The EMS Committee was formed at the request of City Council to provide recommendations for how to best provide EMS services for the City.

The Vision/Mission/Objectives agreed upon unanimously are set forth at Tab 1.

The Committee had access to and/or reviewed significant documents/discussions contained in tabs 4, 5, 6, 7, 8, 9 and 10.

Certain members of the Committee also took a tour of the Emergency Communications Center (911 Center).

Based on Committee deliberations, recommendations were made at the October 24, 2007 meeting as follows:

City EMS Committee Recommendations

These three principles were adopted unanimously by those in attendance:

1. Adopt the Emergency Medical Service (EMS) response time performance measures as outlined in the report for priority 1 and 2 EMS incidents:
   - A turnout time interval of 1 minute or less 90% of the time.
   - A response time interval of 4 minutes or less for a Basic Life Support EMS unit 90% of the time.
   - A response time interval of 8 minutes or less for an ALS EMS unit 90% of the time.
   - Ambulance arrival time of 13 minutes 90% of the time.

2. Aggressively pursue and implement technologies identified in the report that can help to improve EMS response times.

3. That a “Peak” staffed ambulance would be beneficial.
The following recommendation was passed with a 5 to 3 vote (updated by subsequent emails 10 to 2):

“That a 24 hour ambulance be staffed by the Charlottesville Fire Department 7 days per week with the goal to achieve a medic on every engine company as soon as possible. Also to strategically locate the ambulance in the southwest area of the City as soon as facilities are available.”

A comparable cost between 24/7 ambulance and peak ambulance staffing by CFD was provided:
Peak - $500,000
24/7 - $600,000 (a new proposal updates this number to $503,460)

The vote was as follows:
Martin Burks – Citizen Representative - Yes
Tom Hanson – Charlottesville-Albemarle-UVA Emergency Communications Center - Yes
Leonard Sandridge – University of Virginia - Yes
Robby Bragg – Charlottesville Professional Fire Fighters - Yes
Charles Werner – Charlottesville Fire Department - Yes
Larry Claytor – Charlottesville Albemarle Rescue Squad - No
Dayton Haugh – Charlottesville Albemarle Rescue Squad - No
Dan Eggleston – Albemarle County Fire Rescue – No (**Dan’s clarification - Yes by subsequent email)
Mary Loose DeViney – Business Leader - Did not vote – served as meeting facilitator in David Toscano’s absence (Yes by subsequent email)
Dave Norris – Abstain (Yes by subsequent email)

Absent:
David Toscano - Facilitator
John Conover – Former City Councilor (Yes by subsequent email)
George Lindbeck – Operating Medical Director (Yes by subsequent email)
David Wyant – Albemarle BOS (has not participated)

**”Dan Eggleston stated, “I supported the subcommittee’s recommendation for a peak activity unit because it would solve the problem in the most cost effective manner. However, I also noted that that implementing a 12 hour peak activity schedule in a traditional 24 hour work schedule can be problematic and the issue would need to be further quantified. I also noted that a 24 hour ambulance would solve the problem at a slightly higher annual cost (~100k as outlined by Charles), and that City Council would ultimately make the decision if the benefit of a 24 hour ambulance would outweigh the additional cost. In the end, the committee approved a 24 hour ambulance staffed by the Charlottesville Fire Department, and I fully support the committee’s recommendation.”

Following the October 24 meeting and votes, an additional proposal was made to provide service through an agreement between the City and UVA. A majority of members of the Committee expressed to the Chair that they either did not wish to consider the new proposal at an additional meeting and/or wished to simply forward the recommendations made at the October 23, 2007 meeting. Hence, the proposal was not considered during any committee meeting. (This email discussion may be found at Tab 7).
Vision/Mission/Objectives

Vision - To provide the highest level of EMS services to the citizens of the community in a way that is efficient, effective and fiscally responsible.

Mission - To objectively and comprehensively review all aspects of EMS delivery within the City and provide support/coordination in a way that promotes the best care possible, and to make recommendations to City Council on how to proceed with EMS delivery for the citizens of our community.

Objectives

1. Develop response time goals within the City by considering nationally accepted performance criteria, City Standard of Cover response time standards, and by a review of current EMS response time performance.

2. To identify and recommend Best Practices through a review current EMS practices and procedures with an ultimate goal of improving EMS delivery within the City and regionally through a systems approach. This would include the identification of EMS gaps and the development of recommendations to eliminate these gaps.

