Haywood County, North Carolina

Comprehensive Assessment of EMS

July 2019

NOTE: the slides that follow are not intended as a sequential presentation of the findings & recommendations referenced in the titled report; which will be discussed in its entirety during the scheduled review meeting September 16, 2019.

Here for your information anticipating that at some point during the discussion of the report findings the "screen size" view of these pages will better facilitate the related conversations that follow.

Prepared by:
Solutions for Local Government, Inc.

REPORT ORGANIZATION

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Fire Districts

911/Emergency Communications

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Training & Certification

First Responders

Call Volume

Calls Dispatched/Hour/Year

Type of Call

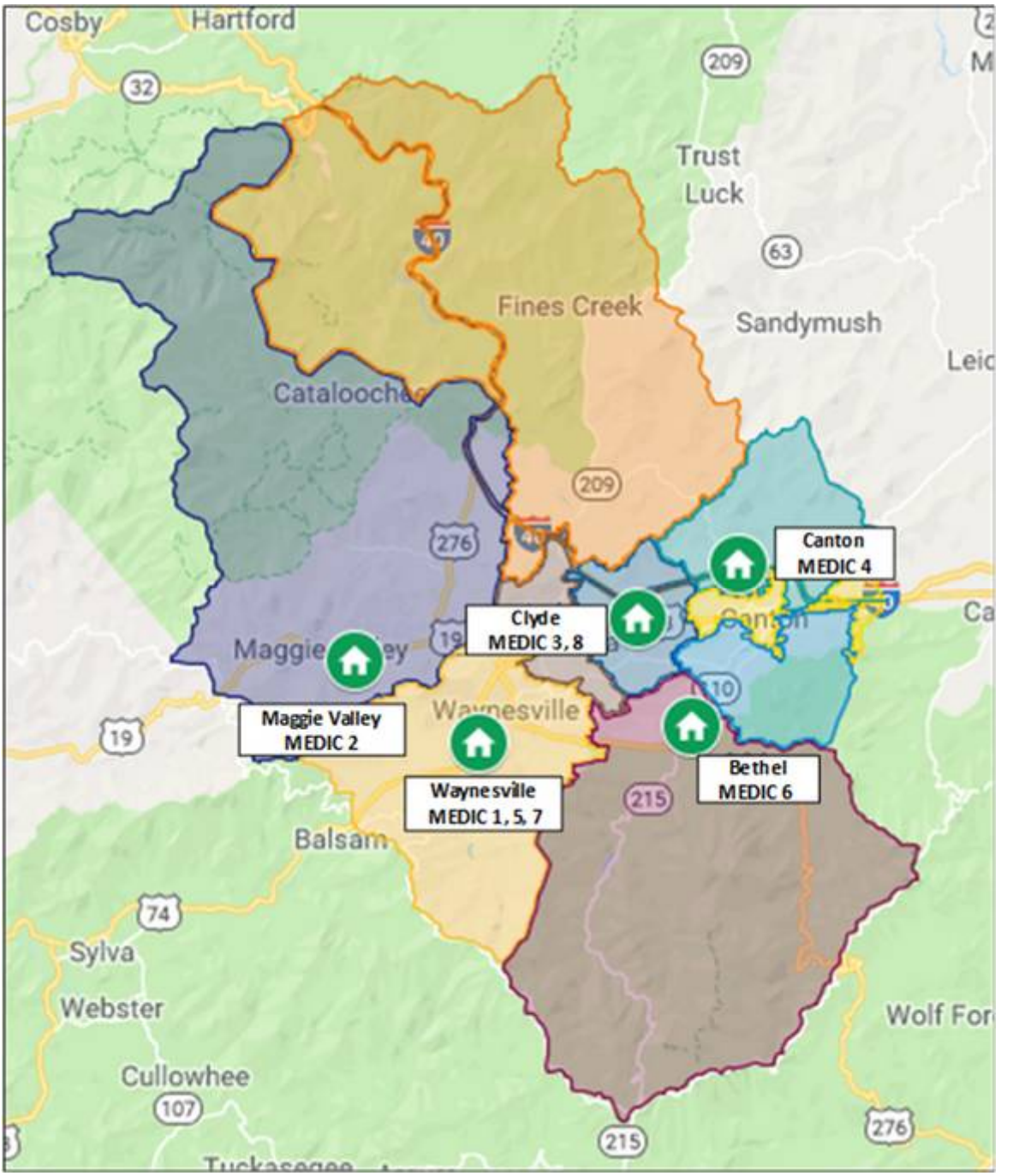
Call Distribution

Calls for Service Dispatched vs. Transports

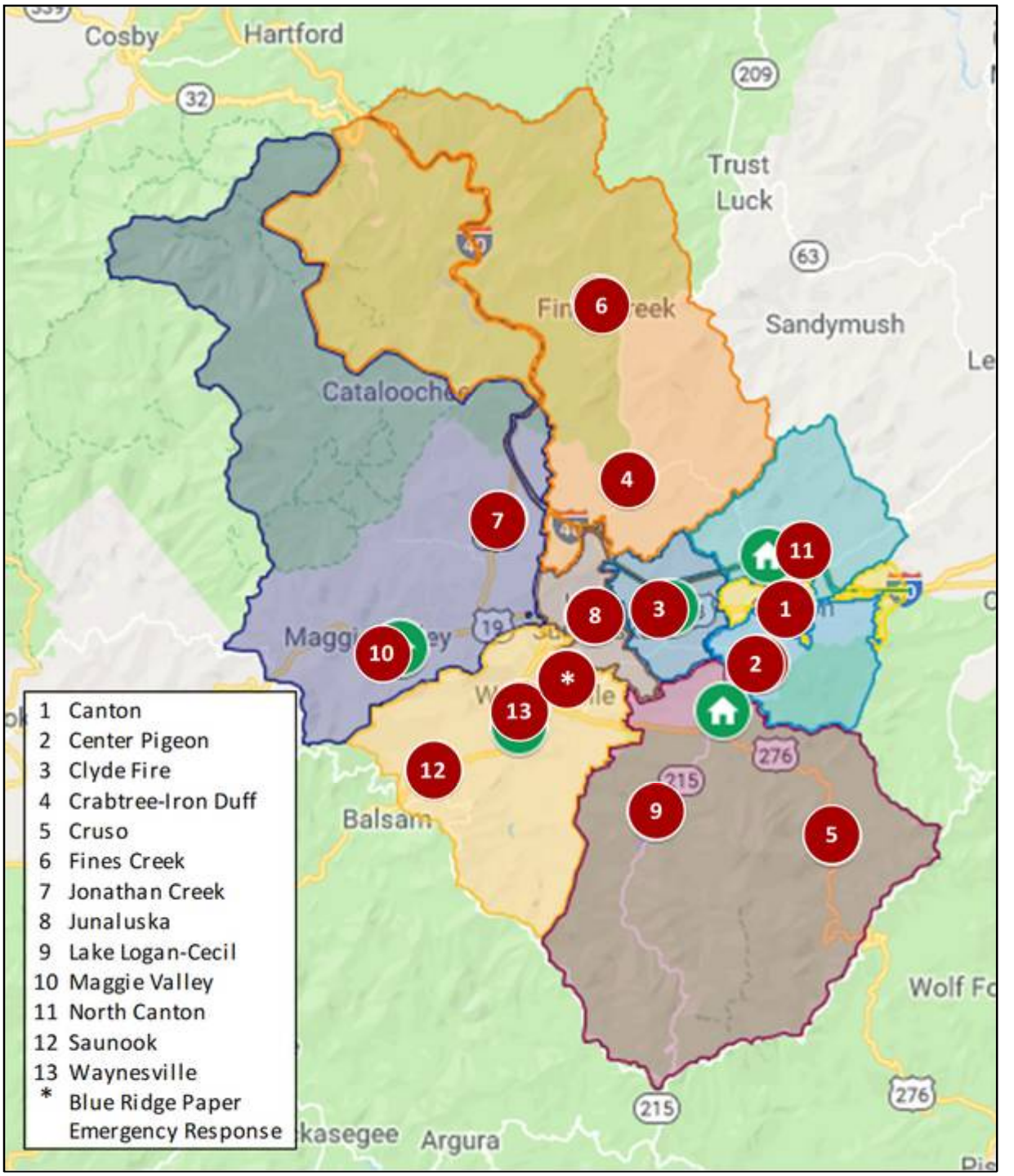
Transport Destinations

EMS Vehicles

Personnel & Vehicle Deployment

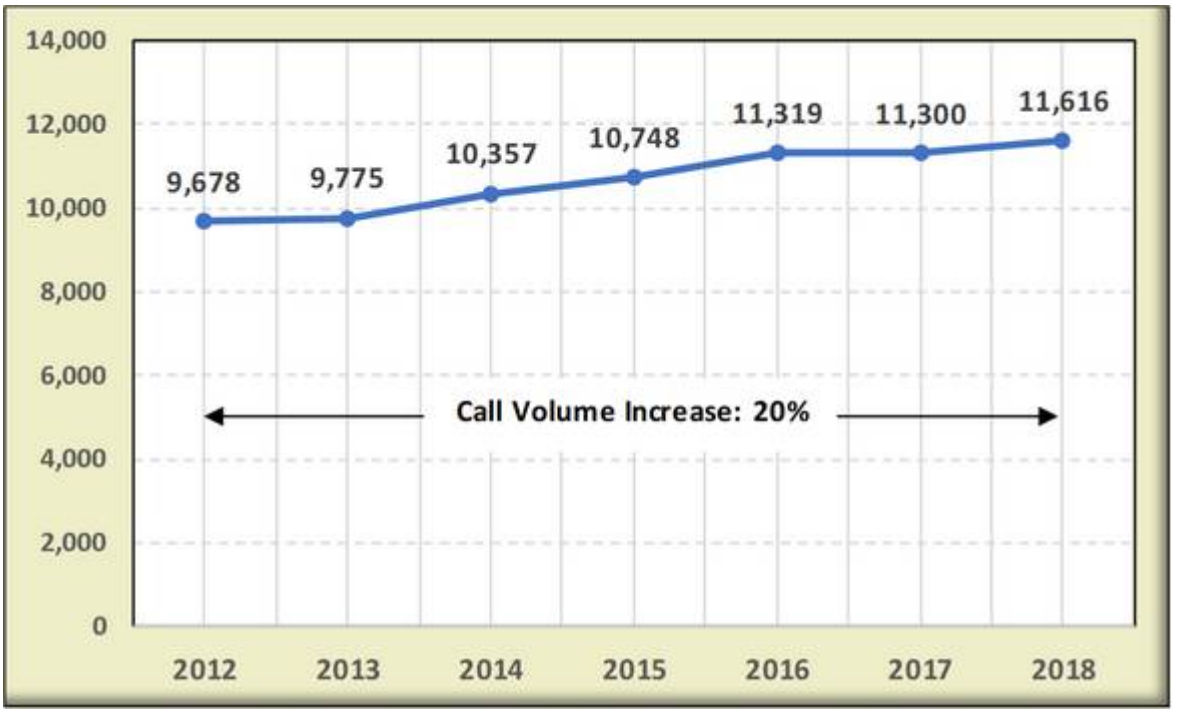


First Responders-Fire Districts



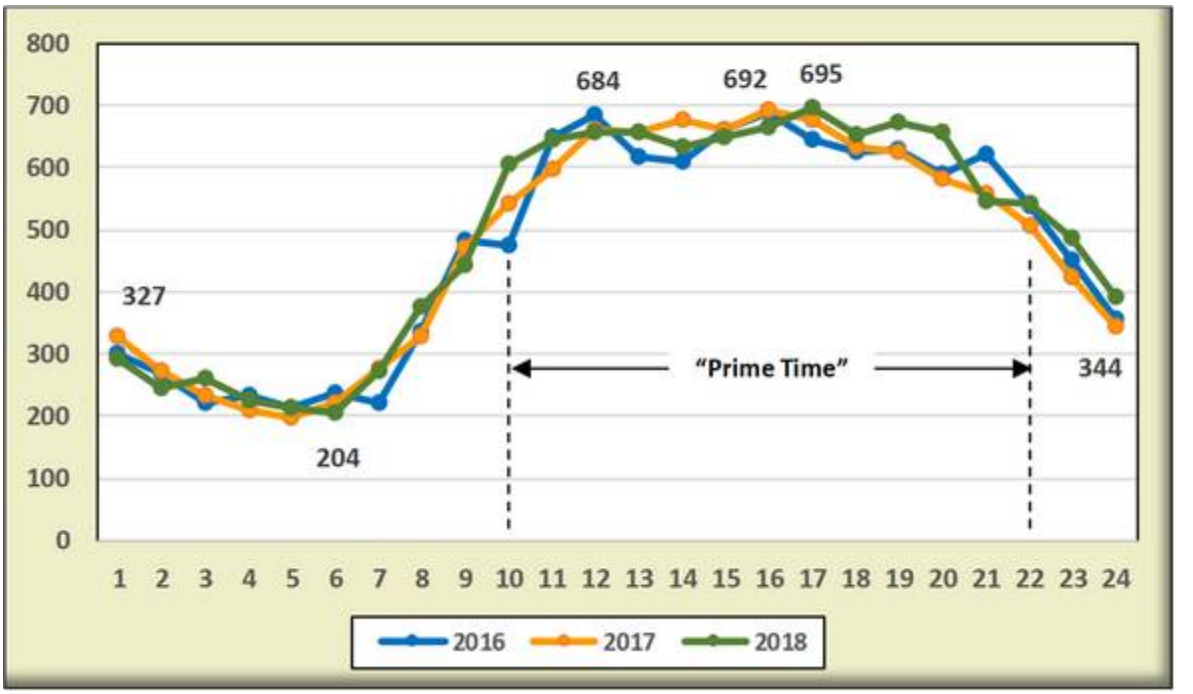
Call Volume

EMS Annual Call Volume
2012-2018

