Orange County, North Carolina

FINAL REPORT

Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Assessment

October 2012

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Solutions for Local Government, Inc.

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SECTION 1-INTRODUCTION

STUDY SCOPE

During November 2011, Orange County representatives met with and subsequently requested a proposal from Solutions for Local Government, Inc. to study and produce, as a single report:

- A Comprehensive Assessment of Emergency Medical Services; and
- A 911 Communications Center Operations Study

The proposal was presented to the Board of County Commissioners in late December 2011 and forwarded to the "Emergency Services Work Group" (an advisory committee) for review and further study. It was forwarded to the Board and approved March 22, 2012; wherein the first project related meeting took place the next day.

With regards to the Emergency Medical Services (EMS) portion of the study, the County requested that it address at least the following topics:

- Call volume(s)
- Call distribution & demographics
- Unit response times & workload
- Base locations & conditions
- Level of service being provided
- Rural vs. urban characteristics impacting service delivery
- First response capabilities
- Staffing
- Performance criteria
- Annual operating costs
- Annual billings & revenue
- Fleet & equipment condition

In turn, the study of the County's 911/Communications Center was to focus on the following topics:

- Center staffing
- Performance & workload
- Data availability
- Dispatch costs
- Existing CAD capabilities and/or shortcomings

THE PROCESS

The County's Emergency Services Department was of course central to the study. EMS and Communications Division chiefs as well as numerous staff and administrative personnel provided volumes in terms of information and reports and many hours of their time attending meetings regarding the many topics that were ultimately addressed. Significant also were the meetings held with and/or presentations provided to various stakeholder groups wherein input and comments were solicited and discussed regarding the County's EMS and 911/Communications Center operations. These groups included representatives from the Carrboro, Chapel Hill and Hillsborough municipal Police Departments, The Carrboro, Chapel Hill and Hillsborough/Orange Rural Fire Departments, The Orange County Fire Chiefs Association; which included the volunteer departments discussed in this report, and the general public.

The Emergency Services Work Group and its appointed membership, together with various public visitors who attended the meetings, made significant contributions during six separate meetings in which the study, study progress, and draft report findings were discussed. These contributions, particularly during the June, July and August extended meetings involved some very substantive comments and suggestions regarding requests for additional information, formatting of presentation

materials, and data clarification. Many, if not all of these suggestions were ultimately addressed in the report that follows and, frankly, made the report better for it.

Following the initial draft reviews by the Work Group, the changes called for were addressed and represented by the consultant. A final draft was prepared by the consultant and copies provided to the members of the Board of County Commissioners. Following which, at their August 30th meeting, they were presented with a formal presentation of the study's findings, recommendations, and probable costs.

Finally, through announcements via local media outlets, the general public was invited to an open meeting where they could receive and comment on the same findings, recommendations, and costs presented previously to the Board. This meeting was held the evening of September 27th

REPORT ORGANIZATION

The narrative and accompanying graphics and illustrations that make up this document are organized into seven (7) major report sections as follows:

Section 1-Introduction
Section2-Emergency Medical Services (EMS)
Section 3-County Population
Section 4-911/Communications Center
Section 5-Probable Costs
Section 6-Implementation Schedule
Section 7-Appendix

Of course the majority of the almost 100 pages that follow are comprised of discussions regarding Emergency Medical Services (Section 2) and the 911/ Communications Center (Section 3}. Subsequently, these two Sections are organized similarly and include the following sub-section headings:

- Historical & Statutory References
- Existing Conditions
- Performance & Costs
- Issues of Concern
- Recommendations

SUMMARY OBSERVATIONS

The *Issues of Concern* identified and addressed for both EMS and the Communications Center are in fact "existing problems" that are impacting the level of service offered the Public Safety community and ultimately the citizens of the County, every day. They did not develop overnight.

Hopefully, however, the work begun by the Emergency Services Work Group has perpetuated a more serious look at these issues. Hopefully as well, this report has begun to identify specific priorities that the County will now begin to address; "begin" is the key. While numerous recommendations are offered, together with a plan for implementation, neither can be said to be "etched in stone", nor should they be. These recommendations will inevitably (as they should) be massaged, word-smithed, and perhaps re-prioritized. The challenge the County faces now-*is to act,* and do so as expeditiously as possible.

SECTION 2-EMERGENCY MEDICAL SERVICES (EMS)

2.1 HISTORICAL & STATUTORY REFERENCES

As a means of introduction to the information and issues discussed in this report section, 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 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.[1]

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.

[1] 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. Subsequently, the 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 Orange 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. 10 NCAC 3D and 21 NCAC 32H 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 brief descriptions provided below are those defined by the North Carolina Office of Emergency Medical Services (NCOEMS). *The Medical Responder (MR) and Emergency Medical Technician-Basic (EMT-B) levels are referred to as "Basic Life Support", or BLS. The remaining levels of care; EMT-I, and EMT-P, are referred to as "Advanced Life Support", or ALS.*

> **Medical Responder (MR)**: Assists pre-hospital technicians in providing basic life support (BLS) care; follows training guidelines of first responders per USDOT.
>
> **Emergency Medical Technician-Basic (EMT-B)**: 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.
>
> **Emergency Medical Technician-Intermediate (EMT-I)**: 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.
>
> **Emergency Medical Technician-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.

2.2 EXISTING CONDITIONS

Organizationally, Emergency Medical Services (EMS) in Orange County is provided as a major division within the Orange County Emergency Services Department. Subsequently, the EMS "system" designation as registered with the North Carolina Office of Emergency Medical Services (OEMS) is "Orange 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; which is included in the Appendix section of this report.

The system response area consists of the 398 square miles (US Census Bureau) that lie within and comprise the boundaries of Orange County. According to the North Carolina Office of Management and Budget, the estimated July 2012 County population was 137,760 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 an Operations Manager, with the rank of Captain, who currently reports directly to the Emergency Services Department Director. Additional full-time administrative personnel include a Training Officer, and a Staff Operations Officer. Technical support within the department is provided as needed by personnel currently assigned to the Planning & Logistics Unit.

Operations personnel include four (4) Shift Supervisors, 36 certified Paramedics and 23 certified Emergency Medical Technicians (EMT's); including the Division Manager, the Operations Officer, and the Training Officer, a total of 66 full-time employees at the present time. In addition, EMS also has access to a small contingent of certified part-time employees that are able to fill in during staff vacations, absences, or when position vacancies occur.

Orange 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 level EMT on board.

The County is a single EMS district which comprises the referenced 398 square miles of the County. The County's current EMS Plan on file with the State OEMS, states that a minimum of five (5) EMT-Paramedic ambulances, will be staffed and available within the County 24 hours per day.

Currently, the highest concentration of population within the County, and subsequently the highest percentage of EMS calls occur within and proximate to the adjacent, south county municipalities of Carrboro and Chapel Hill.

Personnel & Vehicle Deployment

During the period of this study, EMS employees worked either 24-hour or 12-hour shifts. The 24-hour schedule includes one (1) 24-hour shift followed by 72 hours off plus mandatory call-back duty 1-2 times per month. The 12-hour schedule utilizes an alternating two and three day sequence of days worked and days off; i.e. 2-days work, 2-days off, 3-days work, 3-days off, 2 days work, etc. 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. **NOTE: The EMS Division, effective July 27th, is transitioning to all 12-hour shifts.**

Shift Supervisors, are certified EMT-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 *transport vehicle*, is equipped with the necessary equipment, medications, and supplies to enable the responding Paramedic Supervisor to initiate treatment in any incident to which they may be called

The ambulances assigned to EMS shift personnel are referred to by their "unit" designation; for example, "Medic 1". Medic 1, Medic 2, Medic 3, and Medic 4 are currently designated as 24 hour units, while Medic 5 (6am-6pm) and Medic 8 (6pm-6am) combine to provide the fifth 24-hour ambulance referenced in the EMS System Plan. In addition, two (2) "prime-time" ambulances; Medic 6 (9am-9pm) and Medic 7 (12 noon-midnight) are assigned to the Chapel Hill and Carrboro area seven days per week.

Figure 1
EMS Unit Assignments

Unit	Hours	Location	
Medic 1	24/7	Revere Rd.	Hillsborough
Medic 2	24/7	Roberson St.	Carrboro
Medic 3	24/7	Mason Farm Rd.	Chapel Hill
Medic 4	24/7	Mt. Willing Rd.	Efland
Medic 5	12/7 6am-6pm	**[Phelps Rd. Location Pending]**	N. Orange Co.
Medic 6	12/7 9am-9pm	Eubanks Rd.	Chapel Hill
Medic 7	12/7 12pm-12 am	TBD	Chapel Hill
Medic 8	12/7 6pm-6am	Roberson St.	Carrboro

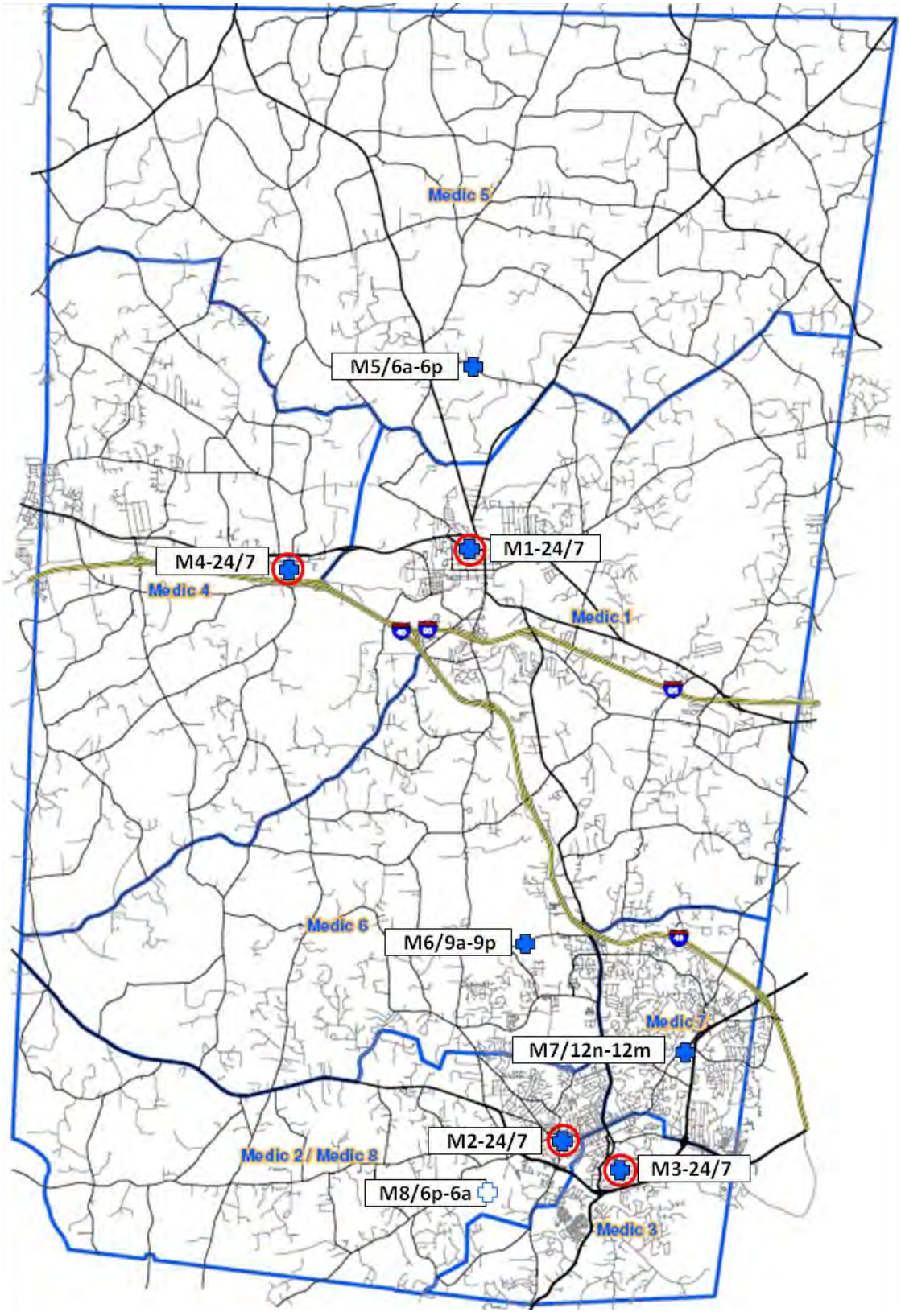
EMS Response Zones
The diagram that follows identifies the currently designated EMS District boundaries within Orange County as well as the vehicle and staff staging locations referenced above.

As the County has grown in population 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 vehicle deployment in an effort to keep pace with call demand as well as citizen expectations of providing timely response.

It is not unusual during the busiest hours of the day, however, for EMS to be down to one (1) or "no" ambulances available to respond to the next incoming 911 call requesting emergency medical assistance somewhere in the County. For example, referring to the County EMS map that follows, say that Medic 1, 6, and 7 are each on scene at three separate emergencies, Medic 4 and 8 are each at different hospitals with recently transported victims, Medic 2 is enroute to a hospital with a victim, and Medic 3 has just been dispatched to a highway accident with injuries. At this point, Medic 5, normally staged in the northern area of the County, would be directed to "move-up" to either the Hillsborough or the Hampton Point area to be closer to the center of the County and in turn more readily available to respond in any direction if called; at least until another ambulance becomes available.

Medic Units were directed to "move-up" to address ambulance shortages 2,360 times in 2011.

Figure 2
Existing EMS Districts & Staging Locations



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), or Paramedic. This applies to both volunteer and paid/career participants.

The current training hours that must be successfully completed to receive certification at either level are as follows:

Figure 3
Minimum Training Hours Required per Level of Certification

Certification Level	Hours
Medical Responder	**69**
EMT-Basic	**169**
EMT-Intermediate; ***in addition to "Basic" hours***	**256**
EMT-Paramedic; ***in addition to all "Basic" & "Intermediate" hours***	**1,096**

In addition to the minimum hours required for certification, continuing education is also required of all Department field personnel. The current *minimum* requirement is 36 hours per year, per employee.

While EMS is not currently allocated designated Field Training Officer (FTO) positions, newly hired employees, particularly trainees, are assigned to work with a senior Paramedic who will serve as such for at least the employee's orientation and/or initial probationary period.

The EMS Division Training Officer is responsible for organizing, implementing, certification, oversight and documentation of all training activities within EMS as directed by the EMS Operations Supervisor. 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, providing continuing education annually to each certified fire department or rescue squad medical first responder, 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 will also work closely and coordinate activities with the Medical Director.

Communications & Dispatch

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 is also an operational division of the Orange County Emergency Services Department. It is located on the second level of the Emergency Services Administration building at 510 Meadowlands Drive in Hillsborough. In the professional terminology of the communications industry, the Communications Center is the designated *public safety answering point*, or PSAP, for emergency communications in Orange County.

The Center operates 24 hours per day and is continuously staffed by Telecommunicators who receive and dispatch calls for not only EMS, but Fire, Rescue, and Law Enforcement throughout the County.

In the case of EMS calls, once the Dispatcher (Telecommunicator) receiving the 911 call is able to verify the location of the incident being reported, he/she will notify (dispatch) the EMS team/station that is responsible for responding to that call's location.

"Emergency Medical Dispatch" (EMD) is a level of certification that enables Telecommunicators that answer 911 medical emergency calls to, while simultaneously dispatching an ambulance, 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 then can be communicated to the EMS responders 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 Orange with EMS response times as they are, these capabilities can and often do prove valuable at the very least in initiating patient care.

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.

First Response

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

In Orange County's case, a "first responder" in medical emergencies could best be described as; *The first EMS, Rescue, 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.

In Orange County, the identified first responders to medical emergencies include the ten (10) volunteer or combination paid/volunteer fire departments within the County, the two career/municipal fire departments and South Orange Rescue Squad.

- Caldwell Fire Department
- City of Carrboro Fire Department
- Cedar Grove Fire Department
- City of Chapel Hill Fire Department
- Efland Fire Department
- Eno Fire Department
- Hillsborough/Orange Rural Fire Department
- Mebane Fire Department
- New Hope Fire Department
- North Chatham Fire Department
- Orange Grove Fire Department
- White Cross Fire Department

Currently Carrboro Fire Department is certified at the EMT level while the remaining departments are certified at the Medical Responder (MR) level.

In addition to these identified Fire Departments, the South Orange Rescue Squad (SORS) is also available for dispatch to medical emergencies and is certified at the EMT level. The Squad shares a unique relationship with Orange County EMS both in that 36 of its 57 certified members are also listed on the Orange County EMS roster on file with the NCOEMS and, that members share duties with EMS employees on Medic Unit 8 on an alternating 3-4-3 day schedule which also includes the use of SORS' 2 BLS ambulances.

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 may be seven (7) staffed ambulances with transport capabilities based at but five (5) designated staging locations throughout the County's 398 square mile area.

Compare this with the combined (potential) capabilities of the 12 Fire departments and one Rescue Squad that are (or could be) available to respond from 22 additional station locations within the same 398 square miles as EMS. It becomes an issue of proximity if nothing else.

Subsequently, in as much as time is critical, first responders with basic skills, once on the scene can offer significantly to the stabilization of the victim until paramedic level responders arrive; i.e. . . ., "get there fast and stabilize the victim until advanced life support assistance arrives". [2]

Dispatchers as First Responders

In significant medical emergencies, the Telecommunicator (Dispatcher) handling the call will simultaneously answer the call, solicit vital information, alert and dispatch the appropriate EMS unit, maintain communications with the caller ***and*** initiate medical instructions, all while *also* maintaining ongoing communications with the EMS unit responding. Typically, in a serious emergency situation, this communication with the caller/victim will continue until the responding EMT's (paramedics) have communicated that they are on the scene and have assumed patient care.

"Emergency Medical Dispatch" (EMD) certification is required before a Telecommunicator can issue treatment instructions of any kind to a victim or caller. This is a significant designation which requires that a specific set of protocols be followed when receiving and handling emergency medical calls.

In calls involving medical emergencies, a significant responsibility of the Telecommunicator relates specifically to these EMD protocols. In this instance the Telecommunicator will remain on the line with the caller to obtain as much additional patient/victim information as possible since they must simultaneously and continuously communicate with the responding Paramedics as to the patient's condition, physical characteristics, scene circumstances, etc.; *and* to provide actual medical/first aid instructions to the caller in an effort to help the victim; i.e., *emergency medical dispatch* (EMD).

In most people's eyes, once the Telecommunicator alerts the appropriate law enforcement agency, EMS unit, or fire station of an emergency and provides dispatch information and general instructions their job is over. Not so in the case of medical emergencies. In many instances, Telecommunicators continue to monitor and support the call and the responding service unit by maintaining on-going

[2] A. Fleming Bell, and Warren Jake Wicker; County Government in North Carolina; Institute of Government, University of North Carolina at Chapel Hill; 1998.

communications and following the efforts of those responder(s) enroute to the incident and throughout the on-site incident activities that follow. (More detailed discussion will be provided in Section 4 of this report, The 911/Communications Center).

Mutual Aid As stated in the County's EMS System Plan; *Orange County Emergency Medical Services is party to the North Carolina* Statewide Emergency Management Mutual Aid and Assistance Agreement.

Reports & Reporting

The record keeping system for EMS providers in North Carolina is "PreMIS", the *Pre-Hospital Medical Information System.* Under the North Carolina EMS Rules and Regulations, every EMS System *is required* to collect and submit (electronically) EMS data based on the North Carolina College of Emergency Physician's Standards for Medical Oversight and Data Collection.[3]

PreMIS provides a method for each EMS provider in North Carolina to enter patient care data into a central database. Other components of PreMIS include: billing export capabilities, technician and provider tracking, and an extensive quality management toolkit.[4]

Orange County EMS personnel currently input Patient Care Reports (PCR's) into individually issued laptop computers. Data is transferred to PreMIS as soon as possible and no less than on a daily basis except during weekends after which data is transmitted the following Monday.

EMS Facilities

Currently the four (4) 24-hour Medic Units and four (4) 12-hour Medic Units and their assigned 2-person Paramedic Teams operate from five (5) designated staging locations within the County. Note that the term "staging locations" is used versus the more common "EMS Base" because in reality none of the staging "areas"; i.e. facilities available; were originally built or intended to accommodate EMS operations. Space has essentially been found, donated for use or assumed for use as the space became available. Furthermore, none of the current staging areas; i.e. facilities; can accommodate a Medic Unit; i.e. ambulance, in a temperature controlled, enclosed and securable environment.

Figure 4
EMS Unit Staging Locations

Unit	Location	
Medic 1	Revere Rd.	Hillsborough
Medic 2	Roberson St.	Carrboro
Medic 3	Mason Farm Rd.	Chapel Hill
Medic 4	Mt. Willing Rd.	Efland
Medic 5	**[Phelps Rd. Location Pending]**	N. Orange Co.
Medic 6	Eubanks Rd.	Chapel Hill
Medic 7	TBD	Chapel Hill
Medic 8	Roberson St.	Carrboro

[3] Pratt, Drexdal; "Required EMS Patient Care Reporting"; NCOEMS Memorandum; 2004
[4] North Carolina EMS Performance Improvement Center website; 2007

EMS Vehicles

EMS currently maintains an inventory of 11 transport vehicles; eight (8) of which are in service 12-24 hours per day. The remaining three (3) transport vehicles, not currently assigned, are reserve back-up units for use when a vehicle is down for repairs or service or otherwise unavailable for use. EMS Division management personnel and the designated in-field Shift Supervisors drive either sedan or SUV type vehicles up-fitted to accommodate their respective assigned responsibilities.

As noted in Figure 5 recent year ambulance purchases signify a significant shift to the Freightliner M2, medium duty type ambulance from Ford F-450, light duty ambulance that was prominent in the past and of which several are still in service. While the cost of the newer ambulances were considerably more than the previous models; $94,575 in 2005 & 2007 for the Ford vs. $186,900 in 2012 for the Freightliner; the decision was not made in haste.

Available documentation indicates that the issue was researched and studied jointly by personnel representing Emergency Services, Asset Management Services, and Fleet Management and determined that the new units provided a number of advantages over the current fleet vehicles:

- Cheaper to operate; first-year mileage of medium duty @ 9 miles/gallon vs. light duty @ 8.6 miles/gallon; first year service cost of light duty @ 8.92 cents/mile vs. medium duty @ 5.98 cents/mile;
- Better survivability in an accident; illustrated during/after actual rollover experienced in 2010;
- Better field of vision- safer scene approach and driver visibility during both emergency response and normal driving conditions;
- Better internal vehicle systems; braking, cooling, transmissions, chassis, electrical;
- Overall dimensions offer better internal maneuverability and patient access
- On-going maintenance advantages cited included serviceability, reliability, and quality of design and construction.

Figure 5
EMS Fleet Vehicles*

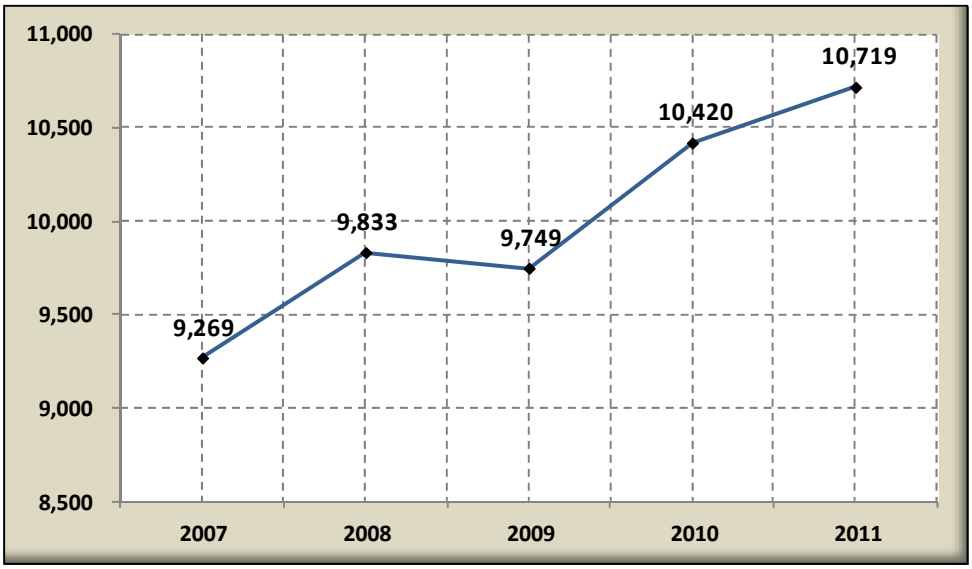
Vehicle Number	Model Year	Model	Maufacturer
633	2005	Ford F-450 XLT Super Duty Ambulance	Wheeled Coach
634	2005	Ford F-450 XLT Super Duty Ambulance	Wheeled Coach
714	2007	Ford F-450 XLT Super Duty Ambulance	Wheeled Coach
715	2007	Ford F-450 XLT Super Duty Ambulance	Wheeled Coach
793	2011	Freightliner M2 Ambulance	Excellance
794	2011	Freightliner M2 Ambulance	Excellance
813	2011	Freightliner M2 Ambulance	Excellance
840	2012	Freightliner M2 Ambulance	Excellance
842	2012	Freightliner M2 Ambulance	Excellance
843	2012	Freightliner M2 Ambulance	Excellance
845	2012	Freightliner M2 Ambulance	Excellance

*The Emergency Services Department is anticipating the replacement of Vehicles 633 and 714 during FY 2012-2013 and 2013-2014. Engines were replaced in Units 634 and 715 in 2011; each are expected to remain in the fleet for several more years.

Call Volume

During calendar year 2011, Orange County EMS units were dispatched a total of 10,719 times. In addition to these incidents, Medic Units were ordered into "move-up" status 2,360 times.

Figure 6
EMS Annual Call Volume



"Move-ups" occur when the number of ambulances available to respond to a call is down to one (1) and that ambulance, regardless of where it is normally assigned, will be directed to "move-up" to a location generally towards the center of the County to be accessible to respond in any direction.

If there comes a point that "no" ambulances are available (which does occur) South Orange Rescue and/or one or more of the County Fire Departments will be alerted to stand-by or, if available, to "move-up" to a specific staging location.

It is a practice common in the industry often referred to as "*modified* system status management" as it provides a means of spreading thin resources strategically in an effort to provide the greatest range of coverage during peak call periods.

Type of Call

The type of calls to which EMS is dispatched will of course vary. A review of those calls dispatched during 2011 identified more than twenty call classifications. Of the 10,719 calls dispatched during 2011, almost 90 percent were listed in one of the 18 categories identified in Figure 7 which, as noted, included any call type representing more than one percent of the total.

And, while they are not emergency dispatches per se, 2,360 "move-ups" were directed for strategic purposes; primarily to enhance coverage when the number of available ambulances to respond to an emergency was down to one (1). While the NCOEMS and the Performance Improvement Center have recommended that any EMS Unit activity be recorded in PreMIS in order that unit hour utilization rates can be (eventually) accurately determined, they are not included in this table or in the previous Call Volume table as emergency dispatches.

Figure 7
Ems Calls by Type

Condition	Code	Frequency	Percent
Sick Person	SICK	1322	**12.3%**
Fall	FALL	1117	**10.4%**
Transfer Interfacility Palliative Care	TIPC	1111	**10.4%**
Breathing Difficulty	BREA	795	**7.4%**
Unconscious	UNCO	747	**7.0%**
Chest Pain	CHES	716	**6.7%**
Accident w/Personal Injury	ACPI	713	**6.7%**
Convulsion	CONV	472	**4.4%**
Hemorrhage	HEMO	376	**3.5%**
Trauma	TRAU	354	**3.3%**
Overdose	OVER	336	**3.1%**
Abdominal Pain	ABDO	322	**3.0%**
Unknown	UNKN	292	**2.7%**
Stroke	STRO	245	**2.3%**
Diabetes	DIAB	209	**1.9%**
Allergy/Allergic Reaction	ALLE	172	**1.6%**
Assault	ASLT	158	**1.5%**
Heart Problem	HEPR	147	**1.4%**
		9,604	**89.6%**
		10,719	100%

Call Distribution
The green dots on the map that follows represent the more than 30,000 calls to which EMS units were dispatched during 2009, 2010, and 2011.

As stated previously, the most significant clusters of calls were in the Carrboro and Chapel Hill areas. Smaller, yet still significant call clusters were also noted in and around Hillsborough and a number of the County's major roadways; i.e. I-85, SR 70, and 86, etc.

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Figure 8
2009-2011 Cumulative EMS Call Distribution

Calls Dispatched per Hour

Among the significant County concerns presented to the consultant as an impetus for this study was the apparent increasing frequency during which EMS units were often out of service; albeit on an active call; or out of the County transporting a victim to a medical facility when emergency calls from within the County continued to be received and dispatched.

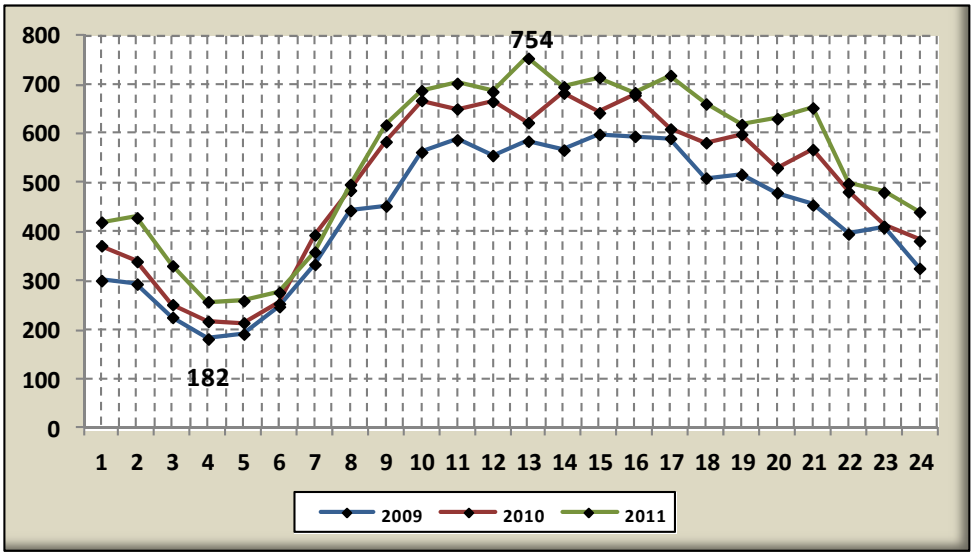
Subsequently, a look at the "calls received per hour", plotted for an entire year, will identify both the peak and approximate time frame of the busiest call periods during any given day and of course the times when EMS personnel are most likely to be needed.

In order to ascertain whether these periods of activity were unique or consistent in their occurrence, the most recent three (3) years of data was reviewed and plotted. The results, illustrated in Figure 9 for 2009, 2010, and 2011 were very consistent

Based on the illustration, the busiest hour of the day during 2011 was between noon and 1:00 pm wherein 754 calls were received. The least busy hour of the day, based on this illustration appears to be between 3:00 am and 4:00 am and is generally consistent for the years studied.

Subsequently, the daily "prime-time" hours; the busiest 12 hour period of the day (give or take); appears to be between 9:00 am and 9:00 pm or, between the numbers 9 and 21 on the horizontal axis. This of course then will be the time period when EMS ambulance units will be in greatest demand.

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.

Emergency vs. Non-Emergency Response

When the average citizen calls 911-it ***IS*** an emergency. Medical dispatch protocols have been developed, however, that dictate, based on the condition identified, how the response is to be coded; i.e. Alpha-least serious, non-emergent through Echo-most serious, emergent. In turn, the response code identified and broadcast to responding units will dictate the "status" of their response; i.e. "lights and sirens", or "no lights and sirens".

For the most part these response codes are universal and well known to emergency medical and first responder agency personnel.

The table that follows identifies the medical dispatch response codes, the condition identified and associated with that code, the agency/unit dispatched and the level (status) at which they are expected to respond.

Figure 10
Medical Dispatch Response Codes

Response Code	Condition Identified	Agency/Unit Dispatched	Response Status
ALPHA	Non-life threatening, low priority assessed	Ambulance only	Non-Emergency
BRAVO	Non-life threatening, but more serious	Ambulance only	Emergency
CHARLIE	Potentially life threatening	First Responders Ambulance	Emergency Non-Emergency
DELTA	Life threatening	All Units	Emergency
ECHO	Circling the drain	All Units; including Law Enforcement	Emergency

The distribution of emergency to non-emergency medical calls has changed significantly since 2009 when the "response determinants" were adjusted to reflect more closely those recommended by the National Academy of Emergency Medical Dispatch (NAEMD). The distribution of emergency and non-emergency medical calls dispatched during 2011 is illustrated in Figure 11. This issue will also be addressed further in *Section 4-911/Communications Center.*

Figure 11
Medical Call Response Levels-2011

Respnse Level	Number of Responses	Percent of Total
Initial Lights & Sirens, Downgraded to No Lights or Sirens	330	**3.1%**
Initial No Lights or Sirens, Upgraded to Lights & Sirens	111	**1.1%**
Lights & Sirens	3,577	**34.1%**
No Lights & Sirens	6,476	**61.7%**
Total Responses	**10,494**	

The non-emergency to emergency call ratio of 2-to-1 is not unusual among North Carolina EMS agencies. In fact, it could be expected to remain close to these percentages for the near future.

The first two Response Level categories listed in Figure 11 may result as the EMD (Emergency Medical Dispatcher) continues their questioning of the 911 caller following the actual dispatch of the response units. As such, the patient's condition may worsen from that initially reported; i.e. "Initial No Lights or Sirens, Upgraded to Lights & Sirens"; or, improve or through further questioning be determined to not be as serious as initially reported; i.e. "Initial Lights & Sirens to No Lights or Sirens".

Emergency 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.

Patients transported by EMS are billed for the service, which in recent years has generated considerable revenue to offset the County's operating costs.

With the exception of 2009, the ratio of EMS patient transports to total EMS calls dispatched has shown to be increasing at a relatively steady rate between 2007 and 2011. The 5-year average ratio of transports to total EMS calls is just under 70% at 69.92.

Figure 12
Annual Emergency Transports

Year	EMS Calls Dispatched	Number Transported	Percentage
2007	9269	6171	**66.6%**
2008	9833	6631	**67.4%**
2009	9749	7330	**75.2%**
2010	10420	7284	**69.9%**
2011	10719	7562	**70.5%**

Transport Destinations

There were a total of 10 transport destinations listed on the NCOEMS/CIS website for Orange County EMS during calendar year 2011. Of the 7,562 transports made, 87.6% were to the first five destinations identified in this table.

It is significant to note that of the state's six (6) certified Level I Trauma Centers, two (2); UNC Hospitals and Duke University Hospital; are within minutes of most areas of Orange County. As well, a third Level I Trauma Center: Wake Med; can generally be reached within 40-50 minutes depending upon the point of origin within Orange County.

