high-functioning monitoring program. |
| Each of the systems described above operate in silos and are not currently configured to communicate or share data. | **Key Risks Addressed:**  
• Limited ability to assess and confirm apparatus readiness, which is critical to safely delivering fire, rescue and emergency medical services to residents of the County  
• Inability to quickly identify historical maintenance activities by apparatus  
• Inability to quickly quantify historical maintenance costs by apparatus  
• Manual tracking of online/offline status of apparatus may limit agility of System to re-assign assets for critical needs  
• Strategic planning hampered by available information, and based on incomplete data  
• Disaggregated use of vendors may limit competition and increase costs |
**Summary Analysis – Continued**

### Vendors

<table>
<thead>
<tr>
<th>Current State</th>
<th>Future State Recommendation</th>
</tr>
</thead>
</table>
| Usage of vendors varies widely by Department, from fully outsourced models to cover all maintenance aspects, to mostly insourced where internal staff provide maintenance services, and vendors are used only for warranty work and parts supply. In most cases, Departments individually procured contracts (or piggybacked contracts from other public entities) with a variety of vendors to perform maintenance, with assignment dependent on apparatus type, location, and complexity. | We understand the new Fleet Manager position is intended to act as a liaison between the System and vendors to assist in management of the System’s entire fleet. As the System is moving to a more centralized environment, and because many existing contracts were designed around the decentralized environment, the County should re-procure the contracts to maximize the benefits to the entire County. These benefits would include:  
- Providing a mechanism for the System to utilize one contract  
- Update contract requirements to include collection and sharing of critical data, or access for utilization of AssetWorks when vendors do not possess the ability to internally track work order details  
- Allowing the System to negotiate terms and pricing with vendors directly, rather than relying on other jurisdictions for cooperative or piggy-backed contracts  
- Negotiating for advantageous pricing for entire System fleet, rather than Department-specific apparatus  
- Contract start/termination dates fit to the System’s schedule to stagger future re-procurements  

We recommend the System re-procure contracts, with a focus on utilizing the Countywide purchasing power to obtain the best available pricing and provide for a variety of vendors. Understanding that many VFDs have cultivated relationships with vendors used on an ad-hoc basis over the last several years, the procurement process should solicit System-wide input during scope development. Multiple-award options should be considered to establish a prequalified pool of vendors, which can allow for vendor assignment, based on specific expertise or geographic convenience, and can minimize the risk of overburdening a single vendor. |

**Key Risks Addressed:**
- Disaggregated use of vendors may limit competition and increase costs
Summary / Overall (continued)

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Current State</th>
<th>Future State Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The mix of technologies used throughout the System also leads to a mix of monitoring practices. When technologies are utilized that allow for collection of data relevant to maintenance activities, the data can then be utilized to provide management with analyses for better decision-making and strategic planning. AssetWorks and IRONS offer more advanced capabilities of tracking maintenance and associated costs. The internally developed system used by one VFD allows for tracking of activities, but not associated costs. VMS allows for the monitoring of assets status on a real-time basis, but is limited in providing costs, and other historical data. Other Departments depend on monitoring performed by maintenance vendors, and/or manual data compilation for monitoring and reporting on an ad-hoc basis.</td>
<td>As stated in the overall Technology section above, we recommend the System use AssetWorks as the CMMS for the collection and maintenance of data. To facilitate timely and accurate collection of data, either the Fleet Manager or additional resources should coordinate with vendors and each Department to transition the upload of data collected and ongoing monitoring to a centralized platform. The CMMS should include an asset listing that is continuously updated as new apparatus are acquired by each Department, and all preventative and corrective maintenance activity System-wide. This may include performing a physical inventory count to verify the existence and completeness of the current list of apparatus. As the System continues to collect more information, we recommend personnel work to establish a set of key performance indicators (“KPIs”). The KPIs should be reviewed on a regular basis, as continuous collection of the data and review of the associated KPIs will allow the System to assess how these different elements change over time. The definition of KPIs should also be reviewed and changed, as the amount and type of information evolves. The Fleet Manager role is a critical component in the development of a robust monitoring program. The role’s central involvement in the collection and analysis of data, coupled with the collaboration of various Departments throughout the System, provides a function dedicated to managing the fleet of the System. This perspective will be invaluable as the System continues to merge and monitor data. As the responsibilities of the role increase, the resource requirements may extend beyond the single role and require a team or capital asset unit. We understand that certain Departments have salaried positions functioning as a Fleet Manager for the apparatus of that Department. This considered, we also recommend the System conduct an analysis to fully define the functions and responsibilities of existing Fleet Manager roles, determine how they currently intertwine, and how these roles can, together, support the management of the System’s entire fleet. Key Risks Addressed:</td>
<td></td>
</tr>
<tr>
<td>• Limited ability to assess and confirm apparatus readiness, which is critical to safely delivering firefighting and emergency medical services to residents of the County</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Inability to quickly identify historical maintenance activities by apparatus</td>
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<tr>
<td>• Manual tracking of online/offline status of apparatus may limit agility of System to re-assign assets for critical needs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Strategic planning hampered by available information, and based on incomplete data</td>
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</tr>
</tbody>
</table>
## INDIVIDUAL DEPARTMENTAL ANALYSIS