3. Develop an implementation plan and timeline for these EMS recommendations
Emergency Medical System Delivery

Analysis of System Performance and Recommendation to Improve Service
1) Introduction

During the August 21, 2007 meeting among City and County staff and stakeholders, a motion was made to form a subcommittee to analyze the City’s emergency medical system (EMS) performance relative to a recommended standard and develop options to address any deficiencies found. The committee is composed of Chief Charles Werner (CFD), Chief Dayton Haugh (CARS), and Chief Dan Eggleston (ACFR). The following report is the result of the committee’s work.

2) Problem Definition

Over the past year, several responders have reported that during some emergency medical events, the ambulance dispatched to the scene often has a prolonged response. The delay in the ambulance response results in a delay in transporting the patient to the hospital. The concern is that the delay in transport could negatively affect patient outcome.

Staff and stakeholders have reviewed the response time data to help qualify the responders’ concerns. However, a review of the data led to a significant debate about how to gauge the system’s performance. The problem is that no uniform response time standards or key performance indicators exist to aide in evaluating system performance to further define gaps in service. Valid system enhancements cannot be determined without first identifying gaps in service.

This report will:

a) Recommend an EMS response time standard and key performance indicators.
b) Compare the system’s performance against the recommended standard to define gaps in service.
c) Develop various recommendations to address gaps in service.

3) Problem Analysis

a) Current Delivery Model

Emergency medical services are provided to the City of Charlottesville in a tiered fashion through a combination of career and volunteer resources. The Charlottesville Fire Department deploys primarily basic life support first response resources out of three fire stations strategically located throughout the City. The goal of a first response resource is to quickly arrive on scene at high priority calls (usually dispatch priority 1 and 2) and provide life saving care until the transport unit arrives.

For lower priority calls (dispatch priority 3), basic life support, emergency medical transport and advanced life support services are provided by CARS. CARS is the primary provider of all three components within the City of Charlottesville. CARS operates out of a primary station on McIntire Road. On average, CARS strives to staff three ambulances on a daily basis with supplementary staffing assistance provided by Albemarle County. The goal of the transport agency (i.e. – CARS) is to respond to the scene and continue care started by the first response resources (if there was a first response) and continue to provide care while in route to the hospital. When required, CARS provides advanced life support care.

The tiered system model as described above is used throughout the country. The differences are that basic life support, advanced life support, and transport services are sometimes delivered by a single agency or separate agencies, volunteer, career, or a combination thereof.
b) EMS response time standards

There appears to be no “universally accepted” national standard for EMS responses. However, some historical general standards from the American Heart Association and NFPA 1710 have been adopted:

- A turnout time interval of 1 minute or less 90% of the time.
- A response time interval of 4 minutes or less for a BLS EMS unit 90% of the time.
- A response time interval of 8 minutes or less for an ALS EMS unit 90% of the time.

The American Heart Association Chain of Survival outlines actions that must be taken in order to successfully resuscitate victims in out-of-hospital cardiac arrest. The measure for EMS must be considered in two different ways.

1. The first consideration is how fast basic life support can be provided to citizens who suffer from cardiac arrest. American Heart Association studies have shown that cardio-pulmonary resuscitation (CPR) must begin immediately, and in all cases no later than 4-6 minutes of a cardiac arrest. Early defibrillation (AED) must then follow early CPR. These actions must be followed up by advanced life support in order to provide advanced coronary care. The combination of late CPR (more than four minutes) and late advanced life support (more than 12 minutes) is particularly lethal. Several researchers have called these time dimensions the resuscitation “failure zone.”

2. The second consideration is early advanced life support intervention for patients that are not yet in cardiac arrest, but have a cardiac rhythm that will become lethal if not treated rapidly.

In addition, the Pre-Hospital Trauma Life Support (PHTLS) guidelines state that for life-threatening trauma type incidents, emergency medical providers should be en-route to the nearest trauma center within 10 minutes of arrival of the first responder. The PHTLS guideline is based on an analysis of trauma related incidents which are most critical when determining how quickly an ambulance should be en-route to the hospital.

When factoring in the guidelines for first response basic level care, advanced level care, and maximum time on scene, a standard for response to life-threatening incidents (dispatch priority 1 and 2) can be defined as illustrated below:

*Recommended EMS Response Time Standard*
c) Workload analysis - ambulance availability

A consulting team, Matrix Consulting Group, recently conducted a study of possible consolidation of City and County fire and rescue services. During their analysis of one year of data from the City and County system, Matrix calculated the daily ambulance staffing needs for the CARS service area that includes the City of Charlottesville and areas surrounding the City (Ivy, Stony Point, North Garden, and East Rivanna.) Matrix compared the call volume with the average time for an ambulance to process a call (dispatch to clear from hospital). The results determined that three ambulances are needed twenty-four hours a day and one ambulance is needed during peak times from 8:00 am to 8:00 pm.