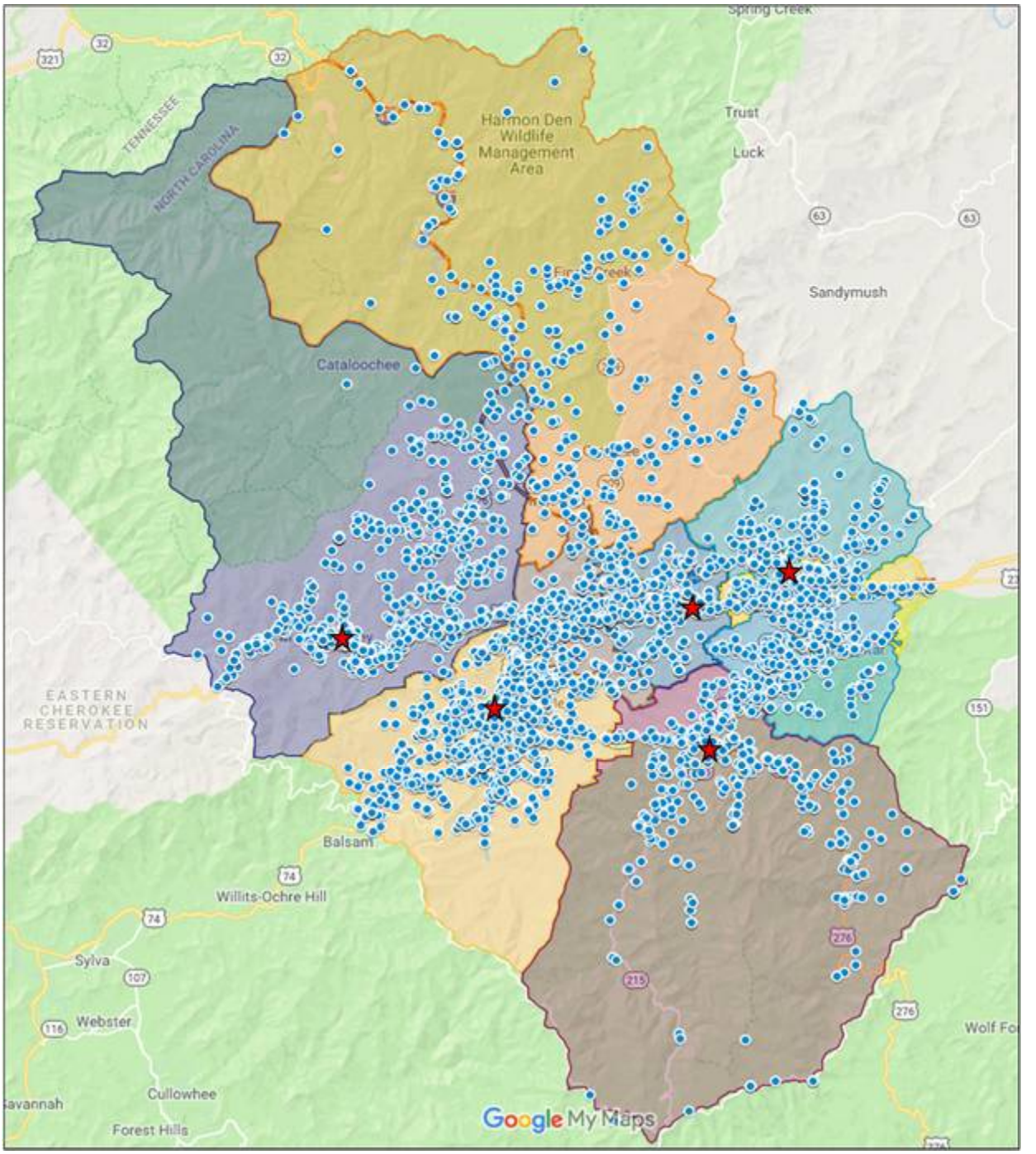


Calls Dispatched per Hour/Year

EMS Calls per Hour/Year



Call Distribution



SECTION 4. PERFORMANCE & COSTS

911/EMS Call Response Process

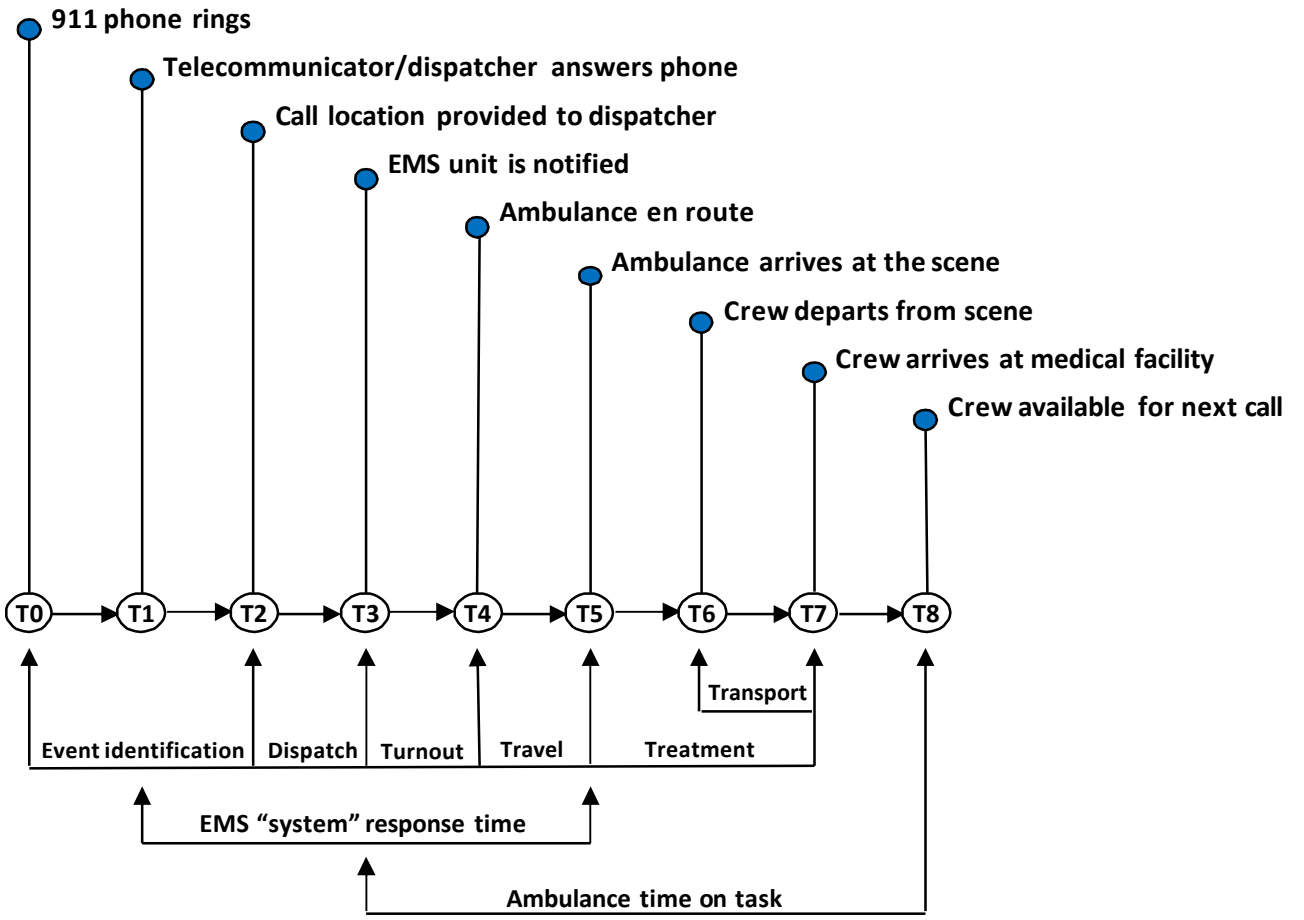
Response Time

Total Event Duration

Community Paramedic Program

Expenses & Revenue

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.***

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.***

Factors impacting response time include not only the distance that must be covered, but also specific and/or unique characteristics such as road conditions, geography, and development density.