Figure 13
EMS Transport Destinations

Facility	Number	Percent
UNC Hospital	4,875	64.5%
Duke Univ. Medical Center	1,125	14.9%
Durham Regional Hospital	438	5.8%
Alamance Reg. Medical Center	129	1.7%
Durham VA Medical Center	61	0.8%
	6,628	**87.6%**
UNC Healthcare Chapel Hill UNC Heart Center UNC Student Health Carillon Assisted living Carol Woods Retirement Comm.	934	12.4%
	7,562	**100%**

2.3 PERFORMANCE & COSTS

Response Time

An EMS Ambulance/Unit's 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 medical emergency has to do with the obvious; ". . . it may mean the difference between life and death".[5]

[5] NENA; "911 System Survey and Resource Guide"; 2002

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 years 2007-2011 were extracted from the Communications Center's CAD system for both the "Turn-Out" and "Travel Time" intervals. For purposes of this report the terms Turn-Out Time and Travel Time are described as follows:

- Turn-Out Time-represents the time from when the radio announcement and request for assistance is received at the EMS Unit "start" location by the EMT's on duty, until the wheels on that response vehicle (ambulance) are moving; i.e. and is announced as enroute.
- Travel Time-is the time interval between that when the ambulance's wheels are moving with EMT's on board, to the time it arrives on the scene and the vehicle's wheels have stopped; i.e. "travel time".

The numbers listed represent the ***average*** times, in minutes and seconds, of all calls dispatched during each of the corresponding years. As previously described, the Total (average) Response Time for each year, is the sum of the average Turn-Out and the average Travel Time for that year.

Figure 14
EMS Interval & Total Average Response Times/2007-2011

Year	Total Units Dispatched	Turn-Out Time	Travel Time	Total Resp. Time
2007	**9,269**	1:41	7:41	**9:26**
2008	**9,833**	1:38	8:15	**9:56**
2009	**9,749**	1:29	9:15	**10:49**
2010	**10,420**	1:27	9:47	**11:14**
2011	**10,719**	1:16	9:30	**10:47**
5 Year Average:		0:01:30	0:08:53	**0:10:26**

Subsequently, the average Turn-Out Time for the years studied was 1 ½ minutes. The average Travel Time was just under nine (9) minutes. And, the average Total Response Time for the five years studied was 10 minutes and 26 seconds. As illustrated, although the Total Response Time average for 2011 decreased (improved) by 27 seconds over that documented for 2010, the trend is definitely "upward" and appears to be increasing.

Prominent industry standard setting organizations, such as NFPA, NCOEMS/PreMIS 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 as a percentage of all calls for response performance measurement. For example, *"that 90% of all calls dispatched be responded to in "x" minutes or less".*

Historically response times have been the most readily measured performance indicator for EMS and that measurement has been the *"average"*. This method however results in highlighting the problem of inequity of service because, theoretically, 50% of the patients experienced response times *longer* than average. To ensure more equitable service to all areas of the community; i.e. County; fractile response time measurement was introduced and is now commonly used by EMS systems throughout the Country.[6]

Figure 15
Average vs. Fractile Time Intervals

Interval	# Calls	Average	90%
Turnout Time	3,517	0:00:55	0:02:00
Travel Time	3,445	0:08:31	0:15:00

The previously referenced NCOEMS Performance Improvement Center runs periodic "performance toolkits" based on actual samples of an individual EMS system's call data. The Center, in addition to "average" times also runs the calculations based on the 90% fractile suggested by NFPA for Fire and EMS systems. The Orange County EMS calls identified in this table (Figure 15) were selected from 2011 call data and run for average and 90% fractile times for both Turn-Out Time and Travel Time. Of course, analysis of the average and 90% fractile times identified do little more than prove the point already stated; 50% of the patients experienced response times that took *longer* than the "average".

This will continue to be the case until the paradigm is changed which, in this case, will be the performance standard regarding response time(s) and the manner by which these response times are measured and assessed.

Total Event Duration

The total event duration is the time from the initial announcement of the 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 Turn-Out Time and Travel Time are the first two time intervals of consequence in this regard, the time on scene with the patient, transport time 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.

Figure 16
Total Average Event Duration
2007-2011

EMS Operations and Medical personnel familiar with EMS operations that were queried indicated that travel distance; i.e. *travel time,* as well as the number and rate of admissions to the emergency rooms of the destination hospitals are having an impact these times.

Note: Preliminary numbers from the first quarter of 2012 indicate that the total average event duration times have again increased by several minutes.

[6] American College of Emergency Physicians; *Principals of EMS Systems*; 2006

Expenses & Revenue

Orange County EMS is funded with General Fund (tax) dollars within the County Budget. The table below illustrates the total annual expenditures approved for EMS for the fiscal years 2008-2009 through 2011-2012.

Figure 17
Annual EMS Budget Allocations/FY 2008-2011

Account	FY 2008-09 Actuals	FY 2009-10 Actuals	FY 2010-11 Actuals	FY 2011-12 Actuals
PERSONNEL SERVICES				
PERM SALS	$ 1,714,386	$ 1,707,256	$ 1,777,621	$ 2,125,380
OT	$ 488,184	$ 441,054	$ 407,296	$ 411,056
TEMP	$ 267,873	$ 78,615	$ 131,519	$ 111,068
HOLIDAY	$ 92,905	$ 92,336	$ 98,924	$ 124,305
SOC SEC	$ 157,258	$ 138,261	$ 145,180	$ 163,856
MEDICARE	$ 36,778	$ 32,413	$ 33,953	$ 38,321
MED INS	$ 322,839	$ 329,134	$ 346,366	$ 455,629
RETIRE	$ 113,483	$ 108,953	$ 147,524	$ 184,889
PERS-OTHER	$ 56,655	$ 21,401	$ 38,226	$ 88,791
SUBTOTAL-PERSONNEL SERVICES	**$ 3,250,362**	**$ 2,949,423**	**$ 3,126,609**	**$ 3,703,295**
OPERATIONS				
TRAINING	$ 4,971	$ 1,325	$ 1,410	$ 980
CERT&LICSN	$ (252)	$ 359	$ 810	$ 1,527
TELEPHONE	$ 30,017	$ 19,858	$ -	$ 3,323
VEH MAINT	$ 110,466	$ 131,932	$ -	$ -
GAS & OIL	$ 4,973	$ 99	$ -	$ -
MOTOR POOL	$ 77,866	$ 37,438	$ -	$ -
EQUIP RPR	$ 35,662	$ 28,947	$ 33,518	$ 43,735
EQUP RENT	$ 46,438	$ 12,600	$ 12,600	$ 12,600
DUES	$ 750	$ 690	$ 1,080	$ 1,032
SUBS	$ 215	$ 259	$ 269	$ 269
MED SUPS	$ 170,600	$ 176,139	$ 214,356	$ 251,644
CONT SVS	$ 50,609	$ 54,462	$ 58,970	$ 63,747
ELECTRICIT	$ 24,150	$ 12,600	$ 12,600	$ 12,600
SUP-ED, OFF, DEP, OTH	$ 8,989	$ 10,024	$ 2,362	$ 3,700
OP-OTHER	$ 26,449	$ 26,650	$ 4,235	$ 285
SUBTOTAL-OPERATIONS	**$ 591,903**	**$ 513,381**	**$ 342,210**	**$ 395,442**
RECURRING CAPITAL				
EQUIPMNT	$ 5,130	$ -	$ -	$ -
IT EQUIP	$ 1,197	$ -	$ -	$ -
VEHICLES	$ -	$ -	$ -	$ 612,946
SUBTOTAL-RECURRING CAPITAL	**$ 6,327**	**$ -**	**$ -**	**$ 612,946**
TOTAL: EMERGENCY MEDICAL SERVICES	**$ 3,848,591**	**$ 3,462,804**	**$ 3,468,819**	**$ 4,711,683**

The largest expense category is of course personnel. Although major capital expenditures, in this case typically 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 84.5%.

It is significant to note, and should signal concern, that the expense category "Training" averaged but 3/10ths of one percent per year, of the total annual budget allocations, for the past three years.

Revenue

Orange 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 significant portions of the amounts billed. The more significant charges are of course assessed and subsequently collected for patients that are "transported" typically to a designated medical facility. The current list of fees charged by the Orange County EMS includes the following:

Figure 18
EMS Fee Schedule

Activity/Response	Charge
Basic Life Support (Non-Emergency)	$ 300
Basic life Support (Emergency)	$ 375
Advanced life Support (Non-Emergency)	$ 400
Advanced Life Support (Emergency)	$ 475
Advanced Life Support (Non-Transport)	$ 150
Mileage	$7.50/mile

Billing & Collections

Since January of 2010, the County has contracted with a private firm that specializes in providing EMS billing services. Prior to that time the County (Tax Office) handled EMS billing and collections responsibilities. Although the billing contractor handles the bulk of the monthly EMS billing, collections and required legal bookkeeping, the County continues to monitor and pursue collection of delinquent accounts.

Figure 19
FY EMS Budget & Collections (Revenue)

Fiscal Year	Annual Budget	Collections	Collections (Revenue) as % of Budget
FY 08-09	$ 3,848,591	**1,862,114**	**48.4%**
FY 09-10	$ 3,462,804	**2,001,204**	**57.8%**
FY 10-11	$ 3,468,819	**2,246,517**	**64.8%**
FY 11-12	$ 4,711,683	***2,266,940***	***48.1%***

For calendar years 2010 and 2011 the percentage of net collections to total billings was 65.7% and 59.6% respectively. Note also, however, that FY 2011-2012 *Collections* (*Revenue) as % of Budget* are incomplete. That is, they 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.

2.4 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 or not an "issue" was identified as such was based on the assessment of current operations and performance discussed in subsections 2.2 and 2.3.

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

- Availability of ALS Ambulances
- Response Times
- EMS Facilities

Issue: Availability of Ambulances

During 2011 ambulances were directed to "MOVE" 2,360 times 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 typically near the center of the County in anticipation of being able to respond in any direction the next call may direct; or,

b. In tracking the status of multiple ambulances, the Communications Center and/or EMS 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; locating/moving ambulances to address the current level of coverage or lack thereof.

The risk, however, of being down to one (or "no") ambulances is that the next emergency medical call that comes in to the Communications Center may not have an ambulance available to respond.

Granted first responders 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 available.

EMS Call Scenarios

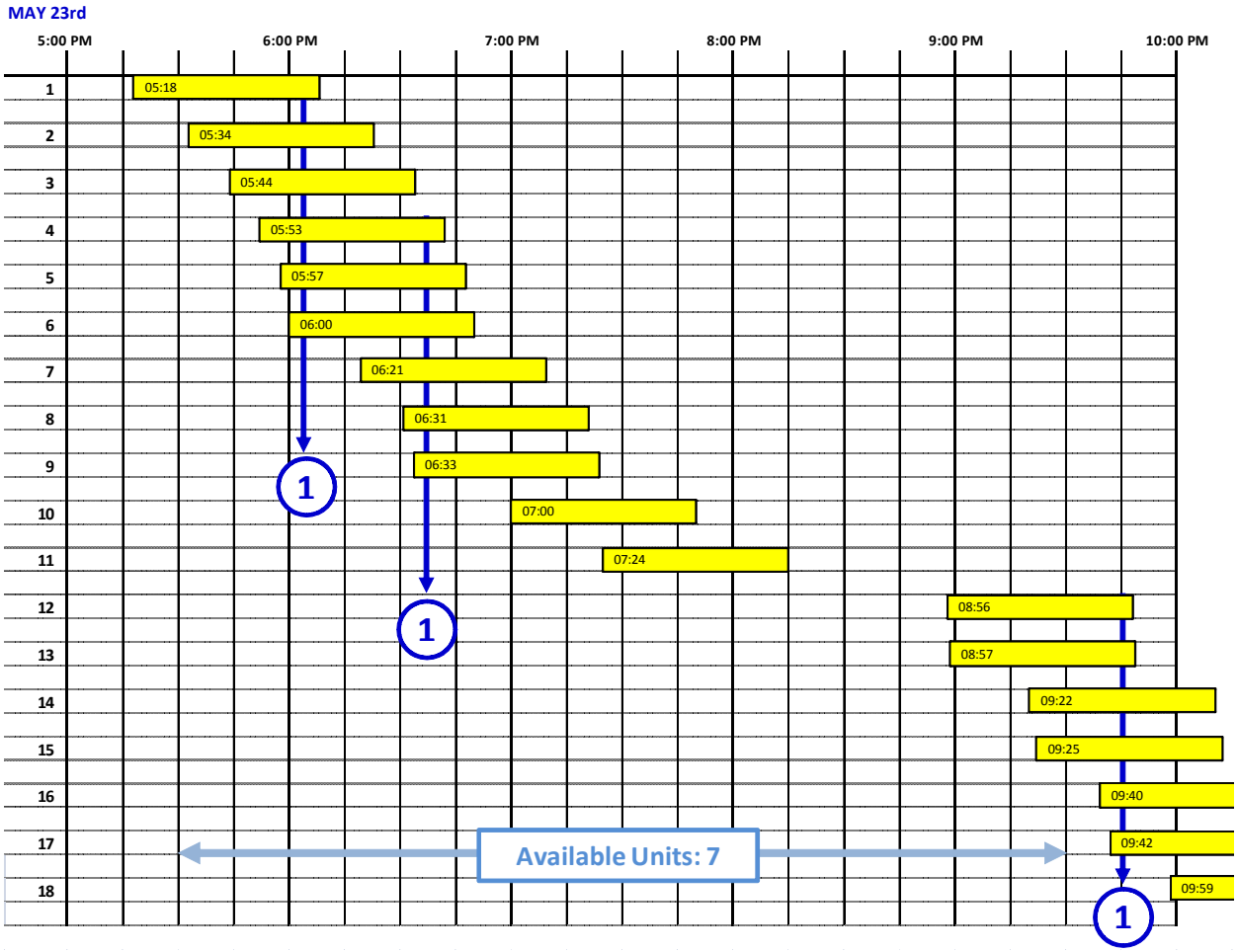
While monitoring EMS radio traffic during onsite time in the County over the months during which this study occurred, the actual announcement that "we are out of ambulances", or "we have one ambulance left" was heard numerous times.

In an effort to understand the specific circumstances that were resulting in such conditions, EMS call logs were reviewed over several months during 2011 to identify the specific conditions that occurred and the circumstances that contributed to them.

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 individually, and the "dispatch" and "available" (back in service) times were documented, as was the type of call; i.e. Chest Pains, Diabetic, Fall, etc.

For purposes of the diagram that follows, the *average* call duration calculated for 2011 (48 minutes) was used for each call recorded.

Figure 20
Actual Ambulance Demand Profile-23 May 2011



The five (5) hour period depicted includes the actual calls and the times that they were dispatched. The duration of the individual calls varied from 18 minutes to 1-hour and 44 minutes, and for all 18 calls noted the average duration was 51 minutes. The "Available Units: 7" notation is the number of Medic Units on duty during the referenced 5-hour time frame.

Note that during this five hour period there were three (3) instances where 6 of the 7 on duty ambulances were in service simultaneously; resulting in the circled number "1" referring to the last available ambulance. Subsequently, the remaining ambulance was in all likelihood directed to "move" to a location that would permit the most flexible response should another call come in before another ambulance was available.

This scenario was found to occur many times during the review of the 2011 EMS call records.

Issue: Response Time

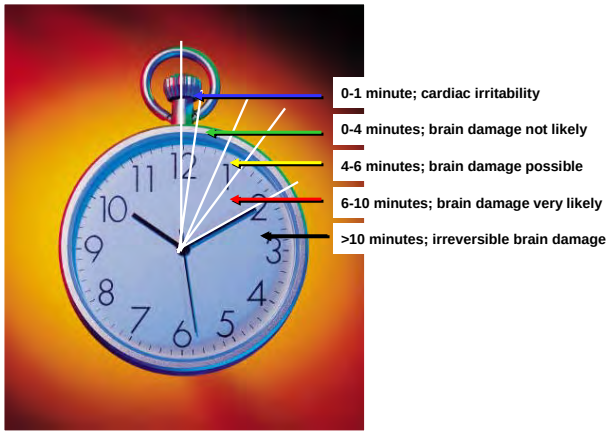
For the purposes of this report and as referenced in Subsection 2.3, EMS ambulance response time is:
The time from the initial alert or announcement by the Communications Center (also called "tone", "page", or "dispatch") of the reported emergency, to the time that the service vehicle and appropriate 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, 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 21 illustrates the significance of time in this equation.

Figure 21



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."

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 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." [7]
In addition,

- The American Association of Orthopedic Surgeons (source of Figure 21) 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.

[7] American College of Emergency Physicians; "Principles of EMS Systems"; 2006

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

The *concern* in this regard is that the years of data gathered and analyzed for this report showed that the total average response time intervals, both turn-out time and travel time, for Orange County EMS exceeded the time standards recommended; consistently.

Figure 22
EMS System Annual Average Response Times

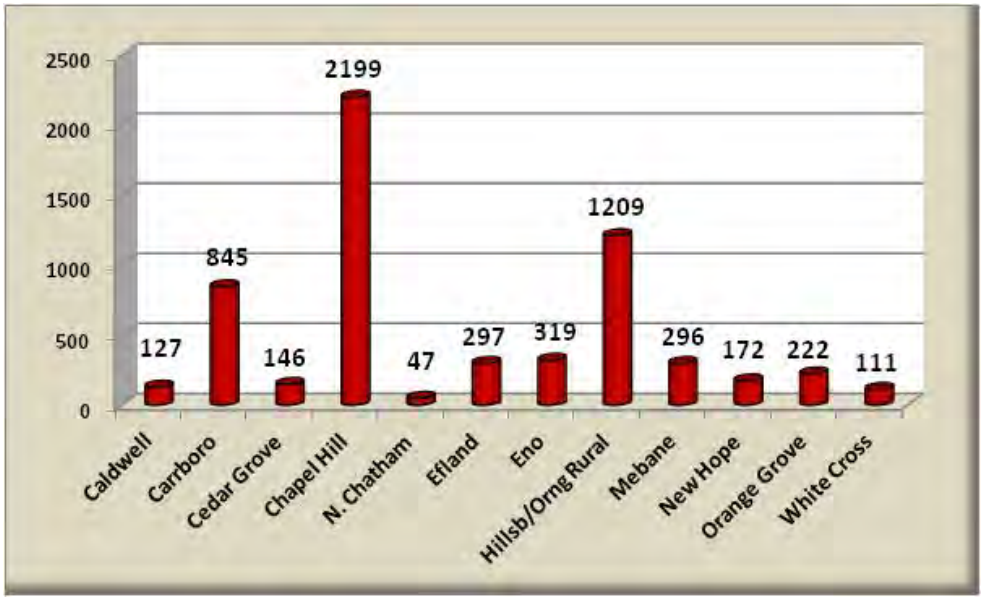
Year	Total Units Dispatched	Turn-Out Time	Travel Time	Total Resp. Time
2007	**9,269**	1:41	7:41	**9:26**
2008	**9,833**	1:38	8:15	**9:56**
2009	**10,614**	1:29	9:15	**10:49**
2010	**11,893**	1:27	9:47	**11:14**
2011	**13,079**	1:16	9:30	**10:47**
5 Year Average:		0:01:30	0:08:53	**0:10:26**

As illustrated, the 5-year average turn-out time of 1 minute-30 seconds exceeds the recommended standard of "no more than one (1) minute"[8]; as well, the 5-year average Total Response Time, of 10 minutes-30 seconds exceeds the recommended standard by almost 2 ½ minutes.

Turn-out time is an issue that must be studied internally and specifically, often times by studying the patterns of individual crews. The focus of the discussion that follows focuses on First Responder and EMS Total Response Time.

As stated, standards also suggest that basic life support (BLS) capabilities; i.e. "first responders"; arrive on scene in no less than four (4) minutes. As previously addressed, the Orange County EMS System Plan filed with the State identifies 12 Fire Departments within the County that support EMS as Medical First Responders. In 2011 the medical calls recorded to which these Fire departments responded were as follows:

Figure 23
Fire Department Medical Call Responses-2011



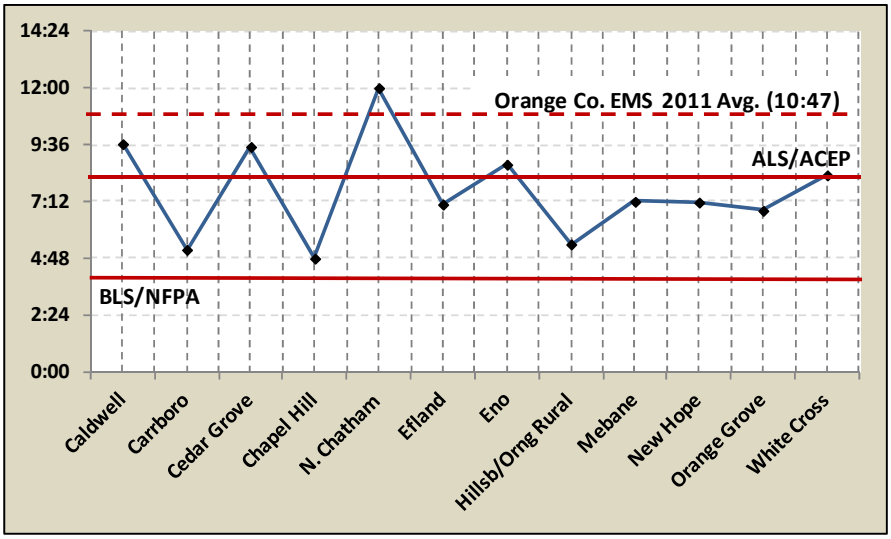
[8] NFPA 450 Guide for Emergency Medical Services and Systems; Subsection 5.6.8 Turnout (Activation) Interval

The total medical calls to which the Fire Departments responded was 5,990; which represents approximately 56% of the emergency calls to which EMS was dispatched. The concern, however, with regards to the response time standards cited is illustrated here:

Figure 24
Fire Dept. Average Response Times to Emergency Medical Calls

Department	Avg. RT
Caldwell	9:38
Carrboro	5:10
CedarGrove	9:31
Chapel Hill	4:48
N. Chatham	12:00
Efland	7:05
Eno	8:46
Hillsb/Orng. Rural	5:24
Mebane	7:12
New Hope	7:10
Orange Grove	6:49
White Cross	8:19

Figure 25
EMS & Fire Average Response Times vs. AECP & NFPA Standards



Moving upward from the horizontal axis in Figure 25 the first horizontal red line represents four (4) minutes; the second horizontal red line represents eight (8) minutes. The horizontal red-dashed line represents the total average response time for EMS in 2011.

Based upon the response time standards cited, at the very least the Fire Department/BLS response times should be *below* the 4-minute line and the EMS/ALS response times should be below the 8-minute line. On the basis of the numbers and times illustrated, none of the Fire Departments who serve as BLS level medical first responders meet the 4:00 minute BLS response time standard called for; albeit several are very close and several certainly meet the criteria much of the time assuming that +/- 50% of the "average" responses are in fact less than the average.

At the same time, the 2011 EMS average response time is nearly 3:00 minutes greater than the 8:00 minutes suggested for ALS response.

NOTE: This issue is about EMS "response time", and as an issue it very much needs to be addressed. However, *time* of response is not the only factor that ultimately will determine the quality if the response.

The role of the Communications Center in Medical emergencies is extremely important; in fact vital, if the "correct" response to a medical emergency is going to occur. The efforts to adequately triage a call based on the NAED and EMD protocols can many times provide valuable advise and/or verbal assistance in initiating basic care for the patient; can identify the specific conditions and/or symptoms to determine the level of response to be dispatched and can keep responders informed of any changes in the patient's condition or scene circumstances as they are enroute.

The medical dispatch response codes used by Communications Center Telecommunicators (see Figure 10, page 18) will identify for first responders and EMS Medic personnel the initially identified condition identified and the Response Code as well as the Response Status recommended; i.e. "DELTA" = "life threatening", First Responders respond Emergency Status; i.e. "lights & siren".

Proper triaging of an emergency medical call is vital and can go a long way to assuring the responder dos not run over a pedestrian at a crosswalk on the way to an incident that is not an emergency.

This said; response "time" in Orange County must still be addressed. The professional organizations that have spoken to and suggested the time standards referenced have identified their basis for doing so. In many discussions of the topic with local EMS professionals in North Carolina, ALS response objectives are typically established at between 8:00-9:00 minutes.

On the basis if the organizations that have endorsed this standard it merits attention and until the North Carolina Medical Board which is responsible for adopting the rules and standards governing advanced life support services says otherwise, the standard; albeit its potential consequences, need to be considered seriously.

Vehicle Speed & Distance to Incident Location

For reference, the following formula can be used to calculate the average travel time, particularly for major emergency vehicle; i.e. ambulances and Fire trucks; between two points; (NFPA 1720-A.4.3.2):

1.7 x Distance + 0.65 = Travel Time

For example, if the distance to the scene of an incident is known to be five (5) miles;

(1.7 x 5) + .65 = 9.15; a Travel Time of 9 minutes and 12 seconds

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

Reversing this formula, using the 2011 EMS average Travel Time of 09:30, and converting the 32 seconds to hundredths of a minute, would result in the following:

9.50 minutes Travel Time = 1.7 times Distance "x" + .65
or
(7.53 - .65)/1.7 = 4.2 miles traveled

This being the case, the distance that Medic Units could travel and still meet the objective of an 8:00 minute total response time is 4.2 miles.

However, ***were*** this to be the case; i.e. ALS ambulances never responding to incidents further than 4.2 miles from their assigned base-in order to meet the 8:00 minute Total Response Time objective; the area within which the existing EMS units could effectively travel would leave the majority of the County essentially "uncovered".

The pages that follow include a sequence of County maps that illustrate the concern associated with this issue.

Map #1 is that previously shown on page 8; it identifies the existing EMS district boundaries and the staging locations of the current EMS Medic units.

Map #2 outlines in various colors the 4-mile/8-minute drive time road-based limits from each Medic location. Note that the boundaries for Medic 1, Medic 4, and the temporary location of Medic 5 overlap one another somewhat. Also, the south County locations identified for Medic 2, 3, 6, 7, and 8 overlap to such an extent that the outermost distances of each were used and combined in order to determine the extent of area covered.

Map # 3 shows the same 4-mile/8-minute road-based boundaries as Map #2, however, this time overlain onto the map illustrating the county-wide distribution of EMS call locations over the past three years; 2009-2011.

Map #4 includes shading over the areas of the County that currently lay *outside* the limits of the 4-mile/8-minute ALS response perimeter(s).

Map #5 is a duplicate of Map #4, however, this time it also includes red dots at the approximate locations of each of the 20 Fire Department stations within the County; and as is the case with Mebane and North Chatham Fire Departments-very near; the County.

Comments re: Maps

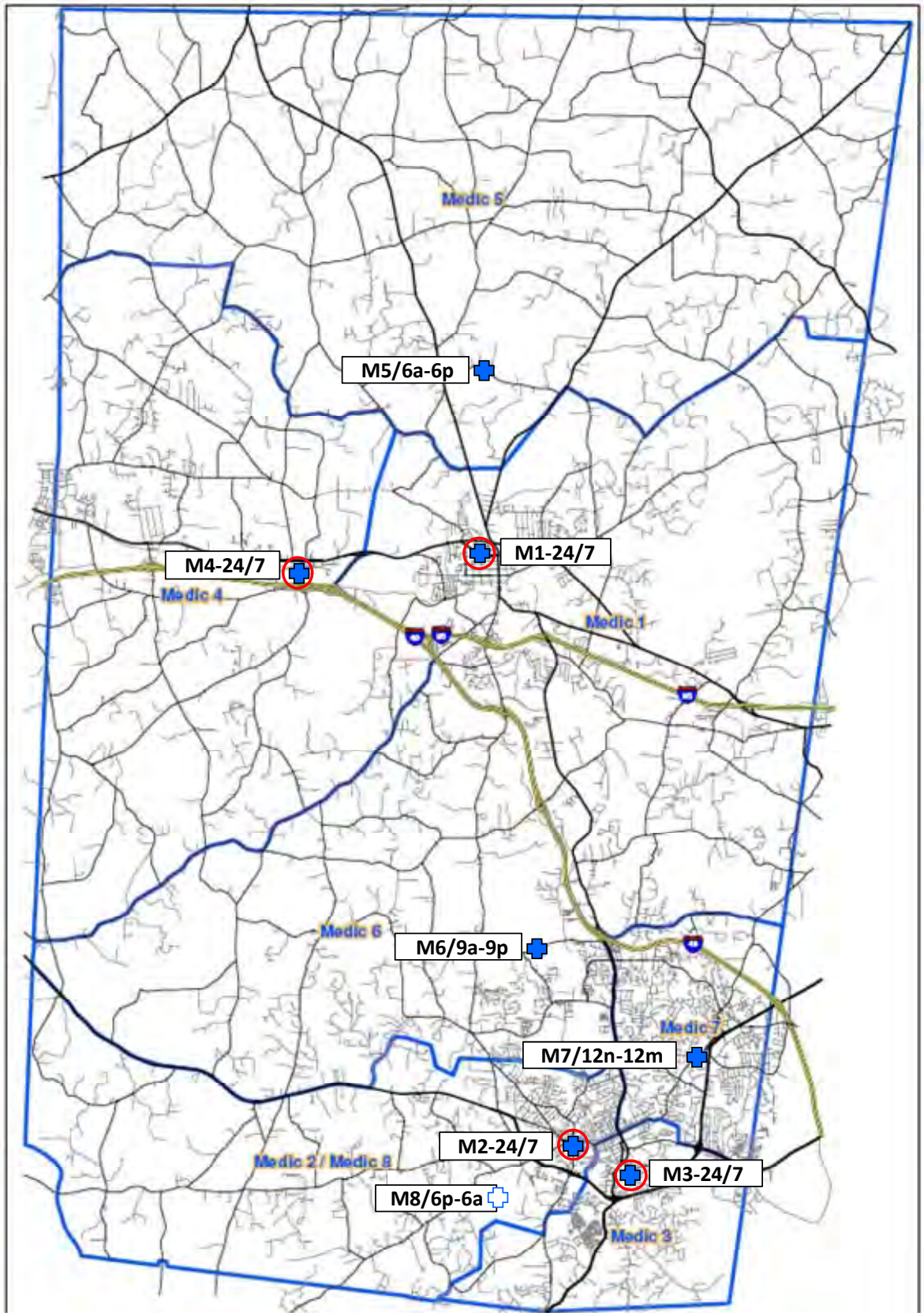
- While the maps emphasize significant characteristics impacting ALS response time, they (collectively) also exacerbate somewhat the previous issue having to do with ambulance availability.

- The areas of the County identified wherein ALS Medic Units should be able to travel within the 4-mile/8-minute time standard are, in fact centered within the more populated areas of the County and, for the most part, proximate the major highways corridors. However, there are still many hundreds of EMS calls that have been dispatched beyond these areas of coverage over the past three years that *have not* received the same level of response.

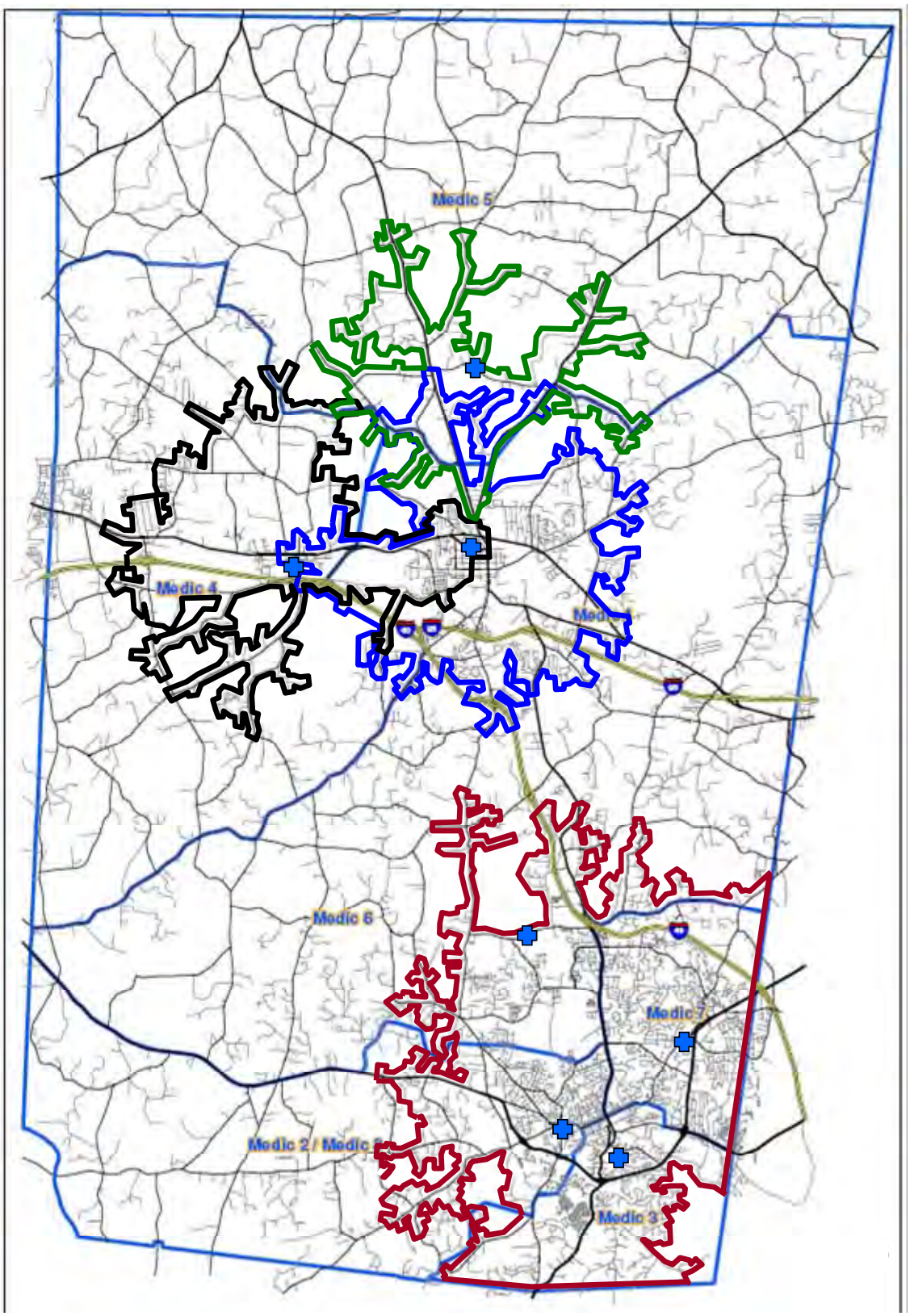
- A visual estimate of the shaded area noted in Map #4 would suggest that as much as 55-60% of the County is outside the 4-mile/8-minute ALS response perimeter.

- As previously stated, the combined (potential) capabilities of the 12 Fire Departments that are available to respond from 22 additional station locations ***could*** provide some assurance to areas of the County that take longer than 8 minutes for EMS/ALS Units to access; however, to get to the incident scene within the 4-minutes suggested for a BLS response, would mean a 2-mile/4-minute Total Response Time. A response time that, as an overall or individual department average, has yet to be accomplished.