### Prince William County Department of Fire & Rescue (DFR)

<table>
<thead>
<tr>
<th>Current State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong> AssetWorks is the asset management system currently used by the County’s Fleet Management Division. The system is used to monitor maintenance schedules, create work orders, and track information related to billing, warranties, and procurement contracts. Work orders are created in AssetWorks for corrective maintenance issues, while the County’s Fleet Management Division and primary outsourced vendor maintain the preventative maintenance schedules for their respective apparatus. AssetWorks contains electronic data interchange (EDI) capabilities, meaning that the system allows for the computer-to-computer exchange of business information in a standard and structured format.</td>
</tr>
<tr>
<td><strong>Vendors</strong> Within the System, the DFR uses both the County’s Fleet Management Division and Atlantic Emergency Solutions (“AES”) for corrective and preventative maintenance. The Fleet Management Division maintains approximately 100 apparatus and AES approximately 60 apparatus. While both the Fleet Management Division and AES maintain the schedules for preventative maintenance, the System’s Fleet Lieutenant and Fleet Manager coordinate with the appropriate corrective maintenance provider for all DFR stations after a work order has been entered into AssetWorks.</td>
</tr>
<tr>
<td><strong>Monitoring</strong> The information available from AssetWorks includes a robust set of data points that can provide insightful information used in analysis and decision-making. These data points include work order number, status, department ID, asset number, labor hours, labor and parts costs separated by internal and commercial labor, miscellaneous costs, and total costs. On an as needed basis, the DFR reviews and analyzes the data available in AssetWorks. Specifically, the maintenance report data is used to assess the condition of apparatus that may need to be replaced or retired.</td>
</tr>
</tbody>
</table>
**Buckhall Volunteer Fire Department**

<table>
<thead>
<tr>
<th>Current State</th>
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</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
</tr>
<tr>
<td><strong>Vendors</strong></td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
</tr>
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</table>
# Dale City Volunteer Fire Department

## Current State

<table>
<thead>
<tr>
<th>Technology</th>
<th>Dale City VFD (“Dale City”) purchased a module from Podio’s project management software called IRONS. Dale City uses the software to manage and track individual apparatus, to manage the related maintenance through work orders, and to aide in communication with the primary vendor on the status of apparatus needing maintenance. It serves as Dale City’s internal recordkeeping tool to report issues; however, it does not include cost and resolution data. Vendors have access to close issues after related maintenance has been performed. Dale City provided reporting from IRONS that included issue(s) noted, creation date, apparatus, and details. Additional work order details by apparatus were also obtained from Dale City’s two vendors that included cost and maintenance activity detail.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendors</td>
<td>First Vehicle Services (FVS) is the primary maintenance vendor and Williams Emergency Vehicle Services (WEVS) is the secondary maintenance vendor utilized by Dale City. FVS maintains the preventative maintenance schedule and alerts Dale City as an apparatus becomes due. FVS then performs the work in Dale City’s in-house shop. Either FVS or WEVS perform the majority of preventative maintenance and some corrective maintenance. When an apparatus under warranty needs corrective maintenance, or if the work cannot be done in-house, other vendors may be used. FVS maintains most of the parts needed for maintenance, but Dale City keeps a small inventory in-house, for quick-fix supplies and parts.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Dale City currently monitors apparatus maintenance spending through a monthly report received from FVS. The report contains all of the costs by apparatus for the respective month and is reviewed by Dale City for accuracy and for any unusual trends in spending for that month. As noted above, Dale City was able to provide historical work orders obtained from FVS, an export of work order details from WEVS’s system, and a report from IRONS detailing the tickets entered into the system.</td>
</tr>
</tbody>
</table>
## Individual Departmental Analysis – Continued