EMS 2018 Interval & Total Average Response Time

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

Response Time

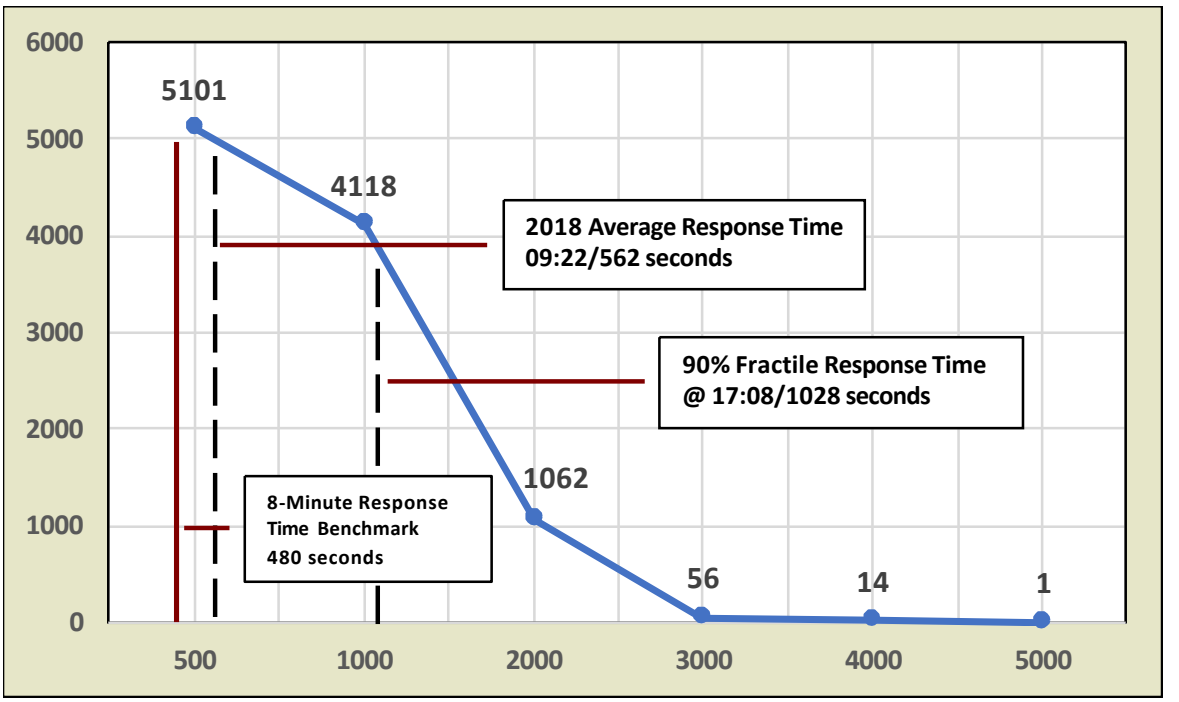
Communications Center EMS response time data for 10,352 calls dispatched during calendar year 2018.

The response time recorded for the 5,176th call (mid-point in the total list of numbers) was 8-minutes and 24 seconds

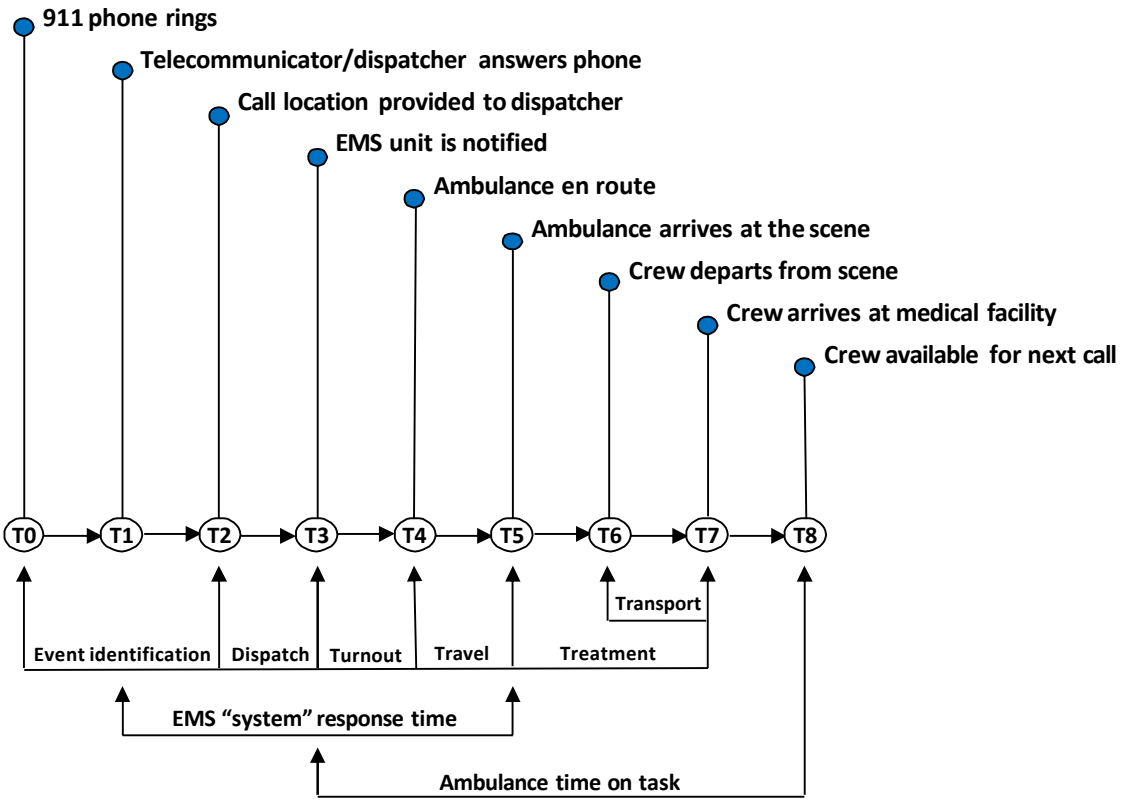
The average response time for all of these calls was consistent with that noted; 9-minutes and 22 seconds

The 90th percent fractile response time (call number 9,316) was 17-minutes and 8 seconds.

Average vs. Fractile Response Time



Total Event Duration



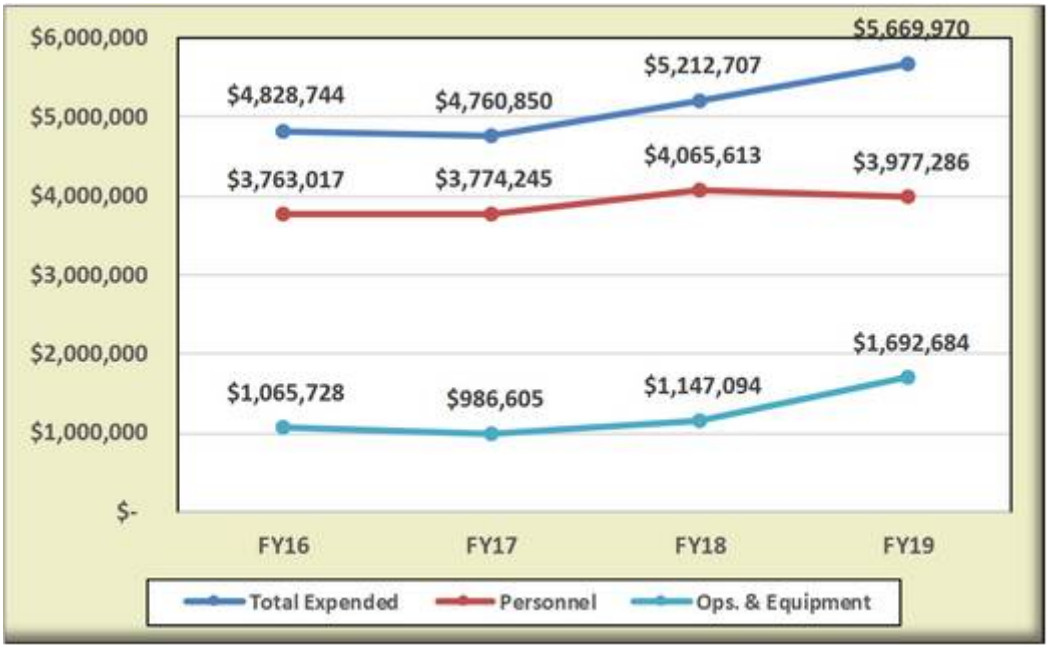
No. Calls Dispatched	Turnout	Travel	Total Avg. RT	On Scene	Scene to Facility	At Facility to Clear	Avg. Call Duration
11,199	0:01:46	0:07:36	0:09:22	0:19:09	0:17:19	0:25:35	1:11:25