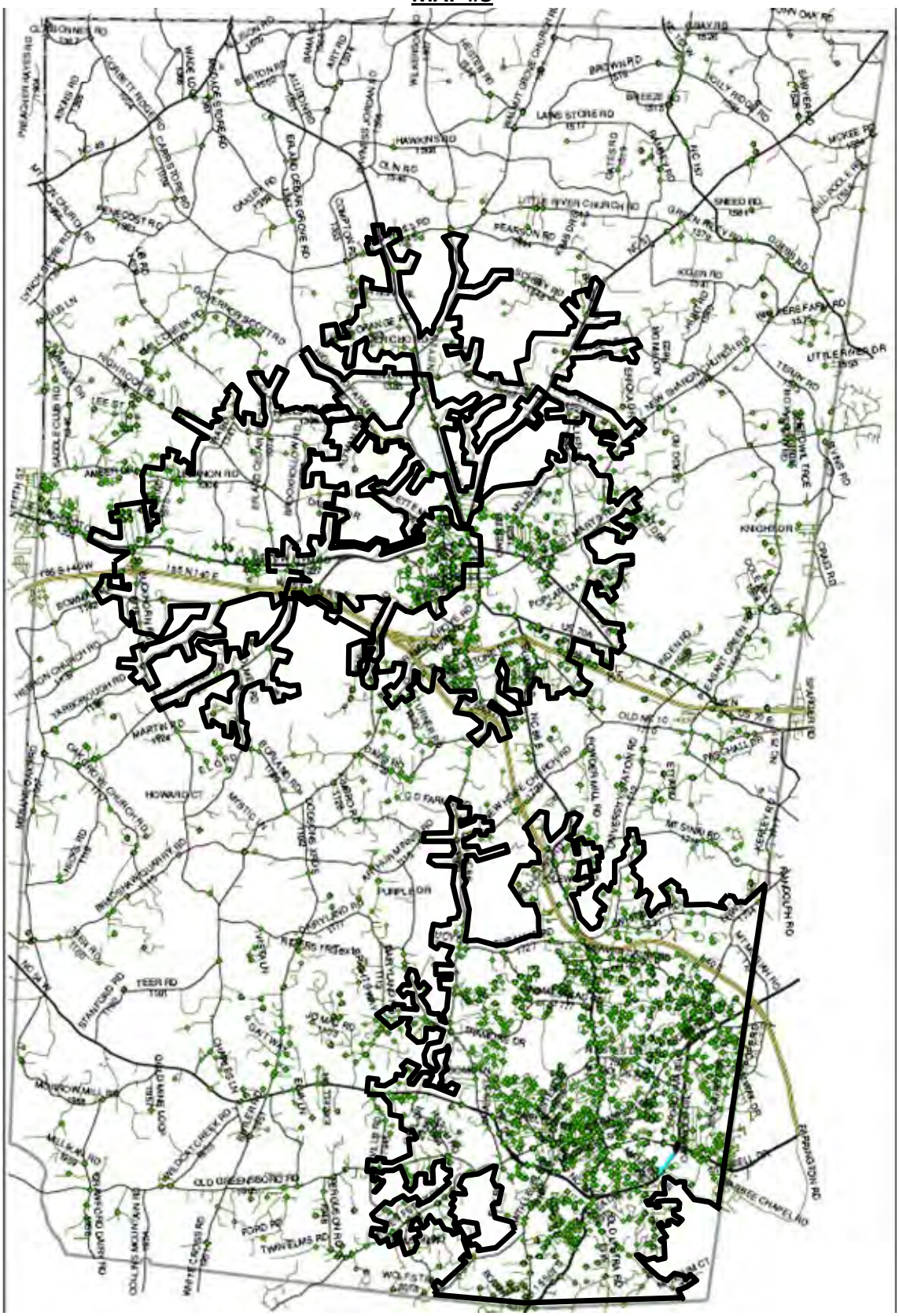
MAP #1


Medic 5
M5/6a-6p
M4-24/7
M1-24/7
Medic 4
Medic 1
Medic 6
M6/9a-9p
Medic 7
M7/12n-12m
M2-24/7
M3-24/7
Medic 2 / Medic 8
M8/6p-6a
Medic 3

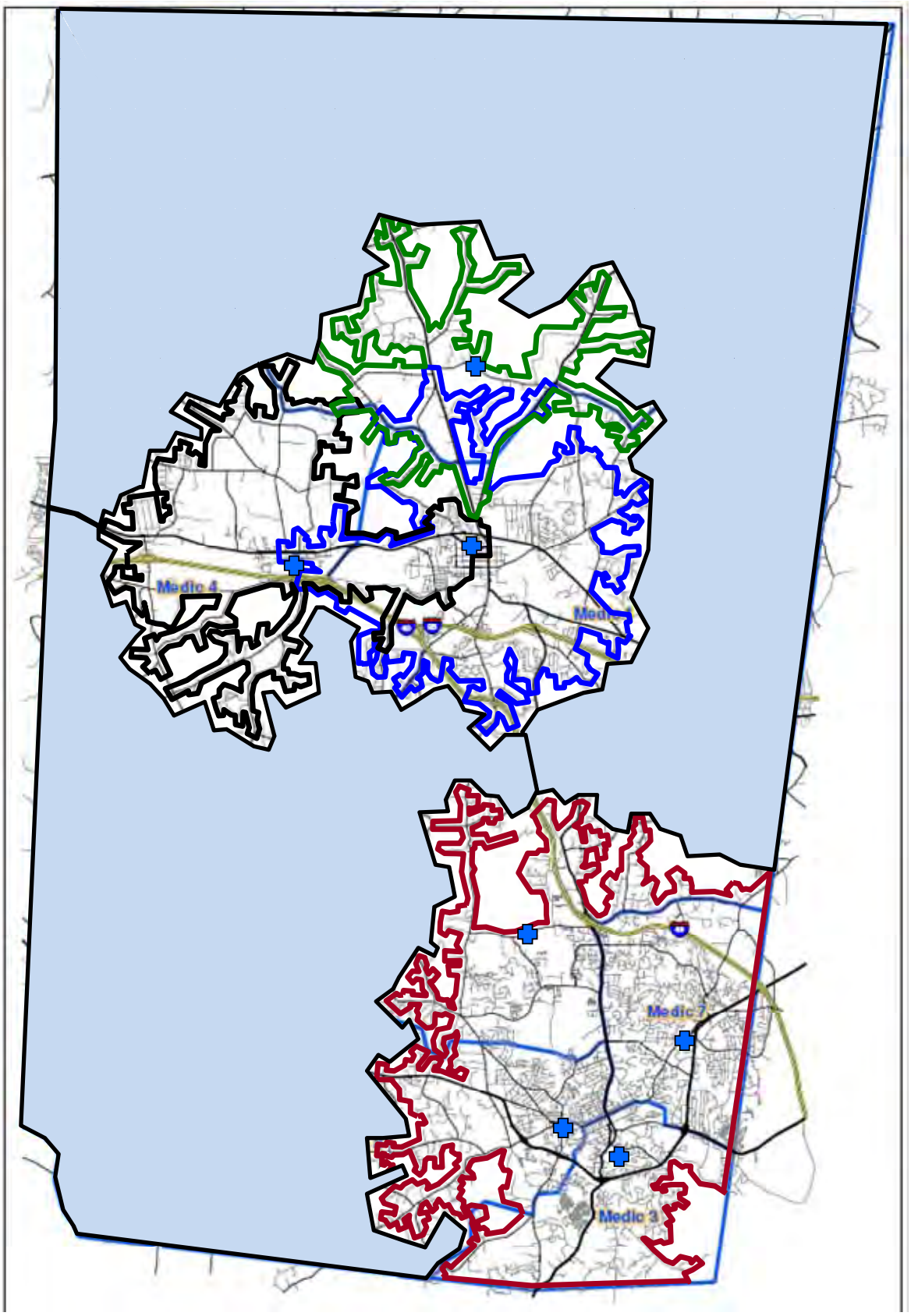
MAP #2



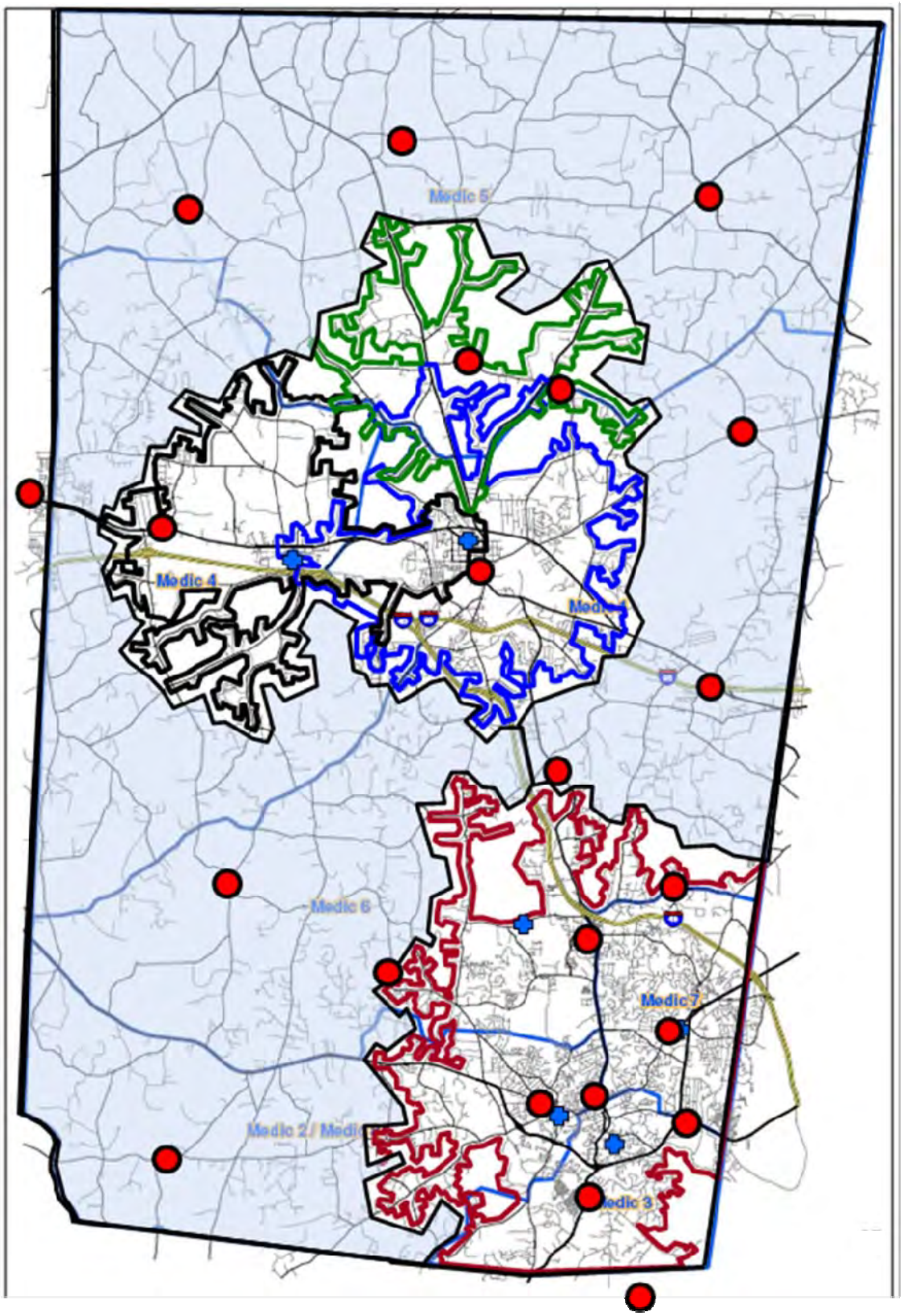
MAP #3


HAWKINS RD
GLN RD
LANE STORE RD
BROWN RD
LITTLE RIVER CHURCH RD
PEARSON RD
KOLEN RD
SHEED RD
QUEEN RD
MOSER RD
SULLY RIDGE RD
LAWYER RD
LITTLE RIVER DR
TERRY RD
KNIGHS DR
CRAIG RD
SPARGER RD
RANDOLPH RD
FARRINGTON RD
TEER RD
OLD GREENSBORO RD
TWIN ELMS RD
FORD RD
OLD NC 10
HOWARD CT
PURPLE DR
MT SINAI RD
KERLEY RD
BOWMAN RD
MARTIN RD
OAKFORD CHURCH RD
HERRON CHURCH RD
YARBOROUGH RD
SADDLE CLUB RD
LYNCHBURG RD
MT OLIVE CHURCH RD
CARR STORE RD
EARLAND CEDAR GROVE RD
GOVERNOR SCOTT RD
HIGHROCK RD
LEE ST
ANDERSON RD
BLACKWELL MEMORIAL CHURCH RD
BLACKWELL QUARRY RD
STANFORD RD
MILLWARD RD
WILDCAT CREEK RD
DOLLINS MOUNTAIN RD
WHITE CROSS RD
DEEP RIVER DR
GATEWAY DR
CHURCH ST
MAIN ST
NEW SHARON CHURCH RD
PEACHTREE RD
PEACHTREE HAYES RD
MOUNT OLIVE CHURCH RD
WAGE LOOP
WILLIAMS RD
ANTIOCH RD
ALLISONDALE RD
WILKERSON RD
BALLAST GROVE CHURCH RD
GATES RD
BLAIR RD
HIGH RD
BULLOCK RD
GREEN RIVER RD
FERRELL RD
OWL TRACE
SPRING RD
DOWDY MILL RD
PLEASANT GREEN RD
HOLDEN RD
WOLFSTONE CT
OLD FARM RD
MCLEAN RD
MCLEAN CT
MCLEAN DR
MCLEAN LOOP
MCLEAN PL
MCLEAN WAY
MCLEAN CIR
MCLEAN TRL
MCLEAN RUN
MCLEAN PATH
MCLEAN PKWY
MCLEAN BLVD
MCLEAN ALLEY
MCLEAN TERR
MCLEAN HILL
MCLEAN GLEN
MCLEAN VIEW
MCLEAN PARK
MCLEAN GROVE
MCLEAN CREEK
MCLEAN RIDGE
MCLEAN MEADOW
MCLEAN FOREST
MCLEAN VALLEY
MCLEAN SPRING
MCLEAN MEADOW
MCLEAN FOREST
MCLEAN VALLEY
MCLEAN SPRING

MAP #4



MAP #5



Average vs. Fractile Response Time Performance Criteria

It is has been a common practice in the past to report response times by using *averages.* This is an easy-to-understand methodology that calculates response times by adding all individual call response times together and then dividing the total number of minutes by the total number of responses to come up with an average.

Unfortunately, measuring and reporting *average* response times is inadvisable because one-half of the patients may receive the required response time, while the other half will not. Given what has been discussed about the need for an eight-minute response to maximize survivability from cardiac arrest, an *average* eight-minute response, by definition, means that one-half, or more, of the service's patients are not reached within that critical time.

Many high-performance emergency ambulance services use a different methodology to measure response times to ensure service equality to all patients: *fractile distribution; in most instances as suggested by NFPA and others,* reported at the 90th percentile.

This methodology places each response within the minute it is achieved and stacks the minutes in ascending order to establish a fractile response-time distribution. The point at which the fractile response time crosses the percentile measures the point of the service's response-time reliability.

For example; the current Orange County EMS response time objectives, as published in the Orange County EMS System Plan on file with the State Office of EMS, states that:

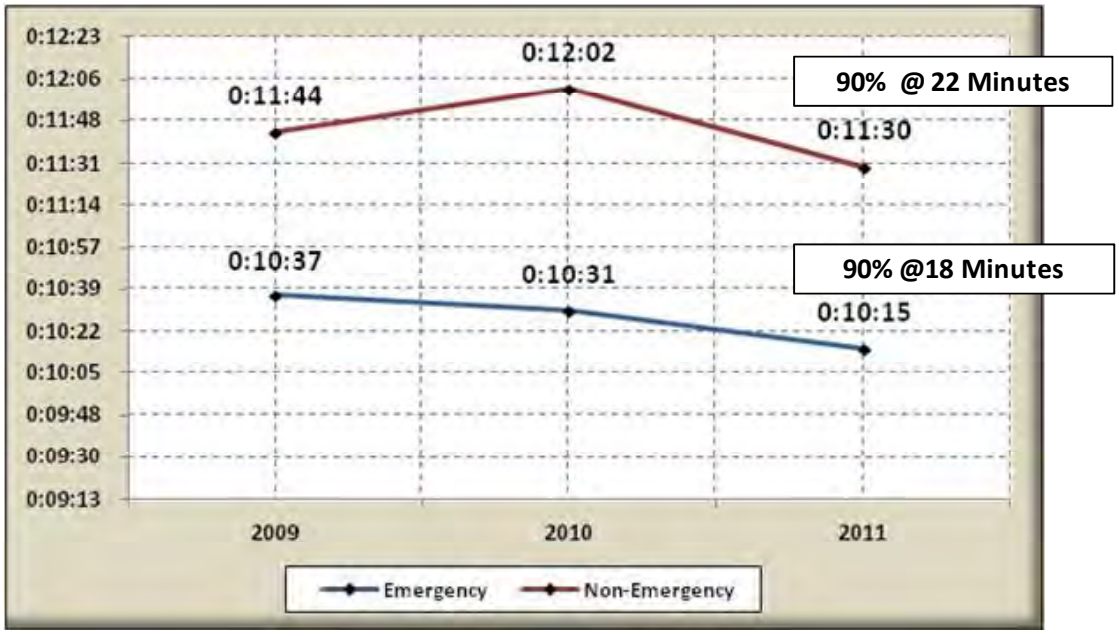
For Emergency Responses;

. . . . . A Paramedic be on scene within 12 minutes 90% of the time

For Non-Emergency Responses;

. . . . . A Paramedic be on scene within 15 minutes 90% of the time

Figure 26
Annual Average Response Time-Emergency vs. Non-Emergency-All Calls 2009-2011
90% Fractile Times-Emergency vs. Non-Emergency-All Calls 2011



Highlighting the 2011 numbers; while the emergency and non-emergency ***average*** response times were less than the 12-minute and 15-minute objectives established for each; the *90% fractile response* for the non-emergency calls was *22 minutes* vs. the *15 minute* objective , and the *90% fractile response* for the emergency calls was *18 minutes* vs. the *12 minute* objective.

Response Time by Area of the County

During the initial presentation of study findings to the Emergency Services Work Group it was suggested that it had long been the perception within the County that rural areas did not receive as rapid a response as the more urban and populated areas of the County. And, that it would be helpful to see and assess what those actual call numbers and corresponding EMS response times actually were.

In doing so, a second series of County maps follows.

Map #6-is again a map of Orange County; in this instance, divided into 2-mile square, numbered grids. The map was developed by Emergency Services Department personnel.

Map #7-color codes each grid on the basis of the average EMS response times recorded for the calls responded to within it during calendar year 2011. The number of calls per grid ranged from '0' to 1,505. The color key located at the bottom of the page provides an explanation of the colors used:

- The average response time into red grid squares was greater than 20 minutes
- The average response time into green grid squares was between 16-20 minutes
- The average response time into blue grid squares was between 12-16 minutes
- The average response time into orange grid squares was between 8-12 minutes
- There were no EMS calls dispatched during 2011 into those grids that were left white

Note also that the Appendix Section of this report includes a larger scale County Grid Map (Map #6) together with the number of EMS calls dispatched into each grid and the average response time for those calls; for the years 2009-2011.

Map #8-identifies the boundaries (in blue) of the existing designated EMS districts. Within each district there are notations that indicate the number of EMS calls and the average response time to those calls for the calendar year 2011. District 5 appears to be the largest in land area followed by District 4 and District 1. District 7 is the smallest.

Map #9-divides the County into hypothetical "zones' based upon the study of EMS call volume, response time, area accessibility, and population. Then, calculating the number of calls and corresponding average response times that occurred within each zone to provide a look at the response time issue from another perspective. For example EMS District 2, in Map 8 showed 2,400 calls with an average response time of 08:37 to all calls. When dividing that District and considering the grid characteristics of "Zone 8" , which includes the western half of District 2, there is a dramatic decrease in the number of calls and significant increase in the average response time.

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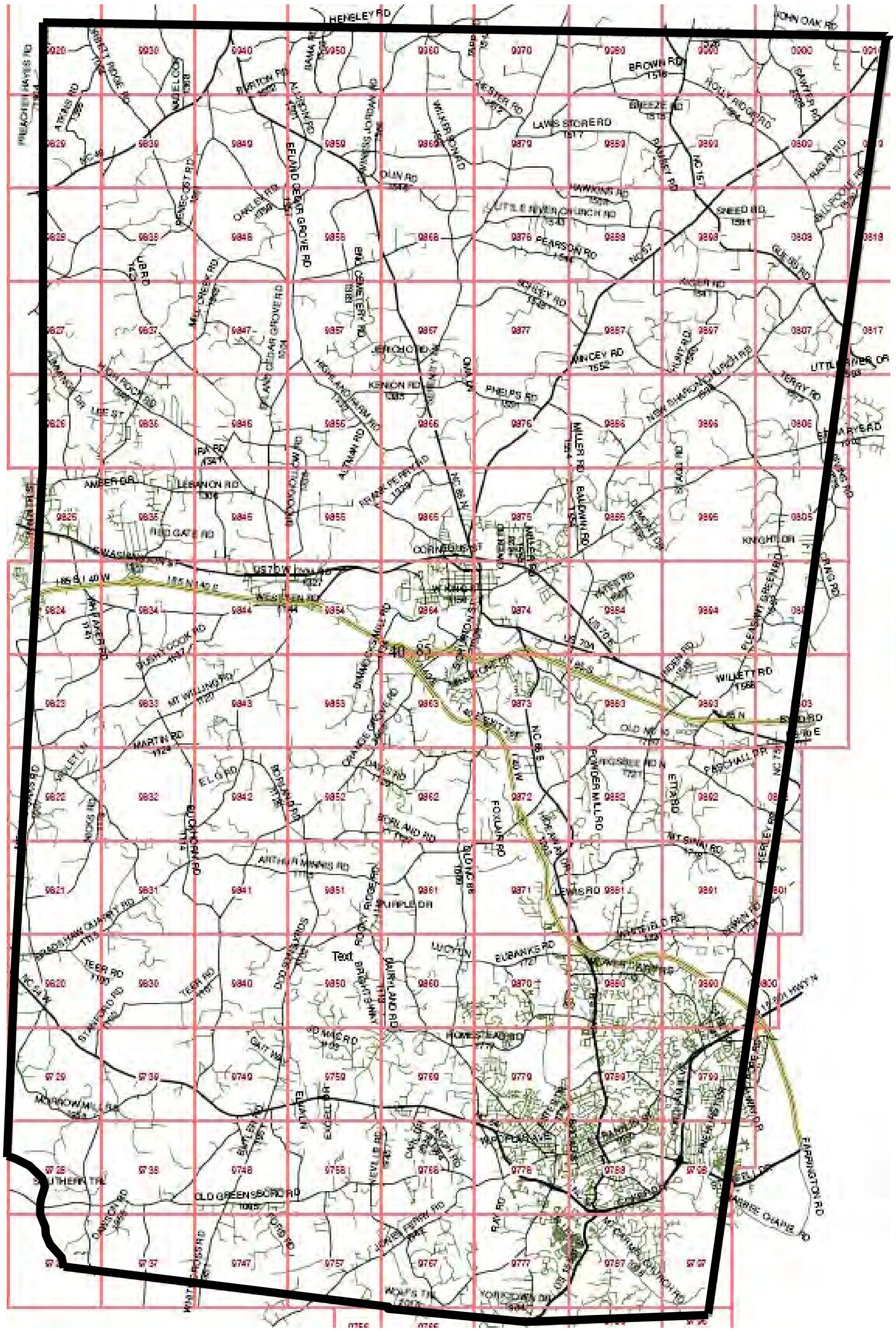
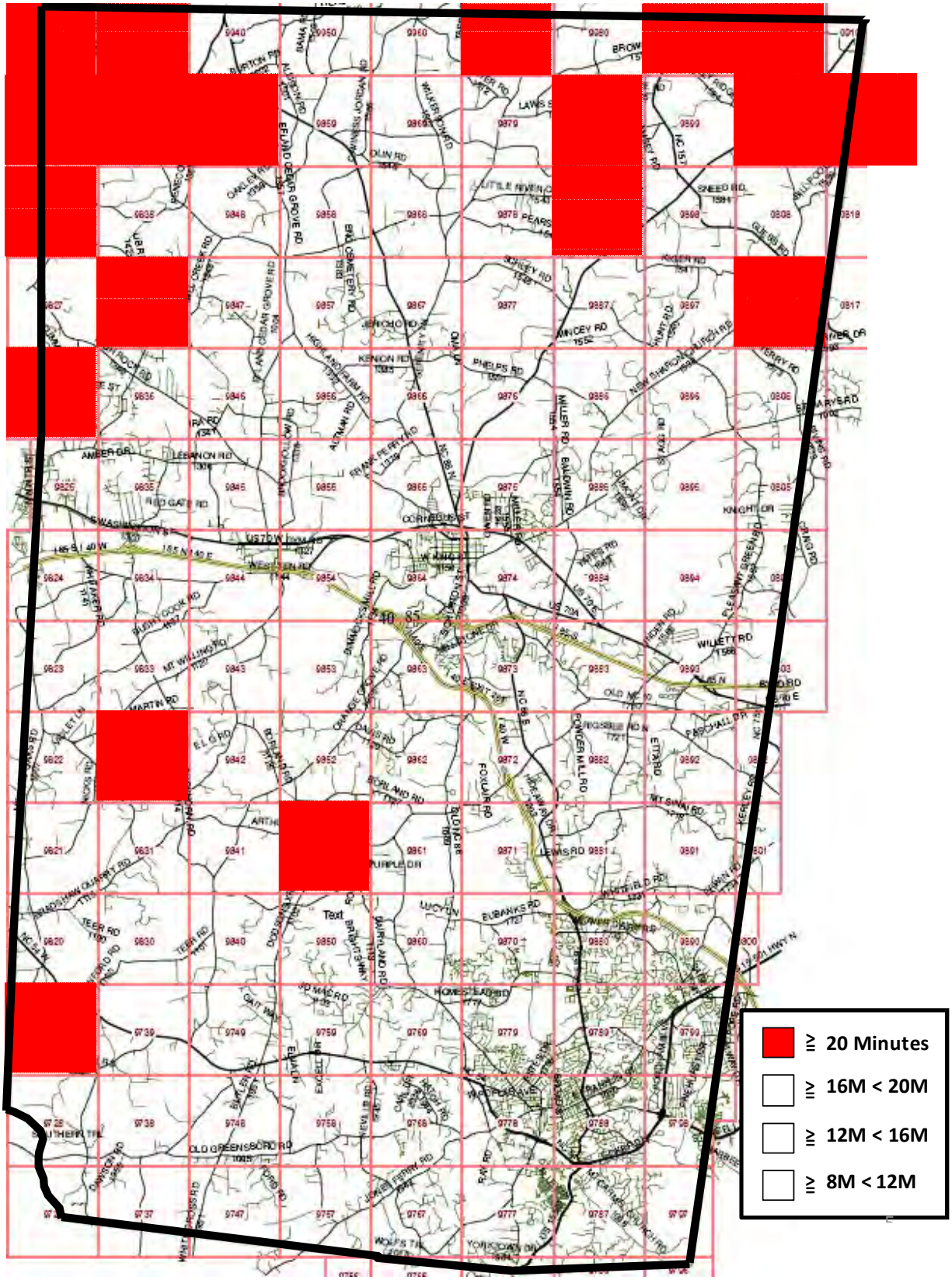
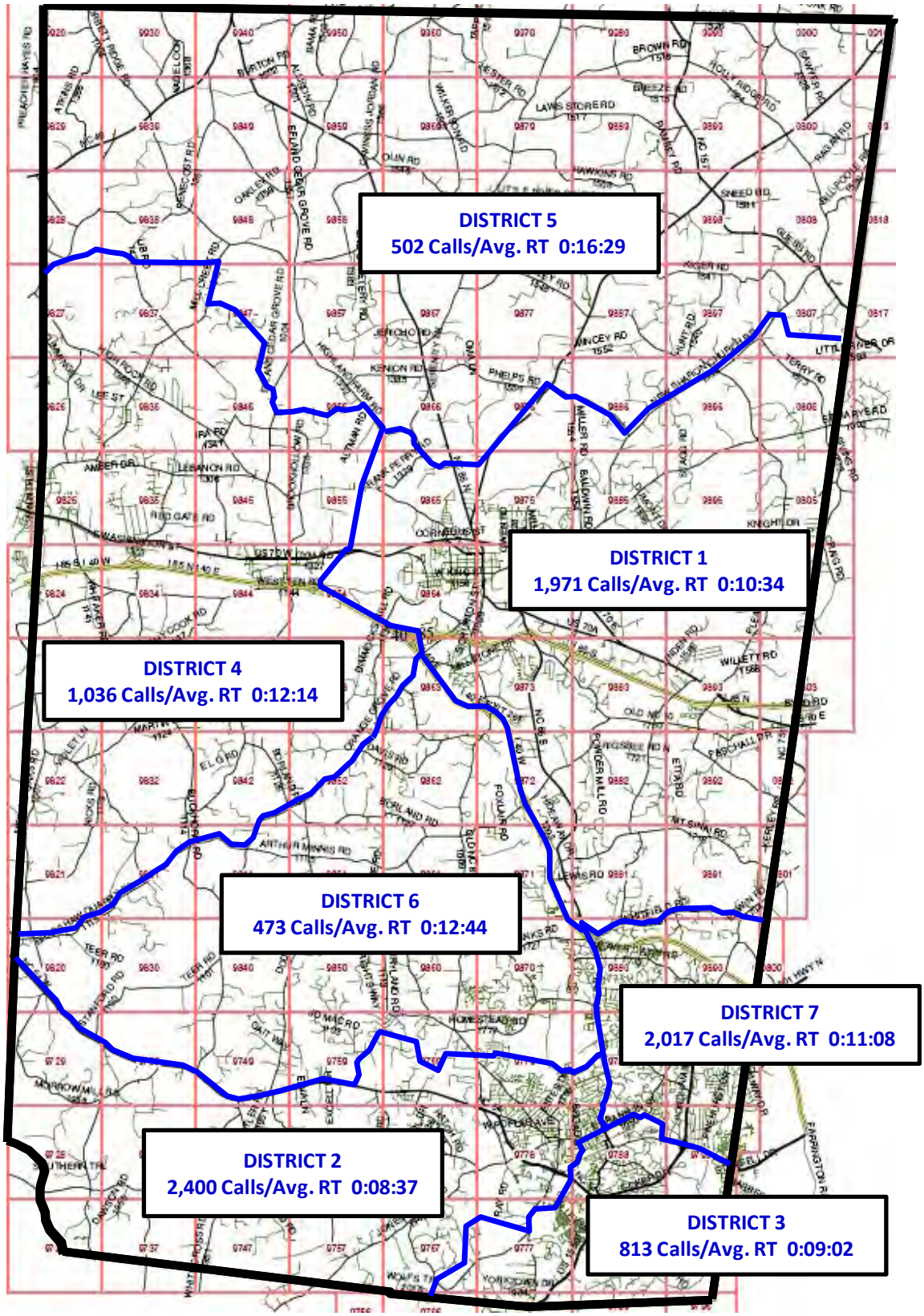
MAP #6


HENSLEY RD
JOHN OAK RD
BROWN RD
LAWS STORE RD
HAWKINS RD
LITTLE RIVER CHURCH RD
SNEED RD
PEARSON RD
JERICHO RD
KENION RD
PHELPS RD
LEE ST
AMBER DR
LEBANON RD
RED GATE RD
KNIGHT DR
WILLETT RD
OLD NC 10
MARTIN RD
MT WILLING RD
E L G RD
ARTHUR MINNIS RD
LEWIS RD
PURPLE DR
EUBANKS RD
HOMESTEAD RD
TEER RD
OLD GREENSBORO RD
SOUTHERN TR
FARRINGTON RD
FOXLAIR RD
POWDER MILL RD
MT SINAI RD
NC 86
NC 57
Text

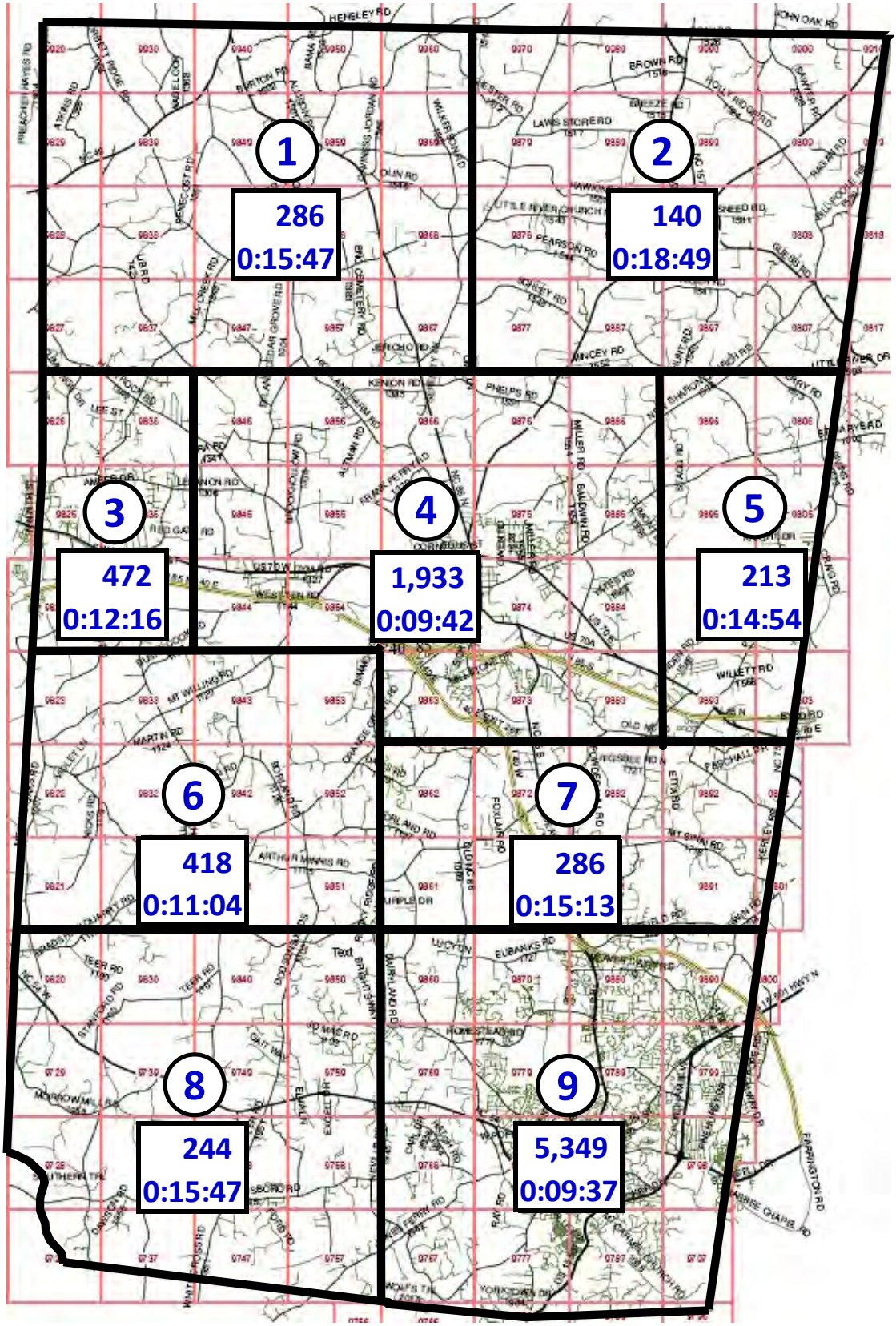
MAP #7



MAP #8


DISTRICT 5
502 Calls/Avg. RT 0:16:29
DISTRICT 1
1,971 Calls/Avg. RT 0:10:34
DISTRICT 4
1,036 Calls/Avg. RT 0:12:14
DISTRICT 6
473 Calls/Avg. RT 0:12:44
DISTRICT 7
2,017 Calls/Avg. RT 0:11:08
DISTRICT 2
2,400 Calls/Avg. RT 0:08:37
DISTRICT 3
813 Calls/Avg. RT 0:09:02

MAP #9


1
286
0:15:47
2
140
0:18:49
3
472
0:12:16
4
1,933
0:09:42
5
213
0:14:54
6
418
0:11:04
7
286
0:15:13
8
244
0:15:47
9
5,349
0:09:37

The responsibility for determining *what* the EMS system response time objective(s) should be is clearly the County's, in that it is the County that must define the level of care that it intends to provide.

