



# Comprehensive Assessment of EMS

July 2019

Haywood County, North Carolina

# Comprehensive Assessment of EMS

July 2019

**TABLE OF CONTENTS**

<b>Section</b>	<b>Page</b>
<b>1. Introduction</b> .....	<b>3</b>
<b>2. Historical &amp; Statutory References</b> .....	<b>4</b>
<b>3. Existing Conditions</b> .....	<b>8</b>
<b>4. Performance &amp; Costs</b> .....	<b>23</b>
<b>5. County Population</b> .....	<b>31</b>
<b>6. Issues of Concern</b> .....	<b>35</b>
<b>7. Recommendations</b> .....	<b>51</b>
<b>8. Future Considerations</b> .....	<b>56</b>
<b>9. Appendix</b> .....	<b>58</b>

## 1. INTRODUCTION

By statute, County government in North Carolina is responsible for ensuring that emergency medical services are provided to the citizens that live within its boundaries; [G.S. 143-517 and 10 NCAC 13P.0201]. In Haywood County, emergency medical services (EMS) are provided as an operating division within the Emergency Services Department. It is staffed with County employees who are certified emergency medical technicians (EMTs) predominately at the Paramedic (highest) level; which is significant for a County of approximately 63,455 residents and a land area of 554 square miles.

However, Haywood County EMS is not without its challenges; the distribution of its population and its varying dynamics and needs of its mix of municipal, suburban and rural communities throughout the County, general population growth, the location and condition of its various facilities, incident response, and of course the costs of providing the service itself are but a few of those challenges.

Subsequently, the organization of this report, following a brief summary of relevant historical and statutory references, begins with an assessment of existing conditions. During the investigation and assessment of the challenges facing EMS, several issues of concern are identified and discussed. These of course are followed with a series of corresponding recommendations. Impressively, a number of issues commonly encountered in similar EMS systems have already been accomplished, namely:

- Haywood County EMS is an Advanced Life Support (ALS) paramedic-level system.
- It has an excellent training program and in fact is certified as an *Advanced Training Institute* by the North Carolina Office of EMS.
- The County has seen fit to provide and fund additional needed EMS personnel in recent months.
- The current fleet of first-out vehicles and transport ambulances are in relatively good condition.

The information gathered for this report came from many sources. These included many interviews and meetings with EMS personnel, site visits to the EMS base locations and numerous fire stations located throughout the County. Additional meetings and conversations took place that involved various County and Town Fire Departments, the Fire Marshal and Emergency Communications Center personnel. In fact, the Communications Center provided a significant portion of the workload and performance data cited.

In addition to EMS and the Communications Center numerous other County offices provided assistance in developing information for this report including the GIS Division of Land Records, Human Resources, Finance, and Technology & Communications. State agencies consulted and from which data was provided included the Office of Emergency Medical Services (OEMS) and the University of North Carolina, School of Government.

The County's Director of the Office of Emergency Services, who dually serves as the EMS Director, was the principal liaison with the consultant during the project and provided valuable on-going agency and EMS system information.

## 2. HISTORICAL & STATUTORY REFERENCES

As a means of introduction to the information and issues discussed in this report, the references that follow are provided for context and background. They are excerpted from several sources; including the North Carolina General Statutes.

### EMS

In 1971 the General Assembly directed the Legislative Research Commission to study emergency medical care in North Carolina. The Commission's study resulted in the Emergency Medical Services Act of 1973 (G.S. 143, Article 56). The Act established the State's Emergency Medical Services (EMS) Program within the State Department of Human Resources (now the Department of Health and Human Services). The Office of Emergency Medical Services (OEMS) administers the State's EMS program, which is placed in the Division of Facility Services of the Department of Health and Human Services (G.S. 143-508). Two state agencies regulate the program. The North Carolina Medical Care Commission adopts the rules and standards that govern ambulance licensure and basic life support services, and the North Carolina Medical Board adopts rules and standards governing advanced life support services.<sup>1</sup>

The Office of Emergency Medical Services (OEMS) is responsible for ensuring that emergency treatment centers are available throughout the state, inspecting and permitting ambulances, licensing ambulance service providers, certifying ambulance personnel, designating trauma centers and a state poison-control center, and assisting in the development of a statewide EMS communications system. Neither the State nor the regional EMS offices are engaged in the actual delivery of emergency medical services in North Carolina. That responsibility is taken on by agencies and organizations at the local level, the principal being County government.

G.S. 153A-250 identifies County responsibilities and authority in this regard. Counties may franchise ambulance services via adopted ordinance(s) or operate its ambulance services directly.

The following North Carolina Administrative Code subsections provide the most current definition and explanation of EMS *System* Requirements.

.0102(25) EMS System- a coordinated arrangement of local resources under the authority of the county government (including all agencies, personnel, equipment, and facilities) organized to respond to medical emergencies and integrated with other health care providers and networks including public health, community health monitoring activities, and special needs populations.

G.S. 143-517 Each county shall ensure that emergency medical services are provided to its citizens.

#### 10A NCAC 13P .0201 EMS SYSTEM REQUIREMENTS

.0201(a) County governments shall establish EMS Systems. Each EMS System shall have:

- A defined geographical service area for the EMS System.
- The minimum service area for an EMS System shall be one county.
- There may be multiple EMS Provider service areas within the service area of an EMS System.
- The highest level of care offered within any EMS Provider service area must be available to the citizens within that service area 24 hours per day.

---

<sup>1</sup> A. Fleming Bell and Warren Jake Wicker; County Government in North Carolina; Inst. of Government, UNC at Chapel Hill; 1998.

The actual operation of local services is financed entirely at the local level. If the County operates an ambulance service as a line department, it may establish rates, fees, and charges to be collected by the service and it may appropriate County funds to the service (G.S. 153A-250).

By statute, all ambulance service providers in North Carolina must be licensed by the State (G.S. 131E-151.1), each vehicle that is operated as an ambulance must be permitted by the State (G.S. 131E-156), and all assigned ambulance personnel must be certified by the State (G.S. 151E-158).

### **Medical Direction**

"Medical Oversight" refers to the responsibility for the management and accountability of the medical care aspects of an EMS System. Medical Oversight includes physician direction of the initial education and continuing education of EMS personnel or medical (responder) crew members; development and monitoring of both operational and treatment protocols; evaluation of the medical care rendered by EMS personnel or medical (responder) crew members; participation in system or program evaluation; and directing, by two-way voice communications, the medical care rendered by the EMS personnel or medical (responder) crew members. A County's "Medical Director" is the physician responsible for the medical aspects of the management of an EMS System, or Trauma Center.

Subsequently, the Medical Director in Haywood County is a licensed, practicing physician whose responsibilities with regards to the County's EMS operation ultimately include certification, medical control, and the continuing education of its employees.

### **Level of Care**

"Level of Care" refers to the level of training and legal certification held by the caregiver or responder. Individuals are certified based on their highest completed level of training. OEMS rules for credentialing and compliance<sup>2</sup> are quite specific with regards to the type of care, procedures, and medications that can be administered by individuals at each level of certification. In North Carolina there are four (4) levels of certification assigned to EMS providers. *The Medical Responder (MR) and Emergency Medical Technician (EMT) levels are referred to as "Basic Life Support", or BLS. The remaining levels of care; Advanced Emergency Medical Technician (AEMT) and Paramedic, are referred to as "Advanced Life Support", or ALS.*

**Emergency Medical Responder (EMR):** Assists pre-hospital technicians in providing basic life support (BLS) care; follows training guidelines of first responders per USDOT.

**Emergency Medical Technician (EMT):** Second level of BLS; individuals trained in advanced first aid, measuring vital signs, CPR, oxygen therapy, etc. intended to take advantage of automatic and semi-automatic external cardiac defibrillators for on-scene defibrillation of patients risking sudden death from ventricular defibrillation; additional training includes advanced airway and administration of epinephrine.

**Advanced Emergency Medical Technician (AEMT):** Allowed to use advanced airway devices, provide intravenous fluid replacement, administer various medications used to correct diabetic, narcotic overdose, respiratory emergency, allergic reactions, and use of automatic and semi-automatic defibrillators.

**Paramedic (EMT-P):** In addition to all previous skills, trained in techniques of cricothyrotomy, needle chest decompression, urinary catheter insertion and nasal intubations; in addition to administration of a broad range of medications.

---

<sup>2</sup> [www2.ncdhhs.gov/dhsr/EMS/credcomp.htm](http://www2.ncdhhs.gov/dhsr/EMS/credcomp.htm)

## **Fire & 911/Emergency Communications**

While EMS services were the focus of this study, it could not be adequately addressed without reference at some point to those other entities/organizations associated with any jurisdiction's emergency services "delivery system". Subsequently, additional information is briefly included here with regards to Fire, and Emergency/911 Communications.

### **Fire Districts**

In accordance with G.S. 153A-233; Fire-Fighting and Prevention Services; "A county may establish, organize, equip, support and maintain a fire department; may prescribe duties of the fire department; may contract for fire-fighting or prevention services with one or more counties, cities, or other units of local government or with an agency of the State government, or with one or more incorporated volunteer fire departments; and may for these purposes appropriate funds not otherwise limited as to use by law. The county may also designate fire districts or parts of existing districts and prescribe the boundaries thereof for insurance grading purposes;" (1977, c. 158).

G.S. 69, Article 3A; addresses the process for creating a rural fire district; i.e., petition of voters, election process, duties of County Board of Commissioners, etc.; together with a petition process calling for a tax "not exceeding 15 cents on the \$100 valuation".

G.S. 69-25.4 (originally) provided that the special (fire district) tax is to be used "only for furnishing fire protection within said district". However, a 1981 amendment to that section defined fire protection to include emergency medical, rescue, and ambulance services, and it expressly authorized the expenditure of fire tax funds for those services. Further, it appears that no special election is required to authorize the expenditure of fire district taxes for these emergency services. The discretion to do so is up to the County Commissioners.<sup>3</sup>

The taxes collected for fire prevention must go into a special fund administered by the County Commissioners or by a three member "fire protection district commission".

G.S. 69.25.7 Administration of special fund; fire protection district commission; reads as follows:

"The special fund provided by the tax herein authorized shall be administered to provide fire protection as provided in G.S. 69-25.5 by the Board of County Commissioners or the joint boards of county commissioners, if the area lies within more than one county or by a *fire protection district commission* of three qualified voters of the area . . ."

The statute goes on to say that the said fire protection district commission board members are to be appointed by the Board of County Commissioners for a term of two years, and that the members will serve at the discretion of and under the supervision of the Board of County Commissioners.

### **Emergency Communications**

Emergency communications in the mind of both citizens and public safety professionals is synonymous with "911"; the number dialed in an emergency. Since this concept deals essentially with telephone communications, the federal government, particularly the Federal Communications Commission (FCC) has played a significant role in its development.

In 1967 the President's Commission on Law Enforcement and the Administration of Justice recommended that a "single number" be established for nationwide use to report emergency situations. On March 22,

---

<sup>3</sup> Loeb, Ben F., Jr.; Fire Protection Law in North Carolina, 5<sup>th</sup> edition; Institute of Government, UNC at Chapel Hill; 1993.

1974, the Office of Telecommunications Policy issued National Policy Bulletin Number 73-1, the *National Policy for Emergency Telephone Number 911*".

By 1996 cellular and commercial mobile telephone service had become so popular and widespread that the FCC issued a report calling for the requirement that 911 service be available to wireless phone users in two phases; Phase I would provide calling party's number and cell tower location; Phase II would provide calling party's number and location of the mobile phone by latitude and longitude. The *Wireless Communications and Public Safety Act of 1999* was subsequently signed by the President on October 26<sup>th</sup>, of that year.

On September 25, 1998, the General Assembly of North Carolina approved Senate Bill 1242, establishing the Enhanced 911 Wireless Fund and the North Carolina Wireless 911 Board. This Bill became North Carolina General Statute 62A Article 2. The objective of the act was to provide for an enhanced wireless 911 system for the use of personal cellular communications services and other wireless telephone customers in response to the mandate by the FCC.

On July 27, 2007, the General Assembly of North Carolina further revised NCGS 62A, creating a 911 Board with responsibility for both wireline and wireless 911 in North Carolina and a single, statewide service charge per connection for any type of voice communication service provider effective January 1, 2008. The proceeds from this service charge are deposited into a fund administered by the North Carolina 911 Board located at the Division of Information Technology Services.

Major responsibilities of Haywood County's Communications Center personnel include but are not limited to:

- Receive, handle and dispatch calls for EMS, Fire, and all law enforcement agencies operating within the County.
- Alert the appropriate law enforcement agency, EMS unit, or Fire station of an emergency and provide dispatch information and instructions accordingly.
- Continue to monitor and support the call and the responding service by maintaining on-going communications and following the efforts of those responder(s) to the incident and throughout the incident scene activities that follow.
- Implement emergency medical dispatch (EMD) protocols during medical emergencies;
  - Remain on the line with the caller to obtain as much additional patient/victim information as possible.
  - Simultaneously and continuously alert the responding EMT's as to the patient's condition.
  - Provide actual medical/first aid instructions to the caller to help the victim.
- Receive and handle all non-emergency ("administrative") calls requesting assistance or information; including:
  - License tag checks
  - Inquiries regarding outstanding warrants
  - Request for information; directions, phone numbers, names, etc.
  - Requests for assistance at a crime or accident scene
  - Duplicate calls
  - Nefarious or misplaced calls



### 3. EXISTING CONDITIONS

Organizationally, Emergency Medical Services (EMS) in Haywood County is provided as a major Division within the Haywood County Office of Emergency Services, which also includes Emergency Management. Subsequently, the EMS “system” designation registered with the North Carolina Office of Emergency Medical Services (OEMS) is “Haywood County”.

The requirements that must be met to become certified as an “EMS System” in North Carolina are identified in Administrative Code Section 10 NCAC 13P .0201; a copy of which is included in the Appendix section of this report. The system response area consists of the 554 square miles (US Census Bureau) that lie within the identified boundaries of Haywood County. According to the North Carolina Office of Management and Budget, the July 2019 County population has been estimated as 63,455 residents.

EMS services, per statute, are available 24 hours per day, 365 days per year. The EMS Division is managed on a day-to-day basis by the Director of the Office of Emergency Services who dually serves as the EMS Director. He reports directly to the County Manager. Additional full-time administrative personnel include a Deputy Director of Operations, Deputy Director of Administration, Training Officer, a Billing Specialist and an Administrative Assistant.

Operations personnel include three (3) Shift Supervisors, three (3) Assistant Shift Supervisors and 42 certified Emergency Medical Technicians (EMT’s), predominately at the Paramedic level. Including the referenced administrative and support personnel; there are a total of **55** full-time EMS Division employees at the present time. As well, a local practicing physician serves as the County’s Medical Director on a part-time basis and is responsible for medical oversight.

In addition to its full-time employees, EMS has access to a modest contingent of certified part-time employees that are able, when available, to fill in during staff vacations, absences, or when position vacancies occur.

Haywood County EMS is certified as a “Paramedic” level agency by the State, which designates them as an “advanced life support” (ALS) provider. This system certification level requires that any time an ambulance responds to a medical emergency, it must have at least one (1) certified Paramedic on board.

The County is a single EMS district which comprises the referenced 554 square miles of the County. The County’s EMS Plan currently on file with the State OEMS, states that a minimum of seven (7) EMT-Paramedic ambulances will be on duty seven days per week. Six of those ambulances operate 24 hours per day-seven days per week. The seventh ambulance operates 12 hours per day-seven days per week during the hours of 7:00 am-7:00 pm.

Currently, the highest concentration of population within the County, and subsequently the highest percentage of EMS calls occur within and proximate to the Town of Waynesville, and to a somewhat lesser degree within and proximate to the Towns of Canton, Clyde and Maggie Valley.

#### **911/Communications & Dispatch**

The report sub-section that follows addresses the deployment of EMS personnel and vehicles throughout the County. While the emergency medical operations discussed in this report section address predominately those activities that require the movement of personnel with special vehicles, skills, and equipment to the scene of the emergency reported, it is the actual **reporting** of that emergency which gets everything started.

In this instance, the County's 911/Communications Center, responsible for receiving and dispatching emergency calls for help, is an operational Division of the Haywood County Sheriff's Office. It is located in the Sheriff's Office building on Brown Avenue in Waynesville. In the professional terminology of the communications industry, the Communications Center is the designated *public safety answering point*, or PSAP, for emergency communications in Haywood County. The Center operates 24 hours per day and is continuously staffed by Telecommunicators who receive, and dispatch calls for not only EMS, but all fire departments and law enforcement agencies throughout the County.

In most people's eyes, once a Telecommunicator alerts the appropriate law enforcement agency, EMS unit, or fire station of an emergency and provides dispatch information and general instructions to the responders, their job is over. This is not the case with regards to medical emergencies. Haywood County Telecommunicators are certified Emergency Medical Dispatchers (EMD's), and in many cases continue to monitor and support the call and the responding service unit by maintaining on-going communications with the victim/caller and the responder(s) enroute to and possibly throughout the on-site incident activities that follow. This is particularly significant with regards to medical emergencies and will be discussed further in the *First Responders* sub-section that follows. The Communications Center also maintains call log reports, on every call received and dispatched which include the type of incident being reported, the agency(s) dispatched, location of the incident, and dispatch and response activity interval times.

### **EMS Personnel & Vehicle Deployment**

During the period of this study, most EMS field operations employees were working schedules that included 24-hour shifts configured as follows:

- Employees assigned to 4 of the ambulances worked 24-hour shifts followed by 48 hours off.
- Employees assigned to 2 of the ambulances worked 24-hour shifts followed by 72 hours off.
- Employees assigned to the 12-hour, "peak time" ambulance worked 12-hour shifts followed by either 48 or 72 hours off depending upon where the shift started at the beginning of each 28-day cycle.
- An additional ambulance, recently approved and scheduled to go online in late August, is expected to run 14-hour shifts, Monday-Saturday, from 8:00 am-10:00 pm and focus on the inter-facility transportation of convalescent patients.

And, as stated, each on-duty ambulance must be staffed with no less than two (2) certified EMT's-at least one of which must be certified at the Paramedic level.

Shift Supervisors are certified Paramedics and are on duty during every shift. And, although having numerous administrative, oversight, and quality assurance responsibilities as the senior member of the shift, they are also, by virtue of the vehicle that they are assigned, able to respond to any medical emergency if needed. Their vehicle, while not OEMS certified as a patient *transport vehicle*, is equipped with the necessary equipment, medications, and supplies to enable the responding ALS Quick Response Vehicle (QRV) and Paramedic Supervisor to initiate treatment in any incident to which they may be called.

The current primary staging locations of the EMS ambulances are listed in Figure 1 that follows. Note that there are currently three (3) ambulances (Medic 1, Medic 5 and Medic 7) stationed in Waynesville. Also, on May 6<sup>th</sup> the Board of County Commissioners approved the hiring of staff to man a new ambulance (Medic 8) to supplement the existing fleet, to assist with non-emergency convalescent transports, the responsibility for which the County had recently assumed. The location of Medic 8, when it comes online, is tentatively scheduled to be in Clyde.

**Figure 1**  
**EMS Response Vehicle Staging Locations**

<b>Ambulance</b>	<b>Hrs/Days</b>	<b>Location</b>	
<b>Medic 1</b>	24/7	141 Hemlock St	Waynesville
<b>Medic 2</b>	24/7	2901 Soco Rd	Maggie Valley
<b>Medic 3</b>	24/7	8437 Carolina Blvd	Clyde
<b>Medic 4</b>	24/7	55 Buckeye Cove Rd	Canton
<b>Medic 5</b>	24/7	141 Hemlock St	Waynesville
<b>Medic 6</b>	24/7	109 State Rd 1884	Bethel
<b>Medic 7</b>	12/7	141 Hemlock St	Waynesville
<b>Medic 8</b>	14/6	8437 Carolina Blvd	Clyde

In addition to these ambulances, Haywood County EMS, in collaboration with Haywood County Regional Medical Center (HRMC), in December 2018, established a **Community Paramedicine** program. Wherein, a licensed Paramedic is deployed from EMS offices on Hemlock Street in Waynesville, five days per week during daytime hours, to visit patients throughout the County referred by EMS staff and by HRMC. As published, the goal of the program is to “*help increase the overall health and wellness of the citizens of Haywood County*”. The Community Paramedic works directly with the patient and their family as well as other care providers in the community to focus on:

- *High Risk Patients*; COPD, congestive heart failure, diabetes, at risk of readmission, etc.
- *Education*; Medication management & compliance; healthcare understanding.
- *Safety*; home safety inspections, fall hazards, environmental concerns
- *Connection w/Resources*; local public health, home health and general health systems available.

Additional comments regarding the objectives and benefits of the program, and the specific services provided by the Community Paramedic are included in Section 4, Performance & Costs.