Considerable review of the Matrix calculations revealed some assumptions that were not based upon historical experience, and subsequently left the fleet size recommendation in question. A review of another fire rescue study published by Tri-Data Corporation for Stafford County (VA) afforded an opportunity to apply different methods of unit hour utilization (UHU) calculation to our local historical data.

Unit-hour utilization (UHU) is often used as a primary measure of EMS unit workload. UHU is the total number of unit-minutes per hour that units are in service. There is some evidence to suggest that a UHU of approximately 0.42 represents the optimum utilization for responding to emergency calls, balancing availability, and productivity. Too far above 0.42 and personnel are arguably overworked, and the unit availability is low (i.e., often busy when a call arrives). Too far below 0.42 and the cost-effectiveness of the unit could be questioned.

Specific assumptions that were utilized in the recalculation of fleet demand included the call processing times, incidents by time of day and the mix of transport versus non-transport events that had been identified in the Matrix study. The Tri-Data study acknowledged industry consensus about the importance of fleet utilization analysis, but also recognized that interpretation of those rates as they apply to overall efficiency is “much debated.”

The result (see Appendix B for a detailed analysis), however, reaffirmed the Matrix recommendation for 3.5 staffed ambulances (per day) to meet call demand. In addition, the Tri-Data formula may be useful in projecting when future resources need to be added based upon changes in demand.

(3) City system performance relative to EMS response time standard and workload analysis

a. Response time analysis

When assessing response times, fractile time analysis is utilized because it recognizes that there will occasionally be outliers even in the best performing systems. Additionally, simple average time analysis can be distorted by a relatively small number of abnormal events (in data capture or actuality). The 90 percentile is most commonly used by fire rescue departments as a high-performance measure.

The following tables illustrate the system’s ability to meet the benchmarks defined in the standard described in the recommended EMS response time standard:

- 5 minute response time goal for a BLS first response resource on scene, 90% of the time
- 9 minute response time goal for an ALS response resource on scene, 90% of the time *
- 13 minute response time goal for an ambulance on-scene, 90% of the time
(* The system does not currently capture the amount of time for an ALS resource to reach the scene. However, an assumption can be made that CARS often supplies the ALS resource on the ambulance.)*

City Responses from 5/1/2007-7/31/2007

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Incidents</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>23</td>
<td>4.82%</td>
</tr>
<tr>
<td>3</td>
<td>72</td>
<td>19.92%</td>
</tr>
<tr>
<td>4</td>
<td>102</td>
<td>41.30%</td>
</tr>
<tr>
<td>5</td>
<td>112</td>
<td>64.78%</td>
</tr>
<tr>
<td>6</td>
<td>89</td>
<td>83.44%</td>
</tr>
<tr>
<td>7</td>
<td>38</td>
<td>91.40%</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
<td>96.44%</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>97.69%</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>98.74%</td>
</tr>
<tr>
<td>More than</td>
<td>6</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Incidents</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>2.10%</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>5.24%</td>
</tr>
<tr>
<td>4</td>
<td>37</td>
<td>13.00%</td>
</tr>
<tr>
<td>5</td>
<td>88</td>
<td>31.45%</td>
</tr>
<tr>
<td>6</td>
<td>103</td>
<td>53.04%</td>
</tr>
<tr>
<td>7</td>
<td>91</td>
<td>72.12%</td>
</tr>
<tr>
<td>8</td>
<td>62</td>
<td>85.12%</td>
</tr>
<tr>
<td>9</td>
<td>34</td>
<td>92.24%</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>96.02%</td>
</tr>
<tr>
<td>More than</td>
<td>19</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

**Results**

1. The recommended EMS response time standard should be considered for adoption. Performance measures should be carefully monitored on an on-going basis to determine system needs and steer improvements as required.

2. The first response BLS resource time needs improvement. The 90 percentile was only achieved at 7 minutes for a recommended target of 5 minutes or less. Future deployment of BLS and/or ALS first responder services from the Fontaine Avenue area could result in improved EMS response times throughout the City, especially the southwest portion in particular.

3. The system does not currently capture the amount of time for an ALS resource to reach the scene. However, if the assumption is made that CARS often supplies the ALS resource on the ambulance, ALS on scene times of 9 minutes or less was achieved 92 percent of the time. This exceeds the recommended target of 9 minutes or less 90 percent of the time.

4. Ambulance on scene times of 9 minutes or less was achieved over 90 percent of the time. This exceeds the recommended target of 13 minutes or less 90 percent of the time.

**b. Workload analysis**

According to the Matrix report and analysis using TriData unit hour calculations, Charlottesville (and surrounding areas of the County currently served by CARS) needs three staffed ambulances -- twenty-four hours a day, and a peak activity unit from 8:00 am to 8:00 pm daily.