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.***

Issue: EMS Base Facilities

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. After which, the architectural details will follow.

The Existing Conditions sub-section did not alluded to physical EMS "bases" or "stations". Rather it referred to EMS "staging"locations. This is because 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 or EMS personnel.

Of significant concern, particularly in view of their cost, is that none of the staging locations available now can offer or assure EMS that it can house an assigned and equipped ambulance inside a code compliant, temperature controlled, securable building as suggested by NCOEMS guidelines.

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 have essentially come to EMS by default. There is no evidence that current staging area locations were strategically planned, but simply that space that was available via recent vacation or 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 essentially uncovered and without any visible evidence that Orange County EMS has a presence in the area or community.

Orange 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.

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.

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

- Indoor, temperature controlled vehicle bays 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
- Food preparation and dining space
- Common/dayroom space
- Multipurpose storage space
- Staff restrooms
- Technology to permit wireless internet capabilities, phone, radio, and pager communications
- Public entrance and space to accommodate visitors

There have been those quick to suggest that EMS should "share space" with the Fire Departments. And there are those that have been just as quick to suggest that, "no, it would never work-Fire and EMS could never get along". The fact is, Fire and EMS personnel work together throughout the County every day . . . and get along just fine.

The actual issue of Fire and EMS "sharing" facilities is more complex:

- The ultimate purpose (mission) of each is different
- Fire Department service areas are specific and limited
- EMS' service area is the entire County
- The schedules of each are different
- EMS may run continuously for extended periods of time
- Fire will more often respond to "periodic" incidents
- The work habits of each are different
- The facility requirements of each are different
- Fire Departments are visible within their respective communities; few know where EMS is.
- Existing Fire station locations are not strategically located to adequately address the deployment of EMS vehicles; to continue to push the "sharing" of these facilities with their respective requirements so different, would simply continue a practice; i.e. discussion; that has worn out its welcome several times over.

EMS Base Location Scenarios

Again, prompted by discussions during presentations to the Emergency Services Work Group regarding EMS response times and the lack currently of adequate EMS base facilities, two (2) hypothetical facility location scenarios were developed to enable a more in-depth discussion and subsequent assessment of options that might be available to the County.

As noted previously, prominent national organizations have suggested that an ALS ambulance be on the scene of a medical emergency within eight (8) minutes of being dispatched. In turn, Orange County EMS has established a response time objective of 12-minutes, to 90% of all emergency calls dispatched.

Therefore, utilizing a "blank slate" approach and looking at a map of the County without regard to existing EMS district boundaries or existing ambulance staging locations; measurements were taken and calculations run to determine the number of EMS base facilities that would be required, together with their respective (approximate) locations, that would be able to provide:

1. An OCEMS ambulance on scene *anywhere* in the County **within eight (8:00) minutes**.

2. An OCEMS ambulance on scene *anywhere* in the County **within twelve (12:00) minutes**.

In reality it took the development (and redevelopment) of many trial-and-error partial scenarios to eventually achieve the objective set for each; the fewest number of EMS stations that would provide the maximum possible coverage. The results are illustrated on the maps that follow.

- **MAP #10-8:00 Minute Response Time (RT) Coverage Scenario-A**; identifies 19 EMS station locations
- **MAP #11-8:00 Minute Response Time (RT) Coverage Scenario-B**; identifies (in red) remaining "pockets" of land not accessible within the 8:00 minute response time limitation
- **MAP #12-12:00 Minute Response Time (RT) Coverage Scenario-A**; identifies nine (9) EMS station locations
- **MAP #13-12:00 Minute Response Time (RT) Coverage Scenario-B**; identifies (in red) remaining "pockets" of land not accessible within the 12:00 minute response time limitation

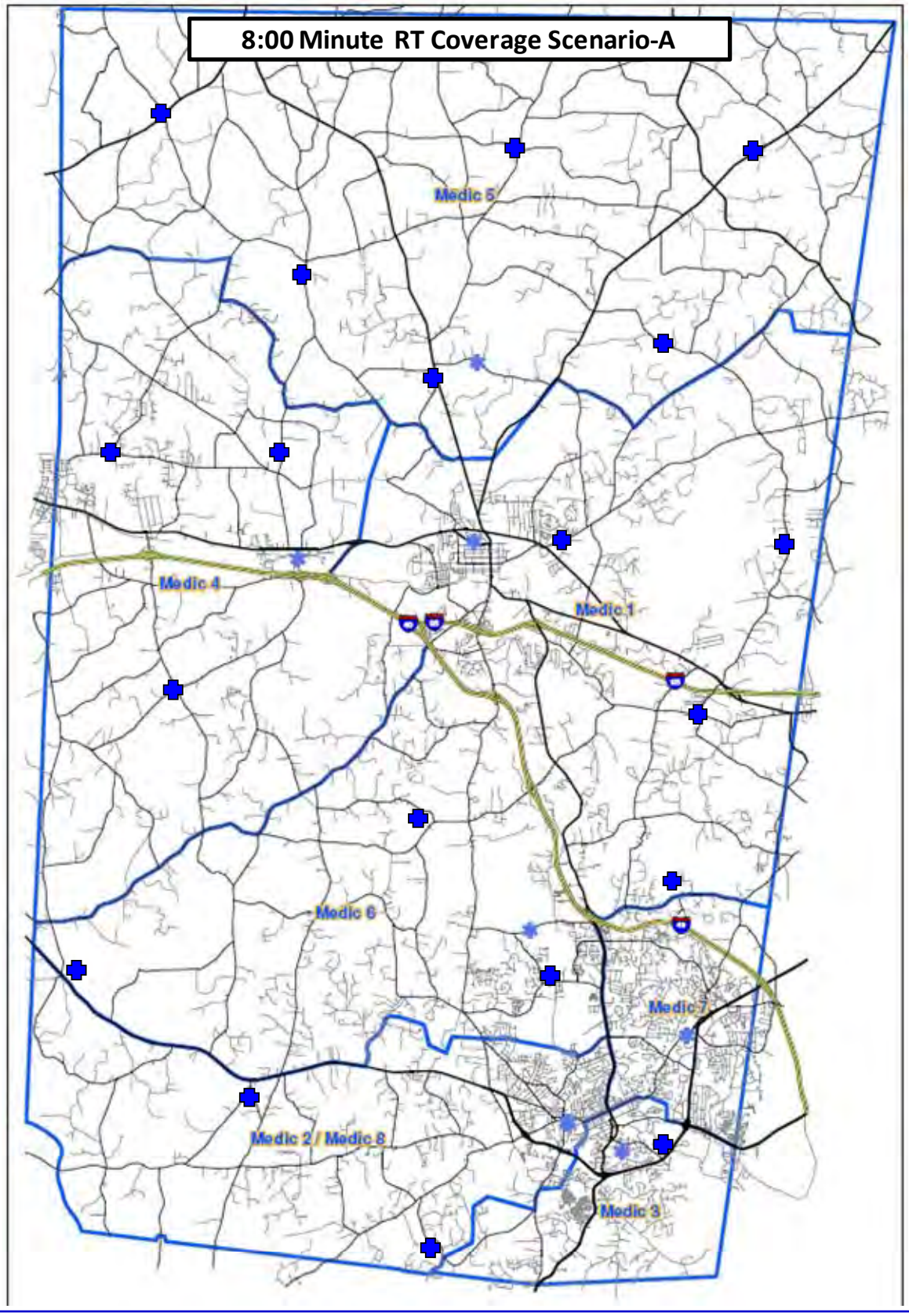
Scenario Personnel Costs

As a means of comparison, the number of stations and the corresponding number of FTE's required to staff a single 24 hour ambulance in each proposed station, and the estimated personnel costs of each coverage scenario were assessed against existing FY 2011-2012 budget figures.

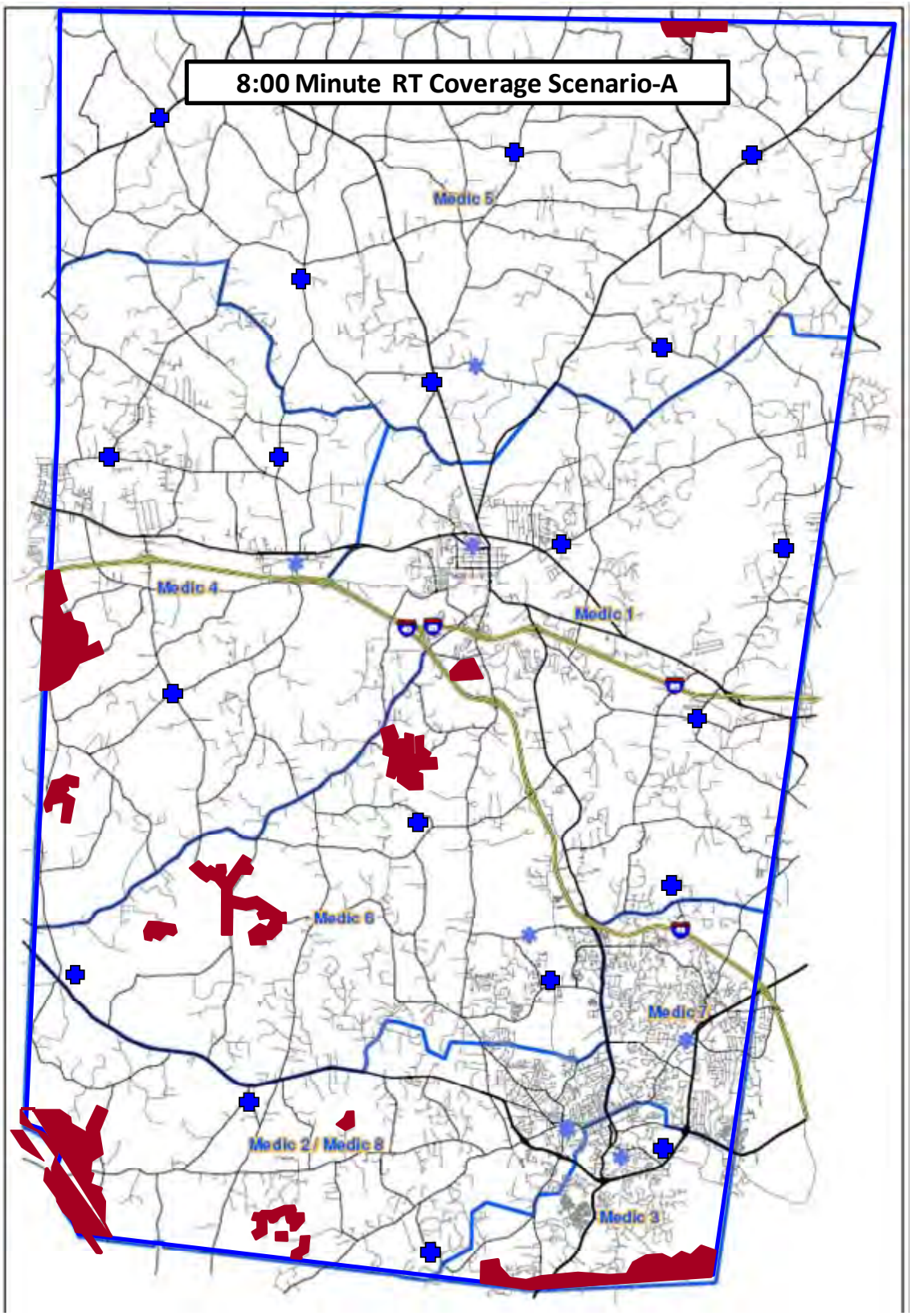
12:00 Minute Response Time Coverage		
19 Stations		204 FTE's
	versus	
6 Locations		63 FTE's
Total Personnel Cost	**$**	**10,135,976**
Less Existing Budget Pers. Cost	$	(3,703,295)
Less Est. Overtime Savings [1/2]	$	(200,000)
Total Net Cost Addt'l. Personnel	**$**	**6,232,681**

8:00 Minute Response Time Coverage		
9 Stations		97 FTE's
	versus	
6 Locations		63 FTE's
Total Personnel Cost	**$**	**4,818,233**
Less Existing Budget Pers. Cost	$	(3,703,295)
Less Est. Overtime Savings [1/2]	$	(200,000)
Total Net Cost Addt'l. Personnel	**$**	**914,938**

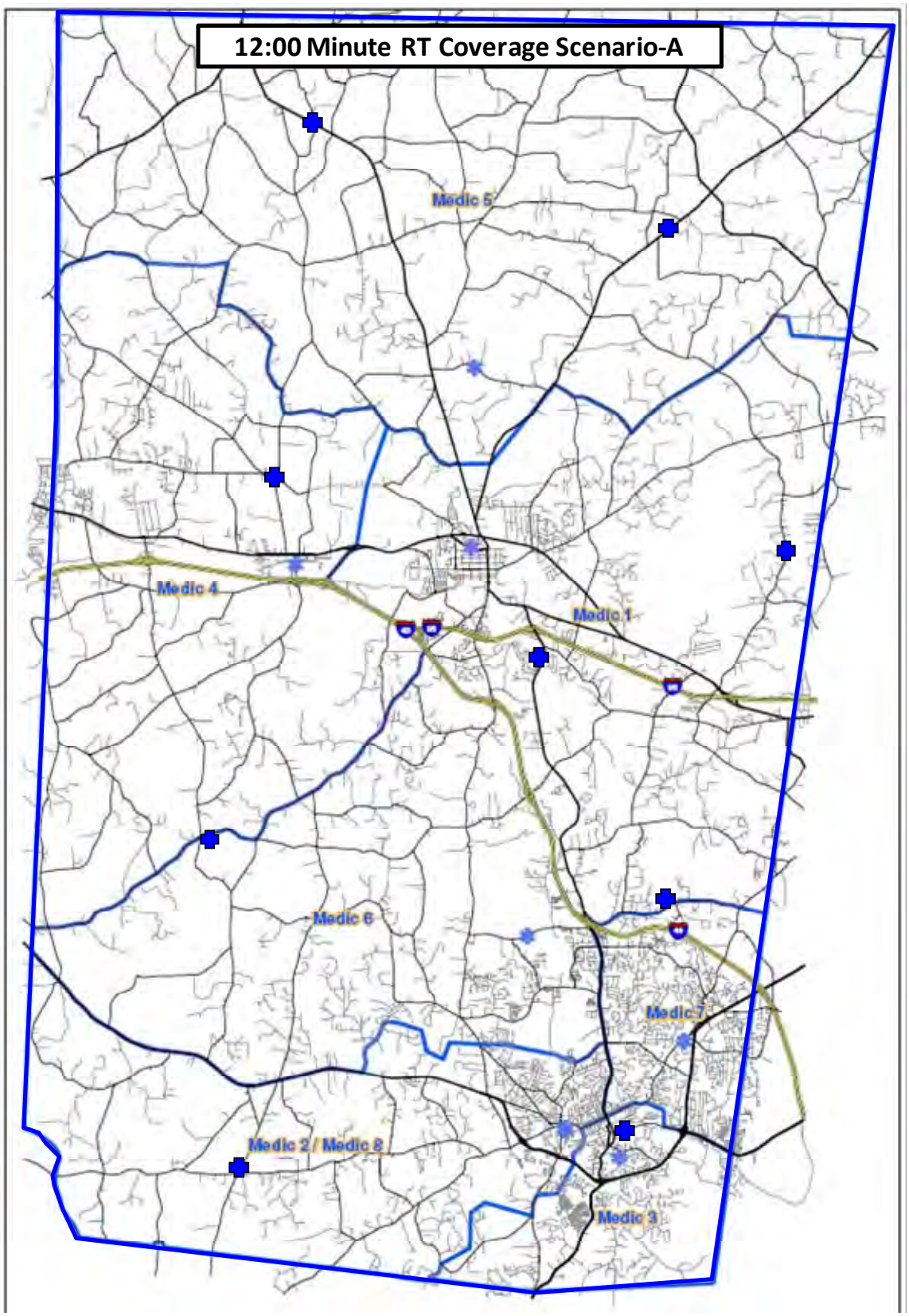
MAP #10


8:00 Minute RT Coverage Scenario-A
Medic 5
Medic 4
Medic 1
Medic 6
Medic 7
Medic 2 / Medic 8
Medic 3

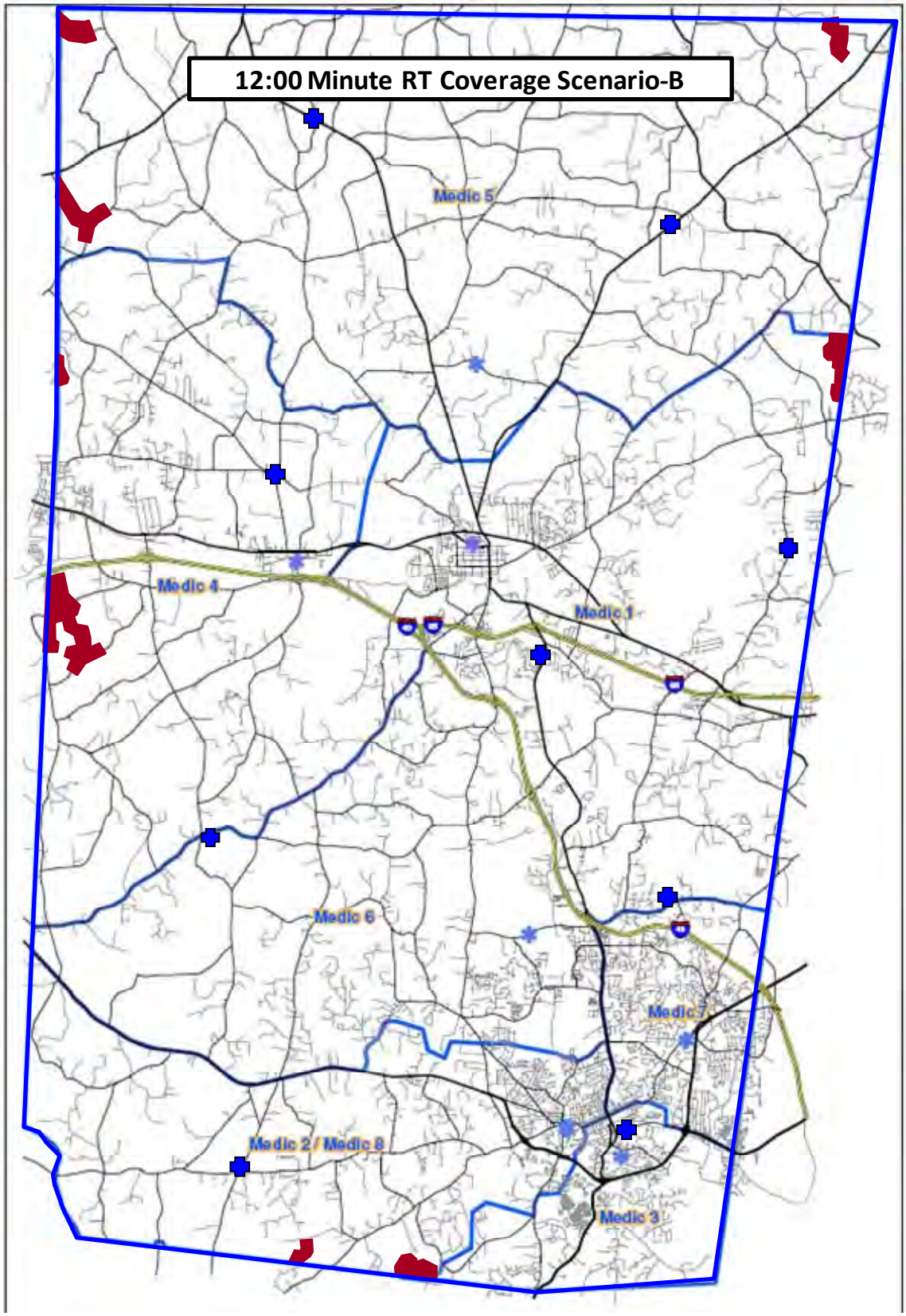
MAP #11


8:00 Minute RT Coverage Scenario-A
Medic 5
Medic 4
Medic 1
Medic 6
Medic 7
Medic 2 / Medic 8
Medic 3

MAP #12


12:00 Minute RT Coverage Scenario-A
Medic 5
Medic 4
Medic 1
Medic 6
Medic 7
Medic 2 / Medic 8
Medic 3

MAP #13


12:00 Minute RT Coverage Scenario-B
Medic 5
Medic 4
Medic 1
Medic 6
Medic 7
Medic 2 / Medic 8
Medic 3

2.5 RECOMMENDATIONS

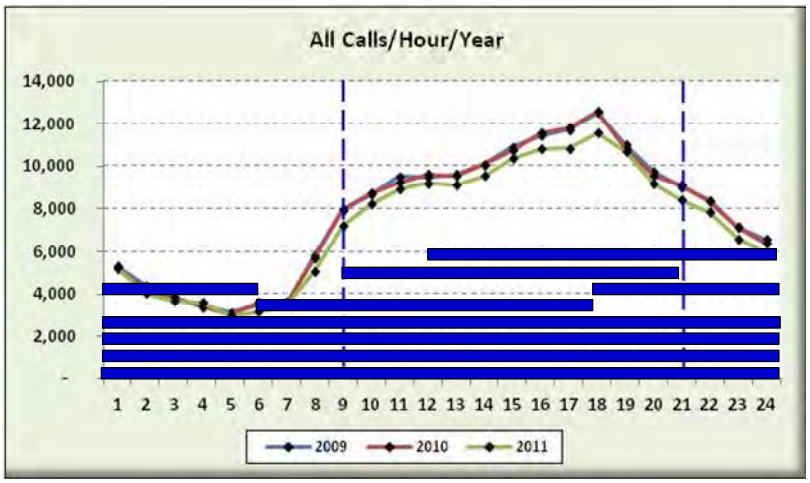
Issue: Availability of Ambulances
Recommendations:

R-1. OCEMS should adjust Medic 5 and Medic 8 coverage hours.
As an initial but immediate response to improve ambulance availability, adjust the assigned hours of available ambulances to more heavily load the prime time block of hours from 9:00 am-9:00 pm when many of the "move-ups" occur. Specifically:

- Move Medic 5 from 6:00 am-6:00 pm to 9:00 am-9:00 pm
- Move Medic 8 from 6:00 pm-6:00 am to 12:00 noon-12:00 midnight

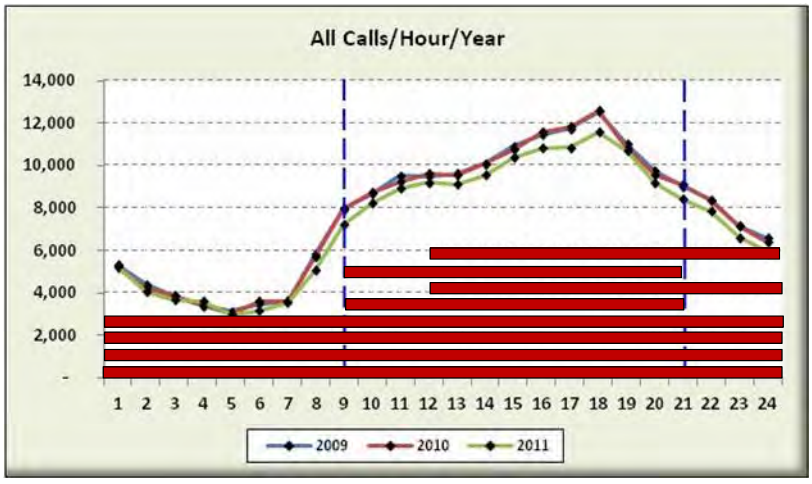
The blue bars in Figure 27 represent the eight (8) Medic Units and their currently assigned shift hours.

Figure 27
Current Deployment of Ambulances



The red bars in Figure 28 represent the coverage of the eight Medic Units once the changes to Medic 5 and * have been made.

Figure 28
Recommended Deployment of Ambulances



The objective of course in adjusting the coverage hours of Medic 5 and 8 is to increase the availability of ambulances and decrease the number of "move-ups' that must be ordered on a daily basis. Call data and corresponding move-up information will need to be closely monitored in order to assess the effectiveness of the shift adjustments.

The data collected will need to include information specific to each individual Medic Unit. The minimum information collected, collated and distributed for review on at least a monthly basis should include at least:

- The number of calls dispatched per day, week, and month
- The total event time of each call
- The number of times "move-ups" were ordered per day, week, and month
- The time of day that each move-up was ordered and its duration

Monthly summary reports of Medic Unit activities should be reviewed by at least the EMS Operations Director, the Medical Director, and the Emergency Services Director. A comprehensive assessment of the progress made towards improving ambulance availability should occur no later than the end of the 6th month to determined if the coverage adjustments are having effect.

R-2. OCEMS should add an additional ALS Ambulance 9:00 am-9:00 pm, 12 hours/day, 7 days/week.
Adjusting the coverage hours of two Medic Units will certainly help reduce the number of "move-ups"; i.e. the number of times per day that available ambulances are down to one (1) or "no" ambulances. If, however, after no more than six (6) months of the enhanced prime-time coverage the number of "move-ups has not been reduced by at least two-thirds (from an average of 6.5/day to no more than 2/day) efforts should be made to immediately bring on-line a fully staffed and equipped ALS ambulance assigned to the 9:00 am-9:00 pm hours, 7 days/week.

R-3a. Utilize available SORS/BLS ambulance for non-emergency patient transports.
R-3b. OCEMS should bring on line and staff a BLS ambulance to provide non-emergency patient transports.
The concept suggested by this recommendation utilizes a BLS staffed ambulance to provide patient transportation (via ambulance) in non-life threatening circumstances. The basis being that ALS Medic Units would of course respond to all calls dispatched, however, rather than then having to transport the patient; i.e. travel to the hospital with the patient, and spend time at the hospital until released, they could return to "in-service" status and be available to respond to another call much sooner.

The reason for there being a "part a" and a "part b" to this recommendation is that they represent two options to accomplish this time saving effort to increase ambulance availability. If South Orange Rescue Squad (SORS), which is essentially a volunteer organization, cannot provide an ambulance and certified EMT personnel, and the concept is considered viable by the County, OCEMS should provide the ambulance and personnel to do so.

Note that while not addressed specifically in the wording of the recommendation it is assumed that the referenced prime-time hours would be the target time this BLS unit would be assigned. However, should EMS recognize that factors such as call time, call volume or other noticeable trends regarding patient transports vary from those hours, it should be able to assign and schedule the unit(s) accordingly.

Issue: Response Time
Recommendations:

R-4. Assess Fire Department capabilities to meet BLS First Responder response time objectives.
This recommendation calls for an independent, objective assessment of existing Fire Department capabilities and the actions, procedures, and associated costs-if any, to address the Medical First Responder response time objectives not yet established by the County.

The information to be reviewed and assessed for each department will include at least, but not be limited to the following:

- Department roster/membership
- Number of paid vs. volunteer personnel
- Available vehicles & relevant equipment
- Station location(s)
- Recent year call volume & type
- Past call locations
- Included map grids
- Existing funding
- Anticipated performance requirements

R-5a. Schedule and implement Fire Department MFR initiative which includes performance objectives.
R-5b. Staff and equip four (4) EMS Quick Response Vehicles (QRV's) for assignment, initially, 12 hours/day, 7 days/week with shift start/end times to be determined by EMS.
Should the findings and recommendations identified in the Assessment of Fire Department Capabilities recommended in R-4 be approved by the County, R-5a the implementation of the individual and collective Fire Department initiatives should take place as soon as possible following approval. Granted all actions and recommendations approved may not be able to occur at the same time for various reasons; i.e. logistics, funding, availability of personnel, etc.

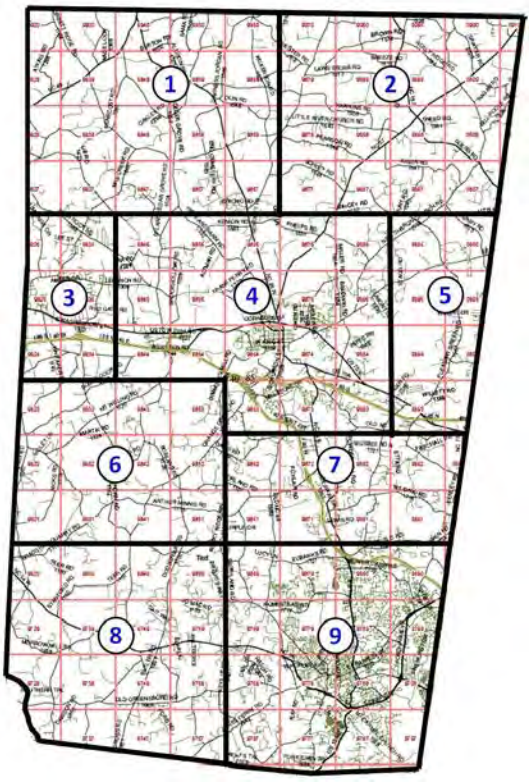
Note that specific performance objectives, particularly with regards to response time, have not been defined at this time. This issue should be addressed during the Assessment (R-4) process, with every Fire Chief individually and with every Department having an opportunity to provide input.

In the event that the findings and recommendations identified in the Assessment of Fire Department Capabilities recommended in R-4 ***not*** be acceptable to the County, an alternative means of providing a medically trained and certified first responders on the scene of a medical emergency "fast"; i.e. *much* faster than the EMS average response times recorded in recent years; *is critical*.

Subsequently, the alternative recommendation in this case is that stated in R-5b. While not as widespread as 12 fire departments, four (4) single-person ALS Quick Response Vehicles (QRV's), appropriately deployed and monitored with regards to directing placement, can go a long way towards improving the initial first response to medical emergencies which is currently averaging 2-3 times that established by NFPA and others as the recommended standard for medical emergencies.

Note that this concept does not take an EMT out of an ambulance and put them in a car instead. It places an EMT in a vehicle with the single purpose of improving the Medical First Responder times to medical emergencies . . . "get there fast, assess the situation, stabilize/treat the patient, communicate the conditions found and await an ALS Medic Unit to arrive to transport the patient if necessary". The EMT ***does not*** leave his/her vehicle to ride in the ambulance. Once control is assumed by the Medic Unit, the assigned EMT will be "in service" and resume the duties assigned.

R-6. Staff & equip six (6) 12 hour/7 day ALS ambulances at appropriate staging/base facility locations within (1) Zones 1 & 2, (2) Zones 7 & 5, and (3) Zones 6 & 8.



If Orange County intends to work towards addressing its statutory responsibility of providing the same level of EMS care to all areas of the County 24 hours per day, this recommendation, once acted upon, will demonstrate a significant step in that direction.

And, while the EMS Base Facilities issue will be addressed specifically in recommendations R-8 through R-12, the strategic placement of those facilities will need to coincide closely with this recommendation. Ultimately, it will be recommended that the County provide no less than nine (9) EMS base station facilities, preferably one within each of the nine zones identified in this map and in larger scale on page 41.

The basis for suggesting that the additional ambulances along with accompanying personnel and equipment be provided within each of 3 "pairs" of two zones each included that:

- Each of the total of six zones identified have among *if not the* slowest EMS response times in the County.
- Each of the "paired" zones is adjacent to one another.
- The location of an EMS station within one of the two adjacent zones *initially,* will improve response times to incidents in both zones, (although perhaps only "somewhat" improved in the zone without the station).
- As will be noted in *Section 6-Implementation Schedule*, the development of the EMS stations will require careful study as to location as well as scheduling of the capital and operating costs identified; these initially "shared" EMS base stations will permit the County to phase the development of future stations.

R-7. Hire a Paramedic Level Shift Supervisor @ 24/7.

The additional EMS personnel to be hired that correspond with the recommendations presented thus far, to address the Availability of Ambulances and Response Time issues discussed, will warrant an additional 24 hour/7 day Shift Supervisor position by Year 4 as identified in the *Implementation Schedule* provided in Section 6.

The relief factor calculations in Subsection 4.4, page 76, identified a multiplier of 5.1 per 24 hour position to enable 8,760 hours of coverage 24/7/365. In addition to personnel, a vehicle (typically SUV) up-fitted to provide two-way radio and computer communications with the Communications Center and on-duty Medic Units in the field, and GPS and AVL equipment will be required as well.

Issue: EMS Base Facilities
Recommendations:

R-8. Prepare a detailed Space Needs Assessment 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.

Once the essential space needs are identified 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 a building identified in a strategic location, the information detailed with this document could be utilized to evaluate the building in question as to its applicability for reuse as an EMS facility.

R-9. Identify a minimum of nine (9) strategic locations, preferably no less than one (1) location within each major zone previously identified, for the potential location in each of a future EMS base.
The criticality of the location of EMS base facilities in an area as large, and as varied as Orange County *cannot* be over emphasized. As alluded to in R-8 above, while the "ideal" situation would be available property on which a "build-to-suit" *new* building could be located, the eventual option that presents itself may in fact be an existing building that may be appropriate for reuse as an EMS facility.

Regardless of the approach, the previous EMS discussion of issues made clear the need for these facilities in locations in addition to ***only*** the most concentrated areas of population in the County.

R 10. The County should purchase/obtain identified sites (and/or buildings) for development.
The completed Space Needs Assessment suggested in R-8 should provide the criteria for evaluating the potential of any site or building considered.

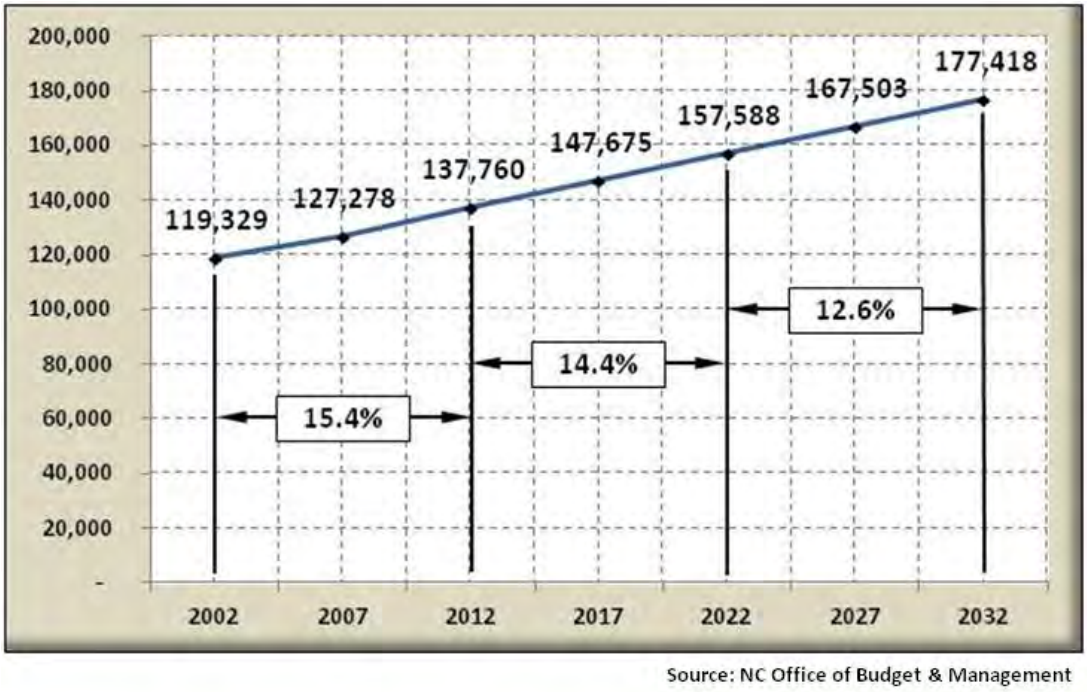
R 11. Procure EMS base planning and design services.
Depending upon the level of detail provided in the referenced Space Needs Assessment, planning and design of a single EMS base facility could take 4-6 months, particularly considering the various regulatory requirements imposed on "public building" projects.