### **EMS Response Districts**

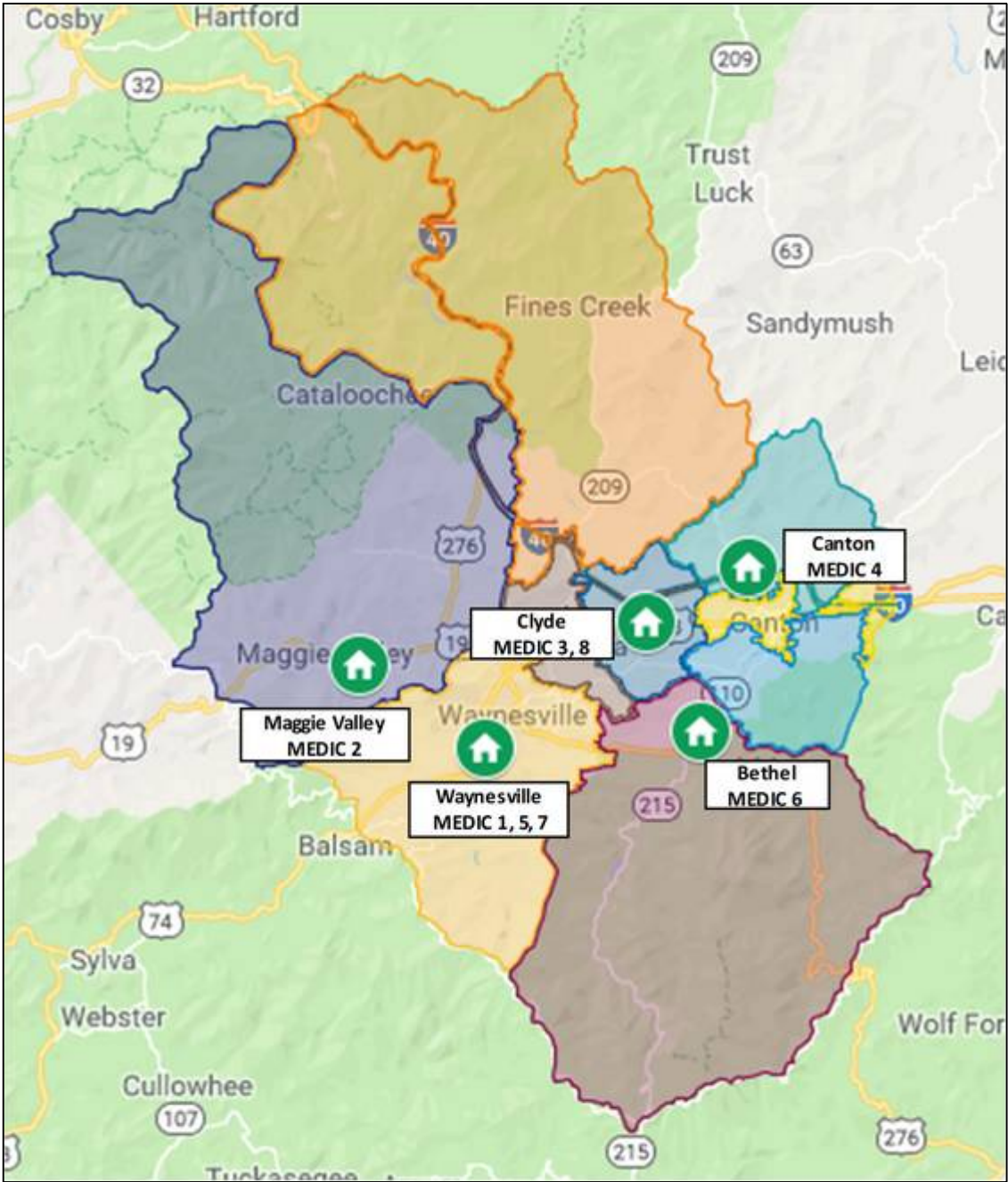
The diagram that follows identifies the currently designated EMS Response District boundaries within Haywood County as well as the ambulance and staff staging locations referenced above.

As the County has grown in population since these districts were originally established, and the corresponding EMS annual call volume has grown with it, EMS has evolved, out of necessity, from a traditional “static” model of ambulance location and deployment to a modified “system status” model of ambulance deployment in an effort to keep pace with call demand as well as citizen expectations of providing timely response.

For example, call data reviewed (October 2018-March 2019) established that during the busiest hours of the day, there were many times when 5, 6 or all 7 of the available transport ambulances were involved with active calls and/or with transports in progress; i.e. ambulance availability became critical. It is the practice of the on-duty EMS Shift Supervisors, to remain aware of the status of each EMS unit. When multiple units are simultaneously on an active call, leaving typically busy areas vulnerable, the Shift Supervisor may instruct an “available” medic unit to reposition to a specific location or stage at a strategic location within the County to be better able to respond to the next call that comes in.

In other words, the EMS response vehicles are not bound by their assigned staging locations or the response district boundaries on the map; i.e. “static”. They are mobile and deployed based on the level of activity taking place at any given time.

Figure 2  
Existing EMS Districts & Staging Locations



As illustrated, there are currently five (5) staging locations for EMS ambulances. However, based on the color coding, the map identifies 13 “districts” (colors). Essentially, each of the five staging locations is comprised of either two or three of the colored segments on the map. Of course, as addressed, any of the ambulances can be deployed to any area of the County to respond to a call. The current numbering of the EMS districts/subdistricts was conceived in a cooperative effort by EMS and the Communications Center. The basis for its configuration arises from the fact that the Communication Center’s software provider has yet to complete development of a GPS oriented automated vehicle location (AVL) “map layer” for the existing CAD system that will accurately locate the closest ambulance to an incoming call.

### Training & Certification

In North Carolina, the successful completion of established minimum training requirements must occur before an individual can be certified to work as a Medical Responder (MR), Emergency Medical Technician (EMT), Advanced Emergency Medical Technician (AEMT), or Paramedic. This applies to both volunteer and paid/career participants.

The educational programs available for each of these certification levels must be conducted by an approved Educational Institution as defined in the rules of the North Carolina Medical Care Commission.<sup>4</sup> The current training hours that must be successfully completed to receive certification at either of the levels identified include the following:

**Figure 3**  
**Minimum Training Hours Required per Level of Certification**

CertificationLevel	Hours
<b>Emergency Medical Responder (EMR)</b>	60
<b>Emergency Medical Technician-Basic (EMT-B)</b>	190
<b>Advanced Emergency Medical Technician-Intermediate (AEMT)</b>	256
<b>Paramedic; in addition to all "Basic" &amp; "Intermediate" hours</b>	1,000

New EMS employees, particularly trainees, are initially assigned to work under the supervision of a designated Field Training Officer (FTO); i.e. Senior Paramedic; for their orientation and/or initial three month probationary period where they can be observed and coached and become familiar with the procedures and protocols specific to Haywood County's EMS system. Successful completion of the probationary period requires the supervisory FTO's acknowledgment of the employee's proficiency and subsequent clearance by the Medical Director.

In addition to the minimum hours needed for certification, continuing education is also required of all EMS field personnel. Currently, the North Carolina Office of Emergency Medical Services requires that North Carolina licensees renew their license every four years. And, that North Carolina licensees hold a valid North Carolina, NREMT (National Registry of Emergency Medical Technicians), or other state approved EMS credential.<sup>5</sup>

Per OEMS and as stipulated in 10A NCAC 13P .0501 (e), the *minimum* continuing competency requirements (CCR) over the four (4) year credential period, to maintain NREMT certification and North Carolina state licenses are as follows:

**Figure 4**  
**Minimum Continuing Education Requirements**

Provider Level	National (NCCR) Requirements	Local (LCCR) Requirements	Individual (ICCR) Requirements	Total Hours
<b>EMR</b>	16	8	8	<b>32</b>
<b>EMT</b>	40	20	20	<b>80</b>
<b>AEMT</b>	50	25	25	<b>100</b>
<b>Paramedic</b>	60	30	30	<b>120</b>

In addition to the educational requirements necessary to maintain their licenses, EMS field personnel typically attend at least 24-36 hours of in-service training classes/programs per year regarding revisions to published medical protocols issued by NCOEMS, working and becoming familiar with newly acquired equipment, software and data system changes/upgrades, etc.

<sup>4</sup> North Carolina OEMS and NCAC 143B-165

<sup>5</sup> 10A NCAC 13P .0501

It is significant also, to note that Haywood County EMS is certified as an *Advanced Training Institute* by the North Carolina Office of EMS. The County's EMS Division Training Officer is responsible for organizing, implementing, certification, oversight and documentation of all training activities within EMS. In addition to direct training responsibilities for department personnel, the Training Officer is also responsible for re-credentialing (per state requirements) all personnel every four (4) years. He is also able to provide required continuing education classes, when requested, to each certified Fire Department's medical first responders, as well as serving as the principal contact and liaison with the State Office of Emergency Medical Services (NCOEMS) with regards to medical protocols, agency and individual licensures, and the receipt and implementation of new/updated EMS practice policy as it is issued by the State.

The Training Officer also works closely and coordinates training requirements and related activities with the Medical Director.

### **First Responders**

In general terms EMS Division employees are considered "first responders" to any emergency to which they are dispatched; as are fire and law enforcement personnel. Realistically, an EMS ambulance may in fact **not** be the first unit or service on the scene of a medical emergency.

In Haywood County's case, a "first responder" in medical emergencies could best be described as; *the first EMS, or Fire service person to arrive at the scene, with or without an ambulance, and initiate medical assistance in an effort to stabilize the patient until advanced life support capabilities arrive to administer additional aid and/or transport.* Of course, under the County's EMS System Plan and State regulations the individual responding in these instances, and the agency the individual represents, must be certified as Medical Responders.

### Fire Departments

In Haywood County currently, the organizations identified and approved by the State as medical responders, in addition to EMS, include the following fire departments:

- Canton Fire Department
- Center Pigeon Fire Department
- Clyde Volunteer Fire Department
- Crabtree-Iron Duff Vol. Fire Dept.
- Cruso Volunteer Fire Department
- Fines Creek Volunteer Fire Department
- Jonathan Creek Volunteer Fire Department
- Junaluska Community Fire Department
- Lake Logan-Cecil Volunteer Fire Department
- Maggie Valley Volunteer Fire Department
- North Canton United Fire Department
- Saunook Volunteer Fire Department
- Waynesville Fire Department

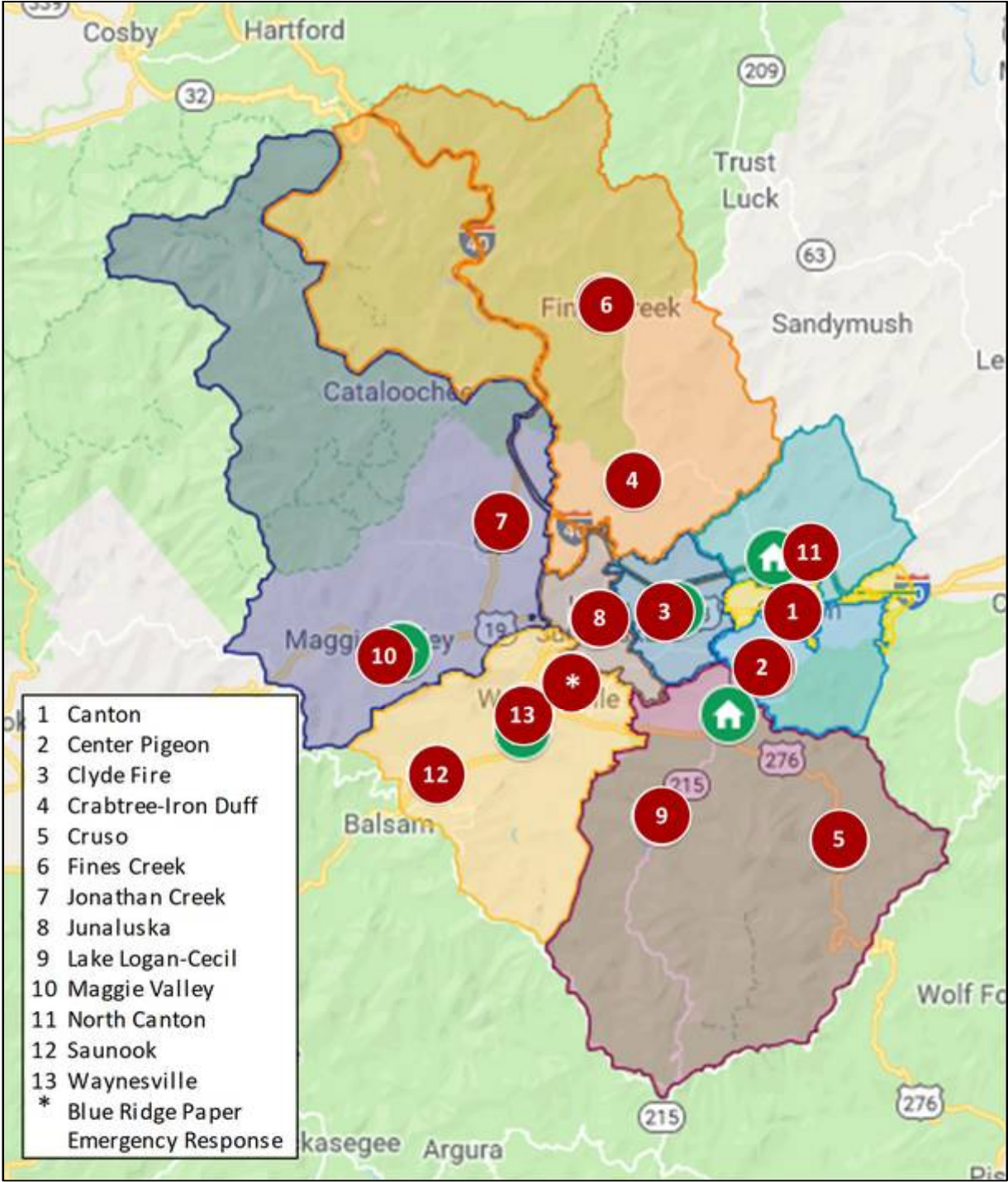
Two significant factors necessitate the need for agencies, *in addition to EMS*, to provide medical first response;

- First, the obvious; time is critical in medical emergencies; and,
- Second, during peak daytime hours there are (currently) seven (7) staffed ambulances with transport capabilities based at but five (5) locations throughout the County's 554 square miles.

Compare this with the combined *potential* capabilities of the 13 County based fire departments that are (or could be) available to respond from as many as 14 additional station locations (Waynesville has two stations) within the same 554 square miles as EMS. It becomes an issue of proximity if nothing else.

Figure 5 that follows identifies the proximate locations of the County's fire departments. The green symbols represent the proximate locations of the EMS ambulance staging locations.

Figure 5  
Haywood County Fire Departments



Note: While not illustrated at this scale, Waynesville has two stations within Town limits

Of course, the principal behind this concept is that someone with basic medical first aid training, that is closer to the victim than an ambulance, can get to and assist and perhaps stabilize the victim faster than an ambulance with advanced life support capabilities can, coming from much further away.

Figure 6, identifies the distribution of calls dispatched to each of the noted Fire Departments' during the most recent three calendar years; 2016-2018. The 13 County based fire departments were dispatched to a combined total of 34,801 calls. Of those calls 24,896 (72%) of the calls dispatched were to medical emergencies.

911/Communications Center

Haywood County's Communications Center dispatchers (Telecommunicators) are literally the *first*, first responders in medical emergencies. The Center is "EMD" certified. "Emergency Medical Dispatch" (EMD) is a level of certification that enables Telecommunicators that answer medical emergency calls, to offer the caller instructions in first aid; e.g. CPR, compression/abatement of serious bleeding, making the victim comfortable, etc. while also obtaining information from the caller as to circumstances and medical indications that can then be communicated to the EMS responders that are on their way.

These procedures require the activation of medical protocols that must be approved by the County's Medical Director and must be reviewed per State requirements for quality assurance on a regular basis. In a County the size of Haywood with EMS response times as they are, these capabilities can and often do prove valuable at the very least in initiating patient care.

Based upon the information obtained from the caller via a pre-established series of questions (which vary depending on the type of incident being reported), the Telecommunicator will initially classify that call as either "Routine"; i.e. "sick person", "citizen assist", "convalescent-nonemergency transport"; or "Emergency"; i.e. "chest pain", "unconscious", "traumatic injury"; etc. It is important to note that the initial call classification assigned (Figure7) **does not** dictate whether the subject victim will require transport following treatment. That decision is made by EMS at the scene.

**Figure 6**  
**Distribution of Calls Dispatched to County Fire Departments**

Fire Department	Medical	Fire	Total
Canton	3658	959	4617
Center Pigeon	2326	842	3168
Clyde Fire	1787	910	2697
Crabtree	588	415	1003
Cruso	504	376	880
Fines Creek	510	234	744
Jonathan Creek	1498	589	2087
Junaluska	2239	960	3199
Lake Logan	397	204	601
Maggie Valley	2585	1006	3591
North Canton	1483	722	2205
Saunook	1163	432	1595
Waynesville	6158	2256	8414
Total-3 Years	24896	9905	34801
Average/Year	8299	3302	11600

**Figure 7**  
**Initial Classification of EMS Calls Dispatched 2016-2018**

Year	No. Calls	Routine Dispatch		Emergency Dispatch	
		No. Calls	Percentage	No. Calls	Percentage
2016	10,968	4,459	41%	6,509	59%
2017	10,998	3,690	34%	7,308	66%
2018	11,470	3,493	30%	7,977	70%



### Call Volume

During calendar year 2018, Haywood County EMS units were dispatched a total of **11,616** times.

As illustrated, annual calls for service have gradually increased over the past 7 years. The total 2012-2018 change in call volume was 20 percent. In fact, if the rate of calls continues for the remainder of 2019 as it has thus far from January 1<sup>st</sup> through June 30<sup>th</sup> (6,187 calls), the total calls dispatched will increase again by as much as 6-7 percent.

**Figure 8**  
**EMS Annual Call Volume**  
**2012-2018**



It is significant to note that the annual call volumes and corresponding increases noted in Figure 8 were, for the most part, attributable to six (6) 24/7 ambulances. Medic 7 was added as a 12 hour per day/peak time (7:00 am-7:00 pm) ambulance in 2018, with the expectation that it would be staffed with part-time personnel. As it turns out, the limited availability of certified EMT's and the reluctance of those that were initially hired to remain committed to the part-time hours, versus other full-time opportunities, yielded less than the results hoped for. During 2018 the average number of calls per month to which Medic 7 responded was 27; with there being *no calls* dispatched in June and but one (1) dispatched in July. By contrast, throughout 2018, Medic trucks 1-6 *each* responded to 100-200 calls per month.

In February 2019, the Haywood County Board of Commissioners approved full time staffing for the peak-time unit (Medic 7) and authorized EMS to hire four (4) full time personnel to staff it for the hours of 7:00 am-7:00 pm, seven days per week. While it took time to recruit, hire and orient the four positions (at least two of whom were to be certified at the Paramedic level) the transition to full-time employees appears to have made a difference. During the first two full months of operation, April and May 2019, Medic 7 responded to an average 110 calls for service per month.

Peak-time ambulances targeting the busiest 10-12 hours of the day have become popular with EMS systems in recent years. As well, their effectiveness, particularly during the first 2-3 years of operation have often contributed to the lowering of the user agency's overall average incident response times.

In addition, since the beginning of 2019, EMS has been providing, upon request *and when a vehicle was available*, non-emergency convalescent transfer of patients between medical facilities. In that the

previous contracted provider of this service is no longer in business, the requests of EMS, from doctors and medical facilities, have increased.

Subsequently, as previously noted, during their meeting on May 6<sup>th</sup>, 2019 the Board of County Commissioners discussed and approved the hiring of six (6) full-time employees to staff an ambulance for this purpose; i.e. Medic 8.

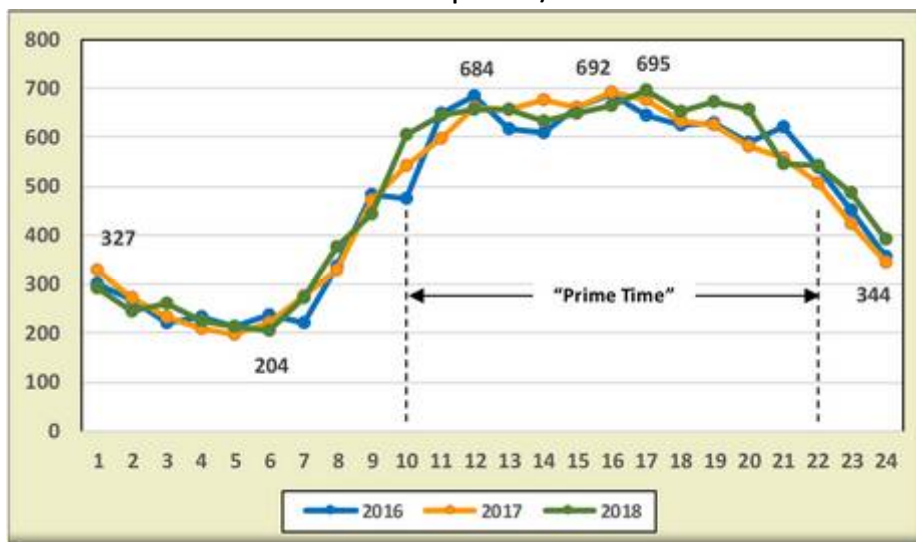
Historically, interfacility patient transfer has been considered a fundamental component of any EMS system and, was originally identified as one of the 15 essential components of EMS.<sup>6</sup> The transfer of emergency patients to secondary centers in order to access higher levels of care not available at the primary or initial receiving facilities is a common use of interfacility transport. As well, non-emergency transfers to higher level facilities occur when definitive care, evaluation by specialty physicians, or evaluation and treatment with procedures not available at the sending facility are needed.

Although speculative at this time, once Medic 8 is fully staffed and operational, the annual number of non-emergency convalescent patient transfers, based on previous year (Communications Center) 2016-2018 records and current requests, is likely to reach and probably exceed 2,000 calls per year. As with the peak-time unit (Medic 7) the impact that the addition of Medic 8 will have on future year call numbers will be discussed further in Section 5, County Population.

### Calls Dispatched per Hour

An assessment of the “calls per hour”, plotted for an entire year, will identify both the peak and approximate time frame of the busiest call periods during any given day, which of course are the times when EMS personnel are in greatest demand. In order to ascertain whether these periods of activity were consistent in their occurrence, the most recent three (3) years of data was reviewed and plotted. The results, illustrated in Figure 9 for 2016-2018, were very consistent. Subsequently, the busiest 12-hour period of the day (“prime-time”) is between 10:00 am and 10:00 pm or, between the numbers 10 and 22 on the horizontal axis.