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.***

SECTION 4. PERFORMANCE & COSTS

Expenses & Revenue

Year End EMS Budgeted Expenditures 2016-2019



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

Expenses & Revenue

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:	**$1,257,877**
Average annual salary per employee:	**$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**

Expenses & Revenue

Actual overtime hours worked:

2	employees @	less than 100 hours
18	employees @	100-500 hours
21	employees @	500-1,000 hours
6	employees @	1,000-2,000 hours
1	employee @	more than 2,000 hrs

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-$35,000

Expenses & Revenue

Services Billed

Activity/Response	Charge
Advanced life Support (Non-Emergency)	$ 535.64
Advanced Life Support (Emergency)	$ 848.08
Basic Life Support (Non-Emergency)	$ 446.36
Basic Life Support (Emergency)	$ 714.18
ALS 2 (Comprehensive)	$ 1,227.50
Specialty Care Transports	$ 1,450.68
Treatment-No Transport Fee	$ 150.00
Mileage (Urban & Rural)	$ 15.10
ALS Disposable Supplies	$ 50.00
BLS Disposable Supplies	$ 25.00
IV Supplies	$ 25.00
Oxygen Supplies	$ 25.00

Collections as % of Budget

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

SECTION 5. COUNTY POPULATION

Haywood County; 2010-2029

Adjacent Counties; 2010-2029

Population vs. EMS Call Volume

EMS Calls/1,000 Residents

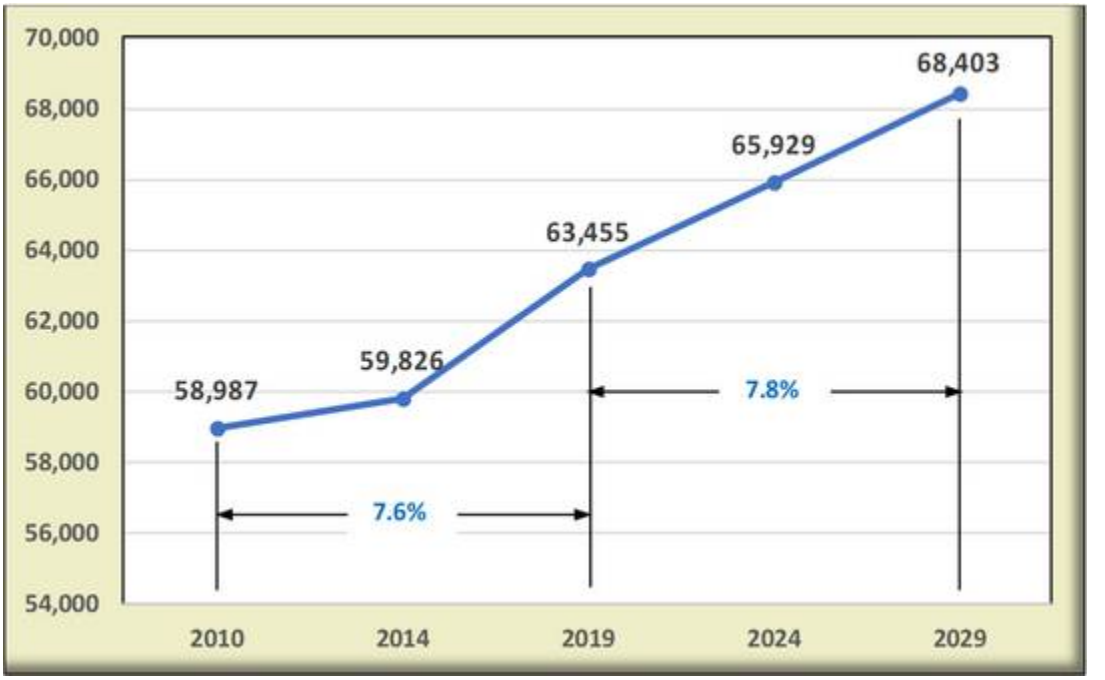
EMS Call Volume/Projections-Baseline

EMS Call Volume/Projected Total; 2019-2029

SECTION 6. COUNTY POPULATION

Haywood County; 2010-2019

Haywood County Experienced & Projected Population 2010-2029



Adjacent County Experienced & Projected Populations 2010-2029

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

Population vs. EMS Call Volume

Figure 27
Haywood County
Populations
2012-2018

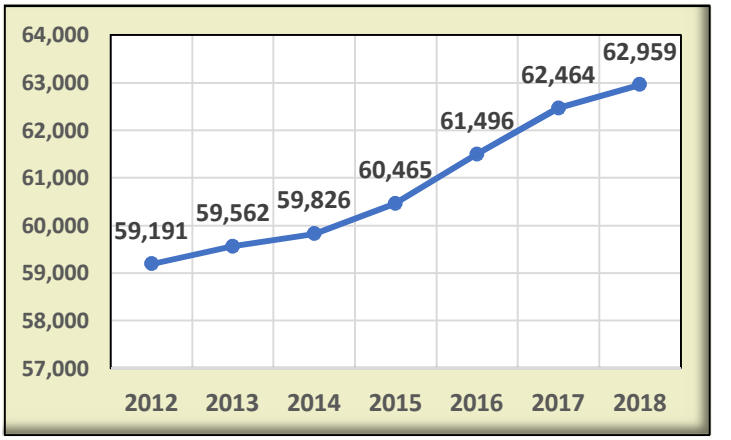


Figure 28
Haywood County
EMS Call Volumes
2012-2018

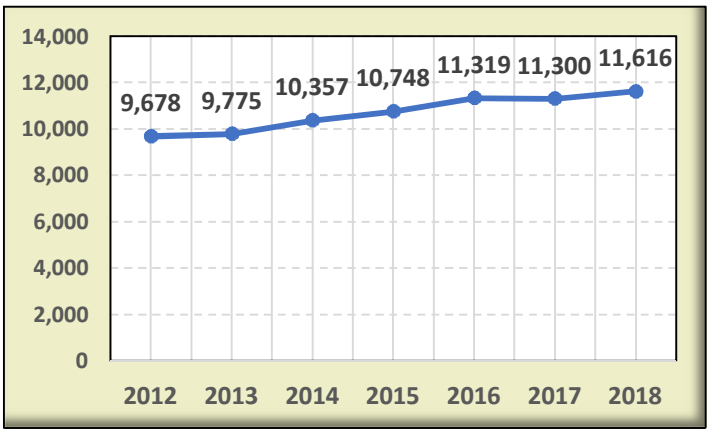
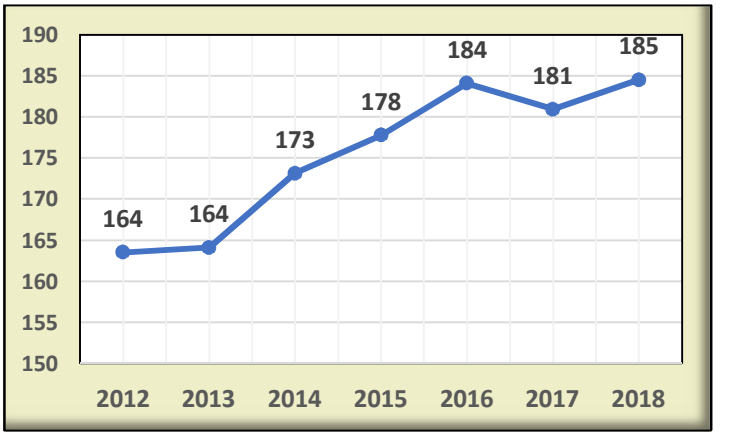