R 12. Advertise, bid, and commence construction on designated EMS base facilities.
Once the design is completed and approved, the bidding and construction of this type of building could take 6-8 months depending upon whether it is to be new construction on a "clean" site or renovation and a building addition to an existing structure. Of course any number of additional options (and benefits) could be realized if for example, a single contractor (or designer) was selected to do more than one facility at a time; i.e. a "package deal".

SECTION 3-COUNTY POPULATION

This section briefly examines Orange 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 demands and in turn needs of both operations. The source of the material presented in this section is the North Carolina Office of Budget and Management (NCOBM).

Figure 29
Orange County Experienced & Projected Populations



Source: NC Office of Budget & Management

These figures indicate that over the past 10 years the County's population has increased 15.4 %. The projected July 2012 resident population is 137,760. Over the next decade the County's population is projected to increase by just under 20,000 residents; 14.4%. The following decade, 2022-2032, although increasing at a lower percentage; i.e. 12.6%; will still experience an increase in population of yet another 20,000 residents.

In turn, as a means of comparison, the counties adjacent to Orange are expected to experience the following in terms of growth over the next 20 years:

Figure 30
Adjacent County Projected Populations/2012-2032

County	Jul-12	Jul-22	% Change	Jul-32	% Change	Total % Change
Alamance	**153,498**	163,168	6.30%	172,841	5.93%	12.23%
Caswell	**23,727**	23,733	0.03%	23,756	0.10%	0.12%
Chatham	**65,814**	78,411	19.1%	91,011	16.1%	35.21%
Durham	**275,946**	312,265	13.2%	348,584	11.6%	24.79%
Orange	**137,760**	**157,588**	**14.4%**	**177,418**	**12.6%**	**26.98%**
Person	**40,247**	45,010	11.8%	49,776	10.6%	22.42%

The experienced EMS call volumes and the corresponding EMS calls per 1,000 resident population has been identified for the years 2000-2011 and will provide the basis for future year call volume projections.

Figure 31
Experienced EMS Call Volume/2000-2011

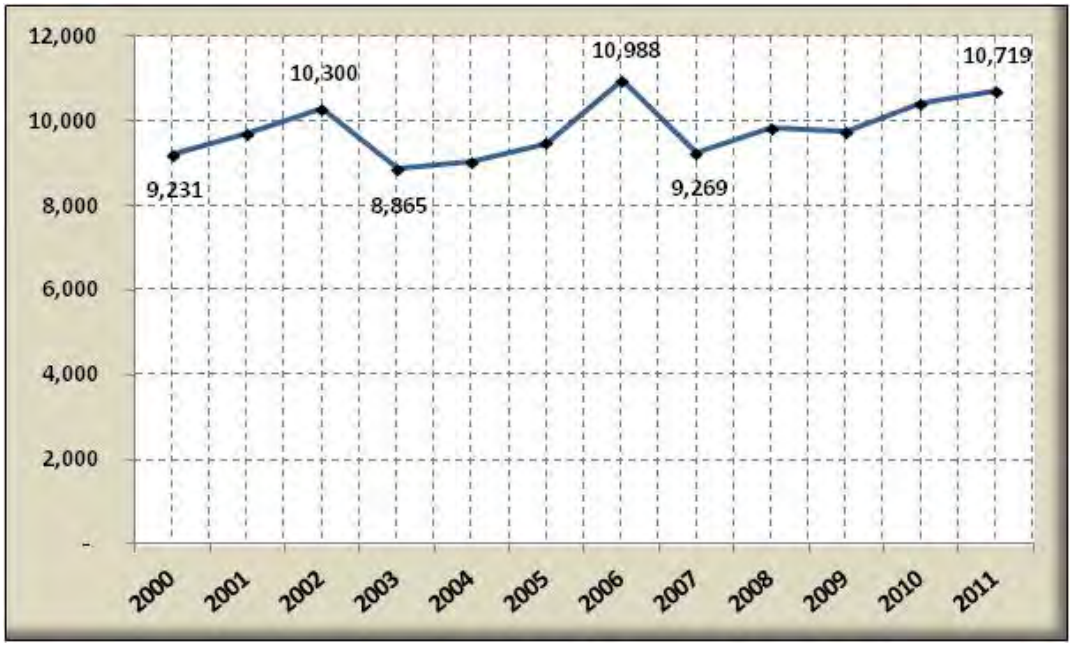
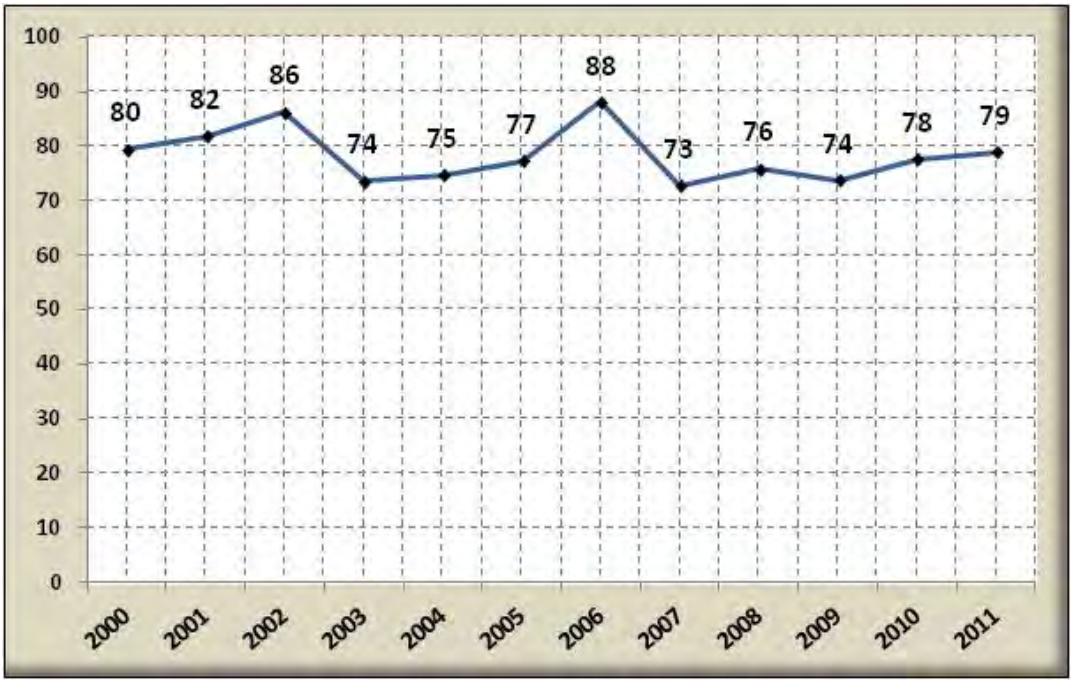


Figure 32
Annual EMS Calls per 1,000 Population/2000-2011



The methodologies used to project future needs; whether people, workload, or in this instance EMS call volume; will typically involve an examination of recent year trends of those same characteristics. Today of course the application of technology and various 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 will be the experienced (known) annual EMS call volumes for 2000-2011 and noted in Figure 31, together with the annual County populations as documented by the North Carolina Office of Budget & Management for the same years.

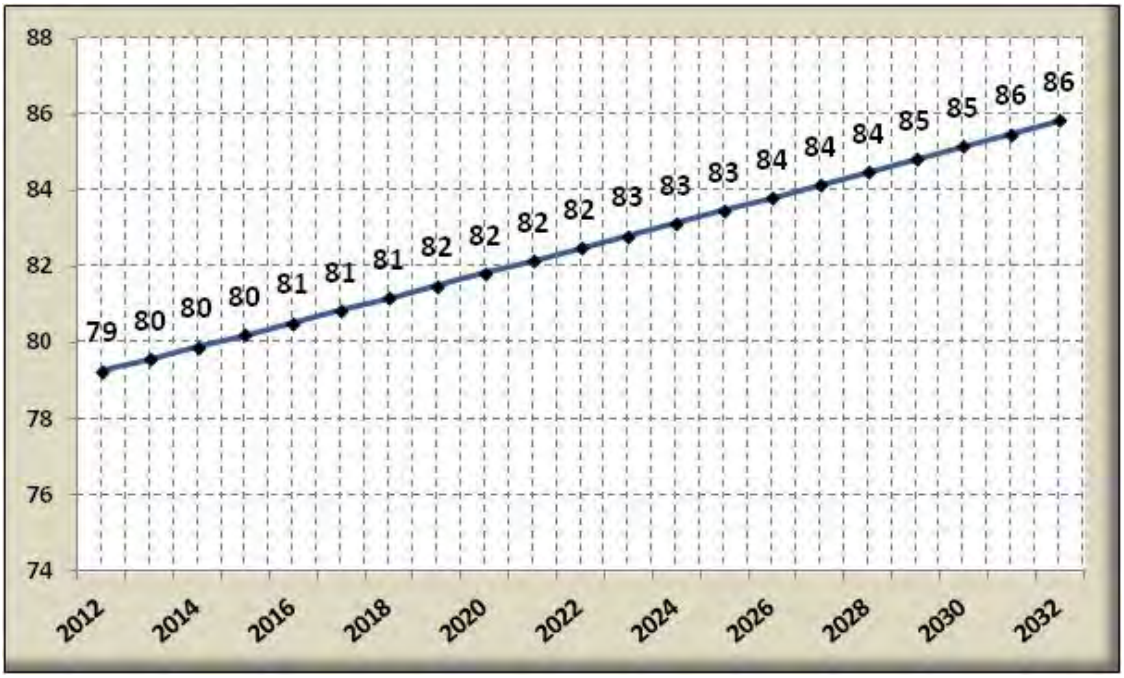
Between 2000 (116,106) and 2011 (135,776) the County's population increased 16.9 percent.

Between 2000 (9,231) and 2011 (10,719) the County's annual EMS call volume increased 16.1 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; Figure 34.

As illustrated in Figure 32 the number of EMS calls per 1,000 residents of course varied from year-to-year. The ratio increased during eight (8) different years and decreased during three (3) different years. In this case the *average annual change* in the ratio of EMS calls/1,000 was + 3/10ths of 1%. This ratio was the applied to the projected future annual populations, the results of which are identified here.

Figure 33
Projected Annual EMS Calls/1,000 County Population/2012-2032



Now, of course, knowing the future year EMS call/1,000 population ratios and the projected annual County populations for 2012-2032 per Figure 29; future year EMS call volumes can be calculated. The results are as follows:

Figure 34
Projected Annual EMS Call Volumes/2012-2032

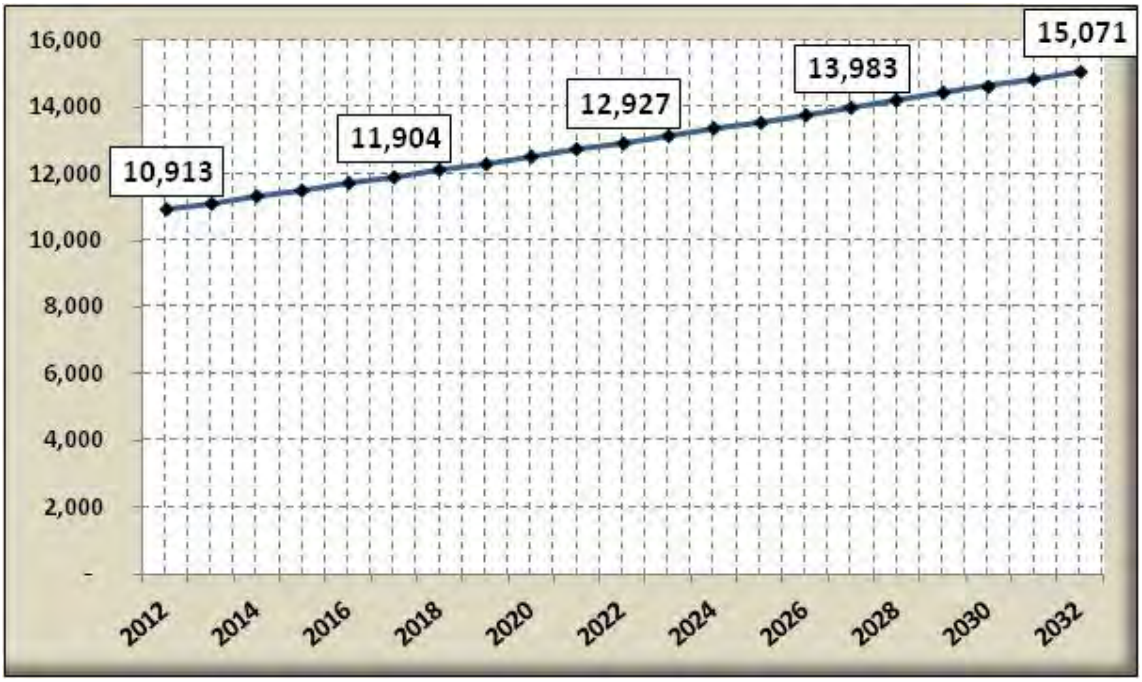


Figure 35
Projection Summary

Factor	2012	% Change	2022	% Change	2032
Co. Population	**137,760**	**14.4%**	**157,588**	**12.6%**	**177,418**
EMS Calls	**10,913**	**18.5%**	**12,927**	**16.6%**	**15,071**

When tracked over the years to come the numbers certainly will not fall into a straight line and at times may vary considerably. In all likelihood, 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 very likely to have an impact are those in the age group bracket of 65 and over. According to the North Carolina Office of Budget & Management's demographics section the projected numbers are as follows:

Age Group 65 yrs. & older-2012	10.6% of County's Population
Age Group 65 yrs. & older-2032	18.2% of County's Population
Age Group's Total Increase:	**121%**

SECTION 4-911/COMMUNICATIONS CENTER

4.1 HISTORICAL & STATUTORY REFERENCES

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

1. It is the place of the Federal Government to encourage local authorities to adopt and establish 911 emergency telephone services in all metropolitan areas, and throughout the United States.
2. Responsibility for the establishment of 911 services should reside with the local government.
3. The cost for basic 911 service should not be a deterrent to its establishment [Paragraph 3(c)]

By 1996 cellular and commercial mobile telephone service had become so popular and widespread that the FCC issued a report (CC Docket No. 94-102; July 26, 1996) 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 26th, of that year.

North Carolina Public Safety Telephone Act

In 1989 the North Carolina General Assembly passed the Public Safety Telephone Act recognizing 911 as a toll free number through which an individual in the State can gain rapid, direct access to public safety aid. The Act became law as North Carolina General Statute Chapter 62A. Local governments were to set a rate and collect a 911 service fee to pay eligible costs associated with providing that direct access to Public Safety Answering Points (PSAP).

When wireless phones became popular, they did not fit the wireline model for providing location information, so in 1998 the Legislature adopted NC Senate Bill 1242 providing for a 911 Wireless Fund and creation of the Wireless 911 Board. This bill defined the composition of the fund and the requirements for participation. It became law as Article 2 of §62A.

During the 2007 legislative session House Bill 1755 was introduced "to modernize and improve the administration of the State's 911 system through a statewide 911 Board by ensuring that all voice services contribute to the 911 system and by providing parity in the quality of service and the level of 911 charges across voice communications service providers." The bill was passed as Session Law 2007-383, and took effect January 1, 2008. It requires all voice communications service providers to collect a single rate 911 service fee and remit collections to the State 911 Board rather than to the local governments. The State 911 Board distributes funds to the PSAPs based upon criteria set forth in the new law.

The duties and responsibilities of the 911 Board are significant. While GS 62A-42 appears to emphasize the Board's duties regarding the collection, management and distribution of 911 funds, an additional, long overdue, and very important responsibility of the Board is the establishment of performance, reporting, operational, and technical capability standards for all certified Communications Centers (PSAP's) throughout the State. At this time, the standards are expected to go into effect in January 2014. A draft of those standards as they currently exist is included in the Appendix of this report.

As well, a major initiative, underway since February 2012, is the provision to each County and established PSAP in the State, the installation of "Emergency Call Tracking System" (ECaTS)" capabilities which is expected to greatly enhance , make uniform, and formalize the complex tasks of collecting, reporting and managing 911 call statistics.

2.1.2 62A-42. Powers and duties of the 911 Board.

(a) Duties. – The 911 Board has the following powers and duties:

(1) To develop the 911 State Plan. In developing and updating the plan, the 911 Board must monitor trends in voice communications service technology and in enhanced 911 service technology, investigate and incorporate GIS mapping and other resources into the plan, and formulate strategies for the efficient and effective delivery of enhanced 911 service.

(2) To administer the 911 Fund and the monthly 911 service charge authorized by G.S. 62A-43.

(3) To distribute revenue in the 911 Fund to CMRS providers and PSAPs in accordance with this Article and advise CMRS providers and PSAPs of the requirements for receiving a distribution from the 911 Fund.

(4) *To establish policies and procedures to fund advisory services and training for PSAPs, to set operating standards for PSAPs, and to provide funds in accordance with these policies, procedures, and standards.*

(5) To investigate the revenues and expenditures associated with the operation of a PSAP to ensure compliance with restrictions on the use of amounts distributed from the 911 Fund.

(6) To make and enter into contracts and agreements necessary or incidental to the performance of its powers and duties under this Article and to use revenue available to the 911 Board under G.S. 62A-44 for administrative expenses to pay its obligations under the contracts and agreements.

(6a) To use funds available to the 911 Board under G.S. 62-47 to pay its obligations incurred for statewide 911 projects.

(7) To accept gifts, grants, or other money for the 911 Fund.

(8) To undertake its duties in a manner that is competitively and technologically neutral as to all voice communications service providers.

(8a) To design, create, or acquire printed or web based public education materials regarding the proper use of 911.

(9) To adopt rules to implement this Article. This authority does not include the regulation of any enhanced 911 service, such as the establishment of technical standards for telecommunications service providers to deliver 911 voice and data.

(10) To take other necessary and proper action to implement the provisions of this Article.

4.2 EXISTING CONDITIONS

Orange 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, Rescue, EMS, and Law Enforcement personnel that respond with special vehicles, skills, and equipment to the scenes of countless reported emergencies, it is the actual ***reporting*** of those emergencies which gets everything started.

In this instance, the County's Communications Center; or "911 Center" as it is often called; is an operational component of the Orange County Emergency Services Department. It is located on the upper level of the Department's headquarters facility at 510 Meadowlands Drive in Hillsborough, together with the offices of the Emergency Services Director, EMS Administration, Planning & Logistics, and Life Safety Divisions of the Emergency Serviced Department. The personnel who work in the Center are of course employees of the County.

In the professional terminology of the communications industry, the Communications Center is referred to as the primary ***public safety answering point***, or **PSAP**, for emergency communications in Orange County.

On duty personnel receive, handle and dispatch calls for Fire, Rescue, Emergency Medical Services (EMS), and Law Enforcement throughout Orange County.

While generally referred to as "dispatchers" the position classification of the employees who work within the Center answering and dispatching calls is "Telecommunicator". During the period of the study, the Center was staffed with four (4) 12-hour shifts, each having five (5) assigned Telecommunicators. The variance in the number of staff on duty at one time, and the Center having to frequently work "short" was most frequently due to staff illness, vacation, approved personal leave, off-site training, or position vacancies.

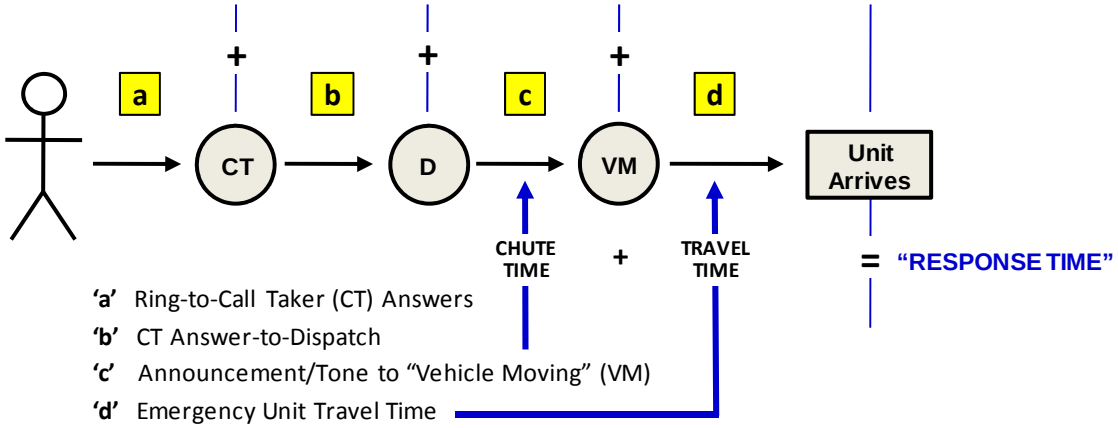
The Process

The essential functions involved in the emergency communications process are illustrated in the diagram that follows (Figure 36). The time intervals identified as 'a', 'b', 'c', and 'd' represent significant activity periods identified for the purposes of this study, particularly with regards to performance. In real life these activities will vary somewhat from call to call and certainly from service to service.

The involvement of Communications Center staff will also vary depending upon the type of call or emergency initially reported and the number of units or agencies dispatched. In some instances, the Telecommunicator may terminate the call when the dispatched agency has been notified, or when they respond via radio "on-scene", in others they will continue to monitor and communicate as necessary with some or all of the units/agencies responding to the emergency for the duration of the call; i.e. until the responding units are "back in service".

The diagram will be repeated later in the report with additional information regarding the Center's performance relative the specific time intervals.

Figure 36
The Emergency Communications Process



The significant activities illustrated and undertaken by Communications Center staff include:

1. **The telephone is answered in the Communications Center (now) by a Telecommunicator who:**

- Follows initial question protocols; verification of address, phone number, immediate circumstances, etc. and either;
- Determines that the emergency is a significant event requiring that a Fire, Rescue, EMS, or law enforcement agency or unit be dispatched,

Or

- Determines that the call is not an emergency, is a duplicate call, or is one describing an incident already reported, and terminates call.

2. **The call is dispatched**

- The dispatch is official once the "tone" or page has been sent and the announcement has been made via radio in the station or vehicle of the service agency to be assigned the call; this announcement of course will include the initial incident description, victim information, reported status/condition, and address.
- A Telecommunicator may maintain communications with units dispatched and responding to the reported incident via radio (versus telephone) oftentimes for indeterminate periods until the full extent and nature of the incident can be personally observed by the responders and the need for additional resources, personnel or information is determined.

3. **During calls involving medical emergencies** a significant responsibility of the Telecommunicator continues after the call has been dispatched, and relates specifically to "emergency medical dispatch" (EMD) protocols. In this instance the Telecommunicator will remain on the line with the caller to obtain as much additional patient/victim information as possible as they will then (oftentimes) simultaneously and continuously alert the responding Paramedics as to patient condition, physical characteristics, scene circumstances, etc.; *and* as appropriate provide First-aid instructions to the caller in an effort to help the victim; i.e., "emergency medical dispatch".

Emergency Medical Dispatch (EMD)

Orange County is a licensee of the National Academies of Emergency Dispatch (NAED) "ProQA" automated emergency medical dispatch program. NAED's EMD standard medical protocols are the accepted national standard for EMD providers.

EMD is based on the premise that a fire engine or ambulance does not have to be the first unit on the scene of a medical emergency. Once a caller reaches a Telecommunicator, that Telecommunicator can, almost immediately, begin providing medical information and pre-arrival instructions via phone. Subsequently, EMD consists of three key components:

First, is triaging the in-coming call request for medical assistance to determine the level of response required; i.e., no response, non-emergency transport, emergency transport.

Second, is providing pre-arrival instructions so the caller can immediately help the victim. The level of telephone assistance can vary from just simple advice to complete instructions for CPR. This is the most visible component of EMD and, in the eyes of some, its most valuable feature in that it can very well save a life.

Pre-arrival instructions are based on the concept that Telecommunicators are the victim's first medical contact and can provide basic first-aid via telephone, by asking specific questions and giving the caller instructions. The questions and instructions-“protocols” in medical parlance-are predetermined, given in a structured sequence, and specially designed to be effective when given to a third party over the telephone. The intended result is a dramatic decrease in the time it takes to begin administering emergency care.

Third, and perhaps the most critical feature of EMD, is quality assurance. *State law requires that each EMD program-and each aspect of the EMD protocol-must be reviewed, revised as needed and approved by the local or regional EMS agency*; in Orange County, that authority is the Medical Director; a licensed physician. This ensures that the information and procedures being given by the dispatchers is correct, and appropriate for the incident. In addition, there must be an on-going review of the use of EMD protocols by Communications Center Telecommunicators to ensure that the protocols are continually followed correctly, and that application of the protocols contributes to a positive patient outcome.

Call Codes

In their communications regarding medical emergencies, Telecommunicators will utilize call codes in radio communications with responding agencies to indicate both the severity of the situation reported and the associated level of response; i.e. emergency, or non-emergency.

The codes utilized are those approved by the National Academy of Emergency Medical Dispatch (NAEMD) and range from the least severe; i.e. not life threatening: ALPHA; to the most severe; i.e. “circling the drain”: ECHO, which calls for an “all units” emergency status response.

The table that follows identifies the Condition Identified, Agency/Unit, and Response Status protocols for each of the five Response Codes.

Figure 37
Medical Dispatch Response Codes

Response Code	Condition Identified	Agency/Unit Dispatched	Response Status
ALPHA	Non-life threatening, low priority assessed	Ambulance only	Non-Emergency
BRAVO	Non-life threatening, but more serious	Ambulance only	Emergency
CHARLIE	Potentially life threatening	First Responders Ambulance	Emergency Non-Emergency*
DELTA	Life threatening	All Units	Emergency
ECHO	Circling the drain	All Units; including Law Enforcement	Emergency

Note the asterisk (*) next to "Non-Emergency" in the Response Status column in the CHARLIE row. In a potentially life threatening emergency, First Responders (typically the closest Fire Department) will be dispatched to respond with lights & siren; i.e. emergency status; while the ambulance (Medic Unit) will be dispatched at the same time, however, in non-emergency status…*initially*. The assumption being that First Responders, assumedly first on the scene, will be able to assess and confirm (or not) the level of severity of the patient's condition. If First Responders in fact confirm the condition to be life threatening, the Medic Unit will (typically) immediately upgrade to emergency status and respond accordingly. Should the condition be determined to not in fact be life threatening, the Medic Unit will, in most cases, continue on to the scene to confirm the condition of the patient and if necessary provide transportation to a medical facility.

Note Regarding the Communications Process
The above narrative explanation of Response Codes focuses on medical emergencies and EMS response; albeit the stated focus of this study. Of course Communications Center personnel must also deal with Fire and Law Enforcement emergencies on a daily basis as well. Subsequently, the Appendix of this report includes process maps outlining examples of the call processing, dispatch, and ongoing communications activities that will typically occur not only with EMS, but with Fire and Law Enforcement as well.

Communications Center Staff
The individuals who occupy the workstations or "consoles" in the County's Communications Center are classified as "Telecommunicators". At present there is one (1) Shift Supervisor (Lieutenant), one (1) Lead Telecommunicator/Assistant Shift Supervisor (Sergeant), one (1) Communications Training Officer, and two (2) Telecommunicators assigned to each shift.

While the designated Supervisors will carry additional responsibilities, they are expected to handle them *in addition to* receiving, dispatching and monitoring 911 emergency and administrative calls received as the call volume dictates.

In this and similar County facilities, the principal activities occurring on the call center floor are those directly involved with the processing of calls received. In this regard, while the position title "Telecommunicator" is totally appropriate, the *functional* responsibilities of the position may vary

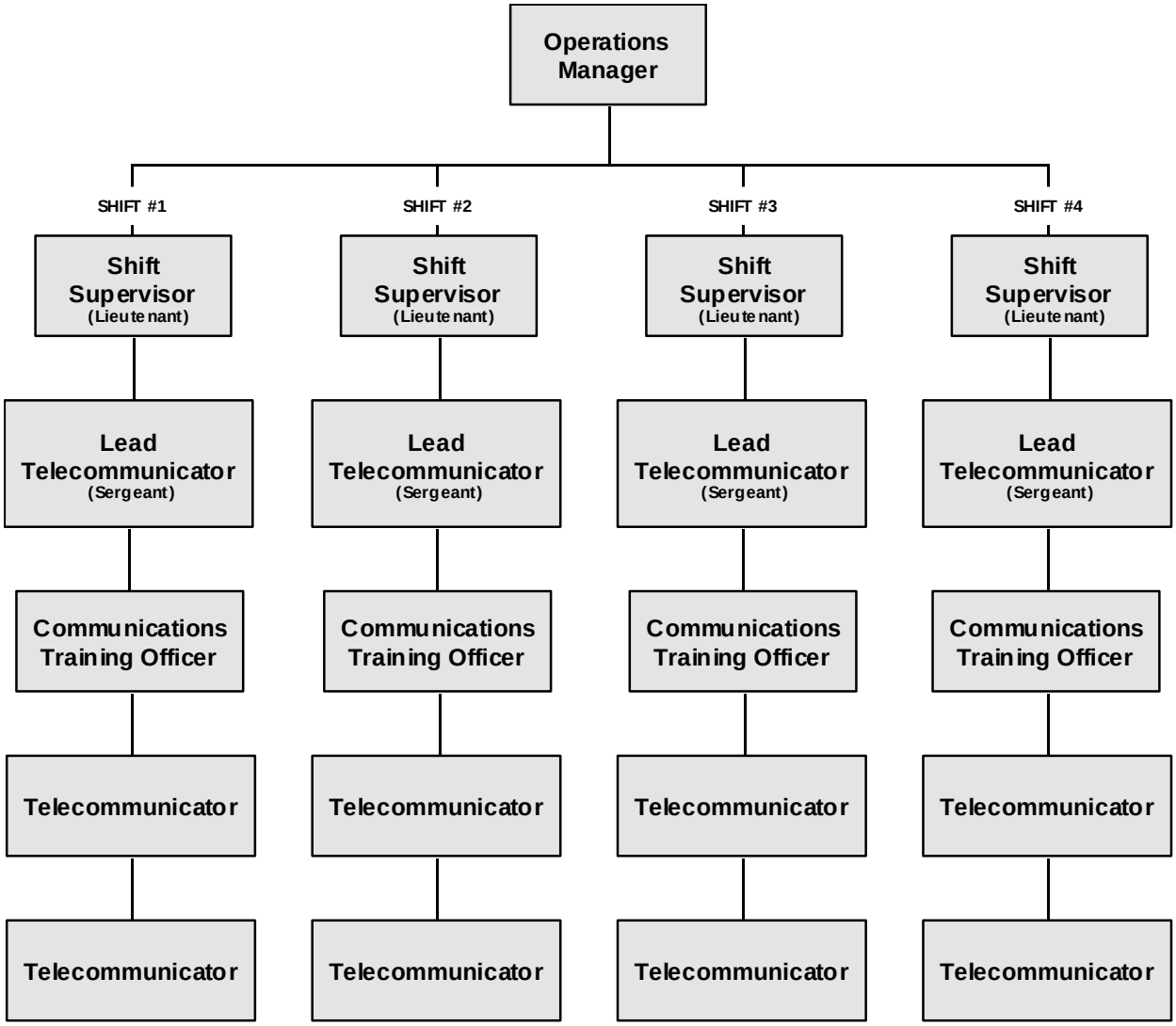
somewhat between "call-taking" and "dispatching", depending on the call volume occurring or whether the Communications Center is working "short".

- A *Calltaker's* primary responsibility is answering 911 and administrative calls coming into the Center, recording essential information in the computer aided dispatch (CAD) system, and (ideally) transmitting that information to a Telecommunicator.

- A *Telecommunicator's* primary responsibility is to dispatch the call to the appropriate agency and handle on-going responding agency communications and radio traffic.

In Orange County all Telecommunicators have been trained and are certified as "Emergency Medical Dispatchers" or EMD's. During the course of this study, the Communications Center was operating with a total *allocation* of 30 full-time positions, plus the Communications Center Operations Manager. However, it should be noted that during that time eight of those positions were either vacant (4) or in training (4) and therefore unavailable for duty. Figure 38 illustrates the current organization and position designations.

Figure 38
Orange County Communications Center Organization



Shift Schedules
Communications Center employees currently work 12 hour shifts on a rotating "2-days on, 2-off, 3-on, 2-0ff, 2-on, 3-off" schedule. In addition to permanent employee salaries, annual budget allocations are also included for overtime and part-time employees to assure continuous coverage of the Center.

Training & Certification
The current formal classroom hours that an employee candidate must complete to work as a Telecommunicator include the following:

Figure 39
Telecommunicator Minimum Classroom Training Hours for Certification

Certification/Training	Hours
North Carolina Sheriff's Training Standards Certification	47
North Carolina State Bureau of Investigation DCI Certification	24
Emergency Medical Dispatch (EMD) Certification	32
Communications Center Operations	160

Following successful completion of the training classes referenced, the candidate will begin work in the Communications Center under the supervision of the shift Communications Training Officer to whom they are assigned for a minimum of three (3) months before they are released to work independently.

In addition to their initial certification, Telecommunicators must maintain their certifications by participating in continuing education classes each year. For example; : NC Sheriff's Training & Standards @ 16 hours per year; NAED/EMD @ 24 hours every 2 years; and recently, the NC 911 Board has passed mandatory training of 16 hours per year for any agency that receives 911 funding. It is also mandated by Title II ADA 28 C.F.R. Part 35, that Centers (PSAP's) train on TTY/TDD calls twice a year.

Call Volume & Distribution
For the calendar years 2009-2011, Communications Center records reflect that a total of 746,037 calls of all types were received; an average of 248,679 calls per year; on average, approximately 681 calls per day. These call totals are *not* all 911/emergency calls, however. The total call numbers include what are referred to as *Administrative* calls as well as 911/Emergency calls.

Depending upon a jurisdiction's population, the number of service agencies and the geographic area served, Communications Centers such as Orange County's will generally find that anywhere from 55-65 percent of all calls received are administrative calls; while 35-45 percent are 911/emergency calls.