Figure 9  
EMS Calls per Hour/Year



Note: the number '1' on the horizontal axis represents 1:00 am; the number 12 represents noon, the number 18, 6:00 pm, etc.

<sup>6</sup> Boyd DR, Edlich RF, Micik SH, et al, eds; Systems Approach to Emergency Medical Care; 1983

### Type of Call

The type of calls to which EMS responds may vary considerably from day to day. A review of the calls dispatched during 2018 identified what amounted to be the major; i.e. most frequent; call classifications. Of the 11,616 total calls dispatched, just over 80 percent were listed in one of the 16 categories identified in Figure 10.

Figure 10  
EMS Calls by Type

Condition	Frequency	Percent
Sick Person	2009	17.2%
Fall	1399	11.9%
Breathing Problem	1051	9.0%
Chest Pain	808	6.9%
Traffic Accident	771	6.6%
Routine Transport	460	3.9%
Unconscious Fainting	530	4.5%
Citizen Assist	434	3.7%
Heart Problems	357	3.0%
Convulsion seizures	314	2.7%
Abdominal Pain	286	2.4%
Stroke	252	2.2%
Traumatic Injury	248	2.1%
Diabetic Problems	214	1.8%
Overdose Poisoning	170	1.5%
Echo Cardiac or Resp. Arrest	133	1.1%
	9436	80.6%

It is interesting to note also that the first five (5) call types on this list; “Sick-Person” to “Traffic Accident” comprised 51.4 percent of the total calls dispatched during 2018.

Comparatively, looking at the 2016 and 2017 numbers the five most frequent call types were the same.

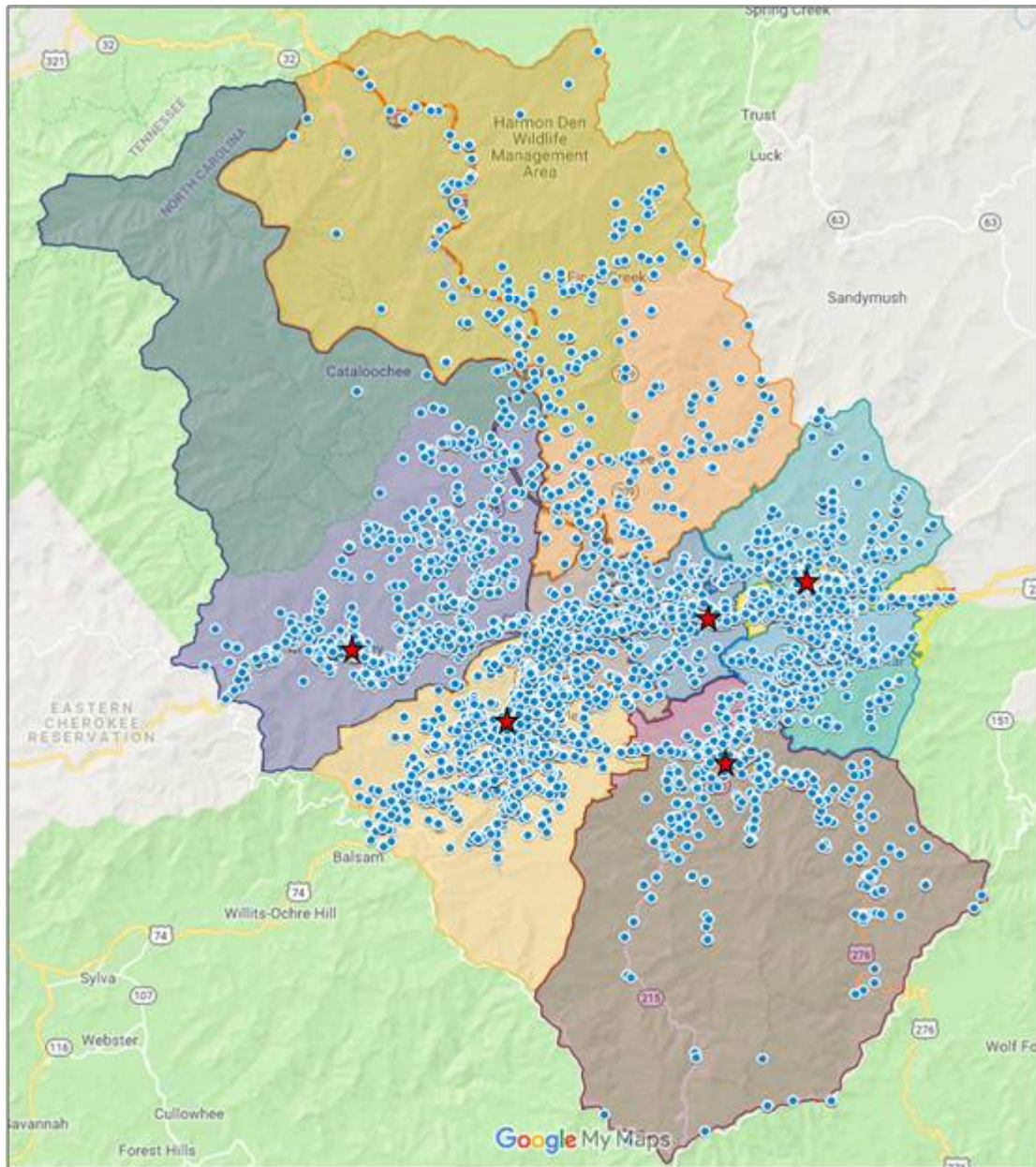
Figure 11  
Comparison of Call Frequency by Type  
2016-2018

Condition/Call Type	2016		2017		2018	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Sick Person	2126	18.7%	2037	17.9%	2009	17.2%
Fall	1397	12.3%	1462	12.8%	1399	11.9%
Breathing Problem	1002	8.8%	993	8.7%	1051	9.0%
Chest Pain	891	7.8%	865	7.6%	808	6.9%
Traffic Accident	703	6.2%	805	7.1%	771	6.6%
	6119	53.9%	6162	54.2%	6038	51.6%

### Call Distribution

The dots on this map of Haywood County represent the more than 11,600 calls to which EMS units were dispatched during 2018.

**Figure 12**  
**2018 EMS Call Distribution**



As noted previously, the highest concentration of population within the County, and subsequently the highest percentage of EMS calls occur within and proximate to the Town of Waynesville, and to a somewhat lesser degree within and proximate to the Towns of Canton, Clyde and Maggie Valley. The significant highways connecting these townships include State routes 19, 23, and 74. Interstate 40 is a major highway which enters the County on the east side from Asheville into the center of Haywood County and continuing north into Tennessee. State route 276 is a significant north-south conduit through the County as are County routes 216 and 209.

### Calls for Service (CFS) Dispatched vs. Transports

Tracking the number of emergency victims transported, together with the number of emergency incidents to which ambulances are dispatched, becomes important when later analyzing average call duration together with call volume during “prime-time” hours to determine the basis for ambulance availability. Figure 13 illustrates the following for calendar year 2018:

- The total EMS calls for service dispatched each month
- The total number of patients transported each month
- The total number of “Emergency Transports” each month

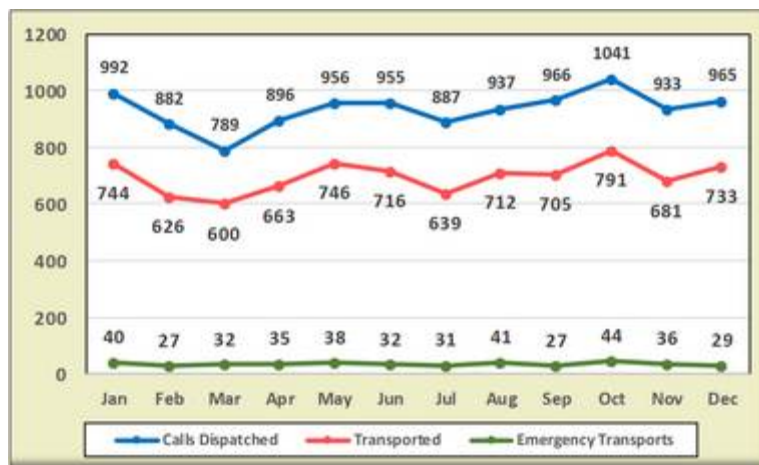
The number of Transports per month as a percentage of total calls dispatched varied each month from 71-78 percent. The average number of calls dispatched per month was 933; the average number of transports per month was 696. The total transports for the year was 8,356, which represented 75 percent of the total calls dispatched.

### Emergency Transports

At the same time, approximately 5 percent of the 2018 transports are represented by the green line in Figure 9; *Emergency Transports*. This **does not** suggest that the remaining 95 percent of the transports noted were “non-emergency” transports from the scene of the incident, accident or injury to the receiving medical facility where they were initially accepted and treated; they most likely were.

This category of “emergency transports” involve patients wherein the receiving facility/physician has determined that based on the severity of the injury or condition and/or a chance of life threat, that the victim must be transported to a facility that can offer a higher level of care. And, while the referring facility and physician bear the legal responsibility to ensure that the patient is transported in a safe and medically appropriate manner, the interfacility transport system; i.e. Haywood County EMS; must have established safeguards in place to ensure that transfer vehicles have the necessary equipment and medications and are staffed by personnel able to appropriately manage the patient during that transfer.<sup>7</sup>

Figure 13  
2018 Calls Dispatched vs. Transports



Examples of the type of patients for whom transfer to a secondary facility might be necessary include those who have suffered cardiac problems, burns, trauma, or stroke as well as pediatric, high-risk obstetrics, neonatal and neurosurgery patients, and those experiencing other complex medical conditions.<sup>8</sup>

<sup>7</sup> 42 USC 1395 dd, of the Social Security Act

<sup>8</sup> Brennan J, Krohmer J, Principals of EMS Systems; ACEP; 2006

### Transport Destinations

EMS prepares monthly “Snapshot” reports which summarize various workload and performance metrics experienced and documented during the previous month. Among the categories addressed is “Destination”, which refers to the location, typically a medical facility, to which patients were taken. The first five headings in the Destination column in Figure 14 identify those locations. The last three categories in the Destination column, while not transports, are included to provide the basis for why transport was not necessary or did not occur.

**Figure 14**  
**EMS Transport Destinations**

As illustrated, the destination of most of those transports was Haywood Regional Medical Center (HRMC) at 75%; followed by Mission Hospital, at 23%.

It is significant to note that Mission Hospital, located in Asheville, is a certified Level 2 Trauma Center; (the highest being Level 1).

Emergency departments, such as that established within HRMC, can treat a variety of conditions, illnesses, and injuries, including broken bones, minor lacerations requiring stitches, and stomach pains, breathing problems, overdose, and more. However, for very severe injuries, trauma care is often necessary. These injuries can include, but are not limited to, traumatic car crashes, brain injuries, serious falls, gunshot or stab wounds, and severe burns.

Treating these injuries are generally outside the scope of traditional hospital emergency departments.

Destination	Admissions
<b>HRMC</b>	6437
<b>Mission Hospital</b>	1963
<b>Other Medical</b>	120
<b>Funeral Home/Morgue</b>	61
<b>Other Destination</b>	53
<b>Treat/No Transport</b>	1352
<b>Cancelled/No Patient</b>	1049
<b>Assist Citizen</b>	405
	11440

Subsequently, proximity to certified Trauma Centers has become an increasingly important issue in recent years. As of January 2010, all North Carolina EMS Systems had to have in place and implemented a Triage and Destination Plan for Trauma, Burns, Pediatrics, STEMI (heart attack), and Stroke.<sup>9</sup>

The goal of each of the Triage and Destination Plans, which represent the most serious of conditions or injury confronted by EMS responders, is to optimize the care provided each patient by matching their symptom/injury timing and treatment needs to the capability of the health care facilities available. In Haywood County’s case, these health care facilities, based on the State’s Triage and Destination Plan protocols, include Mission Hospital, which is the closest certified Trauma Center in the region able to provide the advanced treatment needed in these more serious cases.

The previous sub-section; “Emergency Transports”; referenced patients wherein the receiving medical facility/physician determined that the severity of the injury or condition and/or a chance of life threat warranted transport to a facility that offered a *higher level of care*. For Haywood County that facility is almost always going to be Mission Hospital.

In addition to these medical facility/physician ordered transfers, it is important to recognize that as an Advanced Life Support (ALS) paramedic-level system, and with the required Triage and Destination Plan protocols in place, Haywood County EMS paramedics are qualified and able to assess the severity of a patient’s condition and determine whether a hospital emergency department or a trauma center is the best place to go for care.

<sup>9</sup> NCOEMS Policy Memorandum

### EMS Vehicles

The County currently maintains an inventory of 11 transport ambulances; eight (8) of which will be in service 12 and 24 hours per day, once Medic 8 is fully staffed and operational. The three (3) remaining ambulances are reserve vehicles which are utilized when any of the regular fleet is down for maintenance or service.

After the ambulances, the vehicles on the list are assigned to administrative personnel and designated Captains, Shift Supervisors and the Community Paramedic. It is important to note that the personnel to whom vehicles have been assigned are all licensed paramedics and able to respond to any medical emergency if needed. These vehicles, while not OEMS certified as patient *transport vehicles*, are equipped with the necessary equipment, medications, and supplies to enable the responding Paramedic Supervisor, Community Paramedic, or administrator to initiate treatment in any incident to which they may be called.

**Figure 15**  
**EMS Vehicles**

VehicleCategory	Year	Model	Manufacturer
EMS TransportAmbulance	2010	Ambulance	Chevrolet
	2015	Ram 4500Ambulance	Dodge
	2015	Ram 4500Ambulance	Dodge
	2015	Ram 4500Ambulance	Dodge
	2015	Ram 4500Ambulance	Dodge
	2016	Ram 3500Ambulance	Dodge
	2018	Ram 4500Ambulance	Dodge
	2018	F 450Ambulance	Ford
	2019	F 450Ambulance	Ford
	2019	F 450Ambulance	Ford
	2019	CrestlineAmbulance	Ford
EMS Quick ResponseVehicles(QRV)			
Spare-QRV	2012	Tahoe	Chevrolet
OperationsCaptain	2007	Explorer	Ford
Director	2016	Expedition	Ford
ShiftSupervisor	2017	4WD/4DTahoeSUV	Chevrolet
TrainingCaptain	2017	4WD4DTahoeSUV	Chevrolet
DeputyDir. Administration	2019	F2504X4 Crew Cab	Ford
DeputyDir. Operations	2019	F2504X4 Crew Cab	Ford
CommunityParamedic	2019	Ford Escape	Ford

### Reports & Reporting

Continuum™ is the EMSPIC's new state EMS information system which collects data on each EMS call report made within the state. Data is submitted daily to the EMSPIC in one of two ways. The first is through a web-based data entry tool. The second method is through an XML import process. Continuum™ allows evaluation of EMS patient care and system performance, functioning beyond a medical record and quality management tool with hospital outcome data, billing data, and linkages to multiple databases outside EMS.

Continuum™ is also used by state regulatory offices in North Carolina to monitor and provide credentials to EMS personnel, ambulances and EMS agencies. Continuum™ is used to track and document EMS personnel education, credentials, disciplinary actions and contact information. It is through this system that EMS personnel register for continuing education and certification courses. Grades from completed courses are also posted within the system by course instructors to be referenced by the students, EMS agencies and the state regulatory offices. Continuum™ also stores ambulance permits and inspections information as well as EMS agency permits.

#### 4. PERFORMANCE & COSTS

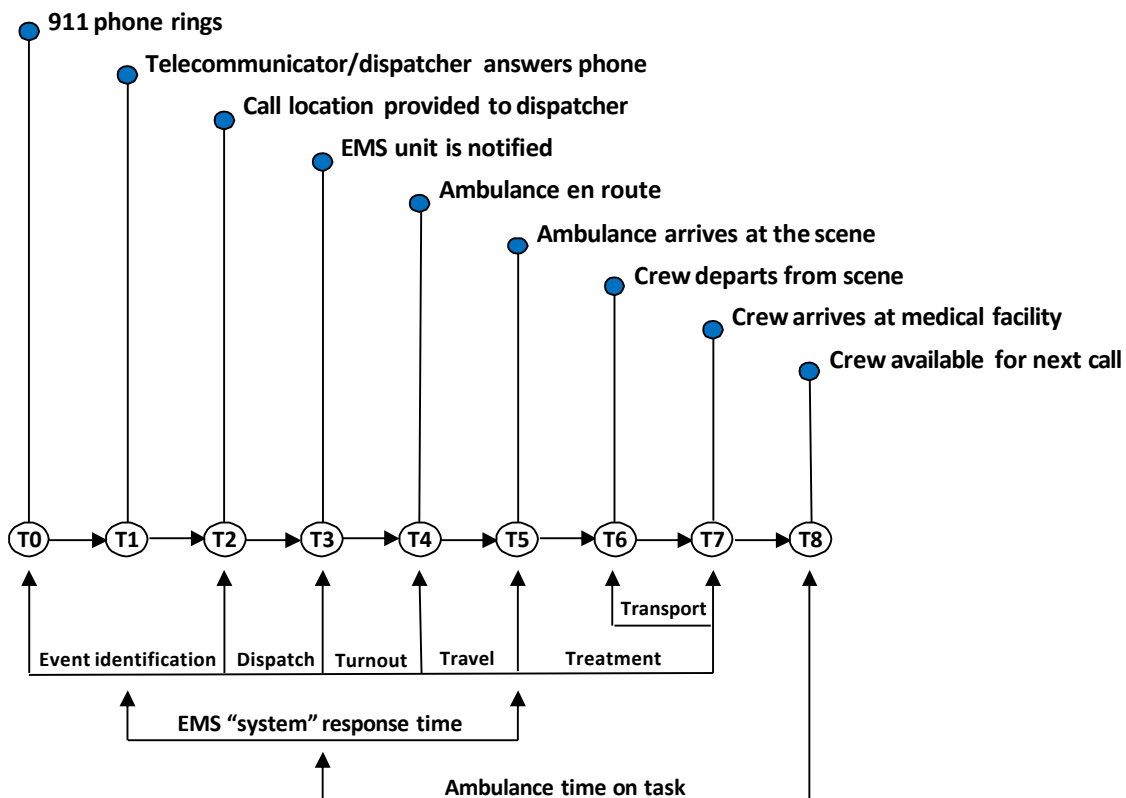
In order to assess an individual EMS agency or an EMS *system's* performance the individual events and the corresponding duration of each of the events that comprise the 911/EMS call-response process must be understood.

The events illustrated in the diagram that follows (Figure 16) are those that the County's Communications Center Telecommunicators and EMS Paramedic teams deal with on a daily basis. The series of events that occur, from the initiation of a 911 call until completion of the EMS response, are provided in a timeline-like sequence. The individual events and corresponding segments of time identified are each important.

While the timeline identifies the events that occur from the time the phone starts to ring in the Communications Center until the EMS Unit (team) is "back in service", the focus of the discussion that follows will be on the principal response time event intervals for which EMS is responsible; T3-T5.

- **T3-T4** is referred to as "turn-out" time (also chute time), which represents the time from the radio announcement of the call and request for assistance is received at the EMS base or "start" location by the EMT's on duty (T3), until the wheels on that response vehicle (ambulance) are moving (T4); the "listen, drop what you're doing, and go" time.
- **T4-T5** is the interval between the time the ambulance's wheels are moving (T4) with EMT's on board, to the time it arrives on the scene and the vehicle's wheels have stopped (T5); "travel time".
- **T5-T8** includes the intervals that involve treatment, transport, and the facility admission process.

Figure 16  
911/EMS Call Response Process





## Response Time

For purposes of this report, EMS ambulance/unit response time is: *the time from the initial alert or announcement by the Communications Center (also called “tone”, “page”, or “dispatch”) of the reported emergency, to the time that the service vehicle and appropriate personnel arrive on the scene;* time T3 through T5 in the previous illustration.

Why is time so important? According to the National Emergency Number Association (NENA), “The most elementary explanation of why time is important in a law enforcement, fire, or medical emergency has to do with the obvious; *serious injury and/or the potential loss of life and property.* Quite simply, response time is important because it may mean the difference between life and death”.<sup>10</sup>

Factors impacting response time include of course the distance that must be covered, but also specific and/or unique area characteristics such as road conditions, geography, and development density.

Factors influencing the *quality* of the response have to do with not only the time it takes to get to the scene of the emergency but also the information communicated to the responding service unit, the skill of the personnel responding, and the availability of the proper equipment to adequately address the emergency at hand. Of course, the emergency service agency *must* be prepared to address the most serious emergency *every time* that they are dispatched.

Call data for the calendar year 2018 were extracted from the Communications Center’s CAD system for both the Turnout (T3) and Travel time intervals (T4). The numbers listed represent the **average** time, in minutes and seconds of all calls dispatched during the year. As previously described, the Total (average) Response Time for the year, is the sum of the average Turn-Out and Travel Times for that year.

**Figure 17**  
**EMS 2018 Interval & Total Average Response Time (RT)**

No. Calls Dispatched	Turnout	Travel	Total Avg. RT
<b>11,199</b>	<b>0:01:46</b>	<b>0:07:36</b>	<b>0:09:22</b>

The average total response time for the calls dispatched was 9-minutes and 22 seconds, T3-T5 in Figure 12. With regards to Turnout time, current NCOEMS policy states: *The EMS Wheels Rolling (Turn-out) Time will be less than 90 seconds, 90% of the time, for all events identified and classified as an emergent or hot (with lights and siren) response.*<sup>11</sup>

Industry standard setting organizations, such as NFPA and others, in recent years have emphasized and defined new standards for measuring response time performance that no longer consider *average* times but rather “fractile” times for response. For example, “90% of all calls dispatched shall be responded to in “x” minutes or less”.