On average, CARS strives to staff three ambulances on a daily basis with some staffing assistance provided by Albemarle County. For the months of May, June, July, August and September of 2007 CARS has had a minimum of 3 ambulances staffed 24 hours a day. However, no data exist to confirm prior staffing levels.

Utilizing the methods described in the workload analysis, it is evident that fewer staffed ambulances would have a dramatic effect on availability and response time. However, review of ambulance response time data shows no current negative impact.

The addition of a staffed ambulance would lower the ambulance utilization rate for the Charlottesville area. The cost of the additional staffed ambulance should be evaluated in terms of
actual ambulance response performance (which currently meets the standard**) and the EMS system’s ability to consistently maintain the necessary level of staffed ambulances.

**This assumption is based on the limited data of 5 months.

4) Option for increased transport services – (See appendix D for all options)

5) Potential Improvement to First Responder Capability

The greatest positive impact on the outcome of life-threatening EMS events resides with first responder arrival time within 5 minutes or less from the time of alarm. To accomplish this improvement, reduced response time could be achieved through use of specialized technology, greater saturation of resources and/or internal processes designed to reduce reaction times.

Technologies such as Smart Station Alerting, can reduce the interval between communication center receipt of an emergency call and the notification of on-duty station personnel. Other technologies such as Opticom Traffic Control systems, Geographic Information System(GIS)/Global Positioning System(GPS) can assist in reducing the actual response travel time. The addition of resources responding from the Fontaine Avenue area would have a positive effect on City first response time, since travel time would be reduced in certain areas and unit availability would improve. Addition and utilization of more first responder equipped vehicles for the delivery of initial emergency medical services will help improve response times. Dedicated ALS first responder coverage would provide the added benefits of a higher level of department EMS service, plus an increased ability to utilize CARS BLS staffed ambulances to meet ALS patient needs for on-scene patient treatment and continuation of care during transportation to the hospital.

An option exists for CFD first response to be increased to cover all levels of EMS calls (to include BLS dispatches). The advantages would include the potential to decrease the overall ambulance demand, since approximately 25% of all EMS calls do not require transport. This option would increase wear and tear on the fleet of fire apparatus, but may be less expensive than the personnel cost associated with adding ambulances. The effect of committing fire apparatus to first response calls more frequently would create a negative impact on fire response by reducing the available fire units needed to meet initial response apparatus and personnel to meet present National Fire Protection Association(NFPA) and Accreditation standards and need to be weighed against the level of fire suppression calls and availability of other system resources. Of the 24 structure fires recorded over the last year, fire units were tied up for 3 of the calls which exceeds the standard utilization factor. The addition of a staffed CFD ambulance helps to meet the EMS demand and reduce the burden on the fire response resources, increase medics on City engines and balance the wear and tear impact on the larger fire apparatus.

Lastly, preliminary data review suggests that turn-out time (alarm to unit responding) often exceeds two minutes. The data from the Fire Records Management System shows that City Fire’s turnout time is within 1 minute 22.7% of the time and within 2.5 minutes 89.2% of the time. No turnout time data is available for CARS. There are some issues with the unit response times as times are not always captured accurately due to radio traffic. Mobile data computers would help to capture accurate response time data.

Advantages -
- Greatest patient impact on survival and patient outcome
- Better level of customer service (and potentially community perception)
- Utilizes existing resources

Disadvantages –
- Increased performance demand on existing units
- Expenses with additional equipment, training and operating costs
- May not be embraced by all personnel
Appendix A - Definitions

a) ALS First Response unit – an Office of EMS ALS licensed non-transport EMS vehicle with at least one ALS provider (EMT-CT or higher), monitor/defibrillator, drug/IV box, and other required EMS supplies/equipment.
b) ALS Transport unit – an Office of EMS ALS licensed Ambulance with at least one ALS provider (EMT-CT or higher) and one BLS provider (EMT or higher), monitor/defibrillator, drug/IV box, and other required EMS supplies/equipment.
c) BLS First Response unit – an Office of EMS BLS licensed non-transport EMS vehicle with at least one BLS (First Responder or higher trained EMS provider), AED, and other required EMS supplies/equipment.
d) BLS Transport unit – an Office of EMS BLS licensed Ambulance with at least one BLS (First Responder or higher trained EMS provider) and a driver.
e) Dispatch time – the point in time at which the appropriate units/stations are notified of the emergency.
f) Turnout time interval - the interval between dispatch time and the time at which the appropriate emergency vehicle starts moving towards the emergency.
g) Unit on scene – the time at which the appropriate unit arrives on the scene of the emergency.
h) Priority 1 call – a high priority call involving a potential life threatening situation
i) Priority 2 call – a moderate priority call involving an event that could result in a life threatening situation.
j) Priority 3 call – a low priority call involving a non-life threatening event.
### Appendix B – Ambulance Utilization Analysis

