

Independent Written Report

Funded by: Blowing Rock Civic Association

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The Blowing Rock Civic Association requested an investigation into the response times of the Emergency Medical Services (EMS) and recommendations for change or improvement. I have been working in the EMS Field since 1976 and have a strong background in pre-hospital medical care and EMS Systems. My experiences range from medical first responder through critical care paramedic and include administrative tenures as Crew Chief, Operations Director, Department Manager and County EMS Director.

This report includes information collected from in person interviews and telephone conversations as well as statistical data collected directly from Amy Snider, 911 Services Coordinator, Watauga County Communications. A concerted effort was made to separate data by individual agency.

Watauga County provides EMS services throughout the County by contracting with Watauga Medics to provide emergency and transport services. Blowing Rock Fire & Rescue provides paramedic 1st Responder services to the Town of Blowing Rock and the entire Blowing Rock Fire District from 3 stations. The primary funders of Blowing Rock Fire & Rescue are the taxpayers in Blowing Rock and the taxpayers located in the fire district.

General concepts related to EMS analysis and evaluation

Response Times

To get a better understanding of response times we will use medically based science. Many of these standards were put in place in the early 70's. "The "standard" was derived while cardiac arrest survival was being studied in the early 1970s by Alvarez and Cobb in Seattle. They noted dramatic increases in survival, which they attributed to at least three factors: reduced response times, of less than eight minutes, first responders performing CPR (Cardiopulmonary Resuscitation) and citizen CPR training. Later, Mickey Eisenberg, MD, et al catapulted Seattle's results to national attention by publishing several landmark studies" (Fitch, 2005). The American Heart Association states, "for each minute that passes without CPR and defibrillation, the chances of survival decreased by 7-10%" (2013). Even applying the nation's best response times, the rate of recovery in the United States from cardiac arrest is less than 10% with only 7% achieving full pre-arrest function. Presently there is not a universally accepted response-time requirement. However, in urban areas the most widely used standard is eight minutes and 59 seconds (8:59). The goal is 90% compliance based on a fractal measure, not an average. (fractal response time measurement includes all time intervals between the time the service received enough information to initiate a response and the time a properly equipped and staffed ambulance arrives on scene.) The 8:59 target is also consistent with the response time recommended by the National Fire Protection Association (NFPA 1710, _5.3.3.4.2). The NFPA requires communities to "provide for the arrival of an ALS (Advance Life Support) company within an eight-minute response time to 90% of incidents. The NFPA standard excludes call-processing time intervals (Fitch, 2005).

Research outline in the article *Emergency Medical Services Response Time and Mortality in an Urban Setting* published in the journal of *Prehospital Care* 2012 states, "A common tenet

in emergency medical services (EMS) is that faster response equates to better patient outcome, translated by some EMS operations into a goal of a response time of 8 minutes or less for advanced life support (ALS) units responding to life-threatening events” (Blanchard et al, 2012).

An analysis of this data suggested there may be a small beneficial for those that receive care in ≤ 7 minutes 59 seconds as it relates to inpatient admission but not on survival. The results of this study call into question the clinical effectiveness of the 8-minute response time on decreasing mortality for adult patients identified as having a life-threatening event at the time of the 9-1-1 call (Blanchard et al, 2012).

In a study cited by *JAMA 2019, Association Between Emergency Medical Service Response Time and Motor Vehicle Crash Mortality Found in the United States*, they found “that during the study period, 2,214,480 ambulance responses to Motor Vehicle Crashes (MVC) were identified (median, 229 responses per county with a range of 73-697) in 2268 US counties. The median county response time was 9 minutes (range 7-11 minutes). Longer response times were significantly associated with a higher rate of MVC mortality (≥ 12 vs < 7 minutes; mortality rate ratio, 1.46” (Byrne et al., 2019). This means that patients with response times greater than 12 minutes have a 1.46 times great chance of mortality than those with response times of less than 7 minutes. “After adjusting for measures of rurality, on-scene and transport times, access to trauma resources, and traffic safety laws. This finding was consistent in both rural/wilderness and urban/suburban settings, where a significant proportion of MVC fatalities (rural/wilderness, 9.9%; urban/suburban, 14.1%) were associated with prolonged response times (defined by the median value, ≥ 10 minutes for rural and ≥ 7 minutes for urban). “These findings suggest that trauma system-level efforts to address regional disparities in MVC mortality should evaluate EMS response times as a potential contributor” (Byrne et al., 2019).