### “Average” is No Longer Acceptable

Published standards now suggest that *average* response time is no longer an adequate measure of performance in a life safety/emergency services response situation. Average response time is just that; i.e. “*average*”. Which means that although any number of calls could have been responded to in *less than* the average time of 9-minutes and 22-seconds (as is the case with Haywood County EMS), an almost equal number of calls were likely responded to in a *greater or even much greater time* than the average noted.

<sup>10</sup> NENA; “911 System Survey and Resource Guide”; 2002

<sup>11</sup> North Carolina College of Emergency Physicians; EMS Back in Service Time; Metric Policy Section

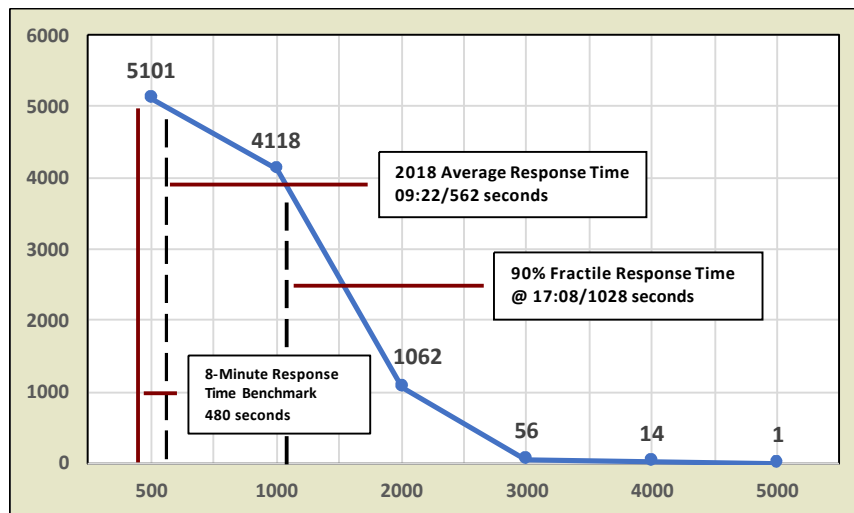
Historically “average” response times have been the most readily measured performance indicator for EMS. This method, however, highlights the problem of inequity of service because, as stated, theoretically 50% of the patients experienced response times *longer* than average. To ensure more equitable service to all areas of a community, in this case Haywood County, fractile response time measurement was introduced and is now used by EMS systems throughout the Country.<sup>12</sup>

Professional organizations as well as those associations that publish what are considered the prevailing standards for the industry; NFPA, the American Heart Association, and the National Institutes of Health among them; have pushed for performance standards; i.e. response times; that are to be met *at least 90 percent of the time*. An example, using NFPA’s 8-minute response time standard for ALS ambulances, is that rather than achieving an *average* response time for 100 calls of 8-minutes or less, the standard now suggests that *no less than 90* (90%) of those 100 calls be responded to in 8-minutes or less.

The Communications Center provided EMS response time data for 10,352 calls dispatched during calendar year 2018. The response times for each of these calls was recorded in seconds and reformatted in ascending order from the shortest response time (less than 30 seconds) to the longest response time (1-hour and 16 minutes). The response time recorded for the 5,176<sup>th</sup> call (mid-point in the total list of numbers) was 8-minutes and 24 seconds. The average response time for all of these calls was consistent with that noted in Figure 17; 9-minutes and 22 seconds. The 90 percent fractile response time (call number 9,316) was 17-minutes and 8 seconds.

Figure 18 provides an illustration of how the referenced call sample might be graphed. The horizontal axis represents response times in seconds. The vertical axis represents the number of calls responded to within the time frames noted; 500 seconds, 1,000 seconds, etc. For example, 5,101 calls were responded to in 500 seconds (8-minutes and 18 seconds) or less. The vertical black-dashed lines represent the average response time for all calls, per Figure 17 and the 90 percent fractile time of 1,028 seconds (17-minutes and 8 seconds) or less. The red vertical line represents the 8-minute (480 seconds) response time benchmark suggested for ALS ambulances as cited above. The expectation being that, based on this illustration and the 90% fractile time identified, that Haywood County must endeavor to “move” the current black-dashed vertical 90 percent line closer to the red line.

**Figure 18**  
**Average vs. Fractile Response Time**



<sup>12</sup> American College of Emergency Physicians; *Principals of EMS Systems*; 2006

### Total Event Duration

The total event duration; is the time from the initial announcement of a call (dispatch) for service, to the time the EMS unit that responded to that dispatch is back in service and available to take another call. While the Turnout and Travel times are the first two-time intervals of consequence, the time on scene with the patient, transport time from the scene to the appropriate medical facility, and time at the medical facility until release, are significant as well. Cumulatively they combine to result in the total event duration time; also referred to as “ambulance time on task” T3-T8 in Figure 16 on page 23.

Figure 19  
Average Event Duration

No. Calls Dispatched	Turnout	Travel	Total Avg. RT	On Scene	Scene to Facility	At Facility to Clear	Avg. Call Duration
11,199	0:01:46	0:07:36	0:09:22	0:19:09	0:17:19	0:25:35	1:11:25

Current NCOEMS policy states: *All EMS units transporting a patient to a medical facility shall transfer the care of the patient and complete all required operational tasks to be back in service for the next potential EMS event within 30 minutes of arrival to the medical facility, 90% of the time.*<sup>13</sup>

In the Procedures sub-section, the policy also states that: *The EMS Unit will be cleaned, disinfected, and restocked (if necessary) during the EMS Back in Service Time interval.*

### Community Paramedic Program

According to the Joint Committee on Rural Emergency Care: *The concept of community paramedicine represents one of the most progressive and historically based evolutions available to community-based healthcare and to the Emergency Medical Services arena.*<sup>14</sup>

The same document defines a Community Paramedic as *a state licensed EMS professional that has completed an appropriate educational program and has demonstrated competence in the provision of health education, monitoring and services beyond the roles of traditional emergency care and transport and in conjunction with medical direction.*

North Carolina General Statute 131E-163.1 states; *The purpose of the program is to expand the role of paramedics in community-based care initiatives that result in providing care that accomplishes one or more of the following goals:*

- *Improves individual and community health.*
- *Reduces unnecessary hospitalizations and emergency room visits.*
- *Improves patient satisfaction.*
- *Reduces healthcare costs.*

To date, (mid-December 2018-June 30, 2019) Haywood County’s Community Paramedic has received 71 referrals to the program, predominately from Haywood Regional Medical Center; monitored from 6-14 patients per month that have agreed to participate in the program; and conducted 182 home visits.

The principal benefits acknowledged to date have included the reduction of unnecessary ambulance transports and hospital readmissions of chronically ill patients; both of which are otherwise costly.

<sup>13</sup> North Carolina College of Emergency Physicians; EMS Back in Service Time; Metric Policy Section

<sup>14</sup> Joint Committee on Rural Emergency Care, National Association of State EMS Officials, December 2010

## Expenses & Revenue

Haywood County EMS is funded with General Fund (tax) dollars within the County Budget. The table that follows illustrates the total annual expenditures for fiscal years 2015-2016 through 2018-2019.

**Figure 20**  
**Annual EMS Budget Expenditures**

ACCOUNT	ACCOUNT DESCRIPTION	FY 2016	FY 2017	FY 2018	FY 2019
11 -4370-512100-	SALARIES & WAGES-REGULAR	1,713,494.64	1,663,272.85	1,868,655.03	1,824,024.76
11 -4370-512200-	SALARIES & WAGES-OVERTIME	800,368.85	801,139.37	802,857.66	793,289.72
11 -4370-512600-	SALARIES & WAGES-TEMP & PART	211,352.56	223,344.52	218,099.82	191,100.66
11 -4370-512700-	SALARIES & WAGES-LONGEVITY	30,432.62	29,601.26	24,909.54	27,470.44
11 -4370-518100-	SOCIAL SECURITY CONTRIB	205,090.47	202,455.91	214,752.55	208,662.10
11 -4370-518200-	RETIREMENT CONTRIB	170,466.82	180,446.34	201,487.87	204,977.10
11 -4370-518204-	CO CONTRIB-401(K) SUPP RET INC	49,847.07	49,176.23	53,605.53	78,638.10
11 -4370-518300-	HOSPITALIZATION INS CONTRIB	420,578.30	538,917.03	594,810.58	563,592.32
11 -4370-518600-	WORKERS' COMP CONTRIB	159,419.00	83,737.00	84,352.00	83,415.00
11 -4370-518900-	OTHER FRINGE BENEFITS-LIFE INS	1,966.29	2,154.41	2,082.23	2,115.35
11 -4370-519300-	PROF SERVICES-MEDICAL	17,499.96	25,000.00	24,999.96	25,000.00
11 -4370-519303-	PROF SERVICES-MED-EMPLOYEES	642.72	2,586.15	20,347.49	17,546.04
11 -4370-519900-	PROF SERVICES-OTHER		210,563.00	169,665.88	250,000.00
11 -4370-521100-	JANITORIAL SUPPLIES	5,910.64	4,564.18	5,862.75	3,761.30
11 -4370-521300-	UNIFORMS	43,603.07	35,464.63	55,384.88	35,349.84
11 -4370-522000-	FOOD & KITCHEN SUPPLIES	672.47	823.05	2,692.97	779.62
11 -4370-523100-	SPECIAL PROGRAM MATERIALS			0.00	7,534.88
11 -4370-523100	SPEC PROGR MAT JM/FD	4,677.44	4,480.33	3,476.19	2,676.60
11 -4370-523113-	RESTRICTED FOR S & RESCUE			513.83	
11 -4370-523800-	DRUGS	13,544.55	14,941.82	15,210.79	17,200.00
11 -4370-523901-	DISPOSABLE MEDICAL SUPPLIES	167,116.69	175,148.18	197,226.09	178,046.68
11 -4370-523902-	DURABLE MEDICAL SUPPLIES	16,931.96	16,288.43	47,158.66	17,424.57
11 -4370-525000-	VEHICLE SUPPLIES & MATERIALS	10,263.00	9,914.35	7,892.52	15,921.48
11 -4370-525001-	EQUIPMENT SUPPLIES & MATERIALS			0.00	2,240.00
11 -4370-525002-	FUEL/GAS/DIESEL	68,496.58	70,251.85	86,095.65	99,000.00
11 -4370-526000-	OFFICE SUPPLIES & MATERIALS	5,996.82	7,153.10	6,861.69	5,716.40
11 -4370-526900-	NON-EXPENDABLE OFFICE SUPPLIES	3,988.47	5,061.13	5,609.22	9,088.34
11 -4370-529100-	DATA PROCESSING SUPPLIES		3,131.16	4,937.00	5,819.50
11 -4370-529200-	DATA PROCESSING-SOFTWARE			0.00	140.96
11 -4370-529800-	DEPARTMENTAL SUPPLIES		9,998.64	963.88	
11 -4370-529900-	MISCELLANEOUS SUPPLIES	1,034.37	818.42	4,918.68	137.97
11 -4370-531100-	TRAVEL	0.00	2,047.21	33,543.88	5,082.11
11 -4370-532000-	COMMUNICATIONS	23,752.37	36,063.79	1,828.94	30,058.99
11 -4370-534000-	PRINTING & BINDING	3,059.56	2,770.12	635.00	2,695.51
11 -4370-535100-	REPAIRS & MAINT-BLDG			2,203.50	3,963.87
11 -4370-535200-	REPAIRS & MAINT-EQUIP	3,777.91	3,037.93	14,362.50	
11 -4370-535201-	MAINTENANCE CONTRACTS	21,510.00	44,565.00	58,760.48	29,119.00
11 -4370-535300-	REPAIRS & MAINT-VEHICLES	95,881.76	45,908.25	896.43	45,489.38
11 -4370-537200-	PUBLIC INFO EDUC RES-MKT	425.00	500.00	5,480.46	396.65
11 -4370-539500-	TRAINING-EMPLOYEE EDUC EXP	7,623.50	5,620.03	1,936.77	6,486.73
11 -4370-539507-	TRAINING-PARTICIPANT EDUC			1,146.29	
11 -4370-539900-	RESTRICTED S&R SERVICES			32,826.15	
11 -4370-541200-	RENT OF BUILDING	33,784.56	29,052.71	19,770.00	32,442.40
11 -4370-542001-	SITE LICENSES - DATA PROC EQUI			3,991.54	1,000.00
11 -4370-543900-	RENT OF EQUIPMENT	2,430.53	2,053.12	19,337.00	1,618.88
11 -4370-545200-	VEHICLE INS	12,811.00	12,181.00	9,076.18	14,200.00
11 -4370-545400-	PROF LIABILITY INS	5,610.00	2,269.08	3,449.25	23,519.99
11 -4370-549100-	DUES & SUBSCRIPTIONS	1,269.00	1,639.99	4,224.00	1,882.73
11 -4370-549923-	MISC CHARGES-OSHA PENALTIES			0.00	
11 -4370-551000-	C/O-OFFICE FURN & EQUIP	0.00	15,298.02	9,650.00	
11 -4370-552000-	C/O-DATA PROC EQUIP	0.00	12,388.00	161,124.94	25,038.15
11 -4370-554000-	C/O-MOTOR VEHICLES	486,036.52	49,539.28	58,532.26	726,313.05
11 -4370-555000-	C/O-OTHER EQUIPMENT	7,377.08	115,180.08		
11 -4370-555000-	C/O-OTHER EQUIPMENT		10,303.00	44,500.00	49,992.63
	<b>Total 114370 EMERGENCY MEDICAL SERV</b>	<b>4,828,744.15</b>	<b>4,760,849.95</b>	<b>5,212,706.51</b>	<b>5,669,969.80</b>

EMS Division expenditures during fiscal year 2018-2019 increased by 8.1 percent over the previous year (FY 2017-2018). The increase was attributed to the purchase of motor vehicles which totaled \$726,313; approximately 12 percent of the year’s total expenditures.

The largest expense category is personnel. Which, combining salaries and wages and all listed associated costs and benefits, amounted to 70.1 percent of the total expenditures. Operations and equipment costs totaled 29.9 percent of total expenditures. Although major capital expenditures, in this case vehicles, may alter the percentage somewhat from year to year; the average annual costs of personnel as a percentage of the total budget for the years studied was 76%.

**Figure 21**  
**Year End EMS Budgeted Expenditures**  
**FY 2016-FY 2019**

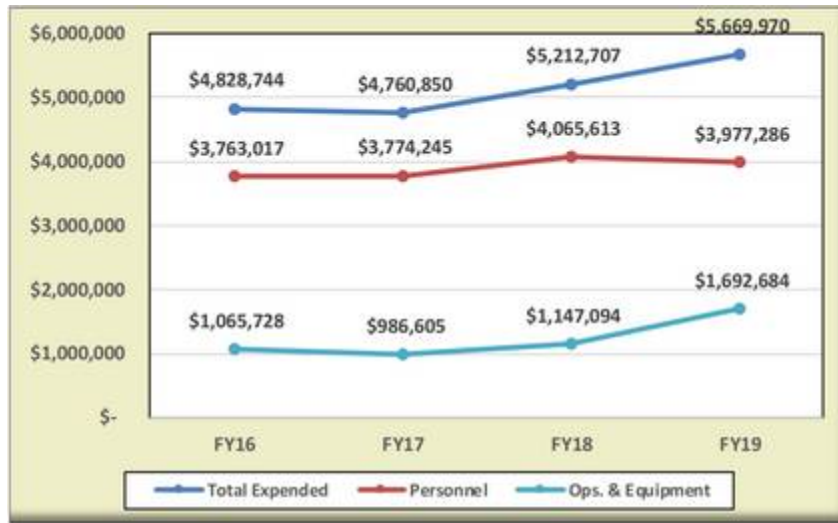


Figure 22 provides a breakdown of the major sub-categories that make up the total personnel costs for the years studied

**Figure 22**  
**Breakdown of Personnel Costs by Category**

Category	Fy 2016	Fy 2017	Fy 2018	Fy 2019
Total Expenditures	\$ 4,828,744	\$ 4,760,850	\$ 5,212,707	\$ 5,669,970
All Wages & Benefits	\$ 3,763,017	\$ 3,774,245	\$ 4,065,613	\$ 3,977,286
Salaries & Wages-Regular	\$ 1,713,495	\$ 1,663,273	\$ 1,868,655	\$ 1,824,025
Salaries & Wages-Overtime	\$ 800,369	\$ 801,139	\$ 802,858	\$ 793,290
S&W; Temp & Part-Time	\$ 211,353	\$ 223,345	\$ 218,100	\$ 191,101
Subtotal-Salaries & Wages	\$ 2,725,216	\$ 2,687,757	\$ 2,889,613	\$ 2,808,415
Subtotal-Benefits	\$ 1,037,800	\$ 1,086,488	\$ 1,176,000	\$ 1,168,870
Total Personnel Costs	\$ 3,763,017	\$ 3,774,245	\$ 4,065,613	\$ 3,977,286

To better understand the dynamics of the personnel cost categories, hourly rates of pay and how overtime was assigned and utilized, data compiled by Human Resources for calendar year 2018 was analyzed. The report included field employees only; i.e. Advanced (Intermediate) EMTs, Paramedics, Shift Supervisors and Assistant Shift Supervisors; all of whom were eligible for overtime pay when it was necessary. All 48 of the field positions were full-time employees. Field personnel included 41 Licensed Paramedics and seven (7) certified Advanced (Intermediate) EMTs’.

The results of the 2018 salary study included the following findings:

- Average hourly rate of pay for Paramedics: \$17.23
- Average hourly rate of pay for AEMTs': \$14.18
- Total regular hours worked; all employees: 76,080 hours
- Average regular hours worked per employee: 1,585 hours
- Total payroll for regular hours worked, not including benefits: \$1,257,877
- Average annual salary per employee, not including benefits: \$34,920
  
- Total overtime hours worked; all employees: 31,231 hours
- Average overtime hours worked per employee: 651 hours
- Total payroll for overtime hours worked: \$740,882
- Average overtime paid per employee: \$15,435
- Actual overtime hours worked:
 

2 employees@	less than 100 hours
18 employees@	100-500hours
21 employees@	500-1,000hours
6 employees@	1,000-2,000hours
1 employee @	more than 2,000 hours
  
- Actual overtime paid, by \$ amount:
 

8 employees@	\$1,000-\$5,000
10 employees@	\$5,000-\$10,000
12 employees@	\$10,000-\$20,000
16 employees@	\$20,000-\$30,000
2 employees@	\$30,000-\$36,000

**Revenue**

Haywood County EMS is able to generate revenue to offset its operating costs by billing the recipients of the services delivered. Most often Medicaid, Medicare and private insurance will pay for major portions of the amounts billed. The more significant charges are of course assessed and subsequently collected for patients that are “transported” to a designated medical facility. The current list of fees charged by Haywood County EMS include the following:

**Figure 23  
EMS Fee Schedule**

Activity/Response	Charge
Advancedlife Support (Non-Emergency)	\$ 535.64
AdvancedLife Support (Emergency)	\$ 848.08
Basic Life Support (Non-Emergency)	\$ 446.36
Basic Life Support (Emergency)	\$ 714.18
ALS 2 (Comprehensive)	\$ 1,227.50
SpecialtyCare Transports	\$ 1,450.68
Treatment-No TransportFee	\$ 150.00
Mileage (Urban & Rural)	\$ 15.10
ALS DisposableSupplies	\$ 50.00
BLS DisposableSupplies	\$ 25.00
IV Supplies	\$ 25.00
OxygenSupplies	\$ 25.00

**Billing & Collections**

For several years the County has contracted with a private firm that specializes in providing EMS billing services. The contractor handles monthly EMS billing, collections, reporting and the required legal bookkeeping associated with these accounts, as well as providing the County with the necessary information to enable it (the County) to pursue the collection of delinquent accounts.

**Figure 24**  
**EMS Budget & Collections (Revenue)**

<b>Fiscal Year</b>	<b>Annual Budget</b>	<b>Collections</b>	<b>Collections(Revenue) as % of Budget</b>
<b>2015-2016</b>	<b>\$ 3,763,017</b>	<b>\$ 2,657,961</b>	<b>70.63%</b>
<b>2016-2017</b>	<b>\$ 3,774,245</b>	<b>\$ 2,752,580</b>	<b>72.93%</b>
<b>2017-2018</b>	<b>\$ 4,065,613</b>	<b>\$ 2,638,840</b>	<b>64.91%</b>
<b>2018-2019</b>	<b>\$ 3,977,286</b>	<b>\$ 2,903,776</b>	<b>73.01%</b>

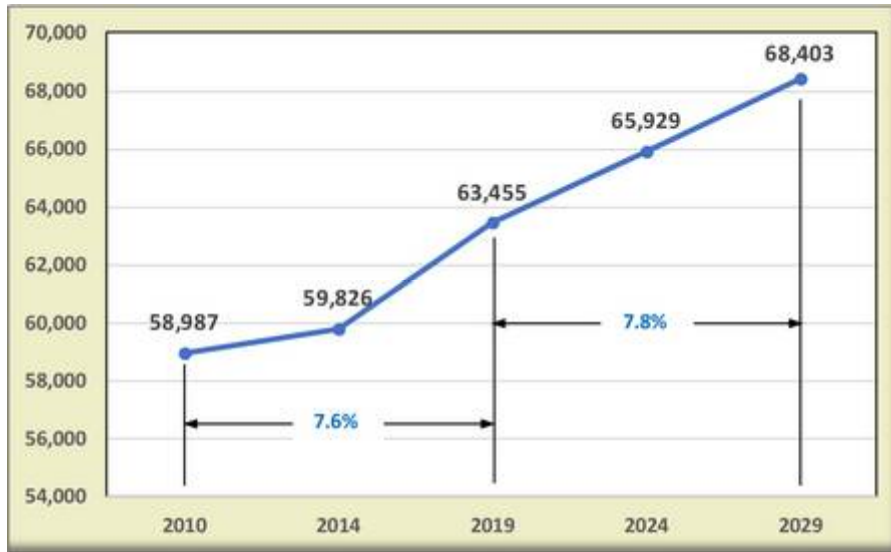
For the combined fiscal years 2016-2019 the percentage of net collections to total billings averaged 70.37%. Note also, however, that FY 18-19 *Collections (Revenue) as % of Budget* is incomplete. That is, the dollar amount will continue to increase as payment of bills that have recently been sent out, as well as those as long as a year or more in arrears, are paid.