### Dumfries Triangle Volunteer Fire Department

<table>
<thead>
<tr>
<th>Current State</th>
</tr>
</thead>
</table>

#### Technology

Dumfries-Triangle VFD (“Dumfries-Triangle”) uses VMS for submission and tracking of maintenance tickets when a corrective maintenance need is identified. The VMS system notifies the Captain, the Chief, and the initiator anytime a ticket is created, updated, or closed. As the maintenance takes place, the ticket details are updated to include notes about cost, the nature of the repair, who does the repair, and the purchase order number.

Dumfries-Triangle maintains the schedule for all preventative maintenance of apparatus after the warranty expires, separately from VMS.

Historical records were not provided by Dumfries-Triangle; however, based on our walkthroughs we understand that a report from VMS could be generated containing the maintenance ticket information.

#### Vendors

Dumfries-Triangle utilizes both in-house maintenance and vendor maintenance. A salaried mechanic (also a member Captain of the VFD) performs all preventative maintenance of apparatus not covered by a warranty, as well as certain corrective maintenance activities not covered by a warranty. To service apparatus on-site, Dumfries-Triangle maintains a small inventory of parts for common maintenance issues, but typically orders as needed. Parts vendors utilized include EquipmentWorks, Northern Virginia Supply, and Alban Tire.

If an apparatus is under warranty, the manufacturer is contacted to perform the maintenance.

#### Monitoring

Although VMS data was not provided to RSM, based on our walkthrough and conversations with Dumfries-Triangle leadership, we understand real-time issues in VMS are monitored, and that Dumfries-Triangle generates reports from VMS on an ad-hoc basis. Dumfries-Triangle indicated that costs and purchase order information is contained within the VMS notes for each activity; however, we understand that cost is not a separate attribute, and as such, creating data in a searchable and sortable format would require manual entry of costs into a separate field.
# Lake Jackson Volunteer Fire Department

## Current State

### Technology
Lake Jackson VFD ("Lake Jackson") utilizes VMS to create and track maintenance tickets, maintain preventative maintenance and inspection schedules, and to notify relevant parties. Lake Jackson utilizes a scheduling function of VMS that allows for the pre-scheduling of preventative maintenance tickets, which then automatically creates a ticket on a specified date. Tickets for corrective maintenance are entered into VMS, updated, and closed by Lake Jackson's Secretary. The VMS system sends a notification to all involved parties, including Finlay Fire, when a ticket is created or updated.

We also understand that Lake Jackson primarily uses a contract with Finlay Fire to perform maintenance work. As Finlay is contractually required to track the details of repair orders performed, the cost data related to Lake Jackson’s repair activities performed by Finlay may be accessible electronically.

### Vendors
Finlay Fire is the primary vendor and performs all preventative maintenance, excluding inspections, and handles all corrective maintenance. If Finlay is unable to perform a given repair, other vendors may be utilized, but are scheduled, coordinated, and invoiced through Finlay. McCarthy Tire is utilized for tire work and state inspections.