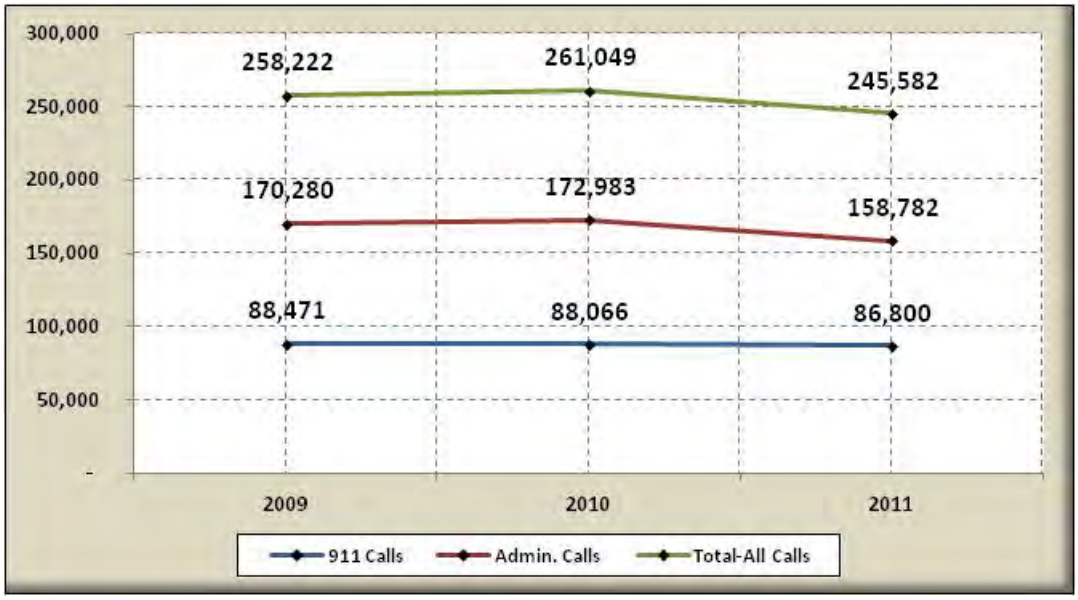
It must be recognized that administrative calls are a very important responsibility of the Telecommunicators assigned to the Communications Center. While the calls may not be emergencies per se, they may be calls from law enforcement or first responders asking for back-up, assistance, or other information relevant their immediate incident or emergency. Of course from time to time calls are received that are duplicate calls or calls that have nothing to do with an emergency. The determination of a call's status alone is a significant responsibility. Examples of incoming "administrative" calls will include:

- 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
- Incoming administrative calls:
- Alarms; i.e. fire, burglar, medical lifelines, etc.
- Operator transferred calls (they can't connect calls to 911 - only to a ten digit number.)
- Non-emergency calls which a citizen did not want to report on a 911 line.

The following table identifies the total 911/emergency and administrative calls received for each of the years 2009-2011.

Figure 40
Total Calls Received by Type
2009-2011



For the 3-year period addressed, the average annual 911 calls received was 88,186 and the average annual administrative calls received was 167,933; 34% and 66% respectively.

Agencies Dispatched

The agencies currently dispatched by the Orange County Communications Center include:

Law Enforcement

Orange County Sheriff's Department
Chapel Hill Police Department
Carrboro Police Department
Hillsborough Police Department

Medical

Orange County EMS

Rescue

South Orange Rescue Squad

Fire Departments

Caldwell Fire Department
Carrboro Fire Department
Chapel Hill Fire Department
City of Carrboro Fire Department
Cedar Grove Fire Department
City of Chapel Hill Fire Department
Efland Fire Department
Eno Fire Department
Hillsborough/Orange Rural Fire Department
Mebane Fire Department
New Hope Fire Department
North Chatham Fire Department
Orange Grove Fire Department
White Cross Fire Department

"Other" agencies that are listed to receive after-hour call-outs:

NC Department of Transportation
Animal Control
Utility Companies
Orange County Public Works
Orange County Probation/Parole
OCDSS/Child & Adult Services

Distribution of Calls by Agency/Service Type

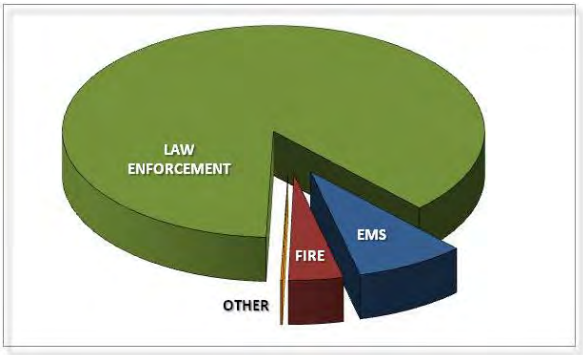
Collecting, organizing, and assessing incoming call data received at the Communications Center becomes very important to not only the Communications Center but also to the various responding agencies and, ultimately the entities that are responsible for funding both the Communications Center as well as the various emergency services and public safety response agencies.

For example, for responding fire, rescue, medical, and law enforcement agencies keeping track of where the calls came from and being able to plot or track the "patterns" of those high (and low) call areas can aid agency managers significantly when planning for the deployment of personnel and equipment throughout their respective jurisdictions and throughout the County generally. The total calls per year, by agency type; i.e. Law Enforcement, EMS, Fire and Other; were collected for the calendar years 2009-2011 and averaged. The chart that follows illustrates the average annual distribution of these calls for the referenced 3-year period.

The breakdown of these calls is clear from the illustration. The actual percentages by agency type are as follows:

Law Enforcement	**87.3%**
EMS	**8.4%**
Fire	**4.2%**
Other	**.14%**

Figure 41
Call Distribution by Agency



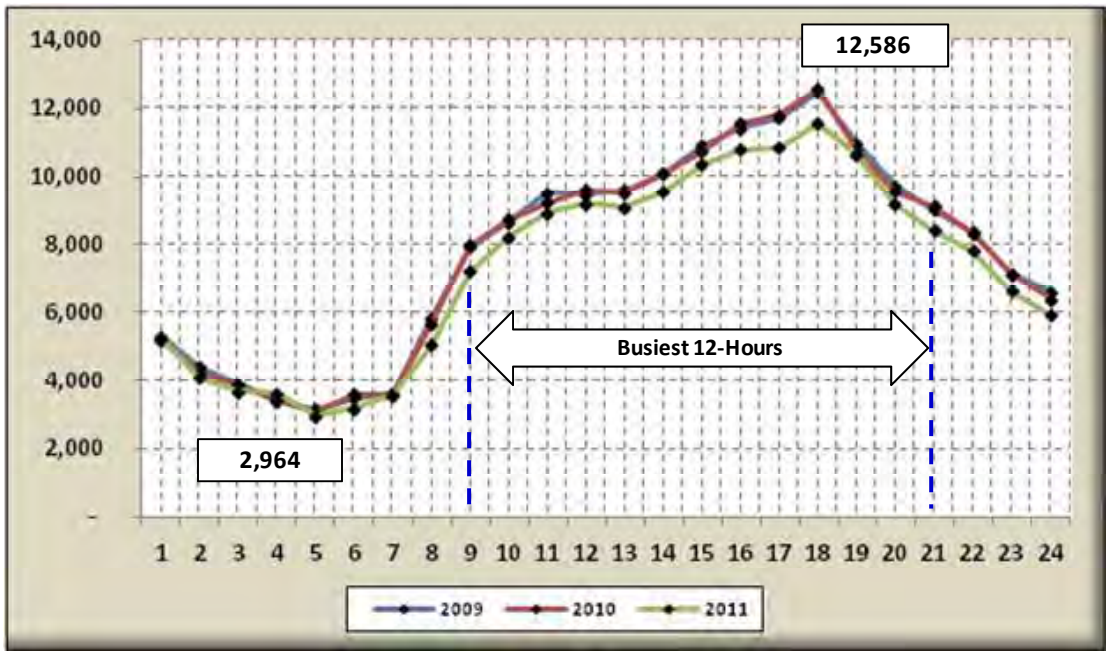
Distribution of Calls by Hour of Day

When considering staffing requirements and the assignment of personnel, it is the call data itself and the processing of that data that becomes important. In this case, the distribution of incoming calls by "Hour of Day" is quite significant.

The tracking of incoming calls by *hour of day per year* becomes critical when anticipating staff assignments ultimately not only to make sure that all emergency calls for assistance get answered, but that they also get answered quickly.

Figure 42 illustrates the total calls received by hour of day for the calendar years 2009-2011.

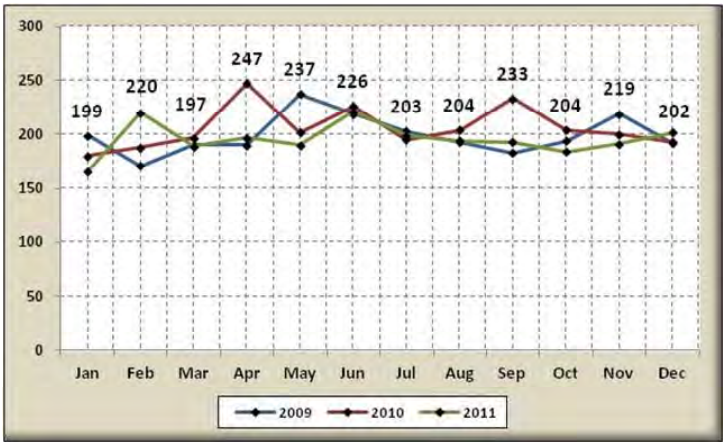
Figure 42
Call Rate per Hour of Day/Year



The "hour of day" is indicated along the bottom of the graph by the numbers "1" through "24". As an example, all calls received between 11:00 pm and Midnight are indicated on the vertical axis extending upward from "24".

Based on these findings the lowest call volume per hour/year has consistently been between 4:00 am-5:00 am (2,964 in 2011). The highest call volume per hour has consistently been between 5:00 pm-6:00 pm (12,586 in 2009 and 2010). Not surprisingly, the busiest 12-hours of the day for the Communications Center is the same as that identified for EMS; 9:00 am-9:00 pm. For all 3 of the years considered, the call volume between 9:00 am-9:00 pm was never less than 8,000 calls per hour.

Figure 43
Peak Hour Call Load/Month



Peak Hour Call Load

Again, an important variable in calculating eventual staffing and subsequent work-load requirements is the total number of calls *received* during the busiest hour of the day.

While the *average* peak call load per hour over the past three (3) years has been 200 calls or 3.3 calls/minute; the peak hour call load for the 36 months studied was 247 calls, a rate of 4.1 calls per minute.

4.3 PERFORMANCE & COSTS

Ask the average citizen what they expect when they call 911 and they will inevitably say "they want help. . . FAST"! Ask them to think about it a minute or two and they might add that they want, "q*ualified personnel*, *with the proper equipment*. . . FAST!"

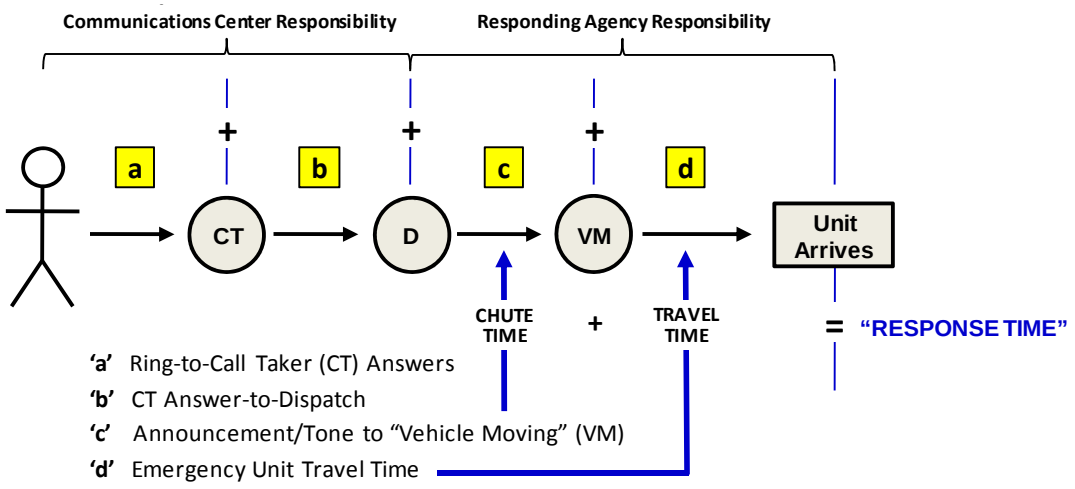
In either case, it is the end result; i.e., the arrival on scene and the effectiveness of the action taken that is what the average citizen will be most concerned with, and for obvious reasons. How well informed those actually responding to the incident are with regards to what to expect at the scene, or how effectively the emergency response process was implemented are less frequently considered outside of professional circles. A number of professional organizations offer significant commentary and/or specific, documented performance standards in which emergency communications plays some role. They include:

- National Academy of Emergency Dispatch (NAED)
- Association of Public-Safety Communications Officials (APCO)
- National Emergency Number Association (NENA)
- National Fire Protection Association (NFPA)
- Insurance Services Organization (ISO)
- Federal Communications Commission (FCC)
- Federal Emergency Management Agency (FEMA)
- Commission on Accreditation for Law Enforcement Agencies (CALEA)

While the citizen is immediately concerned with how long it takes from the time they call 911 to the time the responding agency vehicle arrives on the scene, the emergency responder(s) will be concerned with the steps it will take to mobilize once they have received the dispatch, and the time it will take to travel to the scene of the emergency. Thus, making the process of answering the 911 call, obtaining the necessary information needed to initiate dispatch, and activating the dispatch itself as promptly and efficiently as possible, extremely important.

Figure 44 is essentially the same as Figure 36, previously shown. In this case, however, with added emphasis as to who bears the responsibility for the various critical time intervals.

Figure 44
Critical Emergency Communications & Response Intervals



Time Interval 'a' = the time from first ring to answer

Time Interval 'b' = the time from answer to dispatch

Time Interval 'a' + 'b' = The Communication Center's principal call taking and dispatch responsibilities, except:

- When the responding agency requests that additional units, ambulances, or engine companies be dispatched to assist at a scene or, for assistance enroute with directions, for example, to the location of the incident. In these instances, communications with the Center will continue and be via radio versus the telephone; **or,**

- A 911 call that is a medical emergency wherein the certified EMD Telecommunicator will stay on the telephone with the caller *after* they have dispatched the ambulance to ask the caller a series of "medical condition" questions, based on established medical protocols, to identify the extent and circumstances of the injury or condition, that they in turn then can communicate to the EMS responders enroute while also proceeding to offer instructions to the caller to assist the victim; for example, CPR, "continue to apply pressure to the wound", "keep them warm and still", etc. In this instance the Telecommunicators total "call time" may in fact include time intervals 'a' + 'b' + 'c' + 'd'

From the responding service agency's perspective the critical time interval for them becomes 'b'; based on the premise that they cannot *begin* to respond until they are notified of the incident.

Why time is important

The most elementary explanation of why time is important in a police, fire, or medical emergency has to do with the obvious; serious injury and/or the potential of loss of life and property. Of course not all 911 calls are going to be that serious. Also, the variety, type, and circumstances faced with a single service agency will vary considerably from call to call; even more so between those calls placed to police, fire, and emergency medical services. Of course too, the agency or service *must be* prepared to address the most serious scenario each time they are dispatched.

Critical of course, and a factor that neither dispatchers nor responders can do anything about, is the time between when an event actually "begins" and the time it is reported or 911 is dialed. For example, the time between the fire actually starting and the time it is discovered and reported, the length of time an individual had not been breathing before being discovered, or the delay between a crime occurring and it being discovered and reported.

Additional factors that can impact the time it takes the call-taker between answering the call and dispatching it include:

- The state of mind or hysteria of the caller
- A "silent" call-wherein TTY/TDD is attempted, however questioning can only begin if there is a response
- Non-English speaking or speech impaired calls

Police

While a great deal has been written with regards to law enforcement response times there is no identifiable time standard with which to judge performance or efficiency using only time as a basis. Urban or rural setting, nature of the offense, method of notification and personnel and equipment availability only begin to describe the variables that will inevitably effect police response time to an emergency situation to which they are called.

"Ideally, if the police are notified as a crime is in progress, they have a good chance to arrive before the perpetrators leave the scene. If police do not arrive at the scene within a few minutes, but still arrive while witnesses remain and are able to talk with them while the crime is still fresh in their memory, then they have a high probability of being able to solve the crime". (NENA; *911 System Survey and Resource Guide*; 2002)

Fire

The National Fire Protection Agency (NFPA) states that if a fire is not suppressed in eight to 10 minutes from the time of ignition, it will flashover, spreading outside the initial area or room of origin.

"As a rule of thumb, first responders should arrive on the scene in less than five minutes, 90% of the time." (National Institutes of Health)

"The fire department shall establish a response time objective . . . of four minutes or less for the arrival of the first arriving engine company at a fire suppression incident, for not less than 90% of all incidents" [NFPA Standard 1710 for the Organization and Deployment of Fire Suppression Operations; Section 4.1.3.1.1.]. Note that "response time" in this standard is expressed as the time from "wheels are rolling" to "wheels stopped" at the scene.

Medical

The same NFPA Standard (1710) also states that "deployment objectives for the first responder/AED level to arrive within four minutes for 90% of all calls".

"For cardiac arrest, the highest hospital discharge rate has been achieved in patients for whom CPR was initiated within 4 minutes of arrest and advanced cardiac life support within 8 minutes". (American Heart Association)

In an incident involving lack of oxygen, brain damage is very likely at 6-10 minutes; irreversible after 10 minutes. (American Association of Orthopedic Surgeons)

Emergency Communications

The aforementioned NENA publication, *911 System Survey and Resource Guide* states that:

"An important unit of measurement for primary public safety answering points (PSAP's) is ***average call length***. Calltakers and dispatchers must try to minimize call length while at the same time processing all of the information required to dispatch a call."

The study found that the average call length decreased as PSAP size increased. Average call length was 91 seconds for emergency calls in small PSAP's, 74 seconds for medium PSAP's and 66 seconds for large PSAP's, as defined in the survey.

The National Fire Protection Association's (NFPA) Standard 1221, Section 7.4.1 states; ***"Ninety-five percent of alarms (911 calls) received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds"***. Further, NFPA Standard 1221, Section 7.4.2 states; ***"Ninety-five percent of emergency call processing and dispatching shall be completed within 60 seconds, and 99 percent of call processing and dispatching shall be completed within 90 seconds".***

Based upon the time standards suggested, and with reference to the time intervals identified in the Call Process diagram, the most important performance criteria were determined to be "first ring-to-answer" (time interval 'a'), "answer-to-dispatch" (time interval 'b') and the total Communications Center "response time" which was the combination of time interval 'a' plus time interval 'b'. The results of these analyses are included in the tables that follow.

The Communications Center's telephone vendor allows access to the active data base which records and stores all incoming call times, first ring-to answer, and call duration.

The first report generated, "Call Count per Range", identified the range in seconds from first ring to call answer for all incoming 911 calls. Figure 45 identifies the number of 911 calls received per month during 2011 and the range of time in seconds it took to answer those calls. Subsequently, 94.8% of all incoming calls were answered within 7 seconds and 99.5% of all calls were answered within 14 seconds not only compatible but well within the referenced NFPA standards.

Figure 45
First Ring-to-Answer Times/Annual 911 Calls (2011)

Month	#911	0-7 sec.	7-14 sec.	< 15 sec.
January	6,472	90.3%	8.6%	**98.9%**
February	6,376	88.8%	9.8%	**98.6%**
March	6,989	95.9%	3.8%	**99.7%**
April	7,343	96.0%	3.6%	**99.6%**
May	7,507	96.2%	3.7%	**99.9%**
June	7,261	95.3%	4.2%	**99.5%**
July	7,275	96.1%	3.6%	**99.7%**
August	7,714	96.0%	3.7%	**99.7%**
September	7,586	96.2%	3.5%	**99.7%**
October	7,750	95.6%	4.1%	**99.7%**
November	7,376	95.6%	4.0%	**99.6%**
December	7,201	96.1%	3.7%	**99.8%**
Total Answered	**86,850**		**Total Avg. @**	**99.5%**

The same data base was able to provide individual monthly average Call Answer-to-Call Termination times for all incoming 911 calls.

Figure 46
Average Call Answer-to-Call Termination/Month & Year-2009-2011

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann. Avg.
2009	0:01:43	0:01:44	0:01:44	0:01:48	0:01:44	0:01:44	0:01:40	0:01:39	0:01:42	0:01:40	0:01:45	0:01:47	**0:01:43**
2010	0:01:40	0:01:44	0:01:42	0:01:43	0:01:42	0:01:41	0:01:46	0:01:42	0:01:42	0:01:46	0:01:48	0:01:47	**0:01:44**
2011	0:01:49	0:01:41	0:01:41	0:01:38	0:01:33	0:01:38	0:01:37	0:01:35	0:01:37	0:01:35	0:01:37	0:01:35	**0:01:38**

The average annual Call Answer-to-Call Termination times ranged from a low of 01:38 (98 seconds) in 2011 to a high of 01:44 (104 seconds) during 2010.

Keep in mind; however, this is *telephone* Call Answer-to-Call Termination time with the 911 caller. It *is not* the *Call Answer-to-Dispatch* time referenced for which time interval standards have been established. Emergency response agencies are dispatched via *radio*, *not* by telephone. Subsequently as is often the case, the Telecommunicator may in fact dispatch the response agency while on the phone with the caller before, or sometimes well before, they terminate the conversation with the caller; in which case the call answer-to-dispatch time *may be* less than the Call Answer-to-Call Termination time; which then *might* suggest that the Call Answer-to-Dispatch interval objectives suggested were achieved.

Figure 47
Call Answer-to-Dispatch Times

Year	50%	90%
2009	0:00:55	0:03:00
2010	0:00:56	0:02:54
2011	0:00:53	0:02:42

Call Answer-to-Call Dispatch

The sub-section that follows briefly addresses the data issues encountered during the conduct of this study. Despite repeated efforts by Emergency Services personnel, this specific time interval (Call Answer-to-Dispatch) proved the most elusive in terms of the data available and its reliability; i.e. lack of reliability. This table represents the latest effort to retrieve this data. Not only are the times excessive, they are 2-2 1/2 times what the referenced performance standards suggest that they should be.

In lay terms, the problem appears to be an issue of how the incoming calls are coded and the current CAD system's capabilities to (or not) sort 911 calls from *all* calls. Many hours of monitoring Communications Center activity via radio and in the Center itself has demonstrated repeatedly that 911 calls ***are*** being dispatched in far less than the 2-3 minutes indicated in Figure 47. Considering the County's recent approval to purchase new CAD system software, and its (hopefully) expedient arrival and installation, it was determined that further efforts by staff to assess this issue would be non-productive.

The Data

The availability of and accessibility to useable data from the Communications Centers CAD system was a concern expressed from the very outset of this study by the County itself.

Typically a jurisdiction's 911 Center's Computer Aided Dispatch (CAD) data base serves as the foundation of useable emergency call and response data for any and all emergency service agencies, and system managers and is the basis upon which they base performance assessments, resource deployment, staffing, and budget decisions. The data must be easily accessible, up to date, user (especially service agency) friendly, and its accuracy; i.e. reliability; assured.

This was not found to be the case in Orange County. Why? For one, the CAD system currently in place was originally purchased and installed in 1992. Many "patches" and "parts" have reportedly been added since that time. The fact remains that the technology used for collecting and analyzing emergency services call and incident response data is twenty (20) years old!

While Emergency Services staff labored repeatedly to access, reformat if necessary, interpret and make countless runs of data fields to get to the information required for this study, the efforts should not have had to take the time it did had the system been even modestly up to date.

The good news is that the County has recently (June 2012) approved the purchase of new Communications Center CAD technology and accompanying software which, by all reports, will offer a vast improvement for not only the Communications Center but also the emergency services agencies that respond to the emergency alarms to which they are called.

Expenses & Revenue

Figure 48 identifies the total ("actual") annual budgets of the Communications Center for fiscal years 2008-2009 through 2011-2012. Not, unexpectedly, the major percentage of the total Communications budget for these years was personnel; which averaged 91.3% of the total annual budget.

It is significant to note, and should signal concern, that the expense category "Training" averaged but 9/10ths of one percent per year, of the total annual budget allocations, for the past three years.

Figure 48
Annual Communications Expenditures/FY 2008-2011

Account	FY 2008-09 Actuals	FY 2009-10 Actuals	FY 2010-11 Actuals	FY 2011-12 Actuals
PERSONNEL SERVICES				
PERM SALS	$ 1,162,148	$ 1,137,277	$ 1,041,197	$ 1,039,840
OT	$ 121,819	$ 117,000	$ 76,995	$ 130,883
TEMP	$ 11,420	$ 22,128	$ 32,816	$ 13,237
HOLIDAY	$ 54,001	$ 52,718	$ 52,657	$ 56,482
SOC SEC	$ 82,788	$ 80,994	$ 73,487	$ 75,903
MEDICARE	$ 19,362	$ 18,942	$ 17,187	$ 17,751
MED INS	$ 178,809	$ 177,453	$ 173,620	$ 186,475
RETIRE	$ 66,426	$ 63,044	$ 76,783	$ 86,729
PERS-OTHER	$ 51,590	$ 32,004	$ 33,444	$ 55,574
SUBTOTAL-PERSONNEL SERVICES	**$ 1,748,363**	**$ 1,701,560**	**$ 1,578,187**	**$ 1,662,873**
OPERATIONS				
TRAINING	$ 584	$ 2,100	$ 764	$ 1,950
CERT&LICSN	$ 700	$ 1,520	$ 1,452	$ 918
TELEPHONE	$ 96,519	$ 108,722	$ 69,714	$ 59,477
MOTOR POOL	$ 158	$ 450	$ -	$ -
EQUIP RPR	$ 54,127	$ 34,285	$ 35,003	$ 39,644
EQUP RENT	$ 6,039	$ 13,997	$ 2,151	$ 5,400
DUPLICATIN	$ 423	$ 423	$ -	$ -
DUES	$ 1,685	$ 1,012	$ 2,074	$ 1,575
CONT SVS	$ 2,021	$ 22,210	$ 587	$ 1,230
SUP-DEPT,ED,OFF,COMP,OTH	$ 5,315	$ 4,067	$ 24,096	$ 5,216
OP-OTHER	$ 5,422	$ 5,819	$ (10)	$ (190)
SUBTOTAL-OPERATIONS	**$ 172,993**	**$ 194,605**	**$ 135,831**	**$ 115,219**
RECURRING CAPITAL				
EQUIPMNT	$ 19,068	$ -	$ -	$ -
IT EQUIP	$ -	$ -	$ -	$ -
FURNISH	$ -	$ 2,658	$ -	$ -
SUBTOTAL-RECURRING CAPITAL	$ 19,068	$ 2,658	$ -	$ -
TOTAL: COMMUNICATIONS	**$ 1,940,423**	**$ 1,898,823**	**$ 1,714,018**	**$ 1,778,092**

In North Carolina owners of cellular and land-line telephones are assessed a monthly "911 Service Fee". These funds are collected by the State and /redistributed to the 128 certified PSAP's (Communications s Centers) in the State for specifically designated (allowable) purposes; i.e. typically technical or phone system equipment or upgrades *within the Communications Center*. The amounts received by Orange County as identified in the published annual budget summaries for FY 2008-09 through 2011-12 are identified here.

Figure 49
Annual Budget & Surcharge Revenue Summary

Fiscal Year	Annual Budget	Surcharge Revenue	Collections (Revenue) as % of Budget
FY 08-09	$ 1,940,423	**$ 659,799**	**34.0%**
FY 09-10	$ 1,898,823	**$ 658,184**	**34.7%**
FY 10-11	$ 1,714,018	**$ 657,050**	**38.3%**
FY 11-12	$ 1,778,092	**$ 506,348**	**28.5%**

4.4 ISSUES OF CONCERN

This section discusses the significant Communications Center 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.

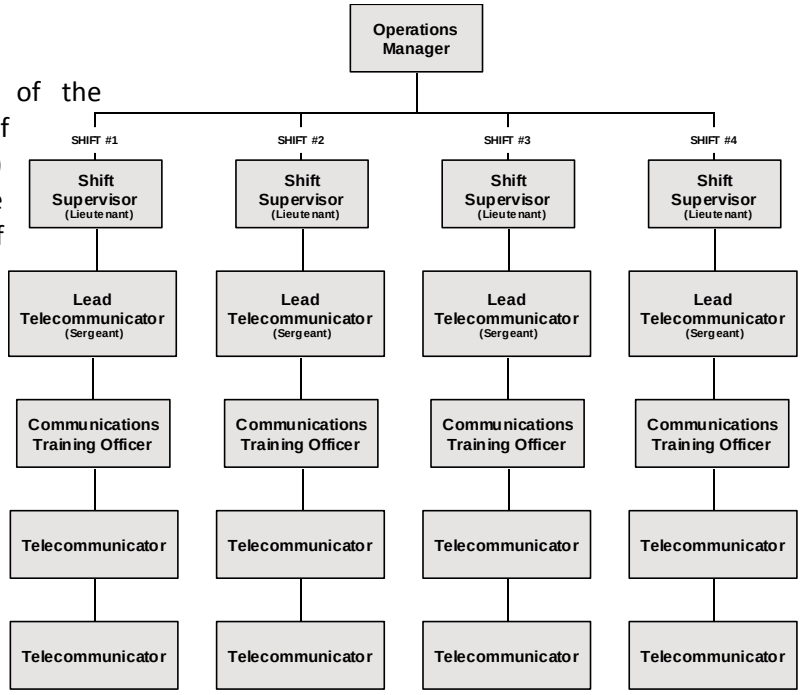
The determination of whether or not an "issue" was identified as such was based on the assessment of current operations and performance in discussed in Subsections 4.2 and 4.3

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

- Staffing
- Data

Issue: Staffing

The current staffing configuration of the Communications Center consists of the Operations Manager and four (4) shifts of five (5) positions each; the 5th position (Telecommunicator) as of this writing is and has been in training for several weeks. Obviously, with the exception of the Operations Manager, each position currently is expected to be occupied 24 hours per day, 365 days per year by appropriately certified personnel.



Relief Factor

Since the Communications Center requires continuous coverage of

each designated post position, it is important that the number of people required to man each position 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 and required training. Theoretically, a position that is open 24 hours per day, 7 days per week will require 8,760 hours of coverage per year.

Communications Center personnel currently work 12 hour shifts. Which, in actuality, based upon their rotation schedule, amounts to a total time assigned of fourteen, 12.2 hour shifts every 28 days; or 2,226.5 total hours assigned per year.

From this total must be subtracted 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 *is available* to cover a given position. Figure 50 identifies the calculations used to determine an individual Telecommunicator's annual availability in hours.

Figure 50
Annual Available Hours per Officer

a.	**Total Assigned Hours/Year**				**2,226.5**
	No. Days Allowed/Year	**Hours/Year**	**Hours/day**	**Hrs. Deducted From Hrs. Assigned**	
b.	**Sick**	12.0	12.2	**146.4**	
c.	**Annual**	15.7	12.2	**191.5**	
d.	**Holidays**	11.0	12.2	**134.2**	
e.	**Training**	3.0	12.2	**36.6**	
	Total Available Hours/Year; a-(b+c+d+e)				**1,717.8**

Note that the Hours/Year are based on the accrual rate of second year employees, per Human Services, at the rate of 3.7 hours/pay period for sick leave (12 days/year), and 4.84 hours/pay period for annual leave (15.7 days/year).

The Relief factor for a 24 hour per day position, open 365 days per year would be 8,760 hours (number of hours position is open) divided by 1,717.8 hours (the number of hours an individual is available per year); the result being, the **Relief Factor = 5.10.**

Figure 51 illustrates the subsequent calculations for both 24 hour and 12 hour shift positions.

Figure 51
Shift Relief Factor Calculations

Position Coverage	Annual Hours Required/Position	Hours Avaiable/Yr. Per Employee	Relief Factor
24 Hrs./7 Days	8,760	1,718	**5.10**
12 Hrs./7 Days	4,380	1,718	**2.50**

Determination of Communications Center Staff Requirements
First, the obvious; what the above calculations just shown illustrate is that four (4) Shift Supervisors, four (4) Lead Telecommunicators/Assistant Shift Supervisors, and four (4) Communications Training Officers cannot cover their respective positions 24/7/365 without some or all of them working *a lot* of overtime or, working short staffed, or a combination of the two; i.e. it takes 5.10 bodies to cover one 24/7/365 position, there are currently four (4) assigned to each position.

Subsequently, in this instance staffing requirements will be calculated two ways:

The first method will include a calculation of the requirements on the basis of the staffing configuration currently ***in place***. Note that *"in place"* is emphasized here in that the basis for the number of positions and in turn the number of personnel filling those positions is essentially, based on "history" versus the calculation of needs based on call data or work load.

The second method, which will utilize the Relief Factor calculations identified in the first method, will calculate the Communications Center staffing requirements based on an industry accepted formula matrix that is based on the County's peak call volume and call duration data identified during this study.

In-Place Position Requirements
Once the current Telecommunicator trainees have completed their training the Communications Center will be able to provide an additional Telecommunicator to each existing shift; bringing the total positions assigned per shift to six (6).

With existing Staffing Configuration, at six (6) positions per shift, the minimum number of personnel required to cover each position 24 hours/day, 365 days/year would be:

Position Title	# Positions Per Shift	Relief Factor	# Required per Position
Shift Supervisor	1	5.10	**5.10**
Lead Telecommunicator	1	5.10	**5.10**
Communications Training Officer	1	5.10	**5.10**
Telecommunicator	3	5.10	**15.30**
	6		**30.60**

This number (30.6) corresponds very closely to the number of employees currently allocated to the Communications Center (30), not including the Operations Manager, there are still five (5) vacant positions including, *most critically*, an Assistant Shift Supervisor and a Shift Communications Training Officer. Also, this staff requirement is based on the number of positions "in place" versus the number *calculated* as "needed".

Determination of Positions Needed
The methodology used to determine the level of staffing required for a primary PSAP such as Orange County's was one initially developed by the U.S. Department of Justice, and since utilized by agencies and organizations such as FEMA, the National Emergency Number Association (NENA), and the Association of Public Safety Communications Officials (APCO).

It utilizes a matrix format that considers two principal criteria:

- The average call-taker "busy time" in seconds; i.e., average call duration, and
- The peak call rate per hour.

The average telephone call duration was calculated using the three years of call-processing data previously referenced for 2009-2011. Call duration information is recorded automatically for every call received. While the computer printouts and call data reviewed for this purpose did not indicate the type of call or specific emergency service requested, it was generally assumed that total call durations of two minutes or more involved an EMD response.

Call data analyzed identified that ***the average call duration was 102 seconds.*** This was the average of the entire sample studied; from the one-ring, 6-second hang-up to the 13 minute medical emergency, EMD response.

Based on the numbers illustrated in Figure 42, on page 68, the busiest hour of the day with regards to call volume for each of the calendar years reviewed was consistently between the 5:00 pm and 6:00 pm. Logically, it was found that the peak call rate did indeed come from this hour of the day. ***The average peak rate per hour identified for the three years studied was 236 calls; 3.9 calls per minute.***

Applying these numbers to the nearest like numbers on the staffing matrix, illustrated in the Figure below, identifies '100' as the number closest to the Communications Center's average busy time of *102 seconds* along the top line. The number 230 in the column (below the number 100) is the closest to the Center's *peak call rate per hour of 236* Now, following the line of numbers to the left from the number 230, results in the number of *"required call-takers" required;* in this case, ten (10).