[Remainder of this page intentionally left blank]

## 5. COUNTY POPULATION

This section examines Haywood County’s recent past and projected future populations. The relevance of the County’s resident population to the future demand for EMS services will be considered in an effort to project future demand. The source of the material presented in this section is the North Carolina Office of Budget and Management (NCOBM).

**Figure 25**  
**Haywood County Experienced & Projected Populations**  
**2010-2029**



These figures indicate that over the past 10 years the County’s population has increased 7.6%. The estimated July 2019 resident population is 63,455. Over the next decade the County’s population is projected to increase by just under 5,000 residents; 7.8%.

In turn, as a means of comparison, the counties immediately adjacent to Haywood County are expected to experience the following in terms of growth over the next 10 years:

**Figure 26**  
**Adjacent County Experienced & Projected Populations/2010-2029**

County	Jul-10	Jul-19	% Change	Jul-29	% Change
<b>Haywood</b>	<b>58,987</b>	<b>63,455</b>	<b>7.6%</b>	<b>68,403</b>	<b>7.8%</b>
<b>Madison</b>	20,789	22,794	9.6%	25,523	12.0%
<b>Buncomb</b>	238,328	265,586	11.4%	296,633	11.7%
<b>Henderson</b>	106,705	118,926	11.5%	133,059	11.9%
<b>Transylvania</b>	33,087	35,435	7.1%	38,842	9.6%
<b>Jackson</b>	40,276	44,909	11.5%	51,262	14.1%
<b>Swain</b>	13,981	14,995	7.3%	16,323	8.9%

While it is conceivable that current residents of the counties with the lowest populations over the next 10 years (Madison and Swain) will move to nearby and more populated counties, including Haywood, to be closer to employment opportunities; it is more likely that Haywood County’s projected growth will be impacted by the significant increase(s) expected in Buncombe County and perhaps Henderson County.



### Future EMS Call Volume

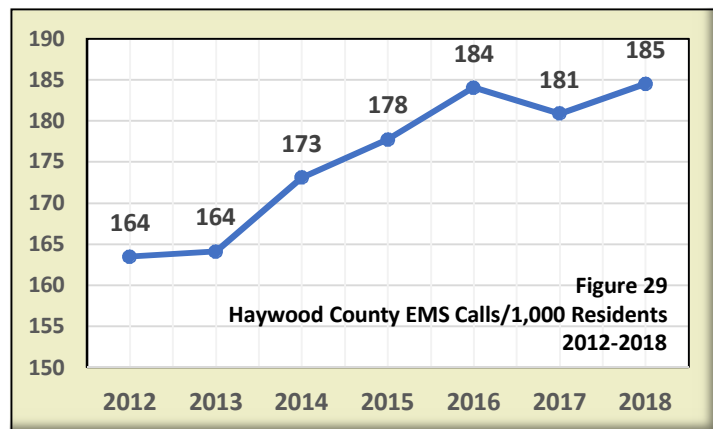
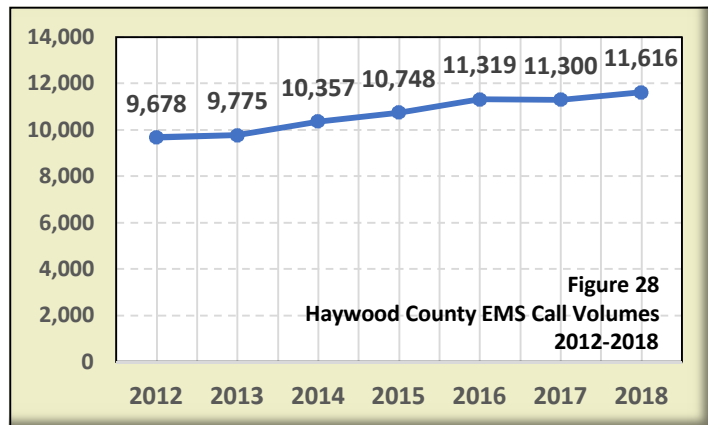
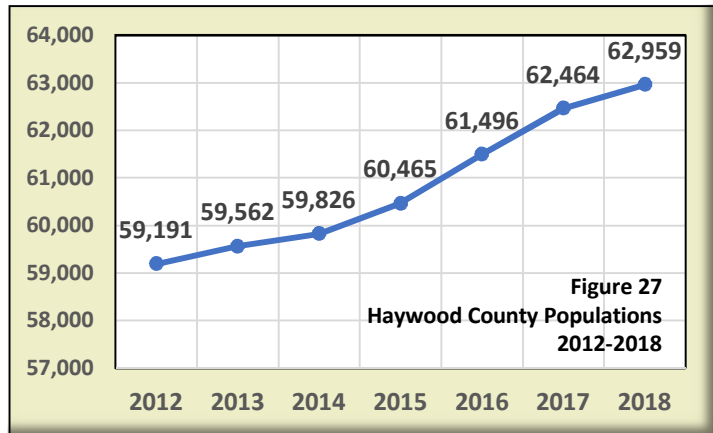
The methodologies used to project future needs; whether people, workload, or in this instance EMS call volume; typically involve an examination of recent year trends of those same characteristics. Today of course the application of various technologies and software programs are available as well; all of which also, however, will typically require historical data to feed their formulas.

Subsequently, the starting point for these calculations is to examine the relationship between the annual County populations as documented by the North Carolina Office of Budget & Management and the annual EMS call volumes experienced (in this case) over the past seven (7) years; 2012-2018. Both are illustrated graphically here in Figures 27 and 28.

Between the years 2012 (59,191) and 2018 (62,959) the County's resident population increased by 6.4 percent.

Between 2012 (9,678) and 2018 (11,616), the County's annual EMS call volume increased by 20 percent.

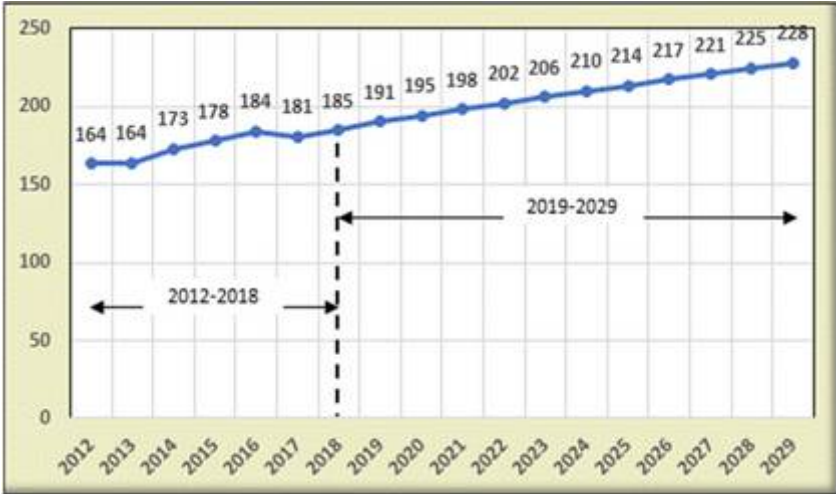
While the County's total annual population figures are important, the correlation of the number of EMS calls per *unit of population served*; in this case the number of calls per 1,000 residents; is the variable that will be incorporated into the calculations of future annual EMS call volumes. Between 2012 (164) and 2018 (185) EMS calls per 1,000 residents increased by 12.8 percent; (Fig.29).



As illustrated, the actual number of EMS calls per 1,000 residents between 2012-2018 did vary from year-to-year. The ratio increased during four (4) different years by as much as 5.5 percent, decreased slightly (1.6 percent) between 2016-2017 and remained the same for 2012 & 2013. The *average annual change* in the ratio of EMS calls/1,000 was 2 percent. This ratio (2%), when applied to future annual Haywood County populations, will result in a straight-line when graphed; i.e. it utilizes the same "average" rate of increase each year. In reality of course the actual rate will vary; as Figure 29 demonstrates.

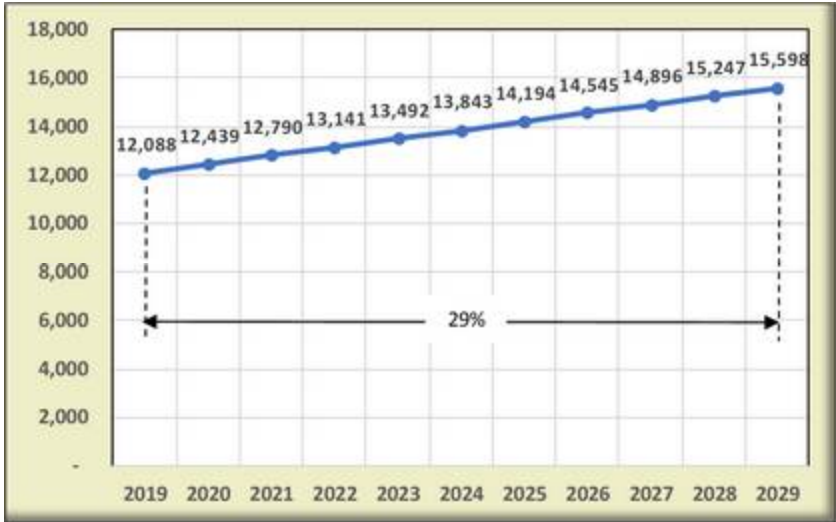
Figure 30 that follows, graphs the projected 2019-2029 ratios of EMS calls per 1,000 residents based upon the actual average rate of change experienced between 2012-2018. The increase in calls per 1,000 between 2012-2018 was 12.8 percent. The increase projected between 2018-2029 is 23.2 percent.

**Figure 30**  
**Projected Annual EMS Calls/1,000 County Resident Population**  
**2019-2029**



Now, knowing the future year EMS call/1,000 resident population ratios and the projected annual County populations for 2019-2029, a *baseline* estimate of future year EMS call volumes can be calculated. The results follow. The reason for referring to the projected call volumes as “baseline” is because they were based on actual data collected over the past seven (7) years. It assumes that EMS is going to operate the same way it has, with the same staff and the same vehicles that it has in the past. That, as previously noted, is not the case.

**Figure 31**  
**Projected Annual Baseline EMS Call Volumes**  
**2019-2029**

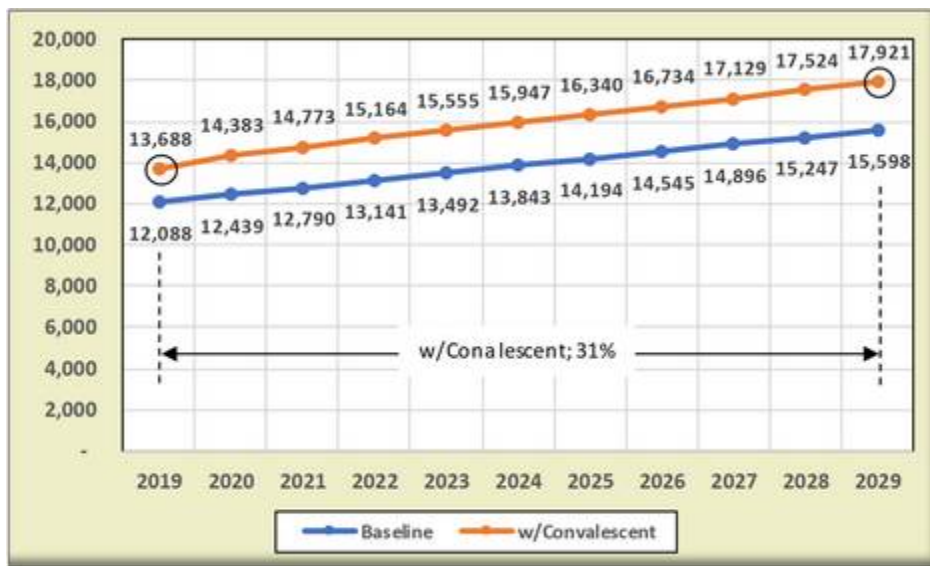


Since the beginning of 2019, EMS has been providing, upon request *and when a vehicle was available*, non-emergency convalescent transfer of patients between medical facilities. Since the previous contract provider of this service is no longer in business, the requests of EMS from doctors and medical facilities have increased. On May 6<sup>th</sup>, 2019 the Board of County Commissioners approved the hiring of six (6) full-time employees to staff an ambulance for this purpose; i.e. new Medic 8. The individuals selected for these positions reportedly began work on July 22<sup>nd</sup>.

Since March (2019), EMS has been tracking the number of inter-facility convalescent transports they have been able to make, again, *when an ambulance was available*; i.e. not on an active emergency call. During March, April, May and June, EMS provided 646 transports of convalescent patients. Conversely, EMS could not respond to 26 requests for transport during that period because there was not an available ambulance.

The average number of convalescent transports *per month*, for this four-month period, was 162. If this number of transports per month were to remain the same for a full year (12 months) the total additional transports would be above and beyond the previously referenced “baseline” projections by almost 2,000 calls; i.e. 1,994. Once Medic 8 is staffed and in-service, focusing on convalescent patient transports, these numbers are very likely going to start increasing at rates higher than projected here.

**Figure 32**  
**EMS Call Volume Projections**  
**2019-2029**



**Figure 33**  
**Projections Summary**

Factor	2018	2029	% Change
County Population	62,959	68,403	8.6%
EMS Calls w/o Convalescent	11,616	15,598	34.3%
EMS Calls w/Convalescent	11,616	17,921	54.0%

When tracked over the years to come, the numbers certainly will not fall into a straight line and at times will vary considerably more than the projections now suggest. Likely, however, the most significant indicator in the years ahead will be the County’s general population and its subsequent demographic sub-groups. As an example, one of those demographic subgroups likely to have an impact on future numbers, are those in the age bracket of 65 and over. According to the NCOBM demographics office the Haywood County projections for this sub-group are:

**Figure 34**  
**Projected Population Sub-Group Change**

Age Group 65 yrs. & older-2019	15,887	25% of County's Population
Age Group 65 yrs. & older-2029	19,318	28% of County's Population
<b>Age Group's Increase</b>	<b>21.60%</b>	

## 6. ISSUES OF CONCERN

This section discusses the significant EMS issues of concern identified during the analyses of the various data collected, the visual study of conditions found to exist, and numerous conversations and formal interviews conducted over the course of the study.

The determination of whether an “issue” was identified as such was based on the assessment of current operations and performance discussed in report sections 3 and 4.

The issues identified as being of significant concern with regards to EMS involved the following topics:

- **Availability of Ambulances**
- **Response Time**
- **EMS Base Facilities**
- **Field Personnel Salaries & Work Hours (Shift Configurations)**
- **Administrative Workload**
- **Communications/GPS**

### Issue: Availability of Ambulances

During 2018 ambulances were frequently repositioned from their identified staging area or location to another point in the County because;

- a. The number of ambulances immediately available was down to one (1) and the subject remaining ambulance was directed to move to a location more central or strategic in anticipation of being tasked or dispatched to respond in any direction the next call may direct; or,
- b. In tracking the active status of multiple ambulances, the EMS Shift Supervisor(s) noted significant area gaps in coverage and redirected movement of ambulance(s) accordingly.

The practice itself is not uncommon and is referred to as system status management; repositioning ambulances to address the current level of coverage or lack thereof.

The risk, of course, of being down to one (or “no”) ambulances is that when the next emergency medical call comes into the Communications Center, there may not be an ambulance available to respond.

Granted, first responders/fire department members fill a significant and vital role at this point, however, without an ambulance available there is likely no ALS level of service available and in turn no means of transport.

### **EMS Call Scenarios**

While listening to EMS radio and cell-phone traffic during onsite time in the County over the months during which this study occurred, the “we’re down to one ambulance” was heard numerous times. And, as noted in EMS’s Monthly “snapshot” report for March 2019, there were ten (10) instances identified where “no ambulances” were available.

To understand the specific circumstances that were resulting in such conditions, EMS call logs were reviewed (initially) for the first quarter of 2019 to become familiar with the reporting format, the information provided, and under what conditions ambulance availability reached critical levels. With 3,035 calls for service during the first quarter, the month of January was selected for a more in-depth assessment.

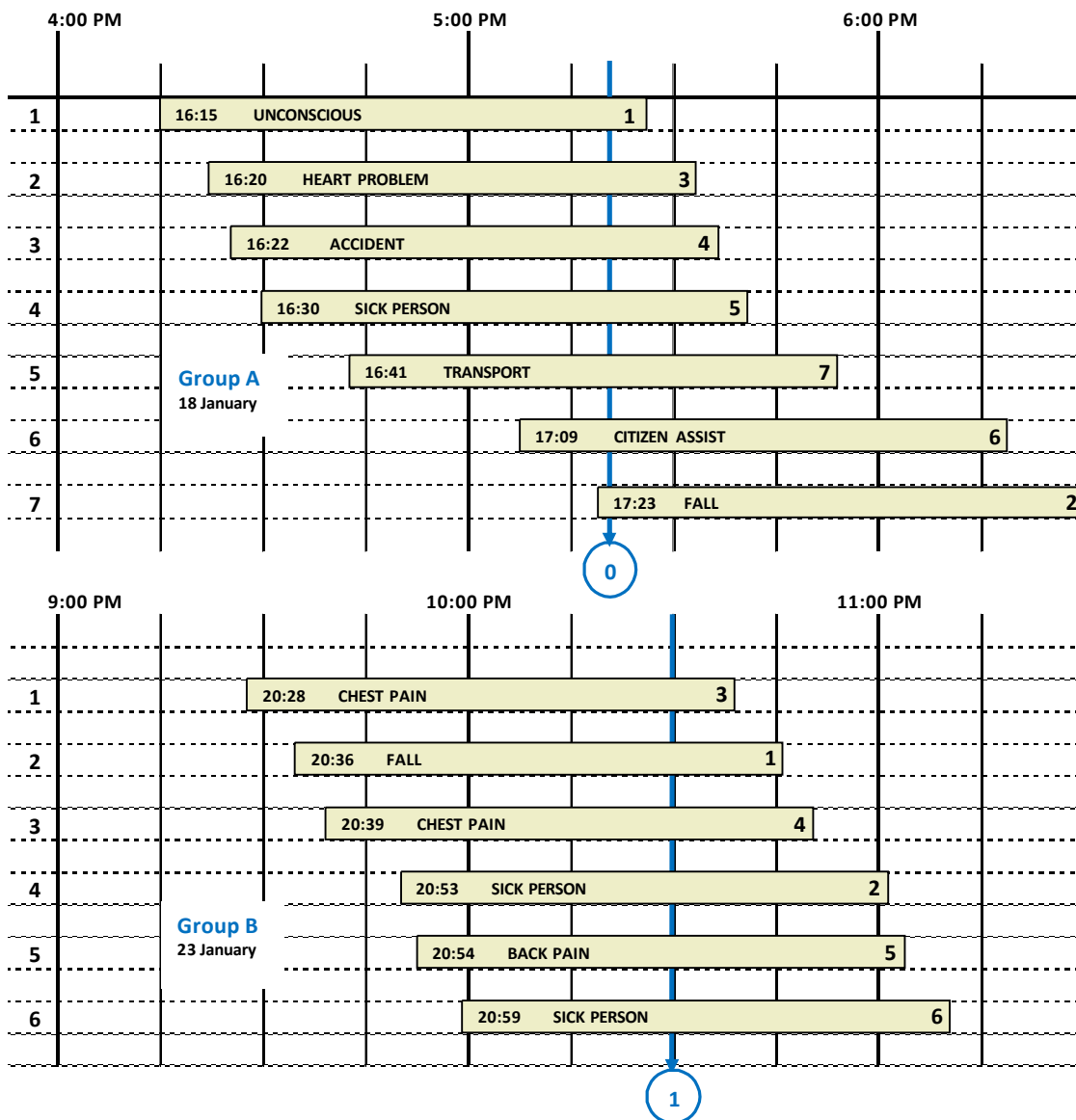
The column headings and a call sample from the CFS report is shown here:

CFS #	Create	When	Location	Caller	Type	Disposition	User	Primary	Unit
2019008204	02/03/2019	17:16:56	181 COOK RD, CANTON	(Name)	EMERGENCY	CONVULSIONS SEIZURE	A-	(Dispatcher)	MED4

There was a total of 986 calls for service (CFS) in January. On nine (9) occasions during the month all seven (7) available ambulances were, at the same time, involved with active calls. There were 31 occasions during the month when there was but one (1) ambulance available.

On several occasions, typically during the busiest hours of the day previously noted, a closely bunched series of calls could be identified. Each call was reviewed, and the “dispatch” times were documented, as was the type of call; i.e. Chest Pains, Diabetic, Fall, etc. For the purpose of the illustration that follows, the *average* call duration previously calculated for 2018 (01:11:25) was used for each call recorded.

**Figure 35**  
**Example of Actual Ambulance Demand Profiles**



The three (3) hour periods depicted include actual calls and the times that they were dispatched. Group A involved seven (7) calls dispatched within a 1-hour, eight (8) minute period. Group B involved six (6) calls dispatched within a period of 31 minutes. Note that the numbers that appear on the right side of the incident “boxes” represent the number of the Medic Unit that responded to that call.