### Monitoring
Lake Jackson was able to provide RSM with an excel export containing ticket details of maintenance work orders. Fields included apparatus involved, asset category, repair status, repair summary, and description notes, which often contained the closed date. Based on our walkthrough and conversations with Lake Jackson leadership, we understand real-time issues in VMS are monitored, and that Lake Jackson generates reports from VMS on an ad-hoc basis.
## Indvidual Departmental Analysis – Continued

<table>
<thead>
<tr>
<th>Nokesville Volunteer Fire Department</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current State</strong></td>
</tr>
</tbody>
</table>

### Technology
Nokesville VFD ("Nokesville") uses VMS to create and track maintenance tickets, maintain preventative maintenance and inspection schedules, and to notify the involved parties. Historical records and other supporting documents were not provided by Nokesville; however, based on our walkthroughs we understand that a report from VMS could be generated containing the maintenance ticket information (without costs). Nokesville also indicated that VMS is used to send automated notifications for each apparatus' preventative maintenance, based on a pre-determined schedule (extended for 5 years). These notifications are then used to schedule preventative maintenance tasks with vendors.

### Vendors
Finlay Fire is the primary vendor used for apparatus maintenance. Finlay is contacted to schedule maintenance, after the automated VMS notification is distributed. All preventative maintenance needs scheduled via the VMS automated notification function, and corrective maintenance, with the exception of ambulance maintenance, are performed by Finlay Fire. If Finlay is unable to perform a given repair, other vendors may be utilized, but are scheduled, coordinated, and invoiced through Finlay. Work on ambulances is performed by FESCO, which is a regional authorized dealer for Nokesville's ambulance manufacturer. FESCO is contracted through a cooperative contract. The Nokesville EMS Captain contacts FESCO who then picks up the apparatus and delivers it after the repair.

### Monitoring
Although VMS data was not provided to RSM, based on our walkthrough and conversations with Nokesville leadership, we understand Nokesville utilizes VMS for automated preventative maintenance schedule notifications. Nokesville also indicated that real-time issues in VMS are monitored, and that reports are generated on an ad-hoc basis. Nokesville should have the ability to create reports from maintenance tickets in VMS, but cost details would involve manual data entry from invoices. Nokesville also divides available apparatus into two fleets, on a rotational basis to minimize downtime and maximize resources available to the public.
## Occoquan-Woodbridge-Lorton (OWL) Volunteer Fire Department

### Current State

<p>| <strong>Technology</strong> | Utilizing in-house capabilities, OWL internally developed a ticketing system for corrective maintenance reporting and tracking, designed to meet their needs as a VFD that performs nearly all maintenance activities in-house. The internally developed system tracks identification of corrective maintenance need(s), current status, notes regarding the repair, and closure of the issue after maintenance is performed, but does not track associated costs. Preventative maintenance is monitored through a detailed master schedule, manually maintained and coordinated by OWL’s Maintenance Coordinator. Each apparatus has a paper file containing all past tickets, invoices, inspection reports, and other documentation related to the apparatus. |
| <strong>Vendors</strong> | Preventative and corrective maintenance is performed by the in-house mechanics, except for corrective maintenance needed on engines, transmissions, and suspensions. To service apparatus on-site, OWL maintains an inventory of parts for preventative maintenance and other common corrective maintenance issues. Northern Virginia Supply is the primary vendor used for ordering and replenishment of parts. Loudoun Services Inc., Atlantic Emergency Services, or Finlay Fire are utilized as vendors to perform work that OWL mechanics cannot complete on-site. |
| <strong>Monitoring</strong> | Although system data was not provided to RSM, based on our walkthrough and conversations with OWL leadership, we understand real-time issues in the system are monitored, and that OWL generates reports on an ad-hoc basis. Since the maintenance ticket and cost information are stored separately, we understand that significant manual effort would be required to obtain cost data by apparatus. |</p>
<table>
<thead>
<tr>
<th><strong>Stonewall Jackson Volunteer Fire Department</strong></th>
<th><strong>Current State</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>Stonewall Jackson VFD (“Stonewall”) utilizes VMS and QuickBooks (accounting software) in tandem to provide ad-hoc reporting. VMS houses issue reporting and status, maintenance schedules, and online/offline status of apparatus. QuickBooks is utilized to store cost information by vendor. Although QuickBooks is used to store costs by vendor, through discussion with Stonewall, we noted that invoices may contain multiple line items related to different apparatus, and information stored in QuickBooks is limited to the vendor name, invoice date, and total. Stonewall was able to provide a report from QuickBooks detailing costs by vendor and provided scanned copies of maintenance invoices for the previous five years. However, we understand this required significant manual entry to scan all of the invoices and compile data into a consolidated spreadsheet. Similar to many VFDs mentioned above, the Finlay Fire contract includes a provision in Attachment A that details the data tracking requirements of repair orders.</td>
</tr>
<tr>
<td><strong>Vendors</strong></td>
<td>Finlay Fire is used as the main vendor for apparatus maintenance and performs the majority of preventative maintenance and some corrective maintenance. For warranty and specialized services, other vendors are used including, but not limited to, ADX, Western Branch, Cummins, Cowles Ford, and McCarthy Tire.</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td>Stonewall utilizes VMS and Quickbooks to create reports as needed for analysis. As noted above, Stonewall was able to provide a QuickBooks report and past maintenance invoices. However, since the maintenance ticket and cost information are stored in separate systems, we understand that significant manual effort was required to obtain cost data by apparatus.</td>
</tr>
<tr>
<td>Yorkshire Volunteer Fire Department</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Current State</strong></td>
<td></td>
</tr>
</tbody>
</table>