Figure 29
Haywood County
EMS Calls/1,000
Residents
2012-2018

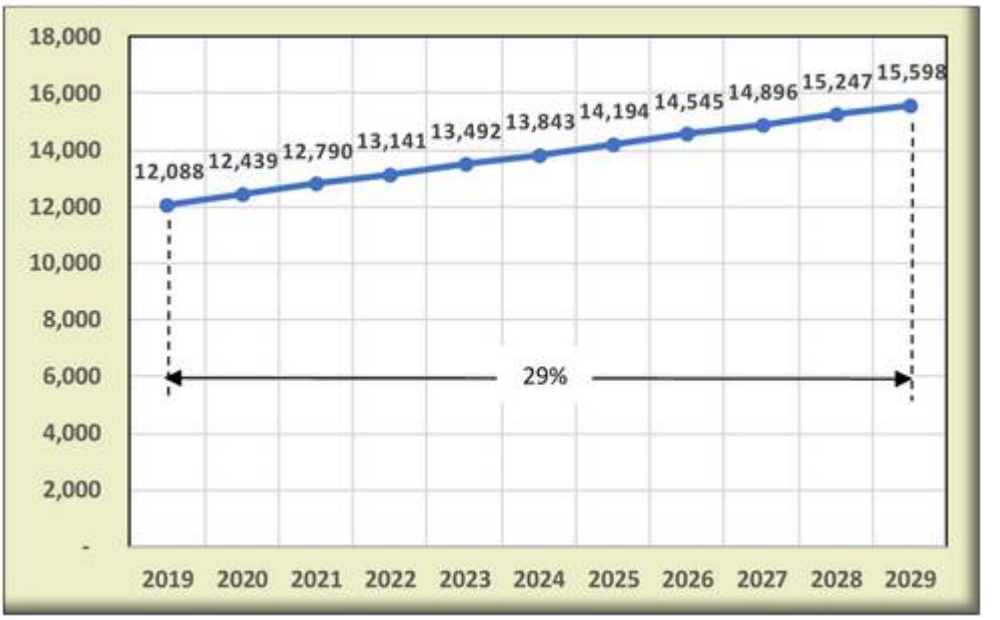


SECTION 6. COUNTY POPULATION

EMS Calls/1,000 Residents

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

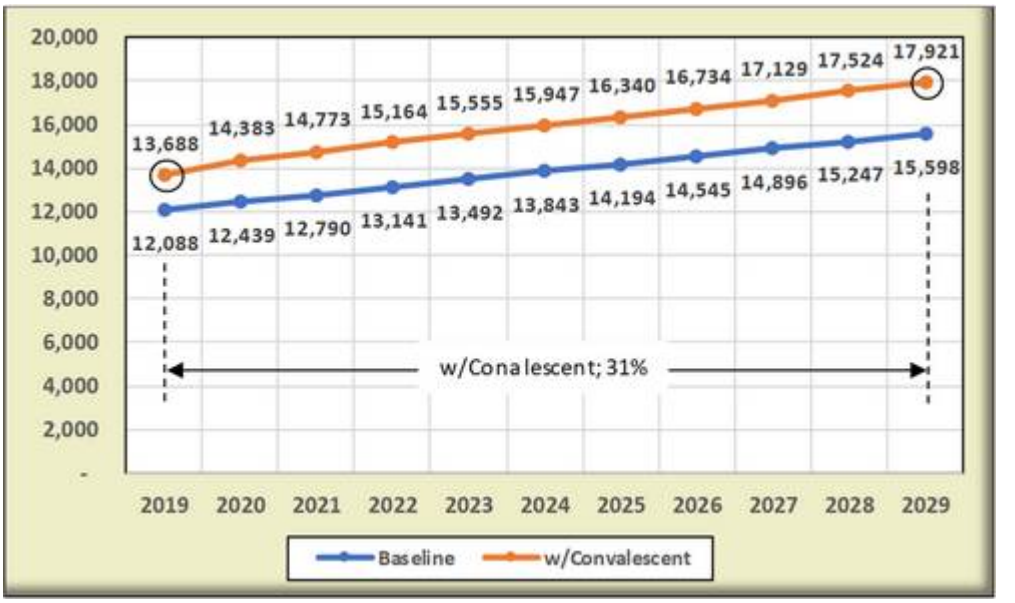
Projected Annual EMS Call Volumes-Baseline
2019-2029



SECTION 6. COUNTY POPULATION

Projected EMS Call Volumes

EMS Call Volume Projections
2019-2029



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%**

SECTION 6. ISSUES OF CONCERN

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 EMS issues identified as significant involved the following topics:

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

Availability of Ambulances

"We're down to one ambulance"

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

> **The number of ambulances immediately available was down to one (1) and the remaining ambulance was directed to move to a location more central in anticipation of being dispatched to respond to the next cal.**
>
> **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.**