Local Response

In Watauga County, Medical Helicopter service is utilized to transport trauma patients from the scene to Level 1 Trauma Centers. Research has shown that air transport to a Trauma Center decreases mortality rate from trauma by 57% (Michaels, 2014). Watauga Medics state that in 2019 that they had an average response time of 9.01 minutes. The fractal response time for Watauga Medics is 17 minutes at 90% compliance.

Key Points

Faster Response Times equates to Better Patient Outcomes

Common Goal is 90% Coverage within < 9 Minutes

Fractal Measurement of Both Coverage and Response Time is the Best Practice

Watauga Medics Fractal Response Time is 17 Minutes at 90%

Coverage is divided between Emergency 1st Responders and Transport Services

Local EMS Analysis and Evaluation

Franchise Agreement (Watauga County and Watauga Medics)

The current franchise agreement between Watauga County and Watauga Medics has been in place since 2018. In review of this agreement, I have identified a few concerns. Included are my recommendations to assist Watauga County moving forward by improving services and response times.

1. Watauga Medics billing fees are not in line with the Medicare allowable rates.
 - Federal Medicare guidelines identify Watauga County as rural. Medicare sets forth allowable rates for service to the EMS providers. Presently some of the Watauga

Medics fees fall below the Medicare allowable rates and are restricted by the franchise agreement. It is recommended that Watauga Medics be allowed to adjust their fee structure to reflect at least 125% of the allowable rate outline by Medicare. Medicare pays 80% of billed charges so billing 125% of the allowable rate would assure maximum federal support of the local EMS system. In all these examples the Medicare patient would be responsible for the 20% of the billed services as required by the government.

1. Basic Life Support (BLS) fee allowed by the franchise agreement is \$300 (23a). Medicare allowable rate is \$227.68. To receive this amount Watauga Medics should bill \$284.60.
2. ALC non-emergency fee allowed by the franchise agreement is \$325.00 (23b). Medicare allowable rate is \$272.68. To receive this amount Watauga Medics should bill \$340.85.
3. ALS emergency fee allowed by the franchise agreement is \$415.00 (23b). Medicare allowable rate is \$431.74 To receive this amount Watauga Medics should bill \$539.65.
4. ALS II fee allowed by the franchise agreement is \$550.00 (23b) Medicare allowable rate is \$624.89. To receive this amount Watauga Medics should bill \$781.11.
5. Mileage fee allowed by the franchise agreement is \$9.50 (23c). Medicare allowable rate is \$11.54 for the first 17 miles and \$7.69 for each mile thereafter. To receive this amount Watauga Medics should bill \$14.42 and \$9.61 per mile.

2. Watauga Medics billing fees are not being adjusted timely in response to changes in the Medicare allowable rate.
 - The Centers for Medicare and Medicaid Services (CMS) evaluates the ambulance fee structure every year. Adjustments are made as needed. Most of the Watauga Medics service fees are below the allowable rates as outlined above. It is my recommendation that the franchise agreement be updated to allow an automatic increase/decrease of fees in response to any Medicare approved rate change.
3. Watauga Medics is reported a 9:01 minute average emergency response time for 2019. The franchise agreement currently requires an average emergency response time “not to exceed 10 minutes” (17a).
 - Watauga Medics are being allotted additional coverage hours beginning January 2021. Their emergency call volume has remained consistent over the past ten (10) year meaning that emergency calls are less than 45% of total call volume and have been no more than 2,500 annually. With the addition of a fourth 24-hour ambulance it should be expected that their response times improve proportionally. I recommend the franchise requirement be amended to an 8:06 minute average emergency response time.
4. The franchise currently states that “not less than 2 ambulances will be kept within the County at all times” (7).
 - Beginning January 2021 Watauga Medics will have 6 ambulance during peak hours and 4 during non-peak hours. It is my recommendation that this number be increased to not less than 3 ambulances within the County. Increased availability and proximity will improve response times.

Key Points

Billing Rates should be increased to Federal Medicare Allowable Rates
Use Fractal Response Times (National Benchmark) to measure Success
County provides an EMS team at BRFD on Monday to Friday for 9 hours
**County continues to provide transport services and rely on high quality
paramedic 1st Responder coverage provided by BRF&R until the
transport ambulance arrives**

Overview of Watauga Medics

A non-exclusive franchise agreement is in place between Watauga County and Watauga Medics. This agreement outlines the provision of Emergency Medical Services throughout Watauga County as provided by Watauga Medics, Inc. Current operations from that agreement includes:

- A. Annual subsidy payable to Watauga Medics by Watauga County of \$1,577,000 (2020/2021)
- B. Billing for all calls in Watauga County generated \$1.71 million in revenue (2018).
- C. Watauga Medics has three stations. Each station has a 24/7 unit (24-hour ambulance seven days a week with two qualified crew members). They have an additional ambulance that works a 12-hour day shift and a 5th ambulance that is stationed at the Blowing Rock Fire Department (BRFD) Station 1 for 9 hours a day Monday through Friday. This 9-hour truck will be converted to a 24/7 unit beginning January 2021. This unit will continue to be stationed at the Blowing Rock Fire Department (Station 1) for 9 hours a day Monday through Friday. After that time, the unit will then move to Watauga

Medics station #2 in Boone for the remainder of their shift. All the ambulances provided by Watauga Medics are ALS (Advanced Life Support/Paramedic) which is the highest certification level of care for a North Carolina County 911 system.

- D. Watauga Medics’ stations are located at 921 W. King Street in Boone, 133 Longvue Street in Boone, and the Villas near the intersection of US321 and US421. They also have a unit stationed at the Blowing Rock Fire Department M-F for 9 hours each day.
- E. In 2019 Watauga Medics had reduced their average *emergency* response time to 9:01 minutes as shown here (Table 1). An average response time reflects 50% of the response times to be less than 9:01 minutes and the other 50% are greater. The data is further broken down by fire district to show which areas have realized the greatest improvement in response times (Table 2).
- F. Watauga Medics received 6,142 call in 2019. Approximately 28% (1,742) of those patients were not transported leaving 4,400 transports. Those transport included interfacility transfers which resulted in 666 patients being taken out of the county. Out of county transports can take up to 6 hours, placing units out of service for extended periods of time.

Table 1

For Year Ending 2019

<u>Response Time</u>	<u>Number of call</u>
00:00 – 04:49	632
05:00 – 07:59	577
08:00 – 08:59	189
09:00 – 09:59	147
10:00 – 11:59	233
12:00 – 14:59	287
15:00 – 16:59	121
17:00 – 17:59	44
18:00 – 19:59	67

Key Points

County chooses to contract with a private EMS provider

Watauga Medics has a Non-Exclusive Franchise contract with the County

No control by Blowing Rock Township or Blowing Rock Fire District

The Blowing Rock area only produces 10% of the county's emergent calls

Average Response Time in Boone is 6 Minutes

Average Response Time outside of Boone is 10 to 24 Minutes

Average Response to for Blowing Rock Fire District is 12 Minutes

Overview of Blowing Rock Fire and Rescue (BRF&R)

Blowing Rock Fire and Rescue serve 36.6 square miles of Watauga County.

- A. In 2019 they equipped all three stations as Medical First Responders. They are not only first responders but were providing care at the paramedic level with Advanced Life Support equipment. The highest level of pre-hospital care available.
- B. Blowing Rock Fire and Rescue has 3 stations staff 24/7. Station 1 is located at 8001 Valley Boulevard in Blowing Rock and is staffed with 2 paid firefighter/paramedics. Station 2 is located at 6165 US 221 and is staffed with 1 paid firefighter/paramedic. Station 3 is located at 2409 Aho Road and is also staffed with 1 paid firefighter/paramedic. The district also has volunteers that will respond if needed.
- C. Their average response time in 2019 was 6 minutes and 51 seconds. This time exceeds national standards for urban and rural areas. NFPA 1710 states, "On all EMS calls, the standard establishes a turnout time of one minute, and four minutes or less for the arrival

of a unit with first responder or higher-level capability at an emergency medical incident. This objective should be met 90% of the time” (NFPA 2020). Fire department response time measurements are an integral part of managing and understanding emergency response. However, fire departments often define response time using different measures and report response time to the public in different ways (Yeomans, 2011).

D. In 2019 the fire department responded to 577 medical calls from the Blowing Rock Fire and Rescue stations (including some medical calls in other fire districts within Watauga County). These calls are simultaneous dispatch with Watauga Medics.

For clarification I would like to review the format used the Watauga Communications when taking 911 medical calls. Carefully following a scripted call intake, they divide calls into the following Response Determinants (Figure 1.)

Figure 1.