| **Technology** | The Yorkshire VFD ("Yorkshire") primarily uses a contract with Finlay Fire to perform maintenance work. As Finlay is contractually required to track the details of repair orders performed, the majority of data related to Yorkshire’s repair activities may be accessible electronically. Separate from the data maintained by Finlay, Yorkshire maintains paper records of all maintenance and inspection activities by apparatus. The folders include all invoices, inspection records, and corrective maintenance request forms and emails. The Department can reference a specific invoice or maintenance activity with the records on hand; however, compilation of data for summarization or mining purposes would require substantial effort. |
| **Vendors** | Finlay Fire currently schedules and performs all preventative maintenance and the majority of corrective maintenance. If an issue arises that Finlay cannot address, Finlay subcontracts to a third-party vendor that can perform the work. No Yorkshire apparatus are currently under warranty. All maintenance activities performed excluding tire work and state inspections are tracked by Finlay. McCarthy Tire is used for tires and for semi-annual state inspections. These invoices and records are maintained in each apparatus’s respective maintenance folder. |
| **Monitoring** | Yorkshire can compile information through requests of data from Finlay, and review of paper records maintained on site. A recurring review of key metrics is not performed, as review of records maintained by Yorkshire is performed as needed. |
**APPARATUS MAINTENANCE PROCESS**

**Engineer**
- Receives nightly staff notes email containing any issue from that day.
- Enter issue into VMS
- Review new need and other identified repairs
- Immediate attention required?
  - Yes: Coordinate with Battalion Chief to replace apparatus with reserve
  - No: Add to other identified repairs list
- Repairs made during next scheduled PM

**Vendor**
- Finlay maintains PM schedule and contacts Department when an apparatus is due
- Obtain apparatus and perform repairs
- Receives invoice via email
- Reviews invoice, marks as "ok to pay", and sends to administrator

**VFD Administrator**
- Receives invoice via email
- Obtain approval for payment from Treasurer or VP.
- Enters invoice information and attaches invoice in ASCEND
- President approves via ASCEND workflow
- County Finance notified for review and payment
- End

**Notes:**
1. VMS (Volunteer Management System) is a system used to create and manage the status of maintenance tickets.
2. Vendors include:
   - Finlay Fire – maintenance for most apparatus
   - Atlantic Emergency Solutions (AES) – manufacturer maintenance
   - Manassas Chevrolet – Small vehicle maintenance
   - Western Branch Diesel/Cummins – drivetrain work
   - McCarthy Tire – Tire supplier/annual inspections

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**Legend:**
- **Manual Step**
- **Automated Step**
Dale City VFD
Apparatus Maintenance Process

1. Chief initiates process by identifying and entering details into IRONS.
2. Operator automatically notified of ticket creation, along with any other stakeholders via IRONS email.
3. Review new need and other identified repairs.
4. Immediate attention required?
   - Add to other identified repair list.
   - Repairs made during next scheduled PM.
5. Apparatus under warranty?
   - Coordinate with Battalion Chief to replace apparatus with reserve if needed.
   - Order necessary parts/supplies from vendor.
   - Schedule maintenance with in-house FVS Mechanic.
6. Place apparatus back in service.