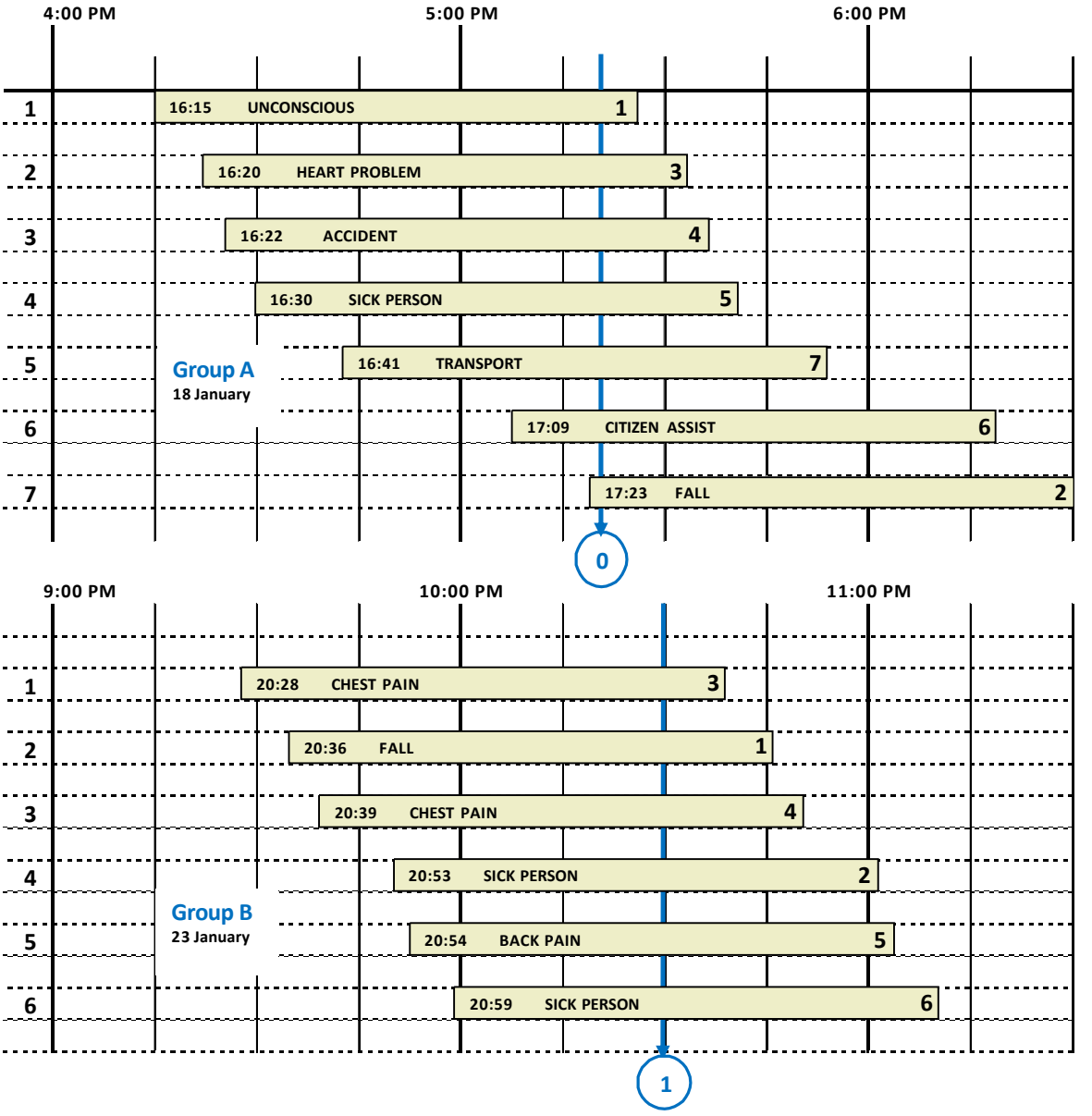
EMS's Monthly "snapshot" report for March 2019, there were ten (10) instances identified where "no ambulances" were available.

> **There was a total of 986 calls for service (CFS) in January.**
>
> **On nine (9) occasions during the month all 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.**

SECTION 6. ISSUES OF CONCERN

Availability of Ambulances

Examples of Actual Ambulance Demand Profiles



A- 7/01:08 **B- 6/00:08**

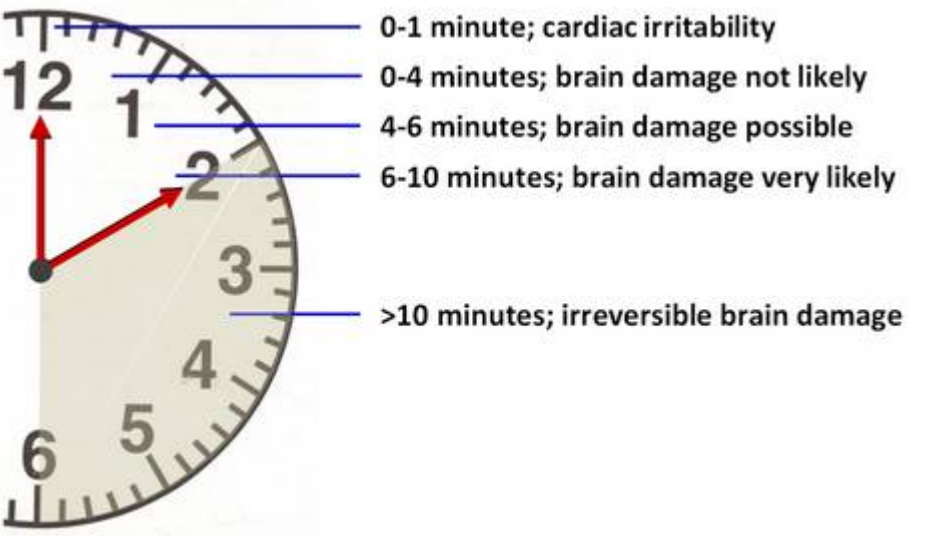
Response Time

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. This figure illustrates the significance of time in this equation.



Response Time

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."

In addition:

The American Association of Orthopedic Surgeons 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.

Response Time

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

In earlier data 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;