Figure 52
Staffing Matrix

Average Call Duration @ 102 seconds

Required Call-Takers	Average Call-Taker Busy Time, In Seconds																		
	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
1	16	13	11	9	8	7	6	6	5	5	5	4	4	4	4	3	3	3	3
2	77	64	54	47	42	37	34	31	28	26	24	23	21	20	19	18	17	16	16
3	157	131	112	98	87	78	70	64	59	55	51	48	45	42	40	38	36	34	33
4	247	206	177	154	137	123	111	102	94	87	81	76	71	67	64	60	57	55	52
5	343	287	248	215	191	171	156	142	131	122	113	106	100	94	89	85	80	77	73
6	443	371	318	278	247	222	202	185	170	158	147	138	130	122	116	110	105	100	95
7	545	457	393	344	306	275	250	229	211	196	182	171	161	154	152	136	130	124	214
8	650	545	469	411	365	329	299	274	252	234	218	205	192	182	172	163	155	148	142
9	756	635	546	479	426	384	349	319	295	273	265	239	225	212	201	191	181	173	165
10	864	726	625	548	488	439	399	366	338	313	292	274	258	243	230	219	208	199	190
11	973	818	705	618	550	496	451	413	381	354	330	309	291	275	260	247	235	224	214
12	1082	911	785	689	614	553	503	461	425	395	368	345	325	307	290	278	262	250	239
13	1193	1005	866	761	678	611	555	509	470	436	407	382	359	339	321	305	290	277	265
14	1304	1099	948	833	742	669	608	558	515	478	446	418	393	371	352	334	318	303	290

Peak Call Rate @ 236/hour

Staffing Matrix Source: U.S. Department of Justice

Applying the Relief Factor to these findings; ten (10) Telecommunicator positions at 5.10 "bodies" per position, equals 51 personnel; considerably higher than what the Center is working with currently. More importantly, four (4) *more positions* than the Communications Center is operating with now.

And, not surprisingly, during various audits of the Communications Center activities, both day and evening shifts, it was noted that staff did not take actual meal breaks, but ate at their work stations while continuing to answer calls. As well, they were not taking any noticeable form of breaks; for example, getting up from their workstation, leaving the call center area and going somewhere for a legitimate and restful "break"; both of which are addressed in FLSA literature for shift work hours of this duration.

Finally, the most blatant "gap" observed in the staffing configuration of the Communications Center, particularly for a Center with the call volume and *current* number of positions, was the absence of an assigned, dedicated, full-time Data System Manager, a dedicated Quality Assurance Officer, and a full-time Training Officer.

These are ***critical*** needs. And, while data/technical support is available on an as needed basis from the Planning & Logistics Unit of the Emergency Services Department this *is not* an adequate substitute for permanently assigned personnel; particularly, considering the Communications Center's position at the very center of the Emergency Services and Public Safety entities in operation in Orange County.

Issue: Data

As discussed briefly in Subsection 4.3, the availability of easily accessed, workable, reliable, and user friendly data, which would normally be available in the Communication Center's CAD system, was not. The information was there! However, it was found many times that it was neither easy to find or access nor in a user friendly format when it was finally obtained; albeit, requiring more work to make it so. A major reason, also previously addressed, was that the technology is 20 years old.

During the early phases of this study, interviews and meetings were conducted with Fire Department, Law Enforcement, and Emergency Services personnel. Though "opinions" flowed freely, and occasional personality "differences" were volunteered in often less than subtle terms, little actual, specific criticism of the Communications Center (or EMS) were offered. The one consistent and oft repeated "concern" had to do with "the call numbers", or the manner in which service agencies were dispatched (or not), the timing of the agency's "page" or dispatch versus the time the call was originally recorded; in other words the data, and the data system capabilities.

The Communication Center's; i.e. the County's technical capabilities were not up to speed, nor apparently have they been up to speed with the expectations of the various agencies served. Much of this will (hopefully) be resolved with County having recently, after many months, finally approved the purchase of new CAD software for the Communications Center; although completion of installation and access to its on-line capabilities remains several months away. It represents the proverbial light at the end of the tunnel.

This combined with the NC 911 Board's installation of their new **ECatS** (Emergency Call Tracking System) data access and reporting system in Orange County and the other 127 PSAP locations in the State. A year from now, the *Data Issue* will hopefully have "gone away".

The essential remaining effort to be undertaken will involve the methodology used by Communications Center and Emergency Services personnel in the orientation and training of the County's Emergency Service users as to the new software's capabilities and the reports it can be expected to provide for those agencies.

4.5 RECOMMENDATIONS

Issue: Staffing
Recommendations:

R-13. Hire a full-time, dedicated Data System Manager to be located as close as possible, preferably adjacent to the Communications Center, and answerable first to the Communications Center Operations Manager.
This position is a priority and efforts to identify and place a qualified person in this role should begin immediately. In turn, the coordination, installation and implementation of the new CAD system software should be at the very top of this individual's 'to-do" list.

R-14. Hire a full-time, dedicated Training/Quality Assurance Officer to be located as close as possible, preferably adjacent to the Communications Center, and answerable first to the Communications center Operations Manager.
This position is as important as that of the Data System Manager in that *accountability* and the adherence to EMD protocols is vital to an effective emergency Communications operation.

R-15. Anticipating increasing responsibilities due to the number of new personnel forthcoming, hire an additional full-time Training/Quality Assurance Officer no later than the end of year-3.
This recommendation anticipates that by the end of year-3 of the Implementation Schedule identified in Section 6 that the combined Training/Quality Assurance Officer position will evolve with the addition of personnel and require a transition to a full-time Training Officer and a full-time Quality Assurance officer.

R-16. Prepare a schedule for the hiring and training of the identified Telecommunicator positions and identify the date to begin solicitation and acceptance of applications.
The Communications Center is currently deficient of resources; i.e. personnel, in key positions; subsequently it will be important to have The Data System Manager and the Training/Quality Assurance Officer in place prior to the hiring of the personnel to fill the recommended Telecommunicator positions. Subsequently, the designated Telecommunicator positions, *particularly* the vacant Assistant Shift Supervisor and Communications Training Officer positions will be critical to an effective and efficient hiring timeline. Delays will prolong and exponentially prolong the problem of lack of staff.

R-17. Hire 17 new, full-time Telecommunicators.
The Implementation Schedule suggested in Section 6 identifies a suggested timeline for hiring of these positions. It is important to recall that hiring a "position" in the Communications Center means providing the responsibilities of that position 24 hours/day, 365 days/year. Subsequently, that "position" will require *five (5) bodies* to fill it. Therefore the sequence for hiring suggests that these Telecommunicators be hired in groups of no less than five (5) at one time; versus, for example, approving funding for two (2) people, "one in July and one (1) in January", which is *very* inefficient.

Issue: Data

Recommendations:

R-18. Purchase necessary AVL vehicle hardware for each new EMS vehicle purchased to enable compatibility with newly purchased CAD software and existing AVL system hardware.

Automatic Vehicle Location (AVL) hardware has already been purchased and is installed in current EMS vehicles. The equipment is compatible with the newly purchased CAD system software and the AVL "package" that is included within it. This recommendation is simply to continue with the purchase and installation of this important hardware into each new EMS vehicle as it comes on line.

R 19. Following the installation of recently purchased Communications Center software and the training of in-house personnel; organize and provide informational meetings to emergency service system members, particularly Fire Departments and Law Enforcement, with regards to the system's capabilities and the information that will be available to them for their use.

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SECTION 5-PROBABLE COSTS

EMERGENCY MEDICAL SERVICES

Issue: Availability of Ambulances

RECOMMENDATIONS	
1	Adjust Medic 5 and Medic 8 coverage hours
2	Add ALS ambulance 9a-9p @12 hrs/7 days
3a	Utilize available BLS ambulance(s) for non-emergency transports
3b	Staff BLS ambulance for non-emergency transport @ 12 hrs/7 days

REC	Personnel	Equipment	Prof. Services	Construction	Other	Total
1	n/a	n/a	n/a	n/a	n/a	$ -
2	$ 224,100	$ 228,400	n/a	TBD	TBD	$ 452,500
3a	n/a	n/a	$ 300,000	n/a	$ 105,000	$ 405,000
3b	$ 205,876	(existing)	n/a	TBD	TBD	$ 205,876

Notes:

Rec 2. Personnel-Includes equivalent of one (1) Paramedic "position" and one (1) EMT "position" @ 12 hours/7 days each = 2.5 FTE Paramedics + 2.5 FTE EMT's.

Rec 2. Equipment-Includes estimated cost of one (1) M2 Ambulance, plus equipment, plus first year medical supply costs.

Rec 3a. Prof. Services-if SORS/BLS option is implemented, costs identified assume payment for transportation services billed @ OCEMS rates for estimated 1,000 patient transports/year.

Rec 3a. Other-If SORS/BLS option is implemented, costs identified assume payment of mileage charges @ OCEMS rates/mile x estimated 14,000 miles/year.

Rec 3b. Personnel-Includes equivalent of two (2) EMT "positions" @ 12 hours/7 days each = 5 FTE's to staff BLS ambulance if Rec 3a. cannot be implemented; assumes OEMS will have a vehicle available.

SECTION 5-PROBABLE COSTS

EMERGENCY MEDICAL SERVICES

RECOMMENDATIONS	
4	Assess FD capabilities necssary to meet MFR-RT requirements
5a	Implement FD/MFR initiative w/performance objectives
5b	Add four (4) QRV's @ 12 hrs/7 days
6	Add six (6) 12 hr/7 day ALS ambulances; Zones 1/2, 7/5, 6/8
7	Hire Shift Supervisor; ALS @ 24/7

REC	Personnel	Equipment	Prof. Services	Construction	Other	Total
4	n/a	n/a	$ 8,000	n/a	n/a	$ 8,000
5a	TBD	TBD	n/a	n/a	TBD	TBD
5b	$ 484,650	$ 220,000	n/a	TBD	TBD	$ 704,650
6	$ 1,344,600	$ 1,370,400	n/a	TBD	TBD	$ 2,715,000
7	$ 321,300	$ 45,000	n/a	n/a	TBD	$ 366,300

Notes:

Rec 4. Prof. Services-Estimated contracted cost to provide independent assessment of existing Fire Department capabilities and needs to accomplish Medical First Responder response time objectives.

Rec 5a. Assumes needs identified and response time objectives resulting from Rec 4 are accepted by the County and Fire Departments respectively and implementation of the initiative is approved.

Rec 5b. Personnel-Assumes Rec 5a is *not* implemented; OCEMS to address critical MFR issue via hire of personnel to staff four (4) Quick Response Vehicles to be staged throughout the County; costs identified to cover one (1) Paramedic "position" per QRV-12hours/7 days-@ 2.5 FTE's per QRV x four (4) vehicles.

Rec 5 b. Equipment-Estimated cost of four (4) SUV type vehicles, including up-fit of communications systems and equipment.

Rec 6. Personnel-Assumes one (1) Paramedic "position" and one (1) EMT "position" per 12 hour/7 day ambulance = 2.5 Paramedic FTE's + 2.5 EMT FTE's per ambulance x six (6) ambulances; implemented over first eight (8) years.

Rec 6. Equipment- Includes estimated cost of six (6) M2 Ambulances, plus equipment, plus first year medical supply costs for each.

Rec 7. Personnel-Includes one (1) EMS Paramedic level Shift Supervisor "position" 24/7/365 @ 5 FTE's.

Rec 7. Equipment-Estimated cost of one (1) SUV type vehicle, including up-fit of communications systems and equipment.

SECTION 5-PROBABLE COSTS

EMERGENCY MEDICAL SERVICES

Issue: EMS Base Facilities

RECOMMENDATIONS	
8	Conduct detailed Space Needs Assessment
9	Identify minimum of nine (9) strategic locations
10	Purchase identified site and/or building
11	Procure base design & construction services
12	Construction; nine (9) EMS Bases

REC	Personnel	Equipment	Prof. Services	Construction	Other	Total
8	n/a	n/a	$ 12,000	n/a	TBD	$ 12,000
9	n/a	n/a	n/a	n/a	n/a	$ -
10	n/a	n/a	n/a	n/a	TBD	TBD
11	n/a	TBD	$ 1,620,000	n/a	TBD	$ 1,620,000
12	n/a	TBD	n/a	$ 8,064,000	n/a	$ 8,064,000

Notes:

Rec 8. Prof. Services- Estimated contracted cost to provide a Space Needs Assessment to address and document building and site requirements for an EMS base facility.

Rec 11. Professional Services-Estimated total cost for planning & design services for nine (9) EMS base facilities; assumes design for each facility is contracted for as a *single* project.

Rec 12. Construction- Estimated cost of construction for nine (9) EMS base facilities bid and contracted for as nine (9) separate projects; single facility construction cost based on a current NC County project in final stages of design @ 5,000 square feet x $180/square foot for pre-engineered steel building.

SECTION 5-PROBABLE COSTS

COMMUNICATIONS CENTER

Issue: Staffing

RECOMMENDATIONS	
13	Hire Full-time Data System Manager
14	Hire full-time Training/Quality Assurance Officer
15	Hire full-time Training/Quality Assurance Officer
16	Prepare schedule for hiring/training of new Telecommunicators
17	Hire 17 full-time Telecommunicators

REC	Personnel	Equipment	Prof. Services	Construction	Other	Total
13	$ 74,250	n/a	n/a	n/a	n/a	$ 74,250
14	$ 64,800	$ 8,000	n/a	TBD	TBD	$ 72,800
15	$ 64,800	$ 8,000	n/a	TBD	TBD	$ 72,800
16	n/a	n/a	n/a	n/a	n/a	$ -
17	$ 784,890	TBD	n/a	n/a	TBD	$ 784,890

Notes:

Rec 13. Personnel-Estimated annual salary + 35 % matching costs for Data System Manager.

Rec 14. Personnel-Estimated annual salary + 35 % matching costs for Training/Quality Assurance Officer.

Rec 14. Equipment-Estimated first year costs for necessary quality assessment and training materials.

Rec 15. Personnel-Estimated annual salary + 35 % matching costs for Training/Quality Assurance Officer.

Rec 15. Equipment-Estimated first year costs for necessary quality assessment and training materials.

Rec 17. Estimated annual salary + 35% matching costs for one (1) full-time Telecommunicator x 17.

SECTION 5-PROBABLE COSTS

COMMUNICATIONS CENTER

Issue: Data

RECOMMENDATIONS	
18	Purchase AVL hardware-new vehicles
19	LE & FD Software Orientation

REC	Personnel	Equipment	Prof. Services	Construction	Other	Total
18	n/a	$ 60,000	n/a	n/a	n/a	$ 60,000
19	n/a	TBD	n/a	n/a	n/a	TBD

Notes:

Rec 18. Equipment-Estimated cost for vehicle hardware necessary to synchronize with CAD system Automatic Vehicle Location (AVL) software for tracking of EMS vehicles; costs identified are based on estimated cost of AVL hardware per vehicle x number of new vehicles (12) projected for purchase during 10-year plan implementation time line.

SECTION 6-IMPLEMENTATION SCHEDULE

YEAR 1-5

No.	Recommendation	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Total
1	Adjust Medic 5 & 8 coverage	$ -	$ -	$ -	$ -	$ -	$ -
2	Add 9a-9p @12/7 ALS	$ -	$ 452,500	$ -	$ -	$ -	$ 452,500
3a	BLS for Non-Em transports @ 12/7	$ -	$ -	$ 405,000	$ -	$ -	$ 405,000
3b	Staff BLS for NE transports @ 12/7	$ -	$ -	$ 205,876	$ -	$ -	$ 205,876
4	Assess FD- MFR/RT requirements	$ 8,000	$ -	$ -	$ -	$ -	$ 8,000
5a	Implement FD/MFR initiative	TBD	$ -	$ -	$ -	$ -	$ -
5b	Add four (4) QRV's @ 12/7	$ -	$ 704,650	$ -	$ -	$ -	$ 704,650
6	Add six (6) ALS Ambulances @ 12/7	$ -	$ -	$ -	$ 1,357,500	$ -	$ 1,357,500
7	Hire Shift Supervisor; ALS @ 24/7	$ -	$ -	$ -	$ 366,300	$ -	$ 366,300
8	Space Needs Assessment	$ 16,000	$ -	$ -	$ -	$ -	$ 16,000
9	Identify nine (9) base locations	$ -	$ -	$ -	$ -	$ -	$ -
10	Purchase sites/buildings	$ -	TBD	TBD	TBD	TBD	$ -
11	Design services- nine (9) bases	$ -	$ -	$ -	$ 540,000	$ -	$ 540,000
12	Construction/Renovation-9 bases	$ -	$ -	$ -	$ -	$ 2,688,000	$ 2,688,000
12	Hire Data System Manager	$ 74,250	$ -	$ -	$ -	$ -	$ 74,250
14	Hire Training/QA Officer	$ 72,800	$ -	$ -	$ -	$ -	$ 72,800
15	Hire T/QA Officer	$ -	$ -	$ 72,800	$ -	$ -	$ 72,800
16	Schedule hiring/training for ne TC's	$ -	$ -	$ -	$ -	$ -	$ -
17	Hire 17 new Telecommunicators	$ -	$ 230,850	$ -		$ 230,850	$ 461,700
18	AVL hardware-new vehicles	$ -	$ 40,000		$ 20,000	$ -	$ 60,000
19	LE & FD Software Orientation	$ -	TBD	$ -	$ -	$ -	$ -
		$ 171,050	$ 1,428,000	$ 683,676	$ 2,283,800	$ 2,918,850	$ 7,485,376
	Capital/One-Time Cost	$ 24,000	$ 488,400	$ -	$ 993,600	$ 2,688,000	$ 4,194,000
	Operating Cost	$ 147,050	$ 939,600	$ 683,676	$ 1,290,200	$ 230,850	$ 3,291,376

SECTION 6-IMPLEMENTATION SCHEDULE

YEAR 6-10

No.	Recommendation	Year 6	Year 7	Year 8	Year 9	Year10	5-Year Total
1	Adjust Medic 5 & 8 coverage	$ -	$ -	$ -	$ -	$ -	$ -
2	Add 9a-9p @12/7 ALS	$ -	$ -	$ -	$ -	$ -	$ -
3a	BLS for Non-Em transports @ 12/7	$ -	$ -	$ -	$ -	$ -	$ -
3b	Staff BLS for NE transports @ 12/7	$ -	$ -	$ -	$ -	$ -	$ -
4	Assess FD- MFR/RT requirements	$ -	$ -	$ -	$ -	$ -	$ -
5a	Implement FD/MFR initiative	$ -	$ -	$ -	$ -	$ -	$ -
5b	Add four (4) QRV's @ 12/7	$ -	$ -	$ -	$ -	$ -	$ -
6	Add six (6) ALS Ambulances @ 12/7		$ -	$ 1,357,500	$ -	$ -	$ 1,357,500
7	Hire Shift Supervisor; ALS @ 24/7	$ -	$ -	$ -	$ -	$ -	$ -
8	Space Needs Assessment	$ -	$ -	$ -	$ -	$ -	$ -
9	Identify nine (9) base locations	$ -	$ -	$ -	$ -	$ -	$ -
10	Purchase sites/buildings	$ -	$ -	$ -	$ -	$ -	$ -
11	Design services- nine (9) bases	$ 540,000	$ -	$ -	$ 540,000	$ -	$ 1,080,000
12	Construction/Renovation	$ -	$ 2,688,000	$ -	$ -	$ 2,688,000	$ 5,376,000
12	Hire Data System Manager	$ -	$ -	$ -	$ -	$ -	$ -
14	Hire Training/QA Officer	$ -	$ -	$ -	$ -	$ -	$ -
15	Hire T/QA Officer	$ -	$ -	$ -	$ -	$ -	$ -
16	Schedule hiring/training for ne TC's	$ -	$ -	$ -	$ -	$ -	$ -
17	Hire 17 new Telecommunicators		$ 323,190	$ -	$ -	$ -	$ 323,190
18	AVL hardware-new vehicles	$ -	$ -	$ -	$ -	$ -	$ -
19	LE & FD Software Orientation	$ -	$ -	$ -	$ -	$ -	$ -
		$ 540,000	**$ 3,011,190**	**$ 1,357,500**	**$ 540,000**	**$ 2,688,000**	**$ 8,136,690**
	Capital/One-Time Cost	**$ 540,000**	**$ 2,688,000**	**$ 685,200**	**$ 540,000**	**$ 2,688,000**	**$ 7,141,200**
	Operating Cost	**$ -**	**$ 323,190**	**$ 672,300**	**$ -**	**$ -**	**$ 995,490**

SECTION 7-APPENDIX

Emergency Medical Services (EMS)

- **10A NCAC 13P .0201; EMS System Requirements**
- **Orange County Grid Map; w/Number of EMS Calls & Average Response Times per Grid;**
  a. **Calendar years 2009-2011**
- **County EMS Agency Comparison Survey**

911/Communications Center

- **Carolina 911 Board PSAP Operating Standards**
- **911/Communications Center Response, Dispatch & Communications Process Maps:**
  - **Emergency Medical Dispatch (EMS)**
  - **Structure Fire (Fire Departments)**
  - **Domestic Violence/Disturbance (Law Enforcement)**
- **NFPA 450 Excerpt: Essential (Communications Center) System Analysis Components**

APPENDIX A

10A NCAC 13P .0201; EMS System Requirements

APPENDIX B

Orange County Grid Map; w/Number of EMS Calls & Average Response Times per Grid; Calendar years 2009-2011

APPENDIX C

County EMS Agency Comparison Survey

APPENDIX D

North Carolina 911 Board PSAP Operating Standards

APPENDIX E

911/Communications Center Response, Dispatch & Communications Process Maps:

- **Emergency Medical Dispatch (EMS)**
- **Structure Fire (Fire Departments)**
- **Domestic Violence/Disturbance (Law Enforcement)**

Note that the call process illustrations that follow are EXAMPLES. Of the many hundreds of emergency calls reviewed and/or audited, no two-even of the same category of call-were ever exactly alike. Should an error or omission be noted, it is due to the consultant's interpretation of the call process described and *should not* be interpreted as an error or omission by the Communications Center or its personnel.

APPENDIX F

NFPA 450 Excerpt: Essential (Communications Center) System Analysis Component

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 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;

(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 defined in Rule .0301(a)(4) 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 per day;

(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(33) of this Subchapter and written procedures which 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 facilities 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 using the emergency telephone number 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 emergency communications center or 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) an emergency communications system operated by public safety telecommunicators with training in the management of calls for medical assistance available 24 hours per day;

(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 emergency communications center or PSAP and to facilities where patients are routinely transported. The emergency communications system shall maintain all required FCC radio licenses or authorizations;

(11) written policies and procedures for addressing the use of SCTP and Air Medical Programs 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 system EMS Care data, review, and evaluation of patient outcomes and quality management peer reviews, that follows the guidelines of the:

(A) "US DOT NHTSA First Responder Refresher: National Standard Curriculum" for MR personnel;

(B) "US DOT NHTSA EMT-Basic Refresher: National Standard Curriculum" for EMT personnel;

(C) "EMT-P and EMT-I Continuing Education National Guidelines" for EMT-I and EMT-P personnel; and

(D) "US DOT NHTSA Emergency Medical Dispatcher: National Standard Curriculum" for EMD personnel.

These documents are incorporated by reference in accordance with G.S. 150B-21.6, including subsequent amendments and additions. These documents are available from NHTSA, 400 7th Street, SW, Washington, D.C. 20590, at no cost;

(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 by-pass of other licensed health care facilities and which 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 appropriate facilities when diversion or bypass plans are activated;

(D) reporting, monitoring, and establishing standards for system response times using data provided by the OEMS;

(E) weekly updating of the SMARTT EMS Provider information;

(F) a disaster plan; and

(G) a mass-gathering plan;

(14) affiliation as defined in Rule .0102(4) of this Subchapter with the trauma RAC as required by Rule .1101(b) of this Subchapter; and

(15) medical oversight as required by Section .0400 of this Subchapter.

(b) 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.

History Note: *Authority G.S. 131E-155(1), (6), (8), (9), (15);143-508(b), (d)(1), (d)(2), (d)(3), (d)(5), (d)(8), (d)(9), (d)(10), (d)(13); 143-509(1), (3), (4), (5);143-517; 143-518;*
Temporary Adoption Eff. January 1, 2002;
Eff. August 1, 2004;
Amended Eff. January 1, 2009.

Orange County Boundaries
w/ Municipality Boundaries

2009 Mean response times by Grid

Report

ResponseMinutes

MapGrid	Mean	N	Std. Deviation
803	16.0719	16	5.39154
804	9.7167	7	5.28292
805	17.0563	8	4.99263
806	22.7697	11	7.95000
807	18.5979	16	5.12286
808	23.9611	3	1.80849
809	16.4200	5	9.60452
817	27.5000	1	.
818	26.9833	1	.
819	28.6500	2	3.37054
900	27.7583	6	5.29741
9727	19.2500	6	3.66736
9728	18.7405	7	6.30104
9729	19.8250	2	2.18025
9737	18.4917	2	1.30815
9738	18.8286	7	2.64023
9739	16.0870	9	3.67727
9747	15.0514	23	3.72016
9748	15.0278	9	3.15293
9749	15.0413	23	4.24234
9757	11.7630	9	3.74574
9758	13.2075	20	4.17752
9759	12.1222	36	3.44612
9766	12.0000	1	.
9767	12.1438	72	6.34648
9768	8.1548	328	5.47947
9769	10.8480	59	4.30562
9776	11.6917	2	2.46309
9777	7.8960	279	4.34889
9778	8.6486	488	5.29302
9779	7.7175	221	4.50145
9787	10.6132	116	5.10491
9788	8.6034	1510	5.63910
9789	10.7184	246	4.01976
9797	12.4833	1	.
9798	10.0880	379	5.00715
9799	11.9254	701	4.76070

9820	16.9526	13	4.07751
9821	24.1167	4	5.22375
9822	15.2171	37	9.16496
9823	10.2000	1	.
9824	16.8119	7	4.71907
9825	12.4429	236	5.86314
9826	17.0949	13	4.41859
9827	16.9833	4	4.85945
9828	22.9833	3	11.76599
9829	33.0806	6	12.46327
9831	17.4083	8	4.02304
9833	13.9633	5	2.55863
9834	13.4532	57	4.44941
9835	14.1671	106	5.64373
9836	17.1123	72	7.77060
9837	18.0907	9	9.94517
9838	16.3471	23	6.36859
9839	18.8367	5	9.55172
9840	18.2274	14	3.88354
9841	11.5703	249	5.06813
9842	20.4056	15	13.70796
9843	14.1190	7	2.73909
9844	9.2255	49	4.58229
9845	14.6884	43	5.76702
9846	15.6565	18	4.43101
9847	19.3817	20	6.65924
9849	19.6384	23	5.24896
9850	15.1132	29	4.66458
9851	9.7778	3	7.07700
9852	13.8458	16	5.35346
9853	12.0417	4	9.03221
9854	11.2393	61	4.88971
9855	22.3917	4	13.01462
9856	11.3500	2	2.89914
9857	22.1592	20	16.07132
9858	21.4233	5	9.11617
9859	18.7083	6	4.33333
9860	11.2174	24	4.98070
9861	10.1397	63	3.82431
9862	13.1792	16	4.93714
9863	9.8274	342	3.92876
9864	11.3687	465	5.16009
9865	14.0020	289	5.66860
9866	17.6599	27	4.35622

9867	18.2167	1	.
9868	19.0754	23	6.21317
9869	12.9167	2	16.42845
9870	12.6811	59	5.73348
9871	8.3108	31	4.63862
9872	5.5754	19	3.72764
9873	8.4441	127	4.37947
9874	10.2832	352	4.46731
9875	13.5070	107	4.80491
9876	16.8292	12	5.27800
9877	16.0232	28	4.64288
9878	22.0816	19	6.65777
9879	20.2256	28	6.95287
9880	9.6294	452	4.55767
9881	12.5944	21	4.31822
9882	9.3989	30	3.21580
9883	10.8731	49	3.35630
9884	12.8583	32	3.72818
9885	16.3119	14	3.32453
9886	18.9537	9	3.51674
9887	14.9950	10	6.91733
9888	14.5667	1	.
9889	27.1233	5	5.91679
9890	13.3353	213	5.20610
9891	16.5182	22	6.39389
9892	12.9205	48	3.83938
9893	10.7229	117	5.70260
9894	18.8750	4	6.25705
9896	18.2611	18	7.79201
9897	19.7389	3	3.33218
9898	21.8583	2	.20035
9899	17.1756	13	5.41925
9920	24.1758	11	3.14239
9930	21.0627	17	7.03374
9940	12.8463	112	5.78734
9950	11.2833	7	7.47855
9970	26.0133	5	10.94525
9990	17.6513	13	20.02915
Total	11.0420	9091	6.03687

2010 Mean Response Times by Grid

Report

ResponseMinutes

MapGrid	Mean	N	Std. Deviation
803	17.9544	15	6.57934
804	13.6542	12	4.48102
805	19.0795	13	5.44293
806	21.3869	14	4.95512
807	19.2385	13	8.47563
808	25.7833	1	.
809	22.1650	10	7.41286
819	21.9833	1	.
900	32.8778	12	24.18399
9727	24.9611	3	10.81029
9728	18.5417	6	5.52112
9729	22.2000	1	.
9737	16.6722	3	7.16396
9738	16.8250	6	2.74671
9739	18.9095	7	4.72876
9747	15.9364	22	3.99475
9748	14.7924	11	3.29011
9749	15.4292	12	6.92996
9757	16.8593	9	13.57322
9758	12.7220	25	4.22902
9759	13.7381	28	5.53460
9767	10.8858	55	5.61815
9768	8.2350	358	5.32306
9769	12.8326	44	5.50949
9776	11.5667	1	.
9777	8.4145	342	5.03896
9778	8.4312	482	5.88911
9779	8.5348	206	4.88165
9787	10.6969	98	4.52535
9788	8.7870	1376	4.81225
9789	11.9938	206	6.57951
9797	12.7667	1	.
9798	10.6633	491	5.89673
9799	12.6503	608	5.55325
9820	15.2867	25	6.22534
9821	25.9667	1	.
9822	12.7109	64	9.36907
9823	15.8593	9	10.47963
9824	13.9067	5	2.41737

9825	12.0662	234	5.90506
9826	16.4061	11	4.29686
9828	22.5222	9	6.05673
9829	24.3071	7	3.32522
9831	20.5897	13	9.12561
9833	14.9611	3	5.89393
9834	12.7324	37	3.74730
9835	12.6305	105	4.93297
9836	15.3060	58	4.18527
9837	15.8347	12	6.42262
9838	16.9433	15	6.82931
9839	24.7967	10	8.12394
9840	15.6889	3	1.37642
9841	10.2671	289	4.78971
9842	13.7078	15	5.42814
9843	14.3222	9	4.96514
9844	10.7271	35	3.73901
9845	12.9590	37	5.65251
9846	16.8333	28	4.76289
9847	22.0900	10	7.09730
9849	22.2933	15	5.12088
9850	14.4000	26	4.43267
9851	17.7024	7	4.78605
9852	17.1467	5	3.94327
9853	13.5067	5	.74457
9854	10.6215	73	5.19454
9855	13.8548	7	5.48095
9856	10.2639	6	2.11973
9857	15.0107	14	8.07952
9858	15.5917	2	5.62150
9859	23.6000	5	8.16488
9860	12.3868	24	1.99704
9861	9.5037	45	4.25942
9862	13.5431	12	6.43246
9863	10.4093	312	4.34488
9864	10.2254	495	5.27758
9865	11.2183	234	6.03463
9866	13.5632	24	4.80884
9867	18.0367	5	5.30011
9868	21.1977	29	10.30323
9869	18.5000	6	4.23404
9870	13.5080	69	3.45151
9871	14.0299	24	5.37480
9872	9.6500	14	4.46447

9873	10.6246	122	4.44535
9874	10.0170	339	4.68080
9875	11.3263	107	5.88940
9876	12.9233	5	3.04034
9877	17.6100	25	5.62420
9878	19.1397	26	4.70647
9879	19.3286	32	6.08849
9880	10.5671	482	4.88582
9881	13.5032	26	5.19197
9882	12.3888	49	5.15962
9883	11.7798	62	4.70309
9884	12.8573	16	3.55339
9885	16.8731	13	5.94369
9886	14.5875	8	4.41157
9887	13.9271	8	4.84486
9888	19.9556	3	4.41356
9889	23.3833	2	1.15494
9890	14.4460	276	5.35359
9891	16.9447	25	6.82240
9892	14.3059	45	5.44770
9893	12.8536	134	4.61916
9894	15.8000	1	.
9896	17.6410	26	6.25187
9898	20.5104	8	5.59862
9899	16.3778	12	5.07598
9920	21.6985	11	4.72393
9930	19.9600	5	1.63612
9940	11.7456	122	5.55307
9950	13.6700	10	4.46909
9960	34.5833	1	.
9970	18.4333	5	4.25194
9990	25.4617	10	7.35015
Total	11.1346	9010	6.06769

2011 Mean Response times by Grid

Report

ResponseMinutes

MapGrid	Mean	N	Std. Deviation
802	9.8833	1	.
803	17.1111	6	3.42188
804	15.1778	9	3.14792
805	18.8979	8	1.79811
806	19.9304	17	3.02739
807	21.5711	19	6.10744
808	15.6000	1	.
809	21.0130	9	3.09744
819	22.2111	3	2.48581
900	22.6306	6	4.52338
9727	17.1889	3	2.83438
9728	14.6611	3	7.46608
9729	24.4667	1	.
9737	15.2500	2	1.24922
9738	16.4650	10	3.52648
9739	15.6381	7	3.85317
9747	18.1988	14	6.97762
9748	15.4058	23	4.50103
9749	15.5710	23	5.35658
9757	13.9683	20	7.61800
9758	12.8375	36	5.04287
9759	14.1924	35	4.46488
9766	12.2222	3	.94286
9767	9.6217	76	5.36166
9768	8.2320	280	5.67263
9769	12.4742	40	4.27730
9776	10.5000	1	.
9777	8.0785	398	4.61277
9778	7.8832	543	4.80890
9779	9.6535	218	4.71622
9787	9.9786	123	4.08503
9788	8.2977	1505	4.78933
9789	10.7878	245	5.13426
9796	13.3833	1	.
9798	10.0108	424	4.94952
9799	11.6270	557	5.11450
9820	18.7691	34	5.37513
9821	17.4444	3	4.16444
9822	10.3950	50	6.96993

9823	17.2630	9	10.24150
9824	14.0600	10	7.86517
9825	11.1713	228	5.08586
9826	20.7852	9	6.27824
9828	20.8458	4	4.78441
9829	28.4667	4	6.66337
9830	17.6472	6	4.60731
9831	18.5908	20	4.39228
9832	20.5167	1	.
9833	13.7958	4	4.13578
9834	10.9923	37	2.99008
9835	12.4015	131	4.58979
9836	15.4237	57	5.94102
9837	20.4028	6	9.71019
9838	16.3657	18	2.60228
9839	21.5896	8	3.77362
9840	19.6621	11	3.88036
9841	9.6755	274	4.09217
9842	16.5295	13	4.78332
9843	12.3825	20	3.17408
9844	10.2844	49	5.57963
9845	10.2672	29	5.39754
9846	15.6231	26	5.00397
9847	16.2333	13	5.01226
9848	19.5533	5	3.72009
9849	20.0155	14	5.74735
9850	16.1708	16	3.64709
9851	20.3600	5	4.48271
9852	11.1139	6	2.97871
9853	13.0513	13	3.35217
9854	11.1720	69	5.49381
9855	11.9450	10	6.68903
9856	14.6333	7	8.94046
9857	18.3833	15	7.19376
9858	16.4889	6	1.68406
9859	18.3267	5	4.09269
9860	13.2914	31	4.35442
9861	10.9511	45	4.75521
9862	13.6014	12	3.12351
9863	9.2247	280	4.32368
9864	9.0440	431	4.85488
9865	8.9562	267	4.80534
9866	11.6730	21	6.97388
9867	14.0850	10	3.88674

9868	17.3543	39	6.10225
9869	18.7056	3	4.07984
9870	12.7240	50	4.30114
9871	15.9212	51	4.70769
9872	12.9046	18	4.76630
9873	10.6670	153	4.37199
9874	8.9363	375	4.98699
9875	10.1649	93	5.47788
9876	13.5247	25	3.77994
9877	17.8389	15	12.44244
9878	18.6107	28	4.90477
9879	14.8516	21	5.30634
9880	10.8427	571	5.01346
9881	15.1306	31	3.93494
9882	14.8471	34	5.90992
9883	10.8388	52	5.30661
9884	12.2333	19	2.69820
9885	13.8481	18	4.32574
9886	13.7907	9	3.69808
9887	15.5318	11	3.67117
9888	23.6542	4	12.95470
9889	27.2250	2	4.13657
9890	13.8344	288	5.14901
9891	19.8876	43	5.11612
9892	15.9458	51	5.15671
9893	13.5598	135	4.48104
9894	13.5000	1	.
9896	16.2820	37	8.76052
9897	18.5000	1	.
9898	19.9071	7	7.82109
9899	18.7167	14	5.97971
9920	23.0125	4	5.89545
9930	24.6067	5	5.82607
9940	12.2642	120	6.95795
9950	16.3762	7	5.16883
9970	21.8567	5	3.75057
9990	21.3218	13	4.79486
Total	10.6357	9365	5.72339

County EMS Comparisons-Summer 2012

County	Number of Ambulances	No. QRV's	Number of Stations	Response Time Goal
Alamance	7-24/7 ALS 2-12/5 BLS; Prime Time	3-24/7 ALS	6	Avg. 8 min.
Durham	10-24/7 ALS 1-12/7 ALS; Prime Time	None	9	0:8:59 @ 90%
Orange	4-24/7 ALS; 4-12/7 ALS	None	6*	EM 12 min @ 90% Non-EM 15 min. or less

County	Population	2011 Ems Calls	FY 11-12 Budget Allocation	EMS Calls per 1,000	Personnel	
					FT	PT
Alamance	152,531	28,000**	$ 5,705,568	184	84	40
Durham	272,314	27,648	$ 8,537,913	102	94	36
Orange	135,776	10,719	$ 4,711,683	79	66	8

** Alamance County's call numbers include non-emergency/convalescent BLS transports.

EMS: County Comparisons-Spring 2011

County	Population	EMS Disp/Yr	Personnel		No. Stations
			FT	PT	
Cleveland	98,628	21,000	63	40	9
Nash	95,804	22,000	68	45	8
Rockingham	91,878	23,000	45	38	5
Burke	89,653	13,000	49	30	6
Moore	86,945	13,000	51	30	8

County	Number of Ambulances	No. QRV's	Response Time Goal
Cleveland	9-24/ALS	2-24/7 ALS	8 min. or less @ 90%
Nash	8-24/7 ALS; 4-12/7 Prime Time ALS	2-24/7 ALS	Avg. of 9 min. or Less
Rockingham	6-24/7 ALS; 1-10/7 BLS	2-24/7 ALS	Less than 8:59
Burke	5-24/7ALS; 2-9/7 Prime Time ALS	2-24/7 ALS	9 min. or less
Moore	6-24/7 ALS; 2-12/7 Prime Time ALS	4-24/7 ALS	9 min. or less @ 90%

Section 1 Administration

1.1 Scope.

1.1.1 These standards shall cover the installation, performance, operation, and maintenance of Public Safety Answering Points and the associated emergency communication systems.