<table>
<thead>
<tr>
<th>Hour of the Day</th>
<th>Annual Calls Per Hour</th>
<th>Average Daily Calls Per Hour</th>
<th># of Transports Per Hour</th>
<th>Average Handling Time for Transports in Minutes</th>
<th># of Non-transports Per Hour</th>
<th>Average Handling Time for Non-transports in Minutes</th>
<th>Avail Time per Hour</th>
<th>Number of Staffed Ambulances</th>
<th>Current Staffing</th>
<th>Number of Staffed Ambulances</th>
<th>Additional Peak Activity Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>381</td>
<td>1.0</td>
<td>0.78287671</td>
<td>53.2</td>
<td>0.2609589</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>26.23%</td>
<td>3</td>
<td>26.23%</td>
</tr>
<tr>
<td>0100</td>
<td>359</td>
<td>1.0</td>
<td>0.73767123</td>
<td>53.2</td>
<td>0.2458904</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>24.71%</td>
<td>3</td>
<td>24.71%</td>
</tr>
<tr>
<td>0200</td>
<td>432</td>
<td>1.2</td>
<td>0.88767123</td>
<td>53.2</td>
<td>0.2958904</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>29.74%</td>
<td>3</td>
<td>29.74%</td>
</tr>
<tr>
<td>0300</td>
<td>271</td>
<td>0.7</td>
<td>0.55684932</td>
<td>53.2</td>
<td>0.18561644</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>18.65%</td>
<td>3</td>
<td>18.65%</td>
</tr>
<tr>
<td>0400</td>
<td>249</td>
<td>0.7</td>
<td>0.51164384</td>
<td>53.2</td>
<td>0.17054795</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>17.14%</td>
<td>3</td>
<td>17.14%</td>
</tr>
<tr>
<td>0500</td>
<td>255</td>
<td>0.7</td>
<td>0.5239726</td>
<td>53.2</td>
<td>0.17465753</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>17.55%</td>
<td>3</td>
<td>17.55%</td>
</tr>
<tr>
<td>0600</td>
<td>290</td>
<td>0.8</td>
<td>0.59589041</td>
<td>53.2</td>
<td>0.19863014</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>19.96%</td>
<td>3</td>
<td>19.96%</td>
</tr>
<tr>
<td>0700</td>
<td>435</td>
<td>1.2</td>
<td>0.89383562</td>
<td>53.2</td>
<td>0.29794521</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>29.94%</td>
<td>3</td>
<td>29.94%</td>
</tr>
<tr>
<td>0800</td>
<td>533</td>
<td>1.5</td>
<td>1.09520548</td>
<td>53.2</td>
<td>0.36506849</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>36.69%</td>
<td>3</td>
<td>36.69%</td>
</tr>
<tr>
<td>0900</td>
<td>618</td>
<td>1.7</td>
<td>1.26986301</td>
<td>53.2</td>
<td>0.42328767</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>42.54%</td>
<td>4</td>
<td>31.91%</td>
</tr>
<tr>
<td>1000</td>
<td>627</td>
<td>1.7</td>
<td>1.28835616</td>
<td>53.2</td>
<td>0.42945205</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>43.16%</td>
<td>4</td>
<td>32.37%</td>
</tr>
<tr>
<td>1100</td>
<td>577</td>
<td>1.6</td>
<td>1.18561644</td>
<td>53.2</td>
<td>0.39520548</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>39.72%</td>
<td>4</td>
<td>29.79%</td>
</tr>
<tr>
<td>1200</td>
<td>637</td>
<td>1.7</td>
<td>1.30890411</td>
<td>53.2</td>
<td>0.43630137</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>43.85%</td>
<td>4</td>
<td>32.89%</td>
</tr>
<tr>
<td>1300</td>
<td>605</td>
<td>1.7</td>
<td>1.24315068</td>
<td>53.2</td>
<td>0.41438356</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>41.65%</td>
<td>4</td>
<td>31.23%</td>
</tr>
<tr>
<td>1400</td>
<td>662</td>
<td>1.8</td>
<td>1.36027397</td>
<td>53.2</td>
<td>0.45342466</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>45.57%</td>
<td>4</td>
<td>34.18%</td>
</tr>
<tr>
<td>1500</td>
<td>640</td>
<td>1.8</td>
<td>1.31506649</td>
<td>53.2</td>
<td>0.43935616</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>44.06%</td>
<td>4</td>
<td>33.04%</td>
</tr>
<tr>
<td>1600</td>
<td>709</td>
<td>1.9</td>
<td>1.45684932</td>
<td>53.2</td>
<td>0.48561644</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>48.80%</td>
<td>4</td>
<td>36.60%</td>
</tr>
<tr>
<td>1700</td>
<td>656</td>
<td>1.8</td>
<td>1.34794521</td>
<td>53.2</td>
<td>0.44931507</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>45.16%</td>
<td>4</td>
<td>33.87%</td>
</tr>
<tr>
<td>1800</td>
<td>615</td>
<td>1.7</td>
<td>1.26396863</td>
<td>53.2</td>
<td>0.42123288</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>42.33%</td>
<td>4</td>
<td>31.75%</td>
</tr>
<tr>
<td>1900</td>
<td>646</td>
<td>1.8</td>
<td>1.32739726</td>
<td>53.2</td>
<td>0.44246575</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>44.47%</td>
<td>4</td>
<td>33.35%</td>
</tr>
<tr>
<td>2000</td>
<td>602</td>
<td>1.6</td>
<td>1.2369863</td>
<td>53.2</td>
<td>0.41232877</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>41.44%</td>
<td>4</td>
<td>31.08%</td>
</tr>
<tr>
<td>2100</td>
<td>498</td>
<td>1.4</td>
<td>1.02328767</td>
<td>53.2</td>
<td>0.34109589</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>34.28%</td>
<td>3</td>
<td>34.28%</td>
</tr>
<tr>
<td>2200</td>
<td>520</td>
<td>1.4</td>
<td>1.06849315</td>
<td>53.2</td>
<td>0.35616438</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>35.79%</td>
<td>3</td>
<td>35.79%</td>
</tr>
<tr>
<td>2300</td>
<td>429</td>
<td>1.2</td>
<td>0.88150665</td>
<td>53.2</td>
<td>0.29383562</td>
<td>21.3</td>
<td>60</td>
<td>3</td>
<td>29.53%</td>
<td>3</td>
<td>29.53%</td>
</tr>
</tbody>
</table>