### **Issue: Response Time**

For the purposes of this report and as previously stated; EMS ambulance response time is:

*The time from the initial alert or announcement by the Communications Center (also called “tone”, “page”, or “dispatch”) of the reported emergency, to the time that the service vehicle and appropriate personnel arrive on the scene.*

The factors that most commonly impact response time include:

- The time required to access and engage the vehicle,
- The speed at which the emergency vehicle is able to travel,
- The distance that must be covered to the incident dispatched, and
- Under what conditions.

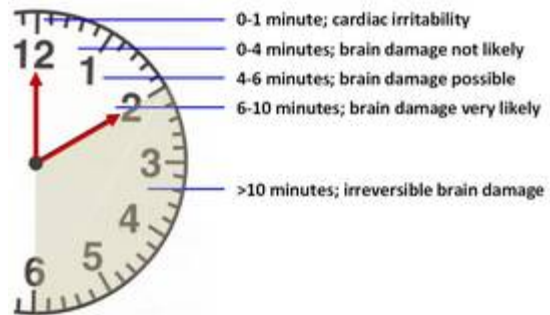
Consequently, the basis upon which pre-hospital emergency medical response criteria has been established is medical case history data regarding the body’s need for oxygen. Simply stated, the human body needs oxygen to survive. While some cells may tolerate short periods without oxygen, most require a constant supply of oxygen to survive. Figure 36 illustrates the significance of time in this equation.

Concerns and subsequent standards regarding emergency medical response times are based on the findings of various significant medical organizations and professional associations. Among these, the American College of Emergency Physicians (ACEP) and the American Heart Association has each similarly stated: “The most important factor in successfully resuscitating a patient in cardiac arrest is the speed of response. The survival rate from untreated ventricular fibrillation decreases up to 10% for every minute that passes, and definitive care is not provided.”

**Figure 36**

**Why Time is Important**

The American Heart Association, ACEP, and other respected organizations recommend that EMS vehicles should respond to deliver BLS (basic life support) skills within 3 to 4 minutes, with ALS (advanced life support) skills available within 6 to 8 minutes. The ALS-within-8-minute concept was developed from research that showed that the survival rate of cardiac arrest victims decreases significantly with each passing minute, and that optimal probabilities for survival increase when BLS has been provided within 4 minutes followed by ALS within 8 minutes.”<sup>15</sup> In addition:



- The American Association of Orthopedic Surgeons (source of Figure 36) suggests that “in an incident involving lack of oxygen, brain damage is very likely at 6 to 8 minutes; irreversible after 10 minutes.”
- The National Fire Protection Association states in NFPA 1710 that AED (BLS) capabilities must arrive within a 4-minute response time to 90% of the incidents; and that ALS capabilities shall be deployed to arrive within an 8-minute response time to 90% of the incidents.

Ultimately then, *someone* with *at least* basic life support skills (BLS) *needs to be on the scene of the emergency within 4 minutes*; and, *someone* with *advanced* life support skills (ALS); i.e. Haywood County EMS; *within 8 minutes*. And, according to NFPA, those response times are to be achieved in at least 90% of all calls dispatched.

<sup>15</sup> American College of Emergency Physicians; “Principles of EMS Systems”; 2006

The response time intervals calculated for calendar year 2018 included an average *Turnout Time* of one-minute and 46 seconds (106 seconds), and an average *Travel Time* of seven-minutes and 36 seconds, for a combined total average response time of nine-minutes and 22 seconds.

**Figure 37**  
**EMS System Annual Average Response Times**

No. Calls Dispatched	Turnout	Travel	Total Avg. RT
<b>11,199</b>	<b>0:01:46</b>	<b>0:07:36</b>	<b>0:09:22</b>

In the earlier data (Section 4, page 25) provided by the Communications Center regarding 2018 calls, 4,793 of the 10,352 calls logged showed response times of eight-minutes or less; i.e. 46% versus the recommended standard of 90%.

Noting these times, the previous discussion begs the question: How, in the coming years, does EMS begin to move from an *average* response time to over 11,000 calls of nine-minutes and 22 seconds, to a response time of eight-minutes or less to *90% of those calls*?

### Emergency Vehicle Speed & Distance to Incident Location

For reference, the following formula can be used to calculate the average travel time between two points;<sup>16</sup>  $1.7 \times \text{Distance} + 0.65 = \text{Travel Time}$

Reversing this formula and using the known EMS average Travel Time of 07:36 noted in Figure 37, and converting the 36 seconds to hundredths of a minute, results in the following:

$$7:36 \text{ minutes Travel Time} = 1.7 \text{ times Distance "x"} + .65; \text{ or}$$

$$(7.6 - .65)/1.7 = 4.08 \text{ miles traveled}$$

This travel time equates to an average speed of approximately 33-34 miles per hour, which actually *is not* unusual for fire, and EMS vehicles when considering acceleration, deceleration, time of day, road conditions, other traffic, etc.

Now, because turnout time is an interval of the total response time, were EMS to endeavor to establish an eight (8) minute response time objective, it would need to reduce either one and/or both intervals in combination by a minimum of one minute and 22 seconds (01:22/1.35). If travel time were reduced by 1.35 minutes, the total miles traveled would be reduced to 3.3 miles. Which would further shorten the already limited "reach" of existing Medic units by almost a mile.

### Adjusting Turn-Out Time

As an interval within the eight-minute response time suggested for ALS systems, NFPA, OEMS and others have established turn-out time standards that are to be achieved at least 90 percent of the time. Figure 38 utilizes the referenced time/distance formula, and inserts recommended turn out times of 90 and 60 seconds, as well as a hypothetical 30 seconds, to identify the impact on miles traveled in an eight-minute response time scenario.

**Figure 38**  
**Turnout Interval-Impact on Distance**

Standard/Basis	Turnout	Travel	Total	Miles
OEMS, NCEP	0:01:30	0:06:30	0:08:00	<b>3.4</b>
NFPA, ACEP, Etc.	0:01:00	0:07:00	0:08:00	<b>3.7</b>
AR	0:00:30	0:07:30	0:08:00	<b>4.0</b>

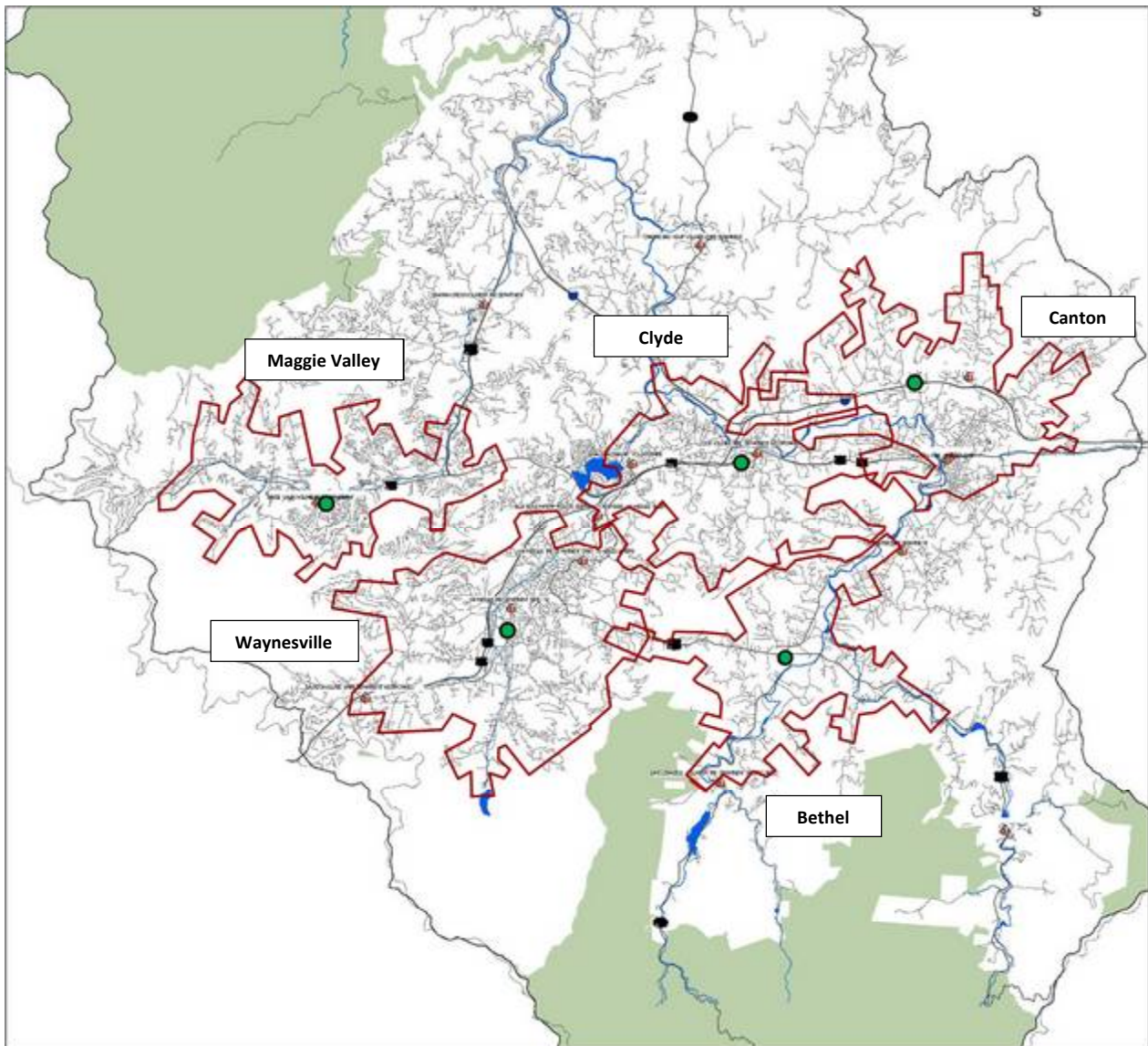
Although the turnout time of 30 seconds in Figure 38 is hypothetical, the seven-minute and 30 second travel time associated with it was very close to the actual average travel time that Haywood County EMS

<sup>16</sup> NFPA 1720-A.4.3.2/Rand Corporation

experienced in 2018 for all calls dispatched. That said, ambulances dispatched from the five (5) existing staging locations in the County should be able to travel four (4) miles in any direction in seven-minutes and 30 seconds. This map (Figure 39) outlines, in red, the 4-mile road-based distance limits from each location; i.e. the green dots.

In order to identify and plot the road distance limits that ultimately determined what these various configurations would look like, measurements were first calibrated and plotted on a large scale (34" x 44") map of the County prepared by County GIS. The plot points were transferred to a smaller scale version of the same map and the boundaries were drawn and later reduced further for inclusion here.

**Figure 39**  
**Current EMS 4-Mile Response Boundaries**

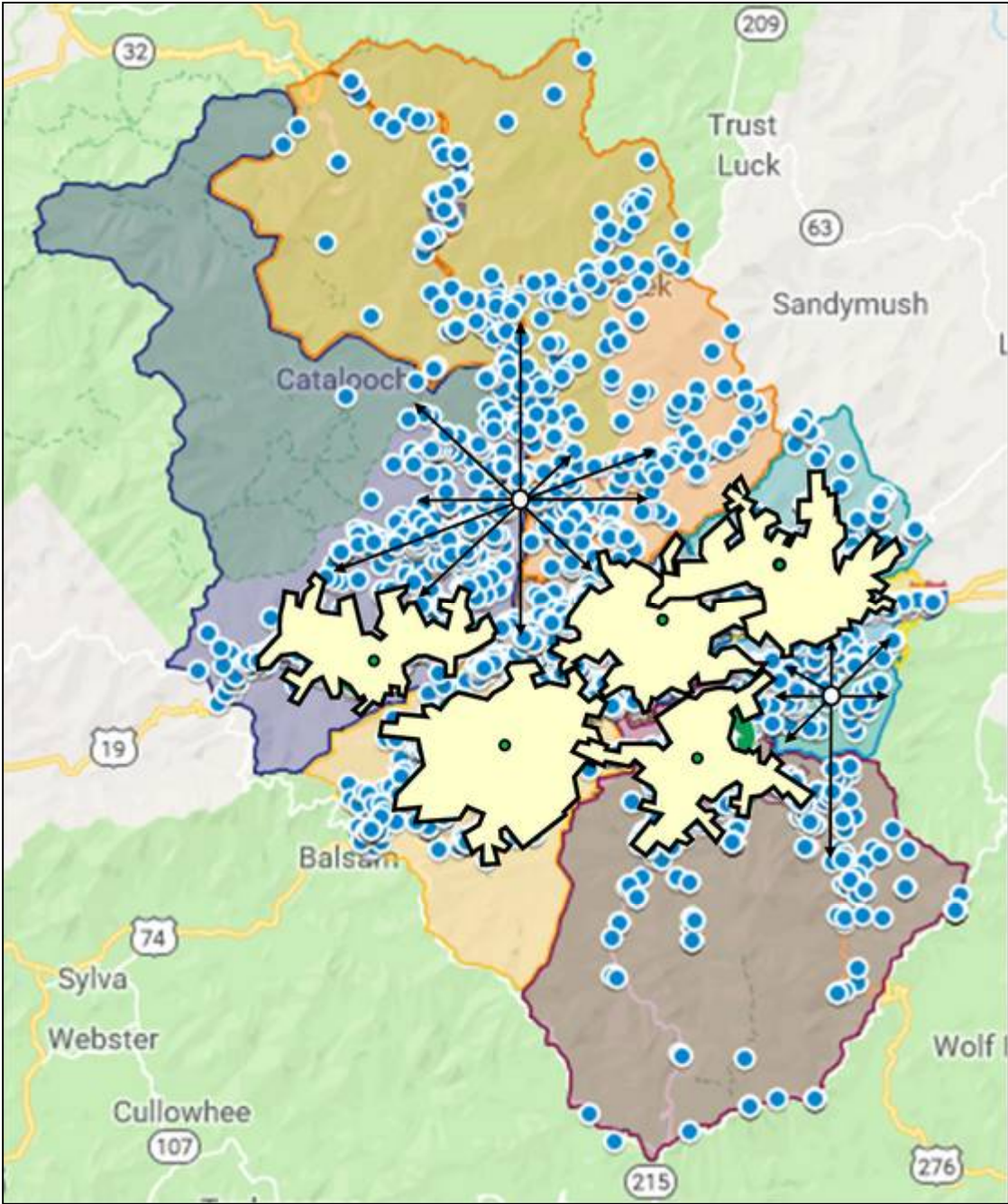


In examining a map of the entire County, that included these the 4-mile/7:30 minute response boundaries, it could be suggested/estimated that as much as 55-60% of the County is *outside* of these outlined areas.



This map (Figure 40) illustrates the location of the over 11,000 EMS calls dispatched during 2018. In this instance the 4-mile road-based distance limits from each ambulance staging location; i.e. the green dots; are outlined in black with cream colored fill. In terms of *response time*, two areas of concern that currently lie *outside* the 4-mile/07:30 minute response boundaries are illustrated with black arrows extending from a white dot. While the white dots in the two areas appear to be centered, that is for illustration purposes. They are not intended to suggest specific addresses for future EMS base locations.

**Figure 40**  
**EMS Call Distribution Map**  
**Current EMS 4-Mile/07:30 Minute Response Boundaries**



### **Issue: EMS Base Facilities**

The County currently rents space at three (3) of the current staging locations: Canton, Bethel and Maggie Valley.

- Bethel is very small, it does not have showers, and the dining/food prep space is inadequate.
- The layout and accommodations at the Maggie Valley Fire Department are awful. EMS bunk rooms and day room are upstairs, showers and restrooms are downstairs, and the kitchen is on the other side of the building. EMS personnel responding to a call at night must exit the bunk room, move through the day room, down a steep flight of stairs and through the fire apparatus bays, around to the area where the ambulance is parked. The concerns previously addressed with regards to turn-out time as an interval of total response time is certainly not going to improve in this scenario.
- The “staging” area in Clyde is nothing more than a conference room in the Town Hall. There are no showers available, neither is there an enclosed, temperature-controlled garage for the ambulance itself. Because the Town Hall closes at night, the crew working Medic 3 must move to the Canton staging location until the next morning, albeit the efficiency of response to the Clyde area during evening hours is substantially diminished.

The Existing Conditions section of this report did not refer to physical EMS “bases” or “stations”. The term “staging” locations was used because, with the exception of the Waynesville facility, there *are no* EMS bases or stations; at least none that are in buildings that were ever planned, built or intended for the purpose of accommodating EMS ambulances and EMS personnel.

As noted, staff *may* have seating and work areas available to them but not always adequate restroom, meal preparation, respite, or specifically required OSHA and/or OEMS decontamination facilities.

The ambulance staging areas currently assigned, again, with the exception of the Waynesville facility, have apparently come to EMS by default. There is no evidence that these locations were strategically planned, but simply that space which was available and not otherwise being used, was offered as a location, for the most part, near the more populated areas of the County. There are currently areas of the County, when considered in context of the response time standards previously discussed, that are essentially “uncovered”.

Haywood County EMS, like Law Enforcement is an on-going and at times almost continuous service that functions 24 hours a day throughout the entire County. Its services are far from occurring on a casual “periodic” or “sporadic” basis. This concern must be addressed as a *long-term* issue. And, it must (in the long term) dovetail with the Response Time and Ambulance Availability issues previously addressed.

When conducting space needs assessments to determine the requirements for an EMS building that is to house and secure an ambulance or ambulances and provide for the needs of the personnel assigned to them, one must begin by considering and discussing at least: the size of the vehicles to be housed, the type of support spaces required, the policy and legal requirements that will dictate specific utilitarian, safety, health, hazard prevention and decontamination procedures, the adjacency of and circulation between the individual spaces to be provided, and the overall security requirements of the facility. All, BEFORE an architect or contractor is considered.

Structures that are planned and ultimately built to accommodate the specific requirements of an EMS base operation will go a long way towards improving operational efficiencies and turn-out times, as well as being more user friendly and more accommodating to field personnel who are working 24-hour shifts.

EMS area base facilities, built to accommodate the needs of personnel, daily operations, equipment and vehicles, adequately staffed, and strategically located within the County, can significantly impact the response time concerns addressed and the level of care provided.

An EMS facility must include, *at the very least*, the following types of space:

- Indoor, temperature-controlled vehicle bays, including a designated vehicle wash bay, with exhaust ventilation and recharging stations
- Secure equipment, materials and medication storage
- Special storage for certain narcotics and refrigerated medical supplies
- Decontamination showers for personnel
- Decontamination/wash areas for equipment
- Space for air drying decontaminated equipment
- Storage accommodations for contaminated clothing, waste, sharps, etc.
- Accommodations for the handling of medical gases (oxygen)
- Laundry facilities
- Fitness room
- Food preparation and dining space
- Common/dayroom space
- Multipurpose storage space
- Staff restrooms & showers
- Bunk rooms to accommodate 24-hour shift personnel
- Technology to permit wireless internet capabilities, phone, radio, and pager communications
- Public entrance and space to accommodate visitors
- Back-up uninterrupted power source (UPS)

[The remainder of this space intentionally left blank]

**Issue: Field Personnel Salaries & Work Hours (Shift Configurations)**

Among the array of topics addressed over the course of this study and perhaps, among the more frequently discussed among both administrative and field/operations personnel, was (low) Paramedic/AEMT pay and, by association shift configurations. The individuals most affected by these topics are the field/operations personnel that, through 2018 and the first half of 2019 included three (3) Shift Supervisors, three (3) Assistant Shift Supervisors and 42 certified Advanced Emergency Medical Technicians (AEMT’s) and Paramedics.

During the fiscal year 2018-2019 the base pay for these positions was as follows:

- EMT-Intermediate (AEMT) \$13.08/Hour \$27,825/Year
- EMT-Paramedic \$14.92/Hour \$31,747/Year

The calendar year 2018 salary and work-hour study compiled by Human Resources revealed that:

- The average regular (net) hours worked per employee was: 1,585 Hours
- Average hourly base rate of pay for AEMTs’ was: \$14.18/Hour
- Average hourly base rate of pay for Paramedics, was: \$17.23/Hour
- Average annual salary per employee, not including benefits, was: \$34,920

From a State perspective, the University of North Carolina ‘s School of Government annually publishes the *North Carolina County Salary Survey* which includes over 100 county government position classifications. Included in the 2018 edition of the survey were the positions “Emergency Medical Technician-Intermediate” and “Emergency Medical Technician-Paramedic”. The significant findings are as follows:

**Figure 41  
2018 County Salary Survey Comparisons**

Position	# Counties Reporting	Minimum Avg. Salary	Maximum Avg. Salary	Overall Avg. Salary	Hawood Co. Avg. Salary	Highest Ranked	Lowest Ranked	Haywood Rank
EMT-Intermediate	44	\$ 25,459	\$ 49,756	\$ 33,923	\$ 27,771	Buncombe	Bertie	42nd
EMT-Paramedic	66	\$ 29,120	\$ 53,833	\$ 38,626	\$ 34,645	Buncombe	Duplin	58th

On a national scale;

- US News has reported that Paramedics made a median salary of \$33,380 in 2017. The best-paid 25 percent made \$43,390 that year, while the lowest-paid 25 percent made \$26,470.<sup>17</sup>
- In an article titled the *20 Highest and Lowest Paying Jobs in Healthcare*, the “lowest” group was ranked starting at number 1 as the highest paid of the “lowest” group, to number 20. “Emergency Medical Technicians and Paramedics were ranked 16<sup>th</sup>. With a mean hourly rate of \$17.64 and mean annual salary of \$36,700.<sup>18</sup>
- The web-based employment recruiter “ZipRecruiter” identifies the average Paramedic Pay in all 50 states from highest paid to lowest; North Carolina is ranked 50<sup>th</sup> with an average hourly rate of \$15.86 and an annual salary of \$32,989.<sup>19</sup>

To the County’s credit, it has included in the budget year commencing July 1, 2019 for Paramedics, AEMTs’ and EMTs’ both a 2% cost of living increase, effective July 1<sup>st</sup>, and a merit increase of 5% which will go into effect January 1, 2020. The new rates, once implemented, are illustrated in Figure 42 that follows.