Response Determinant

Type	Capability	Response Time
Alpha	Basic Life Support	Cold (single unit)
Bravo	Basic Life Support	Hot (multiple units)
Charlie	Advanced Life Support	Cold (single unit)
Delta	Advanced Life Support	Hot (multiple units)
Echo	Advanced Life Support and special units	Hot (Multiple units) plus other first responders, e.g. Fire

- E. Prior to the pandemic all fire districts were dispatched as First Responders to all EMS calls with the exception of the Boone Fire District. EMS services were dispatched to all calls. The only exception to this process is a citizen assist call which is considered non-medical. The fire department alone would response. An example of this would be someone who needs assistance getting up but does not requires any medical intervention. Once COVID became active the Blowing Rock Fire Department altered their responses to include only Delta and Echo calls leaving EMS to respond alone to all other call types.
- F. The 2020 census for Blowing Rock Fire District numbered 4,664. Blowing Rock Fire District is the second largest district in Watauga County by area. Boone is slightly larger at 40.74 square miles. Boone’s 2010 census numbered 27,80.
- G. Blowing Rock Fire Department receive funding from several sources including Watauga Fire District Tax, Blowing Rock Township Tax and Caldwell County Tax. Blowing Rock Fire District includes areas outside of Blowing Rock township and has a tax valuation of \$1.0B with a fire tax rate of .05 which bring in \$494,989 (Table 3). The residents of Blowing Rock township do not pay this .05 fire tax. It is included in their township tax.

Table 3.

For the Year Ending June 30, 2019

Fire Protection District	Tax Rate per \$100	Net Levy
Beech Mountain Rural	0.05	\$ 1,588
Blowing Rock	0.05	494,989
Boone Rural	0.06	947,176
Cove Creek	0.05	253,675
Cove Creek Rural	0.05	324
Deep Gap	0.05	201,961

\$ 473,200.00 Total Annual Personnel Cost

Initial Incidental & Recurring Expenditures

\$ 12,000.00	Equipment & Vehicle Maintenance & Repair
\$ 61,516.00	FT Transport Agency Worker's Comp Insurance (13%)
<u>\$ 42,000.00</u>	Additional portable radios, pagers, uniforms, PPE
\$ 115,516.00	

Initial Capital Expenditures

\$ 78,000.00	Medical, Radios, Cardiac Monitor, Equipment & Supplies
\$ 44,000.00	Stretcher Lift Mechanism
\$ 17,000.00	Powered Stretcher Assembly
<u>\$ 145,000.00</u>	Additional Type I 4WD Ambulance
\$ 284,000.00	

\$ 872,716.00 Initial Year Total Cost Estimate

Average Cost is approximately \$700,000 by amortizing Capital Expenditures over 5 years.

Key Points

Blowing Rock and BRDF fund Paramedic 1st Responders to reduce Risk

Average response time in 2019 was 6 minutes and 51 seconds

58% of Emergency Calls in BRFD are for Town of Blowing Rock

BRFD Footprint is large

BRFD is 36 Square Miles

Town of Blowing is 3 Square Miles

BRF&R already provides responses to all call levels, prior to COVID

BRF&R already responds to Caldwell County with an ALS Ambulance.

Cost per Team is \$50K higher compared to Watauga Medic

Overview of Blowing Rock Township

Blowing Rock Township North Carolina has a population 1,367 according to the 2020 census and a seasonal effective population of approximately 5,000 without including tourists based on approximately 1,800 homes. Blowing Rock encompasses just 3.1 square miles. The tax valuation of Blowing Rock Township is \$1.2B, with a \$0.39 tax rate generating \$4,680,000 in property taxes. The median age of the citizens based on census data is 60.3 years, 57.1 years for males, and 62.1 years for females (World Population, 2020). Anecdotally, we know that the median age for seasonal residents is older but declining as homeowners from surrounding regions are increasing.

Potential Solutions

These proposals are listed in no specific order of priority. They are presented from the viewpoint of decreasing the response times of EMS to Blowing Rock Township. Each proposal cost approximately \$650,000 annually and will provide 24/7 ambulance service to Blowing Rock. To ascertain the actual cost a Request for Proposal (RFP) will need to be solicited from the providers for the exact type of service to be provided.

- 1. County continues to provide transport services, rely on high quality paramedic 1st Responder coverage provided by BRF&R until the transport ambulance arrives and challenge County to provide the same level of service throughout the County using a Fractal Goal to measure success.**

Key Points

BRF&R 1st Responder Emergency Response Times are below 9 Minute Standard

Must accept Transport Response Times by County

Accept that the County is not providing consistent service throughout the County

No Local Control

No Additional Cost

- 2. County provides an ALS Watauga Medics unit in Blowing Rock 24 hours a day, seven days a week funded by County.**

Watauga Medics are already stationed at the Blowing Rock Fire and Rescue station 9 hours a day Monday - Friday. This proposal would increase that time to 24/7.

- The unit would be housed in an existing facility at no additional cost.
- The approximate cost of \$650,000 annually
- Reduced response times for an ambulance in the Blowing Rock Fire District.
- An increased presence of an ambulance in the Blowing Rock Fire District.