### Percent of Staffed Ambulances Committed

<table>
<thead>
<tr>
<th>Hour of the Day</th>
<th>Percent of Staffed Ambulances Committed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>26.23%</td>
</tr>
<tr>
<td>0100</td>
<td>24.71%</td>
</tr>
<tr>
<td>0200</td>
<td>29.74%</td>
</tr>
<tr>
<td>0300</td>
<td>18.65%</td>
</tr>
<tr>
<td>0400</td>
<td>17.14%</td>
</tr>
<tr>
<td>0500</td>
<td>17.55%</td>
</tr>
<tr>
<td>0600</td>
<td>19.96%</td>
</tr>
<tr>
<td>0700</td>
<td>29.94%</td>
</tr>
<tr>
<td>0800</td>
<td>36.69%</td>
</tr>
<tr>
<td>0900</td>
<td>42.54%</td>
</tr>
<tr>
<td>1000</td>
<td>39.72%</td>
</tr>
<tr>
<td>1100</td>
<td>32.37%</td>
</tr>
<tr>
<td>1200</td>
<td>32.89%</td>
</tr>
<tr>
<td>1300</td>
<td>31.23%</td>
</tr>
<tr>
<td>1400</td>
<td>34.18%</td>
</tr>
<tr>
<td>1500</td>
<td>33.04%</td>
</tr>
<tr>
<td>1600</td>
<td>36.60%</td>
</tr>
<tr>
<td>1700</td>
<td>33.87%</td>
</tr>
<tr>
<td>1800</td>
<td>31.75%</td>
</tr>
<tr>
<td>1900</td>
<td>33.35%</td>
</tr>
<tr>
<td>2000</td>
<td>31.08%</td>
</tr>
<tr>
<td>2100</td>
<td>34.28%</td>
</tr>
<tr>
<td>2200</td>
<td>35.79%</td>
</tr>
<tr>
<td>2300</td>
<td>29.53%</td>
</tr>
</tbody>
</table>