First Vehicle Services

1. Maintain and review PM Schedule.
2. Send email every Friday to Chief summarizing the maintenance scheduled for the following week.
3. Close ticket in IRONS.
4. Obtain proper parts and apparatus, and perform repairs.
5. Obtain apparatus and send invoice.

Vendor

1. Obtain apparatus and perform repairs.
2. Return apparatus and send invoice.

VFD Business Office

1. Receive Invoice via email.
2. Enter into ASCEND.
3. County Finance notified for review and payment.

Legend:

- Manual Step
- Automated Step

Note 1: IRONS is a system used to create and manage the status of maintenance tickets.

Note 2: Vendors include:
- First Vehicle Services – In-house mechanic. They handle the process of subcontracting out to a 3rd party if necessary.
- Rise Tire – Tire supplier
- FESCO – Supplier of ambulance parts
- Williams Emergency – Seagrave Manufacturer

Note 3: Stakeholders include the staff officers, station officer, mechanic, Chief, and FVS.
Apparatus Maintenance Process

**Secretary**

1. **CM START**
   - Identify need and input details into VMS
2. VMS notifies stakeholders via email

**Engineer**

1. Review new need and other identified repairs
2. Immediate attention required?
   - **Yes**
     - Coordinate with Battalion Chief to replace apparatus with reserve
   - **No**
     - Add to other identified repairs list
3. Repairs made during next scheduled PM

**Vendor**

1. **PM START**
   - Finlay automatically notified via VMS email that apparatus PM is due
2. Alert department and coordinate delivery/pickup of apparatus
3. Obtain apparatus and perform repairs
4. Returns Apparatus
5. Prepare/send invoice to secretary
6. **B**
   - Receive invoice and obtains Chief’s approval
7. Closes ticket in VMS and enters into ASCEND
8. *County Finance notified for review and payment* **End**

**Note 1:** VMS (Volunteer Management System) is a system used to create and manage the status of maintenance tickets.

**Note 2:** Stakeholders include the station President, Chief, VP and Finlay Fire.

**Note 3:** Vendors include:
- Finlay Fire – maintenance for most apparatus. If a repair or service needs to be done that Finlay Fire cannot do in house, they handle subcontracting the work out to other vendors.
- McCarthy Tire – Tire supplier

**Legend**

- **Manual Step**
- **Automated Step**

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Lake Jackson VFD

Apparatus Maintenance Process

**CM START**

- Identify need and input details into VMS
- VMS notifies stakeholders via email

**B**

- Receive invoice and obtains Chief’s approval
- Closes ticket in VMS and enters into ASCEND
- County Finance notified for review and payment

**Note:**

- **Note 2:** Stakeholders include the station President, Chief, VP and Finlay Fire.
- **Note 3:** Vendors include:
  - Finlay Fire – maintenance for most apparatus. If a repair or service needs to be done that Finlay Fire cannot do in house, they handle subcontracting the work out to other vendors.
  - McCarthy Tire – Tire supplier
Nokesville VFD

Apparatus Maintenance Process

**Apparatus User**

- Identify need and input details into VMS
- VMS notifies stakeholders via email

**Deputy Chief/EMS Captain**

- Review new need and other identified repairs
- Immediate attention required?
  - No
  - Yes
    - Alternative line available?
      - Yes
      - Replace apparatus needing repair with alternative line.
      - Coordinate with Battalion Chief to replace apparatus with reserve
    - No
      - Add to other identified repairs list
      - Repairs made during next scheduled PM

**Vendor**

- Finlay automatically notified via VMS email that apparatus PM is due
- Alert department and coordinate delivery/pickup of apparatus

**VFD Business Office**

- Receive invoice
- Obtain approval from Chief if greater than $10,000.
- Enter into QuickBooks and ASCEND
- President approves via ASCEND workflow
- County Finance notified for review and payment
- Prepare/send invoice to business office.