<sup>17</sup> money.usnews.com

<sup>18</sup> Olya, Gabrielle; *20 Highest and Lowest Paying Jobs in Healthcare*; www.gobankingrates.com; June 2018

<sup>19</sup> www.ziprecruiter.com/Salaries/What-Is-the-Average-Paramedic-Salary-by-State

**Figure 42**  
**Approved Base Rate & Annual Salary Increases**

Position	Current		Effective January 2020	
	Base Rate	Annual	Base Rate	Annual
Paramedic	\$14.92	\$31,747	\$15.96	\$33,969.06
AEMT	\$13.08	\$27,826	\$13.99	\$29,773.53
EMT Basic	\$11.97	\$25,472	\$12.81	\$27,255.21

The dilemma remains, however, that Haywood County will remain in the lower quadrant of the North Carolina Paramedic, AEMT and EMT base pay and annual salary scales. This dilemma *is not unique* to Haywood County; it is obviously a State dilemma as well. Yet, an additional concern confronts the industry. As professional media and related industry organizations have warned over the past couple of years; and local, state and national headlines point out; the nation and state of North Carolina are facing a shortage of paramedics, particularly in rural communities.

*“Journal of Emergency Medical Services: Critical Staffing Shortages”*

[www.jems.com/ems-insider/articles/2015/07/critical-staffing-shortages.html](http://www.jems.com/ems-insider/articles/2015/07/critical-staffing-shortages.html)

*“SC Plagued with EMS Shortage”*

Gross, Daniel; Spartanburg Herald-Journal; 2018

*“Local Counties Address Paramedic Shortage”*

Wilson, Natalie; Fox News-Greensboro, NC; 2018

*“Paramedic Shortages Plague North Carolina EMS Operations”*

[www.emsworld.com/news/10340925/paramedic-shortages-plague-north-carolina-ems-operations](http://www.emsworld.com/news/10340925/paramedic-shortages-plague-north-carolina-ems-operations)

*“Shortage of Paramedic Trainees, an Abundance of Jobs in Iredell”*

Taylor, Shawn; Statesville Record & Landmark; 2017

### The Crux

According to Haywood County Human Services (salary study) records, there were ten (10) “transitions” in 2018 of EMS field personnel; 21 percent of the then 48 total positions; including new hires and resignations/retirements. In addition:

- Currently, 33 percent of EMS employees live outside the County.
- An estimated 55-60 percent work second jobs when not on shift at EMS.
- 33 of the 48 EMS field/operations personnel 2018 base salaries were less than \$40,000.
- The basis for the second job is typically “to make ends meet”.
- Concerns exist that neighboring counties that pay more than Haywood County, and are looking for EMTs’ and Paramedics, will hire good staff away with the incentive of higher pay.
- With which Haywood County’s base rate and annual salaries cannot compete.

An incentive (of sorts) that is keeping field/operations personnel on the roster is the opportunity to work overtime, which of course is paid at one and one-half times the employee’s base hourly rate. Every one of the 48 employees received overtime pay in 2018, which ranged individually from \$1,884 to \$35,589; 30 of the 48 field/operations employees received overtime pay in excess of \$10,000.

There are currently three (3), soon to be four (4), different shift configurations in use. In the FY 2019-2020 rates published by EMS, the members of one shift configuration are “scheduled” to work 840 hours of overtime during the year, another shift scheduled to work 312 hours of overtime and the third shift configuration, 208 hours. The discussion that follows assesses the hours and costs of each of these three primary shift configurations *individually*; as if each, were to be the *only* shift configuration to be used.

### Shift Configurations

During the period of this study, EMS field operations employees were working schedules that included 24 and 12-hour shifts configured as follows:

- Employees assigned to 4 of the ambulances worked 24-hour shifts followed by 48 hours off
- Employees assigned to 2 of the ambulances worked 24-hour shifts followed by 72 hours off
- Employees assigned to the 12-hour, “peak time” ambulance worked 12-hour shifts followed by either 48 or 72 hours off depending upon where the shift started at the beginning each 28-day cycle.
- The Convalescent Ambulance approved by the Board of County Commissioners on May 6<sup>th</sup> was not yet staffed or activated when this report went to press. It is anticipated that it will be deployed 14-hours per day, Monday-Saturday when it is activated.

The purpose of the exercise that follows is to provide insights as to how the 12 and 24-hour shifts are staffed and configured and perhaps, from a cost perspective, which shift configuration might be more cost effective for Haywood County EMS. While 12-hour shifts appear to be becoming more common in EMS, 24-hour shifts are still prevalent. And, the two 24-hour shift configurations that Haywood County uses are those common to EMS systems that choose to use them.

The information includes calculations to determine how the number of employees are arrived at and how they would compare, together with the costs, if ALL field operations personnel were to work the same shift configuration versus the three (3) different ones assigned currently. For, example; the number of employees and corresponding costs if all were to work a 12-hour shift schedule; the number of employees and corresponding costs if all were to work a 24/72 schedule, etc. Also, in illustrating the costs of the different shift configurations, rather than use individual employee hourly rates, the “average” rates of Paramedics and AEMTs illustrated in Section 4, page 29 are used.

### Relief Factor

Since EMS provides ambulances 24 hours per day, 365 days per year it is important that the number of people required to staff each ambulance be accurately determined. These coverage requirements are generally calculated using what is called a “Relief Factor”.

The Relief Factor is the ratio between the number of hours a position is “open”; i.e. needs to be covered; and the number of hours of employee time required to fill that position during those open hours. Since the position must be filled each hour that it is open, additional employee time, or “relief” time, must be considered in order to cover for sick leave, vacation schedules, and time away from the position for such things as legal holidays or training.

Theoretically, a position that is open 24 hours per day, 7 days per week will require 8,760 hours of coverage per year. As noted, EMS personnel currently work 12-hour and 24-hour shifts. Which amounts to a total time assigned per employee that varies between 2,190 to 2,920 hours per year.

From these total **assigned hours** must be subtracted the annual holidays, vacation time, sick leave, and required training time spent “out of position” in order to determine the total hours a single staff member **will be available**. Figure 43 provides the calculations used to determine an individual employees’ annual availability in hours. The number of days per year for each Leave Category (b, c, d and e) are per Article VI of the Haywood County Personnel Policies manual. Category “f” is based on recent year average hours per EMS employee, and category “g” is an estimate allotted for unforeseen circumstances.

The Relief Factor and staffing requirements for both the 12-hour shift configuration (two shifts/24-hour day) and the 24/72 shift configuration will be the same. The reason being that 12-hour shift employees will work 14-12 hour shifts every 28 days (168 hours), and the 24/72 shift employees will work seven (7) 24-hour shifts every 28 days, (168 hours). Using the same formula in calculating the total assigned hours/person/year; i.e. 168-hours x 13.06 28-day cycles/year = 2,190 assigned hours per position.

**Figure 43**  
**12-Hour & 24/72 Shift Relief Factor Calculation**

<b>a. Total Assigned Hours/Year/Position</b>				<b>2190</b>
<small>Assume employee w/2-5 years service</small>				
Leave Category	No. Days Allowed/Year	Hours/D ay	Hours/Year	Hours Deducted from Total Assigned
<b>b. Holidays</b>	12	8	96	96
<b>c. Vacation</b>	12	8	96	96
<b>d. Sick</b>	12	8	96	96
<b>e. Petty</b>	15	8	120	120
<b>f. Training</b>	4.5	8	36	36
<b>g. Other</b>	3	8	24	24

**Total Available Hours/Year:**                    **a - [b+c+d+e+f+g] =**                    **1722**

**Relief Factor**                                    8,760 annual hrs/1,722 hrs. available =                    **5.09**

**Personnel Required**                        12 Ambulance Positions x 5.09 =                    **61.08**

In the 12-hour shift configuration, (2/12-hour shifts/day), employees will work alternating days as follows: 2-on, 3-off, 2-on, 2-off, 3-on, 2-off, repeat. The 24/72 shift configuration assumes that there will be four (4) shifts and that employees will work alternating days as follows: 24 hours (1 day) on, followed by 72 hours (3 days) off, repeat; with the shifts alternating days to assure continuous coverage.

**Figure 44**  
**24/48-Hour Shift Relief Factor Calculation**

<b>a. Total Assigned Hours/Year/Position</b>				<b>2920</b>
<small>Assume employee w/2-5 years service</small>				
Leave Category	No. Days Allowed/Year	Hours/D ay	Hours/Year	Hours Deducted from Total Assigned
<b>b. Holidays</b>	12	8	96	96
<b>c. Vacation</b>	12	8	96	96
<b>d. Sick</b>	12	8	96	96
<b>e. Petty</b>	15	8	120	120
<b>f. Training</b>	4.5	8	36	36
<b>g. Other</b>	3	8	24	24

**Total Available Hours/Year:**                    **a - [b+c+d+e+f+g] =**                    **2452**

**Relief Factor**                                    8,760 annual hrs/2,452 hrs. available =                    **3.57**

**Personnel Required**                        12 Ambulance Positions x 3.57 =                    **42.87**

In this configuration staff will work 10 24-hour days every 30 days for a total of 12.17 30-day cycles per year. It also assumes that there will be three (3) shifts and that employees will work alternating days as follows: 24 hours (1 day) on, followed by 48 hours (2 days) off, repeat; with the shifts alternating days to assure continuous coverage.

### Shift Configuration Costs

The objective in assessing each of the shift configurations illustrated was to determine how many people would be required to staff six (6) EMS ambulances 24 hours per day, 365 days per year; *with* the understanding that the calculations arrived at included time to allow each employee to avail themselves of the leave time(s) stipulated by County Personnel policies, as well as the training time required of them. The calculations resulted in identical numbers for the 12-hour and the 24/72-hour shift configurations.

- Six (6) 24-hour/365-day ambulances per year, with two (2) persons per ambulance, will require 105,120-man hours of coverage per year.
- During this study period, field personnel numbered 48; seven (7) AEMTs (15%), and 41 Paramedics (85%).
- The average AEMT hourly & overtime rates, per Section 4, pg. 29 was \$14.18 and \$21.27 per hour.
- The average Paramedic hourly & overtime rates, per Section 4, pg. 29 was \$17.23 and \$25.85/hr.

#### Cost Scenario #1: 12-Hour & 24/72-hour shift configurations

Total hours assigned/position: 2,190

Total number of employees required: 61

AEMT employees @ 15%: 9

Paramedic employees @ 85%: 52

9 AEMTs' x \$14.18/hour x 2,190 hours assigned = \$279,488

52 Paramedics' x \$17.23 x 2,190 hours assigned = \$1,962,152

Total personnel cost, not including overtime (OT) or benefits = **\$2,241,640**

Estimated OT hours based on traditional 2080 hour/year: 110 hours per person/year

9 AEMTs' x \$21.27 x 110 hours OT = \$21,057

52 Paramedics X \$25.85 x 110 hours OT = \$147,862

Total personnel OT, not including benefits = **\$168,919**

**Total personnel + OT costs, not including benefits: \$2,410,560**

#### Cost Scenario #2: 24/48- hour shift configuration

Total hours assigned/position: 2,920

Total number of employees required: 43

AEMT employees @ 15%: 6

Paramedic employees @ 85%: 37

6 AEMTs' x \$14.18 x 2,920 hours available = \$248,434

37 Paramedics x \$17.23 x 2,920 hours available = \$1,396,147

Total personnel, not including benefits = **\$1,644,581**

Estimated OT hours based on traditional 2080 hours/year: 840 hours per person/year

AEMTs' 6 x \$21.27 x 840 hours OT = \$107,201

Paramedics' 37 X \$25.85 x 840 hours OT = \$803,418

Total personnel OT, not including benefits = **\$910,619**

**Total personnel + OT costs, not including benefits: \$2,555,200**

[A summary analysis of these costs is provided in Figure 47 on page 54]



### 12 & 14-Hour Shift Configurations

While Cost Scenarios 1 and 2 addressed 24 hour per day shift configurations, Medic 7 is a 12 hour-seven (7) day/week “prime time” ambulance; and Medic 8 will be a 14 hour-six (6) day/week ambulance operating between the hours of 8:00 am and 10:00 pm, Monday-Saturday.

The Relief Factor and staffing calculations for both Medic 7 and Medic 8 were identical. The reason being that Medic 7 employees will work 14-12 hour shifts every 28 days (168 hours), and Medic 8 will work 12-14 hour shifts every 28 days; also 168 hours. Using the same formula as applied to the previous shift configurations: 168 hours x 13.06 28-day cycles/year = 2,190 assigned hours per position.

Figure 45  
MEDIC 7 & MEDIC 8 Relief Factor Calculation

a. Total Assigned Hours/Year/Position				2190
Assumes employee w/2-5 years service				
Leave Category	No. Days Allowed/Year	Hours/Day	Hours/Year	Hours Deducted from Total Assigned
b. Holidays	12	8	96	96
c. Vacation	12	8	96	96
d. Sick	12	8	96	96
e. Petty	15	8	120	120
f. Training	4.5	8	36	36
g. Other	3	8	24	24
<b>Total Available Hours/Year:</b>			<b>a - [b+c+d+e+f+g] =</b>	<b>1722</b>
<b>Relief Factor</b>	4,380 annual hrs/1,722 hrs. available =			<b>2.54</b>
<b>Personnel Required</b>	2 Ambulance Positions x 2.54 =			<b>5.09</b>

**Note:** This calculation identifies the requirement for five (5) positions each for both Medic 7 and Medic 8; a total of 10 positions

Medic 7 will run 12-hours per day, seven (7) days per week; employees assigned will work alternating days of 2-on, 3-off, 2-on, 2-off, 3-on, 2-off, repeat. Medic 8 will run 14-hours per day, six (6) days per week; and employees assigned will work alternating days Monday-Saturday of 3-on, 4-off, repeat.

### Cost Scenario #3 (Includes both Medic 7 & 8)

Total hours assigned/position: 2,190

Total number of employees required: five (5) for Medic 7; five (5) for Medic 8

AEMT employees @ 5

Paramedic employees @5

5 AEMTs' x \$14.18/hour x 2,190 hours assigned = \$155,271

5 Paramedics' x \$17.23 x 2,190 hours assigned = \$188,669

Total personnel cost, not including overtime (OT) or benefits = **\$343,940**

Estimated OT hours based on traditional 2080 hour/year: 110 hours per person/year

5 AEMTs' x \$21.27 x 110 hours OT = \$11,699

5 Paramedics X \$25.85 x 110 hours OT = \$14,218

Total personnel OT, not including benefits = **\$25,917**

**Total personnel + OT costs, not including benefits: \$369,827**

**ISSUE: Administrative Workload**

EMS services, per statute, are available 24 hours per day, 365 days per year. The EMS Division is managed on a day-to-day basis by the Director of the Office of Emergency Services who dually serves as the EMS Director. Full-time EMS administrative personnel include a Deputy Director of Operations, Deputy Director of Administration, Training Officer, a Billing Specialist and an Administrative Assistant.

The EMS Director, Deputy Director of Operations, Deputy Director of Administration and the Training Officer, are “8-5” employees, not eligible for overtime, and on call 24 hours per day. During the course of this study and the numerous office visits, meetings, interviews and conversations held with these individuals was it ever noticed that they did not have a significant “to-do” list with which they were dealing. It was also noted that these individuals were frequently involved with work related responsibilities after their “normal” work ours and on weekends. As well, these same individuals now have the following system dynamics to consider and add to their list of responsibilities:

- EMS calls for service (CFS) for the seven-year period of 2012-2018 increased by 20 percent.
- If the rate of calls continues for the remainder of 2019 as it has thus far from January 1<sup>st</sup> through June 31<sup>st</sup> (6,187 calls), the total calls dispatched will increase again by as much as 6-7% percent for 2019 alone.
- Taking on the responsibility for convalescent transports, anticipated to come online in July, will add the operational and logistical challenge of scheduling and transporting an estimated additional 2,000 patients per year.
- Based on the Haywood County population projections (Section 5), and the corresponding calculations of future EMS calls/1,000 residents, with the addition of convalescent transports, the annual number of EMS calls for service is estimated to increase 60-65 percent by the end of 2029 to nearly 18,000.

According to the Job description of the Deputy Director of Administration, he is to; “*focus entirely on logistics, planning and administrative duties;*” which, broken down, suggests that he also:

- Manages payroll, budget, EMS billing, and data analysis.
- Maintains all Department policies, procedures, regulations, guidelines, and protocols.
- Oversees purchases, rental agreements, and leases of/for all facilities, vehicles, communications and medical equipment, and supplies.
- Works closely with the County Facilities & Maintenance Department regarding facilities/building issues and with the County garage regarding vehicle maintenance & repair issues.
- Receives and handles customer/patient billing questions and complaints.
- Serves as the designated liaison with system health care providers.
- Serves as the designated contact person on the Medicare/Medicaid provider license held by EMS.
- Is the co-designee with the Medical Director on the DEA Controlled Substance license held by EMS.
- Responds to major emergencies and is on call 24/7

**Bottom Line:** The recent addition of full-time personnel to the “prime-time” ambulance, and to the new Medic 8-“convalescent” ambulance alone, will add an extension of tasks to several of the position responsibilities listed above for the Deputy Director of Administration. Day-to-day responsibilities are important of course, however, what the County and EMS must realize is that it is *critical* that considerable and ongoing thought, discussions, study and planning time be allocated **now** to adequately prepare for the system and operational changes that will begin to, and continue to, occur in the years ahead; not the least of which is a 60-65 percent increase in call volume by 2029.

**ISSUE: Communications/ GPS**

The current numbering of the EMS districts/subdistricts was conceived in a cooperative effort between EMS and the Communications Center. The basis for its configuration arises from the fact that the Communication Center’s software provider has yet to complete development of a GPS oriented automated vehicle location (AVL) “map layer” for the existing CAD system that will accurately locate the closest ambulance to an incoming call.

For example; a telecommunicator receives a 911 call requesting help at a specific address. He/she queries the system to locate the closest available EMS ambulance. The GPS function reports Medic 4 to be the closest; i.e. 3 miles from the address given. The problem that occurs is that the GPS will read the miles “as the crow flies” rather than as *road miles*. Subsequently, in responding, Medic 4 finds that the actual distance to be 5 road miles because it had to go up and/or down or around a mountain to get there. Then, come to find out, Medic 6 was 4 miles away from the caller’s address on a straight 4-lane road and would had been able to get there in half the time.

Emergency Communications, EMS and Fire agencies throughout the State and nation utilize any number of Communications GPS/AVL systems and do so effectively.

In a jurisdiction as rural and topographically challenged as Haywood County, a less than adequate system could be potentially hazardous for the occupants of the ambulance and/or, of perhaps greater concern, delays in responding to the emergency to which the ambulance was called.

[The remainder of this page intestinally left blank]

## 7. RECOMMENDATIONS

### ISSUE: Availability of Ambulances

#### RECOMMENDATIONS:

As noted, several times within the report, in early February the Board of County Commissioners, prior to the commencement of this study in March, approved funding of full-time personnel for Medic 7, the “prime-time” ambulance that currently runs from 7:00 am-7:00 pm, seven days/week.

In early May, when the study was well underway, the Board also approved the activation of an additional ambulance, with full-time personnel to focus on providing interfacility transport of convalescent patients; i.e. Medic 8; scheduled to operate from 8:00 am-10:00 pm, Monday-Saturday

That said, through at least March of this year, the issue of ambulance availability, especially during prime-time hours, was a problem, as discussed and illustrated in Section 4.

As of this writing (July), with Medic 7 and 8, scheduled to be fully staffed by July 22<sup>nd</sup> and operational by the end of August two things should begin to occur;

Medic 7, particularly if prime-time hours are adjusted, should begin to positively influence the monthly call loads of Medic units 1-6; as well as increasing ambulance availability; and hopefully, in time, begin to bring down the average response times simply by being available

Medic 8, while focusing on convalescent patient transports; with careful scheduling of those transports and the Unit’s availability 14-hours/day, 6 days/per week, it will also be able to respond to emergency calls for service, offering yet additional relief with regards to ambulance availability.

#### Recommendation #1

**Change Medic 7’s prime time hours from 7:00 am-7:00 pm to 10:00 am-10:00 pm.**

Three (3) years of data (2016-2018) clearly illustrates that the prime-time hours wherein the call load is greatest is between 10:am-10:00 pm; i.e. the period during which seven (7) full-time ambulances are in greatest demand.

#### Recommendation #2

**Monitor and document, each night for three (3) months, the number of calls for service to which each 24-hour Medic unit (1-6) is dispatched;**

**-First, between the hours of 10:00 pm-10:00 am**

**-Second, between the hours of 12:00 midnight and 8:00 am**

The information is available daily via the Communication Center’s CAD system. Counting and charting the number of calls dispatched for each 24-hour unit daily for the three (3) month period, for each time frame suggested, may very well determine what adjustments *might* be made in scheduling to improve ambulance availability where and when it is most needed.

Note that in as much as the personnel assigned to the units being monitored currently all work 24-hour shifts. Four (4) to six (6) hour “gaps” between calls dispatched are important to those personnel who need the rest. The documentation of these calls and time frames should be able to assess both issues.

**ISSUE: Response Time**  
**RECOMMENDATION:**

As discussed in Section 4, the concerns and subsequent standards regarding emergency medical incident response times are based on the findings of various significant medical organizations and professional associations. Among them, the American College of Emergency Physicians (ACEP), the American Heart Association, the American Association of Orthopedic Surgeons, and National Fire Protection Association (NFPA).