### Ambulance Utilization Rate

- **Current Staffing**
- **Additional Peak Activity Unit**

![Ambulance Utilization Rate Graph](image)
<table>
<thead>
<tr>
<th></th>
<th>3 units</th>
<th>3 units</th>
<th>2 units</th>
<th>4 units</th>
<th>4 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total EMS Calls - CARS</td>
<td>12,247</td>
<td>14,000</td>
<td>12,247</td>
<td>12,247</td>
<td>19,000</td>
</tr>
<tr>
<td>Percent transport</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>Percent non-transport</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Transport calls</td>
<td>9,185</td>
<td>10,500</td>
<td>9,185</td>
<td>9,185</td>
<td>14,250</td>
</tr>
<tr>
<td>Avg call handling time</td>
<td>53.20</td>
<td>53.20</td>
<td>53.20</td>
<td>53.20</td>
<td>53.20</td>
</tr>
<tr>
<td></td>
<td>488,655</td>
<td>558,600</td>
<td>488,655</td>
<td>488,655</td>
<td>758,100</td>
</tr>
<tr>
<td>Number of non-transport</td>
<td>3,062</td>
<td>3,500</td>
<td>3,062</td>
<td>3,062</td>
<td>4,750</td>
</tr>
<tr>
<td>Total handling time, non transport</td>
<td>21.30</td>
<td>21.30</td>
<td>21.30</td>
<td>21.30</td>
<td>21.30</td>
</tr>
<tr>
<td></td>
<td>65,215</td>
<td>74,550</td>
<td>65,215</td>
<td>65,215</td>
<td>101,175</td>
</tr>
<tr>
<td>Total handling time in minutes</td>
<td>553,871</td>
<td>633,150</td>
<td>553,871</td>
<td>553,871</td>
<td>859,275</td>
</tr>
<tr>
<td>Total handling time in hrs.</td>
<td>9,231</td>
<td>10,553</td>
<td>9,231</td>
<td>9,231</td>
<td>14,321</td>
</tr>
<tr>
<td>Amount of time unit was in service</td>
<td>8,760</td>
<td>8,760</td>
<td>8,760</td>
<td>8,760</td>
<td>8,760</td>
</tr>
<tr>
<td>time unit was in service x # of units</td>
<td>26,280</td>
<td>26,280</td>
<td>17,520</td>
<td>35,040</td>
<td>35,040</td>
</tr>
<tr>
<td>UHU</td>
<td>0.35</td>
<td>0.40</td>
<td>0.53</td>
<td>0.26</td>
<td>0.41</td>
</tr>
</tbody>
</table>
Appendix D – Options

• Addition of a CFD Ambulance for twenty-four hour Operations and ALS Engine Companies

Advantages -
  o Added resource should ease ambulance utilization rate and may have a positive effect on both ALS and ambulance arrival times
  o Provides a consistent/predictable level of service
  o Increases twenty-four hour ALS medic capability on City fire engines.
  o Improves geographic placement of EMS/ALS resources in the City of Charlottesville
  o Provides reserve ambulance capacity twenty-four hour to cover unpredictable EMS surge
  o Provides the ability to strategically/dynamically position EMS unit to address peak demand
  o Provides additional EMS resources to the Charlottesville Fire Department limiting the impact on fire protection and other emergency response requirements
  o Could reduce the number of vehicles responding to ALS calls.

Disadvantages -
  o Significant expense to improve an ambulance response time that currently meets an appropriate performance standard

Cost -
  o $1,047,000 first year, with an annual operating cost of $579,727 as estimated by Matrix
  9 FTEs

• Addition of a CFD staffed Ambulance for Peak Response Times

Advantages -
  o Approximately 75% the cost of staffing a twenty-four hour ambulance.
  o Improved depth of ambulance service over existing level.
  o Addresses the minimum ambulance utilization needs
  o Accomplishes a geographic advantage to the southwest area of the City

Disadvantages -
  o Logical issues associated with integration of an additional work schedule into department operations and personnel assignments.
  o Will not affect periodic surges in demands that occur outside of historic peak hours.
  o Does not build in a significant reserve ambulance capacity.
  o Does not increase the desired medic level (ALS) on City engines.

Cost -
  o ¾ the operational cost of twenty-four hour Ambulance.
  o 6 FTEs

• Partnership with CARS

Charlottesville Albemarle Rescue Squad has a fleet of eight transport ambulances, several of which may not be staffed at any given moment. Additionally, there is a greater availability of basic EMTs than ALS providers on-duty at CARS. The most limiting factor in the deployment of medic units is ALS staffing.