**End**

**Note 1:** VMS (Volunteer Management System) is a system used to create and manage the status of maintenance tickets.

**Note 2:** Stakeholders include the station EMS Captain, Deputy Chief, President, Chief, VP and Finlay Fire.

**Note 3:** Vendors include:
- Finlay Fire – maintenance for most apparatus. If a repair or service needs to be done that Finlay Fire cannot do in house, they handle subcontracting the work out to other vendors
- FESCO – Ambulance work
- McCarthy Tire – Tire supplier

**Legend**

- Manual Step
- Automated Step
Apparatus Maintenance Process

CM START

Receive automatic email from ticketing system identifying the need

Review new need and other identified repairs

Immediate attention required?

Yes

Coordinate with Battalion Chief to replace apparatus with reserve

Add to other identified repairs list

No

Alert mechanics and coordinate PM/schedule repair

Obtain apparatus and assess need for parts

Necessary parts already in stock?

Yes

Obtain parts and make repairs

Place purchase order with supplier

Processes parts invoices as needed

Receive and fill purchase order

Send invoice and parts to department

End

No

Obtain apparatus and assess need for parts

Original purchase approved via ASCEND workflow

County Finance notified for review and payment

End

Note 1: Most work is performed by the in-house mechanics. Engine, transmission, and suspension work is performed by vendors. Vendors include CSI, Finlay, Atlantic, and Cummins.
Apparatus Maintenance Process

**The County's Fleet Management Division/AES**
- Alerted by department of CM need
- Input CM information into asset management system
- Obtain apparatus
- Able to perform maintenance?
  - Yes: Perform maintenance
  - No: Utilize other contract vendors for specialty work as needed
- Return Apparatus after maintenance is performed
- If performed by AES, prepare/send invoice to apparatus's specific station

**Lieutenant/Fleet Manager**
- Maintains fleet PM schedule
- Review maintenance need
- Coordinate replacement of apparatus with reserve if necessary
- Coordinate with shop to deliver/pickup apparatus and schedule repair

**Accounting**
- Receives invoice
- Enters into ASCEND
- Appropriate personnel approves via ASCEND workflow
- County Finance notified for review and payment
- End

**Legend**
- Manual Step
- Automated Step

**Note 1**: The County's Fleet Management Division is responsible for the majority of the preventative maintenance but AES maintains approximately 60 assets.

**Note 2**: Vendors include:
- The County's Fleet Management Division – Preventative maintenance for most apparatus and corrective maintenance
- AES – Preventative maintenance and corrective maintenance
- McCarthy Tire – Tire supplier

**Note 3**: Able to perform maintenance?
- Yes
- No
Yorkshire VFD

Vendor

CM START
Receives email from apparatus user identifying the need.

Review new need and other identified repairs

Immediate attention required?

No

Add to other identified repairs list

Yes

Alert Vendor and coordinate delivery/pickup of apparatus and schedule repair

Coordinate with Battalion Chief to replace apparatus with reserve

A

Obtain apparatus and perform repairs

Returns Apparatus

Prepare / send invoice

B

Vendor

PM START
Finlay maintains PM schedule and contacts Department when an apparatus is due

B

Receives invoice and scans into PDF

Receives invoice and enters into ASCEND

Chief approves via ASCEND workflow

County Finance notified for review and payment

End

Note 1: Vendors include:
Finlay Tire – Maintenance for most apparatus
McCarthy Tire – Tire supplier
NAPPA – Small repairs parts
APPENDIX A

Contract Record Retention Requirements

Finlay Fire

Section II: General Provisions - II.10 Examination of Records
The Contractor agrees that the County, or any duly authorized representative, shall, until the expiration of five (5) years after final payment hereunder, have access to and the right to examine and copy any directly pertinent books, documents, papers and records of the Contractor involving transactions related to this Contract.

Attachment A: Scope of Work - Repair Orders
All repair orders shall be per vehicle per repair visit and shall have the following data elements:

a. Vehicle description, including Unit number, VIN, Model Year, Make and Model, and Mileage;
b. Description of Complaint;
c. Description of Cause;
d. Description of Action; Taken to Repair;
e. Labor Charge Including Number of Hours and Hourly Rate;
f. Parts Charges;
g. Shop Supplies (if applicable); and
h. HazMat Disposals (if applicable).