The consensus among them being; *EMS vehicles should respond to deliver BLS (basic life support) skills within 3 to 4 minutes, with ALS (advanced life support) skills available within 6 to 8 minutes with the caveat that an ALS average response time of 8 minutes is no longer acceptable, but rather, according to NFPA, those response times are to be achieved in at least 90% of all calls dispatched.*

In the earlier data (Section 4, page 25) provided by the Communications Center regarding 2018 calls, 4,793 of the 10,352 calls logged showed response times of eight-minutes or less; i.e. 46% versus the recommended standard of 90%. Further, the 90 percent fractile response time (call number 9,316) was 17-minutes and 8 seconds.

**The Options**

Ultimately, NFPA recognizes that the responsibility for determining what the EMS system response time objective(s) should be is clearly the Authority Having Jurisdiction (AHJ). In this instance of course, the Haywood County Board of Commissioners must be able to define the level of care that it intends to provide. The authority is also defined in the State’s general statutes/Administrative Code:

10A NCAC 13P .0201 EMS SYSTEM REQUIREMENTS

*.0201(a) County governments shall establish EMS Systems; wherein it is stated that each EMS System shall have: The highest level of care offered within any EMS Provider service area shall be available to the citizens within that service area 24 hours per day.*

A number of County EMS systems with which the consultant has worked, have established response time objectives of their own that vary from the 8 minutes suggested by NFPA and others. For example, one County, in its EMS Plan submitted to NCOEMS, stated that:

*“For emergency responses, . . . a paramedic shall be on scene within 12 minutes 90% of the time.”*  
*“For non-emergency responses, . . . a paramedic shall be on scene within 15 minutes 90% of the time”*

In fact, NFPA suggests, in NFPA 1720 ( Table 4.3.2; 2020 edition), guidelines for Volunteer Fire Departments that offers some additional insights.

**Figure 46**  
**NFPA Response Time Guidelines for Rural Responders**

Demand Zone	Demographics	Response Time (Minutes)	Response Objective
Urban Area	> 1,000 people/sq. mi.	9	90%
Suburban Area	500-1,000 people/ sq. mi.	10	80%
Rural Area	<500 people/ sq.mi.	14	80%
Remote Area	Travel Distance > 8 miles	depends on travel distance	90%

Note that these are “guidelines”. Haywood County’s unique characteristic of having vast areas of federal land in both the north and south ends of the County may prompt yet another demographic category.

**Recommendation #3**

**The EMS Peer Review Committee should be convened, with assurances that the Medical Director and County Manager can be present, to discuss and draft specific EMS ambulance response time objectives to be submitted to and approved by the Haywood County Board of Commissioners.**

## Issue: EMS Base Facilities

### RECOMMENDATIONS:

#### Recommendation #4

**Prepare a detailed Space Needs Assessment & Facility Program that addresses the essential building and site requirements to accommodate a stand-alone, functional, code compliant EMS base facility that can serve as a prototype for all future facilities.**

The recommendation suggests that the County contract for professional services, working directly with the County and EMS personnel, to detail and document the space and site requirements for an EMS Base facility. Expected Cost: \$18,000-\$30,000 depending upon experience and credentials of the provider.

Once the essential space needs are identified and preliminary costs determined, various options can be refined based upon the specific type(s) of facilities needed; for example, a station that would accommodate a single ambulance, a station that would accommodate multiple ambulances, etc.

The benefit of such an assessment and the documentation of the specific space and site requirements could serve the County in multiple ways;

- As a conceptual “pattern” it could be utilized as the prototype facility concept to be built at multiple locations.
- As a “test template”, were an existing building identified in a strategic location, the information detailed within this document could be utilized to evaluate the building in question as to its applicability for reuse as an EMS facility.

#### Recommendation #5

**The County should identify and purchase/obtain property in Clyde that can accommodate an EMS Base facility that meets the criteria stipulated in the Space Needs Assessment & Facility Program referenced in Recommendation 4.**

While the “ideal” situation would be available property on which a “build-to-suit” *new* building could be located. Keep in mind that should an *existing building* be identified for possible reuse as an EMS base facility, the same criteria stipulated in the Space Needs Assessment & Facility Program document are to be complied with.

#### Recommendation #6

**The County should identify and purchase/obtain property in Bethel and in Maggie Valley that can accommodate a much more adequate EMS Base facility in each area; that again, will meet the criteria stipulated in the Space Needs Assessment & Facility Program referenced in Recommendation 4.**

While the staging facility used by EMS in Canton is “adequate”, it is a third-party lease which, in time, could result in a rather awkwardly timed “move” initiated by one of the two lessors. Combined with the experienced call volume in Canton and the overflow south of the 4-mile response distance limit (Map, page 39), scouting a new location for a full-service EMS base would seem prudent. Also, the large area of clustered EMS calls north of the Maggie Valley and Clyde 4-mile response boundary limits (Map, page 39) merits serious consideration for an additional future EMS base.

#### Recommendation #7

**The County should identify and, if possible, purchase/obtain property in Canton and in the area north of Maggie Valley and Clyde for future EMS bases locations.**

**ISSUE: Field Personnel Salaries & Work Hours (Shift Configurations)**

**RECOMMENDATION:**

**Issue summary:**

- FY 2018-2019 Paramedic and AEMT salaries were below State average.
- There is a recognized shortage of Paramedics and AEMTs in North Carolina (and the Nation).
- 33 of 48 field/operations personnel FY 2018-2019 salaries were below \$40,000.
- Concern that neighboring counties with higher base salary rates will hire away good personnel.

An incentive (of sorts) that is keeping field/operations personnel on the roster is the opportunity to work overtime, which of course is paid at one and one-half times the employee’s base hourly rate. Every one of the 48 operations employees received overtime pay in 2018, which ranged, individually, from \$1,884 to \$35,589; 32 of the 48 field employees received overtime pay in excess of \$10,000. The source/impetus of that overtime appears to be the 24/48-hour shift configuration.

Researching the literature and using the search criteria “pros & cons of 24-hour shifts in EMS” yielded, as expected, hundreds of responses. The articles, essays, research papers, etc. arguing against 24-hour shifts in EMS outnumbered those that favor 24-Hour shifts by an estimated ratio of 8-to-1. Those against, cite health and safety issues predominantly and often, burnout. Those in favor of 24-hour shifts will almost always, in one form or another say;

- They prefer the longer shifts and additional days off, allowing them to earn overtime by picking up more shifts, to work other jobs, or to take care of and/or spend more time with the kids.
- “24-hour shifts don’t pay that much but with 2-3 days off I can make enough in overtime (or on another job) to make a living.”

The shift configurations currently in use to staff the six (6) 24-hour ambulances include four (4) shifts wherein staff work 24 hours followed by two (2) days off, and two (2) shifts wherein staff work 24 hours followed by three (3) days off. For purposes of this discussion, a third 12-hour shift configuration @ two (2) shifts/day is also included for comparison purposes. Calculations were run to determine the staffing requirements and cost differences between each configuration and assumed, to provide parity in the calculations, that **each** configuration would be calculated to include all 48 existing positions.

It was found that the 12-Hour and the 24/72 configurations were the same in every category listed in Figure 47. This was because each shift configuration worked 168 hours each 28-day cycle of the year.

**Figure 47  
Shift Configuration Staffing & Cost Analysis**

Shift Configuration	Hours Assigned	Hours Available	Relief Factor	# Personnel Required	Scheduled OT Hours/Person	Personnel Cost w/o OT & Benefits	Personnel OT w/o Benefits	Total Annual Cost w/o Benefits
<b>12 Hr. (2)</b>	2190	1722	5.09	61	110	\$2,241,640	\$168,919	<b>\$2,410,560</b>
<b>24/72</b>	2190	1722	5.09	61	110	\$2,241,640	\$168,919	<b>\$2,410,560</b>
<b>24/48</b>	2920	2452	3.57	43	840	\$1,644,581	\$910,619	<b>\$2,555,200</b>

The difference in the 12-hour & 24/72 shift configurations (which are the same), and the 24/48 shift configuration, including base pay and overtime, is \$144,640; the 12 & 24/72 shifts being the less expensive.

**Recommendation # 8**

**Considering the variables discussed, the County should retain and continue to utilize the existing shift configurations.** [Refer also to comments that follow.]

The dilemma posed by this issue; i.e. low pay and work hours; is that low pay is very often offset by opportunities to work and receive overtime; ergo, the opportunity to increase total income, in some instances substantially. The 24-hour shift configurations appear to be providing for these overtime opportunities. It is also very likely the reason more people have not “jumped ship” to work with systems that offer a substantially higher base pay. Which begs the question; “at what price?” Considering the call volumes, population growth and system changes that lay ahead, *will working these 24-hour shifts be sustainable?*

**ISSUE: Administrative Workload**

**RECOMMENDATION:**

The County and EMS must realize that it is *critical* that considerable current and ongoing thought, discussions, study and *time* be allocated **now**, to address strategically the system and operational changes that are going to occur and continue to occur, and change, over the next decade. The changes must be identified, articulated, scheduled, planned, implemented, and paid for in an organized, well thought out manner in preparation of an anticipated workload of 18,000-20,000 calls per year by 2029.

In any health care program, whether that program delivers routine or emergency services, the operational “elephant in the room” is LOGISTICS. The research and selection of the supply chain of retailers and suppliers of the pharmaceuticals, medical and surgical supplies, medical devices and equipment, and other products needed to support Haywood County’s EMS responders in the field, and in turn County residents in peril, is a significant responsibility; as is the receipt, accounting for and redistributing of the medications and supplies received., all of which occur almost daily. And, ultimately, if it cannot be done correctly and in a timely and efficient manner, it will not be effective. “Logistics” is but one (1) of the dozen responsibilities assigned to the Deputy Director of Administration.

**Recommendation #9**

**Provide EMS approval to hire a qualified individual, on a full-time basis, to work closely with the Deputy Director of Administration to assure, as directed, the issues addressed in this narrative.**

It is assumed that EMS will work closely with Human Resources in the development of a specific Job title and assigned responsibilities. Cost: Recommend equivalent Pay Grade [65] as that of EMS Shift Supervisor.

**Issue: Communications/GPS**

**RECOMENDATION**

the Communication Center’s software provider has yet to complete development of a GPS oriented automated vehicle location (AVL) “map layer” for the existing CAD system that will accurately locate the closest ambulance to an incoming call.

The vendor has apparently been “working on this” for some time. The issue is a problem for both the Communications Center and for EMS. Emergency Communications, EMS and Fire agencies throughout the State and nation utilize any number of Communications GPS/AVL systems and do so effectively every day.

**Recommendation #10**

**That the highest-level Sheriff’s office representative possible (hopefully the Sheriff) make direct formal written contact with the vendor, inquiring as to the status and projected date that the promised “fix” for this problem will be available.** (Yielding, of course, the actual wording of said letter to the selected author.)



## 8. FUTURE CONSIDERATIONS

### Paramedics with College Degrees

The North Carolina Department of Health and Human Services (DHHS), Division of Health Service Regulation, Rules Task Force has proposed increasing the education requirements for future Paramedics to include the minimum requirement of an Associate Degree, assumedly in Paramedicine, effective July 2023.

At this time (July 2019) an Associate Degree from an accredited North Carolina Community College will typically require five semesters; approximately 2 ½ years to complete. Also, however, an individual seeking the education to become eligible for certification as a Paramedic can attend a Continuing Education program at an accredited State Community College that requires the successful completion of 1,000 hours of coursework pertaining solely to paramedicine; approximately one to 1 ½ years.

The proposal, which has been endorsed by at least one national paramedic association, to increase the education requirements for Paramedics raises several questions to contemplate:

- Will it discourage individuals who do not have the time or money to pursue an associate degree from wanting to be a Paramedic?
- Will fewer candidates, both those discouraged and those in school for longer periods contribute further to an already serious shortage of Paramedics in the State?
- Would the requirement of a college degree in turn mean that Counties will have to increase the Paramedic salaries to attract and keep good people?

### Tracking County Population & EMS Call Volume

The methodology used to project future EMS call volume (Section 5. County Population) is straight forward and can be repeated on an annual basis providing EMS calls are collated and up-to-date and current year populations are available. When it comes to changes in the general population of a County and the EMS calls per 1,000 resident populations, as few as 2-3 years can represent a trend that can be anticipated and planned for rather than reacted to when it arrives.

The EMS monthly “snapshot” reports already identify the total calls dispatched each month. At the end of each year, [www.osbm.nc.gov/facts-figures/demographics](http://www.osbm.nc.gov/facts-figures/demographics) can provide the County’s estimated population.

### NFPA 451 Guide for Community Health Care Programs<sup>20</sup>

In August of this year NFPA will publish and release NFPA 451. Why is it important? In February 2019 the U.S. Department of Health and Human Services announced a new emergency medical service payment pilot program that could transform how EMS systems operate across the country, and possibly lead to wider adoption of community paramedicine programs.

Shortcomings in the current system led the Centers for Medicare & Medicaid Services to introduce a new payment model called “Emergency Triage, Treat and Transport” (ET3) to help expand treatment options. The model will create a new set of incentives for emergency transport and care, ensuring patients get convenient, appropriate treatment in whatever setting makes the most sense for them. However, as with any significant change to the status quo there are going to be questions. Which is where NFPA 451 comes in. The new guide offers EMS systems a template for setting up local programs that meet the requirements outlined in the ET3 model.

---

<sup>20</sup> Montes, John; Paradigm Shift; NFPA Journal; March/April 2019

### 911/Emergency Communications

Haywood County's emergency services network, which includes virtually all of the public safety agencies operating in the County, could not exist; i.e. could not *begin* to approach the general public's expectations of it, without a sophisticated emergency communications system.

While there is no doubt that much credit is due the many Fire, EMS, and Law Enforcement personnel that respond with special vehicles, skills, and equipment to the scenes of countless reported emergencies, however, as noted previously, it is the actual **reporting** of those emergencies which gets everything started.

Haywood County's Communications Center Telecommunicators are literally the **first**, first responders in medical emergencies. During calendar year 2018 the Center's

- Telecommunicators answered 146,966 calls.
- Busiest 12-hour period of the day (prime-time) was 9:00 am-9:00 pm.
- Single busiest hour of the year was 4:00 pm-5:00 pm during which 10,681 calls were received; at the average rate of one (1) call every two minutes during that hour, *every day* of the year.
- Telecommunicator's EMD certification enabled them to verbally triage medical emergency calls received and relay that information to ambulance personnel in-transit to the scene.

Haywood County's Emergency Services *system* calls for service are expected to increase in the years to come. The *system's* agencies with the lights and sirens on their vehicles are certain to get plenty of attention. The "quiet" member of this *system*, the Communication Center, must receive the same level of attention, in terms of both personnel and technology if the system is to remain as effectively responsive as possible in the years ahead.

### Technology Applications

There are software products on the market and in some instances on-line, that can be quite helpful in plotting response strategies for and within an EMS system such as Haywood County's.

The capability to plot call locations via a "dot map", like that illustrated in Figure 12 on page 19, can be helpful in identifying call trends, the grouping of calls outside established road mile response limits, locating the calls responded to by each medic unit individually, and determining adjustments of ambulance positions during specific hours of the day, etc.

The referenced map on page 19 was developed for this report thanks to the efforts of an administrative staff member of Haywood County Technology & Communications. The map is still accessible via the web link: <https://drive.google.com/open?id=1uQi9BRAKwe955yWlkZr-9Qb5wvNdlfDb&usp=sharing>.

Another application, which requires similar integration with the County's roads and highway mapping system, is software that can calculate and simultaneously map EMS ambulance travel distance along roadways from specific existing or proposed ambulance base location(s). Again, a very useful tool in plotting response strategies as well as determining base and staging locations in a system-status system.

## 9. APPENDIX

### 10A NCAC 13P .0201 EMS SYSTEM REQUIREMENTS

## SECTION .0200 – EMS SYSTEMS

### 10A NCAC 13P .0201 EMS SYSTEM REQUIREMENTS

(a) County governments shall establish EMS Systems. Each EMS System shall have:

- (1) a defined geographical service area for the EMS System. The minimum service area for an EMS System shall be one county. There may be multiple EMS Provider service areas within an EMS System. The highest level of care offered within any EMS Provider service area shall be available to the citizens within that service area 24 hours a day, seven days a week;
- (2) a defined scope of practice for all EMS personnel functioning in the EMS System within the parameters set forth by the North Carolina Medical Board pursuant to G.S. 143-514;
- (3) written policies and procedures describing the dispatch, coordination, and oversight of all responders that provide EMS care, specialty patient care skills, and procedures as set forth in Rule .0301 of this Subchapter, and ambulance transport within the system;
- (4) at least one licensed EMS Provider;
- (5) a listing of permitted ambulances to provide coverage to the service area 24 hours a day, seven days a week;
- (6) personnel credentialed to perform within the scope of practice of the system and to staff the ambulance vehicles as required by G.S. 131E-158. There shall be a written plan for the use of credentialed EMS personnel for all practice settings used within the system;
- (7) written policies and procedures specific to the utilization of the EMS System's EMS Care data for the daily and on-going management of all EMS System resources;
- (8) a written Infectious Disease Control Policy as defined in Rule .0102 of this Subchapter and written procedures that are approved by the EMS System Medical Director that address the cleansing and disinfecting of vehicles and equipment that are used to treat or transport patients;
- (9) a listing of resources that will provide online medical direction for all EMS Providers operating within the EMS System;
- (10) an EMS communication system that provides for:
  - (A) public access to emergency services by dialing 9-1-1 within the public dial telephone network as the primary method for the public to request emergency assistance. This number shall be connected to the PSAP with immediate assistance available such that no caller will be instructed to hang up the telephone and dial another telephone number. A person calling for emergency assistance shall not be required to speak with more than two persons to request emergency medical assistance;
  - (B) a PSAP operated by public safety telecommunicators with training in the management of calls for medical assistance available 24 hours a day, seven days a week;
  - (C) dispatch of the most appropriate emergency medical response unit or units to any caller's request for assistance. The dispatch of all response vehicles shall be in accordance with a written EMS System plan for the management and deployment of response vehicles including requests for mutual aid; and
  - (D) two-way radio voice communications from within the defined service area to the PSAP and to facilities where patients are transported. The PSAP shall maintain all required FCC radio licenses or authorizations;
- (11) written policies and procedures for addressing the use of SCTP and Air Medical Programs resources utilized within the system;
- (12) a written continuing education program for all credentialed EMS personnel, under the direction of a System Continuing Education Coordinator, developed and modified based on feedback from EMS Care system data, review, and evaluation of patient outcomes and quality management peer reviews, that follows the criteria set forth in Rule .0501 of this Subchapter;
- (13) written policies and procedures to address management of the EMS System that includes:
  - (A) triage and transport of all acutely ill and injured patients with time-dependent or other specialized care issues including trauma, stroke, STEMI, burn, and pediatric patients that may require the bypass of other licensed health care facilities and that are based upon the expanded clinical capabilities of the selected healthcare facilities;
  - (B) triage and transport of patients to facilities outside of the system;
  - (C) arrangements for transporting patients to identified facilities when diversion or bypass plans are activated;

- (D) reporting, monitoring, and establishing standards for system response times using system data;
  - (E) weekly updating of the SMARTT EMS Provider information;
  - (F) a disaster plan;
  - (G) a mass-gathering plan that includes how the provision of EMS standby coverage for the public-at-large will be provided;
  - (H) a mass-casualty plan;
  - (I) a weapons plan for any weapon as set forth in Rule .0216 of this Section;
  - (J) a plan on how EMS personnel shall report suspected child abuse pursuant to G.S. 7B301;
  - (K) a plan on how EMS personnel shall report suspected abuse of the disabled pursuant to G.S. 108A-102; and
  - (L) a plan on how each responding agency is to maintain a current roster of its personnel providing EMS care within the county under the provider number issued pursuant to Paragraph (c) of this Rule, in the OEMS credentialing and information database;
- (14) affiliation as defined in Rule .0102 of this Subchapter with a trauma RAC as required by Rule .1101(b) of this Subchapter; and
- (15) medical oversight as required by Section .0400 of this Subchapter.
- (b) Each EMS System that utilizes emergency medical dispatching agencies applying the principles of EMD or offering EMD services, procedures, or programs to the public shall have:
- (1) a defined service area for each agency;
  - (2) appropriate personnel within each agency, credentialed in accordance with the requirements set forth in Section .0500 of this Subchapter, to ensure EMD services to the citizens within that service area are available 24 hours per day, seven days a week; and
  - (3) EMD responsibilities in special situations, such as disasters, mass-casualty incidents, or situations requiring referral to specialty hotlines.
- (c) The EMS System shall obtain provider numbers from the OEMS for each entity that provides EMS Care within the county.
- (d) An application to establish an EMS System shall be submitted by the county to the OEMS for review. When the system is comprised of more than one county, only one application shall be submitted. The proposal shall demonstrate that the system meets the requirements in Paragraph (a) of this Rule. System approval shall be granted for a period of six years. Systems shall apply to OEMS for reapproval no more than 90 days prior to expiration.

*History Note: Authority G.S. 131E-155(1); 131E-155(6); 131E-155(7); 131E-155(8); 131E-155(9); 131E-155(13a); 131E-155(15); 143-508(b); 143-508(d)(1); 143-508(d)(2); 143-508(d)(3); 143-508(d)(5); 143-508(d)(8); 143-508(d)(9); 143-508(d)(10); 143-508(d)(13); 143-517; 143-518; Temporary Adoption Eff. January 1, 2002; Eff. August 1, 2004; Amended Eff. January 1, 2009; Readopted Eff. January 1, 2017; Amended Eff. July 1, 2018.*