If CFD entered into a partnership with CARS, the number of FTEs required to staff an additional medic unit would be reduced by 50%. This assumes one CARS volunteer EMT/Driver and one CFD ALS provider are utilized. This arrangement might also eliminate the need for the City to purchase ambulances and related equipment.
Advantages –
- Less expensive than full time CFD unit
- Could be used for peak hour coverage or continuous twenty-four hour
- This partnership model has worked successfully for Albemarle County

Disadvantages –
- Depending on location of deployment, geographic advantage (from another location within the City) may not be obtained and continues the practice of clustering of resources
- Decentralized operations and personnel identity
- Greater potential for inconsistency with assigned personnel
- Difficult in achieving continuing education

Cost –
- 2 - 4.5 FTEs versus 4.5 – 9 FTEs
- Capital costs unlikely

• **Partnership with ACFR at Station 11**

Similar to the option with CARS, a partnership between Albemarle County Fire Rescue and CFD would result in less expenditure in both personnel and possibly equipment. Utilizing the Albemarle County Fire Rescue member assigned to Car 111 (for ALS first response), the addition of a City firefighter each shift would achieve an ALS ambulance crew. The ambulance would have to be provided by Albemarle County Fire Rescue or CFD, although initially, CARS may be willing to provide an ambulance for the first several months

Advantages –
- Less expensive than full time CFD unit
- Could be used for peak hour coverage or continuous twenty-four hour
- Greater consistency with assigned personnel likely
- Would provide better service coverage for the southern portion of the urban ring

Disadvantages –
- Decentralized operations
- Logistical issues of personnel assignments
- Difficulties in personnel management/supervision
- Resources located outside of the City of Charlottesville
- Will not improve response coverage issues on the southwest area of the City

Cost
- 2 – 4.5 FTEs versus 4.5 – 9 FTEs
- May incur capital expense associated with purchasing and equipping an ambulance

• **Contract with the County to Provide Peak Hour Staffing**

Advantages -
- Uses existing transport system provides and existing system.
- Could be staffed and operational relatively quickly.

Disadvantages -
- Will not cover southwest area of city any better than current system
- Places resources outside of the City of Charlottesville
- Creates some issues with logistical placement and decision process

Cost –
• **Take No Action**

There does not appear to be an immediate deficiency with regard to length of time for an ambulance to reach the scene of a medical emergency in the City. This assumes a 90 percentile achievement of a 13 minute on scene response time is acceptable, as the recommended EMS response time standard suggests.

Advantages -
- No additional cost
- No redundancy of services

Disadvantages -
- May not meet future staffed ambulance needs
- Does not improve current first responder response time performance

Cost –
- None
Mary,

Since I was unable to make the last meeting of the committee, I wanted to take a chance to write down some of my opinions regarding the current EMS discussions.

Charlottesville has depended upon, and will continue to depend on, two primary agencies for the provision of fire and rescue services – the Charlottesville-Albemarle Rescue Squad (CARS) and the Charlottesville Fire Department (CFD). Given the recommendations of the Matrix Study, it does not appear that fire services for Albemarle County and the City of Charlottesville will merge. It is also my understanding that we have come to a consensus that there is a need for increased EMS coverage/provision in the City.

I believe a primary goal at this time should be to provide the structure and impetus required for CFD and CARS to develop a relationship in which they cooperate to provide EMS services for the city, not only in the short term, but to develop a strategy for the long term that provides a framework that can be used to address a variety of fire/rescue issues in the City as they arise.

I believe that the introduction of multiple outside resources to provide EMS services in the City is a poor plan for several reasons. Multiple agencies introduce multiple administrative structures and multiple operating protocols (both for patient care and for operational issues) thus making the current situation more complex rather than simpler to manage. This strategy also fails to address the need for CARS and CFD to cooperate to form a system that meets short term as well as long term needs in the City: in fact, I believe the use of outside agencies will simply serve to delay the development of a long term solution/strategy. If issues of cooperation aren’t addressed now, they will need to be addressed again later when the next challenge arises. A third or fourth agency may well be able to provide additional service at less initial cost, but we gain nothing in terms of the long term development of the agencies we will need to depend upon. Should we “rent” services from a third or fourth party to meet our short term needs, or “buy” resources that strengthen our existing agencies and gain “equity” in our system in terms of resources and personnel. This strikes me as choosing a short term, “tactical”, approach over a long term “strategic” approach.

The introduction of an ambulance staffed by CFD seemed to be favored by the committee, and I think will significantly augment resources in the City. There is no reason that such a service cannot benefit the public as well as both agencies. It is difficult as a medical director not to argue that an additional medic level unit available on the street would not be of benefit. CFD would benefit from adding a service that would provide an opportunity for EMS providers in the fire service to provide the full spectrum of field EMS care. CARS could benefit from the increased resources and reduced strain on personnel/resources at times, and could also benefit from an increased number of experienced medics available for preception/training. There may well be efficiencies to be gained by cooperating on training/continuing education opportunities as well. The incremental cost increase between a 12 hour service and a 24 hour service would argue
towards the 24 hour service in my opinion. Again, for the full benefits to be realized, both agencies would need to be willing to cooperate both administratively as well as operationally.

Thank you,

George Lindbeck, MD  
Operational Medical Director,  
Charlottesville-Albemarle Rescue Squad  
Charlottesville Fire Department