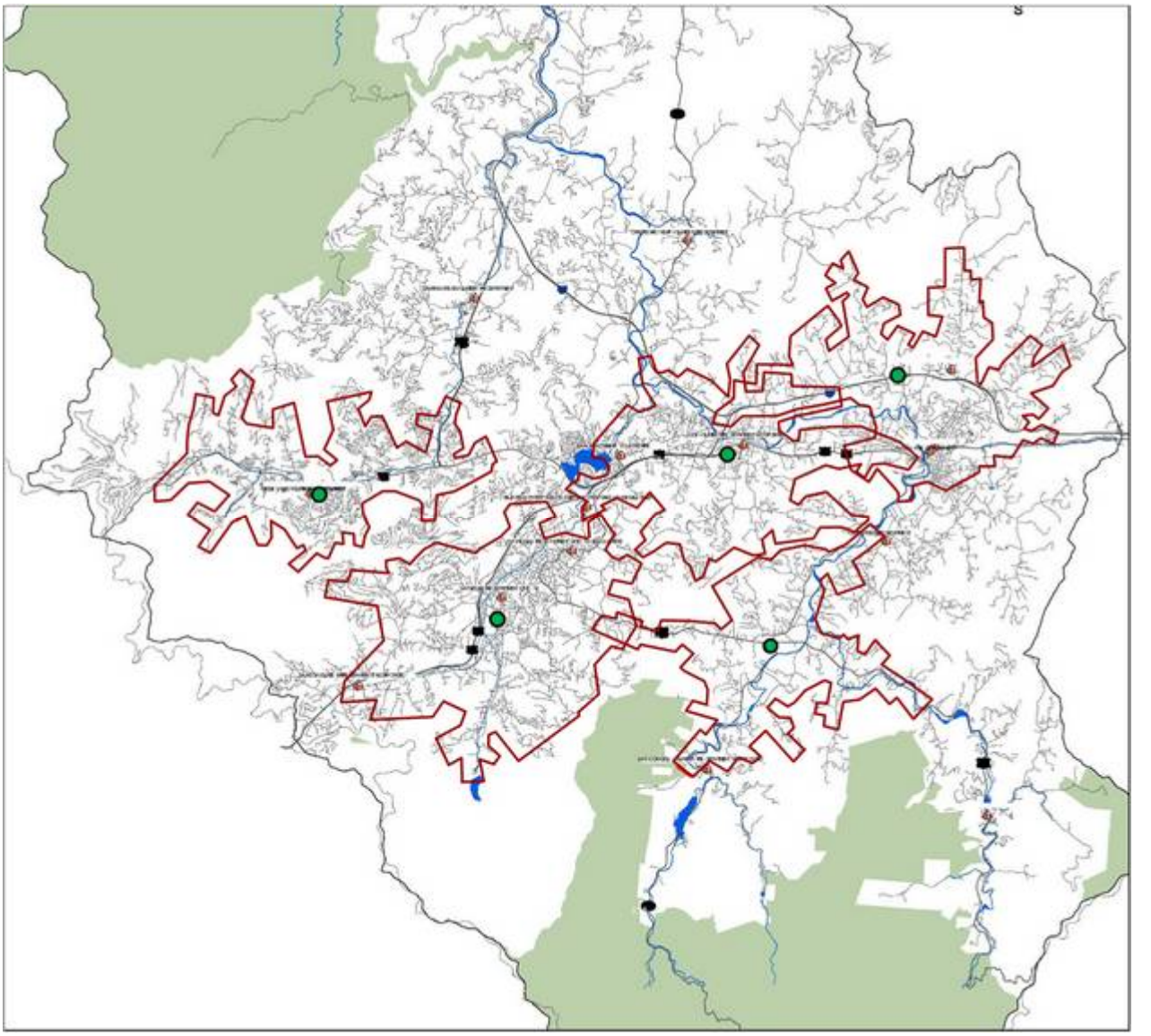
1.7 x Distance + 0.65 = Travel Time

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

SECTION 6. ISSUES OF CONCERN

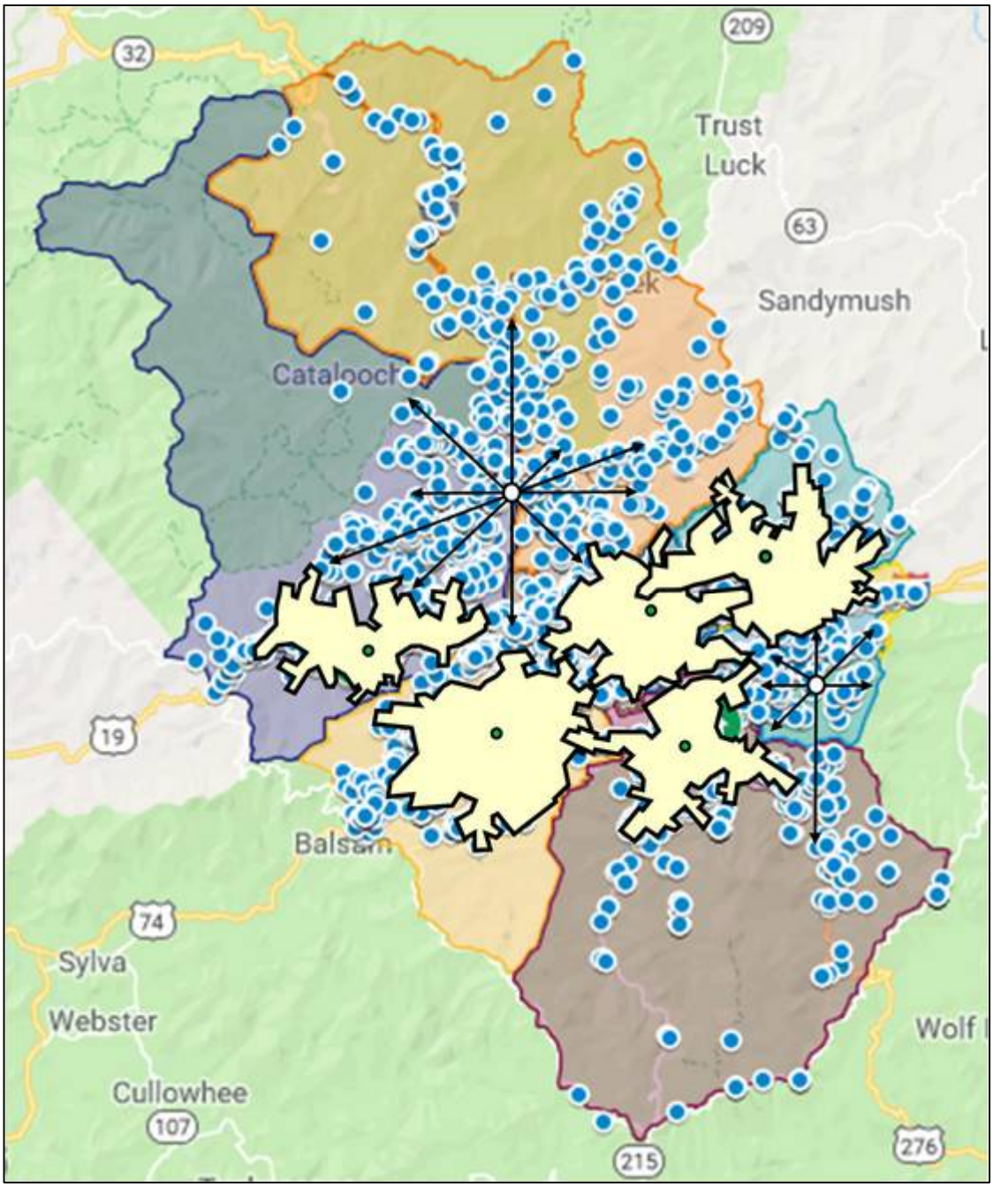
Response Time

4-Mile/8-Minute Response Limits



Response Time

4-Mile/8-Minute Response Limits
& Major Areas of Concern



Field Personnel Salaries & Work Hours

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

EMT-Intermediate (AEMT)	**$13.08/Hour**	**$27,825/Yr.**
EMT-Paramedic	**$14.92/Hour**	**$31,747/Yr.**

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

The average regular hours worked/ employee was:	**1,585 Hrs.**
Average hourly base rate of pay for AEMTs' was:	**$14.18/Hr.**
Average hourly base rate of pay for Paramedics, was:	**$17.23/Hr.**
Average annual salary per employee was:	**$34,920**

2018 NC County Salary Survey

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

On a national basis:
The web-based employment recruiter "ZipRecruiter" identifies the average Paramedic Pay in all 50 states from highest paid to lowest; North Carolina is ranked 50th with an average hourly rate of $15.86 and an annual salary of $32,989.

Yet, an additional concern confronts the industry:
The nation and state of North Carolina are facing a shortage of paramedics, particularly in rural communities.

Issue: Field Personnel Salaries & Work Hours

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 is anticipated that it will be deployed 14-hours per day, Monday-Saturday when it is activated.

Relief Factor

The Relief Factor is the ratio between the number of hours a position is "open"; 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, ("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.

Field Personnel Salaries & Work Hours

12-Hour & 24/72 Shift Relief Factor Calculation

a. Total Assigned Hours/Year/Position **2190**

Assumes employee w/2-5 years service

Leave Category	No. Days Allowed/Yea	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

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**

24/48-Hour Shift Relief Factor Calculations

a. Total Assigned Hours/Year/Position **2920**

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

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**

Field Personnel Salaries & Work Hours

Basis for Costs used in Shift Scenario Analyses

Shift Configuration Costs

Three (3) Shift Scenarios:

24/72 Shift	**7-24/28 @ 168/28**
12-Hour Shift; (Two/Day)	**14-12/28 @ 168/28**
24/48 Shift	**10-24/30 @ 240/30**

Cost Basis:

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

Field Personnel Salaries & Work Hours

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

Total personnel cost, not including OT or benefits = $2,241,640

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

Total personnel cost, not including OT or benefits = $1,644,581

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

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

Results: Shift Scenario Analyses

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

SECTION 7. RECOMENDATIONS

Issue: Availability of Ambulances

Recommendation #1

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

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

Issue: Response Time

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

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.

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 (Recommendation 4)

Issue: EMS Base Facilities, (Con't)

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.

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 base locations.

Issue: Field Personnel Salaries & Work Hours

Recommendation # 8

Considering the variables discussed, the County should retain and continue to utilize the existing shift configurations. [Refer also to comments at top of page 55 in the report narrative]

Issue: Administrative Workload

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.

Issue: Communications/GPS

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.)

SECTION 8. FUTURE CONSIDERATIONS

Paramedics with College Degrees

Tracking County Population & EMS Call Volume

NFPA 451 Guide for Community Health Care Programs

911/Emergency Communications

Technology Applications