This unit would still be utilized as needed for calls, standbys, and backup throughout Watauga county. The Blowing Rock Fire District generated less than 10% of the Watauga county call volume while the Boone Fire District creates over 65% of that annual call volume. It is my estimate that

during peak hours this unit will be out of the Blowing Rock Fire District approximately 40% of the time.

Key Points

Provides 24/7 coverage

Crew pulled away as needed coverage elsewhere

Takes advantage of BRF&D main facility

Annual incremental cost is \$580,000

No additional funding has been offered by County

No Local Control

3. BRF&R provides an ALS unit at BRF&R main station 24 hours a day, seven days a week funded by BRFD and Town of Blowing Rock taxes.

- The unit would be housed in an existing facility at no additional cost.
- The approximate cost would be \$650K.
- Significantly reduced response times for an ambulance in the Blowing Rock Fire District as the unit would not leave the district unless it is on a call. This unit would also be utilized as needed for standbys and backup on emergent calls throughout Watauga county.
- A franchise agreement would need to be established with Blowing Rock Fire and Rescue for ambulance transport services.

- The unit cost will be averaging over \$1,000 per transport.
- Funding of \$600,000 net cost could come from different sources to cover capital cost and ongoing expenses. As an example:

Increase in Taxes	\$6000,000
Each \$0.01 Fire Tax increase	\$100,000
Each \$0 .01 Blowing Rock Township Tax	\$120,000
Revenue from call volume, 400 calls billed at \$500 (allowable rate) x 50% collection	\$100,000

Key Points

Allows for Control of Personnel

Need to outsource billing

Net Cost is approximately \$600,000

Increase in BRFD tax rate

Increase in Town of Blowing Rock tax rate

Need to determine fair allocation to BRFD and Town of Blowing Rock

4. Town of Blowing Rock provides EMS that would provide an ALS ambulance 24 hour a day, seven days a week funded by the Town of Blowing Rock

- This system would run independently of Watauga County and Blowing Rock Fire and Rescue.

- This service could be a private service or a township service, depending on how much control and responsibility the township wants to maintain.
- A franchise agreement with Watauga County would be needed. This agreement would include any supplements from tax dollars and billing restrictions.
- To assure that best pricing is achieved this service should be put out for RFPs.
- The ownership of vehicles, staff and administrative responsibilities would be determined based on the RFP (Request for Proposal).
- Blowing Rock Township is a small area with a small population for an independent EMS to operate. This service could be provided by 1 ambulance, with the other county services continuing to provide routine transports and emergency backup. The unit cost will be significant averaging approximately \$2,000 per transport. (336 transports per year)

Key Points

Most Expensive Alternative

Town would be in control of the additional ALS Ambulance

No commitment to County, except Mutual Aid

Funding would come from BRFD fire taxes and Town property taxes

Need to outsource Billing

Need Franchise Agreement with County

Need Agreement with BRF&R to house ALS Ambulance

Need Agreement on use of ALS Ambulance in County System

Obtain agreements with Watauga Medics for all non-emergent transports.

Other Considerations

1. Seasonal coverage with County

After a careful analysis of the monthly statistics, it seems reasonable to flex coverage with seasonal demands. The yearly cost could possibly be lowered. The highest demand months are May through November. The greatest difficulty with this scenario is the ability to find the necessary resources to flex up during the summer months. This mainly applies to qualified staff as summer months add increase call volume for most of the counties in North Carolina.

2. Peak Time coverage

Breaking down call volume into actual calls per hour and by day of the week helps determine appropriate staffing. Increased staffing during peak hours can improve response times and help controlling overall cost. Watauga Medics is currently staffing a 12-hour day truck in Boone and a 9-hour day truck Monday – Friday in Blowing Rock. This concept can be further applied to keep the Blowing Rock unit in their district as much as possible.

3. Quick Response Vehicles (QRV's)

A QRV is a fully equipped ALS non transport unit that is manned by a single Paramedic who is strategically located and can respond to emergency medical situations quickly. This concept is currently in place at BRF&R. Paramedics were responding to 100% of 911 calls through 2019. Once the pandemic began to take hold the Fire Chief changed the response to include only Delta and Echo calls. The QRVs are no longer responding

to Alpha, Bravo, Charlie response determinants due to COVID 19. Historically a QRV with a paramedic arrived at the scene of an emergency in an average 6.5 minutes. This time meets or exceeds National standards and significantly impacts mortality rates. In addition to excellent response times the cost of this services is less than half that of an ambulance. As the COVID vaccine becomes readily available and things we begin to return to normal, the BRF&R needs to continue their QRV service in the community.

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