1.1.2 These standards shall not be used as a design specification manual or an instruction manual.

1.1.3 Unless specified otherwise herein compliance with these standards is required by July 1, 2012.

1.2 Purpose.

The purpose of these standards shall be as follows:

1.2.1 To specify operations, facilities, and communications systems that receive emergency calls from the public.

1.2.2 To provide requirements for the retransmission of such emergency calls to the appropriate emergency response agencies.

1.2.3 To provide requirements for dispatching of appropriate emergency response personnel.

1.2.4 To establish the required levels of performance and quality of installations of emergency services communications systems.

1.3 Application.

These standards shall apply to emergency 911 systems that include, but are not limited to, dispatching systems, telephone systems, and public reporting systems that provide the following functions:

1.3.1 Communication between the public and emergency response agencies.

1.3.2 Communication within the emergency response agency under emergency and non-emergency conditions.

1.3.3 Communication among emergency response agencies.

1.4 Equivalency.

Nothing in these standards is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by these standards.

1.4.1 Technical documentation shall be submitted to the local authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

Section 2 Definitions

2.1 General.

The definitions contained in this Section shall apply to the terms used in these standards. Where a term is not defined in this Section or another Section within these standards, it shall have the definition provided in the N.C. 911 Board Statutes. Where a term is also not defined by the N.C. 911 Board Statutes, it shall be defined using its' ordinarily accepted meaning within the context in which it is used. Merriam-Webster's Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

2.2 Official Definitions.

2.2.1 Public Safety Answering Point (PSAP). As defined in GS 62A-40(18): The Public Safety Agency that receives an incoming 911 call and dispatches appropriate Public Safety Agencies to respond to the call. See 47 CFR 20.18(b) for basic 911 services, defined as:

> Basic 911 Service. CMRS providers subject to this section must transmit all wireless 911 calls without respect to their call validation process to a Public Safety Answering Point, or, where no Public Safety Answering Point has been designated, to a designated statewide default answering point or appropriate local emergency authority pursuant to § 64.3001 of this chapter, provided that "all wireless 911 calls" is defined as "any call initiated by a wireless user dialing 911 on a phone using a compliant radio frequency protocol of the serving carrier."

> See GS 62A-40(9), Enhanced 911 Service, defined as:
> Directing a 911 call to an appropriate Public Safety Answering Point by selective routing or other means based on the geographical location from which the call originated and providing information defining the approximate geographic location and the telephone number of a 911 caller, in accordance with the FCC Order.

2.3 General Definitions.

2.3.1 Backup Public Safety Answering Point. A structure used to house a part of the control equipment of an emergency reporting system or communications system; also, a normally unattended facility that is remote from the Public Safety Answering Point and is used to house equipment necessary for the functioning of an emergency communications system.

2.3.2 Circuit. The conductor or radio channel and associated equipment that are used to perform a specific function in connection with an emergency call system.

2.3.4 Communications System. A combination of links or networks that serves a general function such as a system made up of command, tactical, logistical, and administrative networks supporting the operations of an individual PSAP.

2.3.5 Comprehensive Emergency Management Plan (CEMP). A disaster recovery plan that conforms to guidelines established by the Public Safety Answering Point and is designed to address natural, technological, and man-made disasters.

2.3.6 Computer-Aided Dispatch (CAD). A combination of hardware and software that provides data entry, makes resource recommendations, and notifies and tracks those resources before, during, and after emergency calls, preserving records of those emergency calls and status changes for later analysis.

2.3.7 Computer Aided Dispatch (CAD) Terminal. An electronic device that combines a keyboard and a display screen to allow exchange of information between a Telecommunicator and one or more computers in the system/network.

2.3.8 Control Console. A wall-mounted or desktop panel or cabinet containing controls to operate communications equipment.

2.3.9 Coordinated Universal Time. A coordinated time scale, maintained by the Bureau International des Poids et Measures (BIPM), which forms the basis of a coordinated dissemination of standard frequencies and time signals.

2.3.10 Dispatch Circuit. A circuit over which a signal is transmitted from the Public Safety Answering Point to an emergency response facility (ERF) or emergency response unit (ERU) to notify the emergency response unit to respond to an emergency.

2.3.11 Emergency Call Processing/Dispatching. A process by which an emergency call answered at the Public Safety Answering Point is transmitted to emergency response facilities (ERFs) or to emergency response units (ERU) in the field.

2.3.12 Emergency Response Unit (ERU). A first responder to include but not limited to a police vehicle, a fire truck, and an ambulance.

2.3.13 Logging Voice Recorder. A device that records voice conversations and automatically logs the time and date of such conversations; normally, a multichannel device that keeps a semi-permanent record of operations.

2.3.14 Notification. The time at which an emergency call is received and acknowledged at a Public Safety Answering Point.

2.3.15 Operations Room. The room in the Public Safety Answering Point where emergency calls are received and processed and communications with emergency response personnel are conducted.

2.3.16 Public Safety Agency. An organization that provides law enforcement, emergency medical, fire, rescue, communications, or related support services.

2.3.17 Security Vestibule. A compartment provided with two or more doors where the intended purpose is to prevent continuous and unobstructed passage by allowing the release of only one door at a time.

2.3.18 Standard Operating Procedures (SOPs). Written organizational directives that establish or prescribe specific operational or administrative methods that are to be followed routinely for the performance of designated operations or actions.

2.3.19 Stored Emergency Power Supply System (SEPSS). A system consisting of a UPS, or a motor generator, powered by a stored electrical energy source, together with a transfer switch designed to

monitor preferred and alternate load power source and provide desired switching of the load, and all necessary control equipment to make the system functional.

2.3.20 TDD/TTY. A device that is used in conjunction with a telephone to communicate with persons who are deaf, who are hard of hearing, or who have speech impairments, by typing and reading text.

2.3.21 Telecommunicator. A Telecommunicator shall mean any person engaged in or employed as a full time or part time 911 communications center call taker (emergency communications specialist, emergency dispatcher, etc.) and is engaged in the act of processing a 911 call for emergency assistance by a Primary PUBLIC SAFETY ANSWERING POINT, including the use of 911 system equipment, call classification, location of a caller, determination of the appropriate response level for emergency responders, and dispatching 911 call information to the appropriate responder and 911 System.

2.3.22 Uninterruptible Power Supply (UPS). A system designed to provide power, without delay or transients, during any period when the primary power source is incapable of performing.

2.3.23 Voice Communication Channel. A single path for communication by spoken word that is distinct from other parallel paths.

Section 3 Public Safety Answering Point (PSAP)

3.1 General.

3.1.1 Any Primary Public Safety Answering Point, Backup Public Safety Answering Point, or Secondary Public Safety Answering Point that receives funding from the NC 911 Board is required to comply with all NC 911 Board Standards.

3.1.2 All equipment, software, and services used in the daily operation of the Public Safety Answering Point shall be kept in working order at all times.

3.1.3 The Public Safety Answering Point shall be provided with an alternate means of communication that is compatible with the alternate means of communication provided at the Emergency Response Facilities (ERFs).

3.1.3.1 The alternate means shall be readily available to the Telecommunicators in the event of failure of the primary communications system.

3.1.3.2 The Telecommunicators shall be trained and capable of using the alternate means in the event of failure of the primary communications system.

3.1.4 Each Public Safety Answering Point shall maintain a Backup Public Safety Answering Point or have an arrangement for backup provided by another Public Safety Answering Point. Agencies are encouraged to pool resources and create regional backup centers.

3.1.4.1 The Backup Public Safety Answering Point shall be capable, when staffed, of performing the emergency functions performed at the primary Public Safety Answering Point.

3.1.4.2 The Backup Public Safety Answering Point shall be separated geographically from the primary Public Safety Answering Point at a distance that ensures the survivability of the alternate center.

3.1.4.3 Each Public Safety Answering Point shall develop a formal plan to maintain and operate the Backup Public Safety Answering Point or if backup is provided by another Public Safety Answering Point a formal plan that defines the duties and responsibilities of the alternate Public Safety Answering Point.

3.1.4.3.1 The plan shall include the ability to reroute incoming emergency call traffic to the backup center and to process and dispatch emergency calls at that backup center.

3.1.4.3.2 The plan shall be included in the Comprehensive Emergency Management Plan (CEMP).

3.1.5 The Public Safety Answering Point shall be capable of continuous operation long enough to enable the transfer of operations to the Backup Public Safety Answering Point in the event of an emergency in the Public Safety Answering Point or in the building that houses the Public Safety Answering Point.

3.1.6 Systems that are essential to the operation of the Public Safety Answering Point shall be designed to accommodate peak workloads.

3.1.7 Public Safety Answering Points shall be designed to accommodate the staffing level necessary to operate the center as required by the Standards set herein.

3.1.8 The design of the Public Safety Answering Point shall be based on the number of personnel needed to handle peak workloads as required by the Standards set herein.

3.1.9 Each Public Safety Answering Point shall have a written Comprehensive Emergency Management Plan (CEMP).

3.1.9.1 Emergency Fire Plan. There shall be a local management approved, written, dated, and annually tested emergency fire plan that is part of the CEMP.

3.1.9.2 Damage Control Plan. There shall be a local management approved, written, dated, and annually tested damage control plan that is part of the CEMP.

3.1.9.3 Backup Plan. There shall be a local management approved, written, dated, and annually tested backup Public Saftey Answering Point plan that is part of the CEMP and approved by the NC 911 Board.

3.1.10 Penetrations into the Public Safety Answering Point shall be limited to those necessary for the operation of the center.

Section 4 Power

4.5.1 At least two independent and reliable power sources shall be provided, one primary and one secondary, each of which shall be of adequate capacity for operation of the Public Safety Answering Point.

4.5.2. Power sources shall be monitored for integrity, with annunciation provided in the operations room.

4.5.3 Primary Power Source. One of the following shall supply primary power:

4.5.3.1 A feed from a commercial utility distribution system

4.5.3.2 An engine-driven generator installation or equivalent designed for continuous operation, where a person specifically trained in its operation is on duty at all times

4.5.3.3 An engine-driven generator installation or equivalent arranged for cogeneration with commercial light and power, where a person specifically trained in its operation is on duty or available at all times.

4.5.4 Secondary Power Source.

4.5.4.1 The secondary power source shall consist of one or more standby engine-driven generators.

4.5.4.2 Upon failure of primary power, transfer to the standby source shall be automatic.

4.5.5 Stored Emergency Power Supply System (SEPSS) shall be provided for telecommunications equipment, two-way radio systems, computer systems, and other electronic equipment determined to be essential to the operation of the Public Safety Answering Point.

4.5.5.1 The SEPSS shall be of a class that is able to maintain essential operations long enough to implement the formal Comprehensive Emergency Management Plan.

4.5.5.2 The instrumentation required to monitor power shall be remotely annunciated in the operations room.

4.5.6 Power circuits shall include their associated motors, generators, rectifiers, transformers, fuses, and controlling devices.

4.5.6.1 The power circuit disconnecting means shall be installed so that it is accessible only to authorized personnel.

4.5.6.2 Surge Arresters otherwise known as Transient Voltage Surge Suppression ('IVSS) shall be provided for protection of telecommunications equipment, two-way radio systems, computers, and other electronic equipment determined to be essential to the operation of the Public Safety Answering Point.

4.5.7 Isolated Grounding System. Telecommunications equipment, two-way radio systems, computers, and other electronic equipment determined to be essential to the operation of the Public Safety Answering Point shall be connected to an isolated grounding system.

4.5.8 Engine-driven generators shall be sized to supply power for the operation of all functions of the Public Safety Answering Point.

4.5.8.1 When installed indoors, engine-driven generators shall be located in a ventilated and secured area that is separated from the Public Safety Answering Point by fire barriers having a fire resistance rating of 2 hours or better.

4.5.8.2 When installed outdoors, engine-driven generators shall be located in a secure enclosure.

4.5.8.3 The area that houses an engine-driven generator shall not be used for storage other than spare parts or equipment related to the generator system.

4.5.8.4 Fuel to operate the engine-driven generator for a minimum of 24 hours at full load shall be available on site.

4.5.8.5 Equipment essential to the operation of the generator shall be supplied with standby power from the generator.

4.5.8.6 Generators shall not use the public water supply for engine cooling.

4.5.9 Uninterruptible Power Supply (UPS) and Battery Systems. A UPS and battery system shall be installed and be sufficient to prevent power surges from damaging equipment in the 911 Emergency Center as well as provide power for all essential 911 Emergency Center operations until the backup power source can be fully activated.

4.5.9.1 Each UPS shall be provided with a bypass switch that maintains the power connection during switch over and that is capable of isolating all UPS components while allowing power to flow from the source to the load.

4.5.9.2 The following UPS conditions shall be annunciated in the operations room:

(1) Source power failure, overvoltage, and under-voltage

(2) High and low battery voltage

(3) UPS in bypass mode.

Section 5 Construction

5.1 General

As a condition for receipt of a grant from the North Carolina 9-1-1 Board for any type of new construction or for a renovation of an existing structure and/or facility incorporated into the construction agreement(s) shall be the following requirements.

5.1.1 The requirements in Section 4 Construction, shall apply only to new construction and construction renovations funded by the North Carolina 911 Board. Existing Public Safety Answering Point facilities are encouraged to meet these standards, but are not required to meet these standards.

5.2 HVAC.

5.2.1. HVAC systems shall be designed to maintain temperature and relative humidity within limits specified by the manufacturer of the equipment critical to the operation of the Public Safety Answering Point.

5.2.2 HVAC systems shall be independent systems that serve only the Public Safety Answering Point.

5.2.3 HVAC system intakes for fresh air shall be arranged to minimize smoke intake from a fire inside or outside the building and to resist intentional introduction of irritating, noxious, toxic, or poisonous substances into the HVAC system.

5.2.4 HVAC emergency controls shall be provided in the operations room to permit closing of outside air intakes.

5.2.5 Backup HVAC systems shall be provided for the operations room and other spaces housing electronic equipment essential to the operation of the Public Safety Answering Point.

5.2.6 HVAC systems shall be designed so that the Public Safety Answering Point is capable of uninterrupted operation with the largest single HVAC unit or component out of service.

5.3 Fire Protection.

5.3.1 The Public Safety Answering Point and spaces adjoining the Public Safety Answering Point shall be provided with an automatic fire detection, alarm, and notification system.

5.3.2 The alarm system shall be monitored in the operations room.

5.3.3 Operation of notification appliances shall not interfere with communications operations.

5.3.4 Electronic computer and data processing equipment shall be protected in accordance with the manufacturer's recommended specifications, and common business practices.

5.4 Security.

5.4.1 The Public Safety Answering Point and other buildings that house essential operating equipment shall be protected against damage from vandalism, terrorism, and civil disturbances.

5.4.2 Entry to the Public Safety Answering Point shall be restricted to authorized persons.

5.4.3 Entryways to the Public Safety Answering Point that lead directly from the exterior shall be protected by a security vestibule.

5.4.4 Door openings shall be protected by listed, self-closing fire doors that have a fire resistance rating of not less than 1 hour.

5.4.5 Where a Public Safety Answering Point has windows, the following requirements shall apply:

5.4.5.1 Windows shall be a minimum of 4 ft (1.2 m) above floor level.

5.4.5.2 Windows shall be rated for bullet resistance to Level 4 as defined in UL 752, Standard for Safety Bullet-Resistant Equipment.

5.4.5.3 Windows that are not bullet resistant shall be permitted provided that they face an area that cannot be accessed or viewed by the general public.

5.4.5.4 Windows that are required to be bullet resistant shall be configured so that they cannot be opened.

5.4.5.5 Walls with bullet-resistant windows shall be required to provide the same level of protection as the window.

5.4.6 Means shall be provided to prevent unauthorized vehicles from approaching the building housing the Public Safety Answering Point to a distance of no less than 82 ft (25 m).

5.4.7 As an alternative to prevent unauthorized vehicles, unauthorized vehicles shall be permitted to approach closer than 82 ft (25 m) if the building has been designed to be blast resistant.

5.6 Lighting.

5.6.1 Artificial lighting shall be provided to enable personnel to perform their assigned duties.

5.6.2 Emergency Lighting. The Public Safety Answering Point shall be equipped with emergency lighting that shall illuminate automatically immediately upon failure of normal lighting power.

5.6.3 Illumination levels shall be sufficient to allow all essential operations.

5.7 Circuit Construction and Arrangement.

5.7.1 As built drawings shall be provided.

5.7.2 Circuits shall not pass over, pass under, pass through, or be attached to buildings or property that is not owned by, or under the control of, the PSAP or the entity that is responsible for maintaining the system.

5.7.3 Emergency call instruments installed in buildings not under control of the PSAP shall be on separate dedicated circuits.

5.7.4 The combination of public emergency services communication and signaling (C&S) circuits in the same cable with other circuits shall comply with the following:

5.7.4.1 Other municipally controlled C&S circuits shall be permitted.

5.7.4.2 Circuits of private signaling organizations shall be permitted only by permission of the PSAP.

5.8 Underground Cables.

5.8.1 Underground communication and signal cables shall be brought above ground only at points where the PSAP has determined there is no potential for mechanical damage or damage from fires in adjacent buildings.

5.8.2 All cables that are installed in manholes, vaults, and other enclosures intended for personnel entry shall be racked and marked for identification.

5.8.3 Cable splices, taps, and terminal connections shall be located only where accessible for maintenance and inspection and where no potential for damage to the cable due to falling structures or building operations exists.

5.8.4 Cable splices, taps, and terminal connections shall be made to provide and maintain levels of conductivity, insulation, and protection that are at least equivalent to those afforded by the cables that are joined.

5.9 Aerial Cables and Wires.

5.9.1 Protection shall be provided where cables and wires pass through trees, under bridges, and over railroads, and at other locations where damage or deterioration is possible.

5.10 Wiring Inside Buildings.

5.10.1 Conductors at the Public Safety Answering Point shall extend to the operations room in conduits, ducts, shafts, raceways, or overhead racks and troughs of a construction type that protects against fire and mechanical damage.

5.10.2 Cables or wiring exposed to fire hazards shall be protected from the hazard.

5.10.3 At the Public Safety Answering Point, cable terminals and cross connecting facilities shall be located either in or adjacent to the operations room.

5.10.4 All wired dispatch circuit devices and instruments whose failure can adversely affect the operation of the system shall be mounted in accordance with the following:

(1) On noncombustible bases, pedestals, switchboards, panels, or cabinets

(2) With mounting designed and constructed so that all components are readily accessible

5.11 Circuit Protection.

5.11.1 All surge arresters shall be connected to earth ground.

5.11.2 All protective devices shall be accessible for maintenance and inspection.

5.11.3 Surge arresters shall be designed and listed for the specific application.

5.11.4 Each conductor that enters a Public Safety Answering Point from a partially or entirely aerial line shall be protected by a surge arrester.

5.12 Grounding.

5.12.1 Sensitive electronic equipment determined by the PSAP to be essential to the operation of telecommunications and dispatching systems shall be grounded.

5.12.2 Listed isolated ground receptacles shall be provided for all cord-and-plug-connected essential and sensitive electronic equipment.

5.12.3 Unused wire or cable pairs shall be grounded.

5.12.4 Ground connection for surge suppressors shall be made to the isolated grounding system.

5.13 Access.

5.13.1 All equipment shall be accessible for the purpose of maintenance.

Section 6 Operations

6.1 Management.

6.1.1 All systems shall be under the control of a responsible employee or employees of the PSAP served by the systems.

6.1.2 The Public Safety Answering Point Emergency services dispatching entities shall have trained and qualified technical assistance available for trouble analysis and repair by in-house personnel or by authorized outside contract maintenance services.

6.1.3 Where maintenance is provided by an organization or person other than an employee of the PSAP complete written records of all installation, maintenance, test, and extension of the system shall be forwarded to the responsible employee of the PSAP.

6.1.3.1 Maintenance performed by an organization or person other than an employee of the Public Safety Answering Point shall be by written contract that contains a guarantee of performance.

6.1.5 The Public Safety Answering Point shall have a written local management approved access control plan.

6.1.4.1 Maintenance personnel other than an employee of the Public Safety Answering Point shall be approved by the Public Safety Answering Point pursuant to the approved access control plan as offering no threat to the security of the facility or the employees and equipment within it.

6.1.5 All equipment shall be accessible to the PSAP for the purpose of maintenance.

6.1.6 At least one supervisor or lead with Telecommunicator certification shall be available to respond immediately at all times 24 hours per day, 7 days per week, 52 weeks per year.

6.2 Telecommunicator and Supervisor Qualifications and Training.

6.2.1 Telecommunicators and Supervisors shall be certified in the knowledge, skills, and abilities related to their job function.

6.2.2 Telecommunicators and Supervisors shall have knowledge of the function of all communications equipment and systems in the Public Safety Answering Point.

6.2.3 Telecommunicators and Supervisors shall know the rules and regulations that relate to equipment use, including those of the Federal Communications Commission that pertain to emergency service radio use.

6.2.4 Telecommunicators and Supervisors shall be capable of operating and testing the communications equipment they are assigned to operate.

6.2.5 Telecommunicators and Supervisors shall receive training to maintain the skill level appropriate to their position.

6.2.6 Telecommunicators and Supervisors shall be trained in TDD/TTY procedures, with training provided at a minimum of once per year as part of the Annual Training.

6.3 Staffing.

6.3.1 There shall be sufficient Telecommunicators available to affect the prompt receipt and processing of emergency calls needed to meet the requirements as specified herein.

6.3.2 After January 1, 2013 a minimum of two (2) Telecommunicators must be available at all times 24 hours per day, 7 days per week, 52 weeks per year to immediately receive and process emergency calls.

6.3.3 Where communications systems, computer systems, staff, or facilities are used for both emergency and non-emergency functions, the non-emergency use shall not degrade or delay emergency use of those resources.

6.3.3.1 A Public Safety Answering Point shall handle emergency calls for service and dispatching in preference to nonemergency activities.

6.3.4 The PSAP and emergency response agencies shall develop standard operating procedures that identify when a dedicated Telecommunicator is required to be assigned to an emergency incident.

6.3.5 Telecommunicators shall not be assigned any duties prohibiting them from immediately receiving and processing emergency calls for service in accordance with the time frame specified in the Operating Procedures.

6.4 Operating Procedures.

6.4.1 Ninety (90) percent of emergency calls received on emergency lines shall be answered within ten (10) seconds, and ninety-five (95) percent of emergency calls received on emergency lines shall be answered within twenty (20) seconds.

6.4.1.1 Compliance with 5.4.1 shall be evaluated monthly using data from the previous month.

6.4.2 The Public Safety Answering Point is required to provide pre-arrival medical protocols as set forth by the North Carolina Office of Emergency Services, Health and Human Services in the initial call reception or by the responsible EMS provider on behalf of the primary answering point.

6.4.3 For law enforcement purposes, the Public Safety Answering Point shall determine time frames allowed for completion of dispatch.

6.4.4 When emergency calls need to be transferred to another PSAP, the Telecommunicator will transfer the call without delay. The Telecommunicator will advise the caller: “Please do not hang up; I am connecting you with (name of the agency).” The Telecommunicator should stay on the line until the connection is complete and verified.

6.4.4.1 The Public Safety Answering Point shall transfer calls for services as follows:

(1) The call for service shall be transferred directly to the Telecommunicator.

(2) The answering transferring agency shall remain on the line until it is certain that the transfer is affected.

(3) The transfer procedure shall be used on emergency 9-1-1 calls.

6.4.5 All calls for service, including requests for additional resources, shall be transmitted to the identified emergency response units over the required dispatch systems.

6.4.6 An indication of the status of all emergency response units shall be available to appropriate Telecommunicators at all times.

6.4.7 Records of the dispatch of emergency response units to call for services shall be maintained and shall identify the following:

(1) Unit designation for each emergency response unit dispatched

(2) Time of dispatch acknowledgment by each emergency response unit responding

(3) Enroute time of each emergency response unit

(4) Time of arrival of each emergency response unit at the scene

(5) Time of patient contact, if applicable

(6) Time each emergency response unit is returned to service

6.4.8 All emergency response agencies shall use common terminology and integrated incident communications.

6.4.9 When the device monitoring the system for integrity indicates that trouble has occurred, the Telecommunicator shall act as follows:

(1) Take appropriate steps to repair the fault.

(2) Isolate the fault and notify the official responsible for maintenance if repair is not possible.

6.4.10 Standard operating procedures shall include but not be limited to the following:

(1) All standardized procedures that the Telecommunicator is expected to perform without direct supervision

(2) Implementation plan that meets the requirements of a formal plan to maintain and operate the Backup Public Safety Answering Point.

(3) Procedures related to the CEMP.

(4) Emergency response personnel emergencies.

(5) Activation of an emergency distress function.

(6) Assignment of incident radio communications plan.

(7) Time limit for acknowledgment by units that have been dispatched.

6.4.11 Every Public Safety Answering Point shall have a comprehensive regional emergency communications plan as part of the CEMP.

6.4.11.1 The emergency communications plan shall provide for real-time communications between organizations responding to the same emergency incident.

6.4.11.2 This emergency communications plan shall be exercised at least once a year.

6.4.12 In the event that an emergency response unit(s) has not acknowledged its dispatch/response within the time limits established by the Public Safety Answering Point, the Telecommunicator shall perform one or more of the following:

(1) Attempt to contact the emergency response unit (s) by radio.

(2) Re-dispatch the emergency response unit(s) using the primary dispatch system.

(3) Dispatch the emergency response unit(s) using the secondary dispatch system.

(4) Initiate two-way communication with the emergency response unit's supervisor.

6.4.13 The Public Safety Answering point shall develop and implement standard operating procedures for responding to and processing TDD /TTY calls.

6.4.14 Calls received as an open-line or "silent call" shall be queried as a TDD/TTY call if no acknowledgment is received by voice.

6.4.15. A Public Safety Answering Point must have a written procedure for handling 911 hang-up calls.

6.5 Time.

6.5.1 The clock for the main recordkeeping device in the Public Safety Answering Point shall be synchronized to Coordinated Universal Time.

6.5.2 All timekeeping devices in the Public Safety Answering Point shall be maintained within ±5 seconds of the main recordkeeping device clock.

6.6 Recording.

6.6.1 Public Safety Answering Points shall have a logging voice recorder with one channel for each of the following:

(1) Each transmitted or received emergency radio channel or talk group.

(2) Each voice dispatch call for service circuit.

(3) Each Telecommunicator telephone that receives emergency calls for service.

6.6.2 Each Telecommunicator position shall have the ability to instantly recall telephone and radio recordings from that position as applicable.

6.6.3 Emergency calls that are transmitted over the required dispatch circuit(s) shall be automatically recorded, including the dates and times of transmission.

6.7 Quality Assurance

6.7.1 Public Safety Answering Points shall establish a quality assurance/improvement program to ensure the consistency and effectiveness of emergency call processing.

6.7.2 Statistical analysis of emergency call and dispatch performance measurements shall be completed monthly and compiled over a one (1) year period.

Section 7 Telephones

7.1 Telephone Receiving Equipment.

The provisions of this Section shall apply to facilities and equipment that receive emergency calls transmitted by public use of commercial telephone systems, cellular or personal communications services systems, and voice over Internet protocol (VoIP).

7.2 Equipment and Operations.

7.2.1 Telephone lines shall be provided as follows:

(1) A minimum of two 911 emergency telephone lines and 911 emergency telephone devices shall be assigned exclusively for receipt of emergency calls. These lines shall appear on at least two telephone devices within the Public Safety Answering Point.

(2) Additional 911 emergency telephone lines and 911 emergency telephone devices shall be provided as required for the volume of calls handled.

(3) Additional telephone lines and telephone devices shall be provided for the normal business (non-emergency) use as needed.

(4) At least one outgoing-only telephone line and telephone device shall be provided.

7.2.2 911 emergency lines and emergency telephone devices will be answered prior to non-emergency telephone lines and non-emergency telephone devices.

7.2.3 When all 911 emergency telephone lines and emergency telephone devices are in use, emergency calls shall hunt to other predetermined telephone lines and telephone devices that are approved by the Public Safety Answering Point.

7.2.4 Calls to the business number shall not hunt to the designated emergency lines.

7.2.5 When a Public Safety Answering Point receives an emergency call for a location or an agency that is not in its jurisdiction, the Public Safety Answering Point shall transfer the call directly to the responsible Public Safety Answering Point. When possible the call data will be transferred with the emergency call. If the call transfer method is not possible, call information shall be relayed by the Telecommunicator.

7.2.5.1 The Telecommunicator shall remain on the line until it is certain that the transfer has been made and the originating Telecommunicator verifies the transfer has been successfully completed by hearing both parties speaking to each other.

7.2.6 All 911 emergency calls shall be recorded.

7.3 Circuits/Trunks.

7.3.1 At least two 911 call delivery paths with diverse routes arranged so that no single incident interrupts both routes shall be provided to each Public Safety Answering Point.

7.3.2 Where multiple Public Safety Answering Points that serve a jurisdiction are not located in a common facility, at least two circuits with diverse routes, arranged so that no singular incident interrupts both routes, shall be provided between Public Safety Answering Points.

7.3.3 The Public Safety Answering Point shall have sufficient 911 emergency trunk capacity to receive 99.9% of all calls during the busiest hour of the average week of the busiest month of the year.

7.4 911 Emergency Number Alternative Routing.

7.4.1 Public Safety Answering Points shall maintain a written plan as part of the Comprehensive Emergency Management Plan (CEMP) for rerouting incoming calls on 911 emergency lines when the center is unable to accept such calls.

7.4.1.1 The Public Safety Answering Point shall practice this plan at least once annually.

7.4.2 Where overflow calls to 911 emergency telephone lines and emergency telephone devices are routed to alternative telephone lines and alternative telephone devices within the Public Safety Answering Point, the alternative telephone lines and alternative telephone devices shall be monitored for integrity and recorded as required by these standards.

Section 8 Dispatching Systems

8.1 Fundamental Requirements of Emergency Call Dispatching Systems.

8.1.1 An emergency call dispatching system shall be designed, installed, operated, and maintained to provide for the receipt and retransmission of calls.

8.2 Telecommunicators that receive emergency calls shall have redundant means within the PSAP premises to dispatch calls.

(1) The failure of any component of one dispatching means shall not affect the operation of the alternative dispatching means and vice versa.

8.3 Primary dispatch paths and devices upon which transmission and receipt of emergency calls depend shall be monitored constantly for integrity to provide prompt warning of trouble that impacts operation.

8.3.1 Trouble signals shall actuate an audible device and a visual signal located at a constantly attended location.

8.3.2 The audible alert trouble signals from the fault and failure monitoring mechanism shall be distinct from the audible alert emergency alarm signals.

8.3.3 The audible trouble signal shall be permitted to be common to several monitored circuits and devices.

8.3.4 A switch for silencing the audible trouble signal shall be permitted if the visual signal continues to operate until the silencing switch is restored to the designated normal position.

8.3.5 Where dispatch systems use computer diagnostic software, monitoring of the primary dispatch circuit components shall be routed to a dedicated terminal(s) that meets the following requirements:

(2) It shall be located within the communications center.

(3) It shall not be used for routine dispatch activities.

8.4 The radio communications system shall be monitored in the following ways:

(1) Monitoring for integrity shall detect faults and failures in the radio communications system.

(2) Detected faults and failures in the radio communications system shall cause audible or visual indications to be provided within the Public Safety Answering Point.

Section 9 Computer-Aided Dispatching (CAD) Systems

9.1 General.

9.1.1 PSAPs shall use Computer-Aided Dispatch (CAD) systems. These systems shall conform to the items outlined in this Section.

9.1.2 The CAD system shall contain all hardware and software components necessary for interface with the 9-1-1 system.

9.2 Secondary Method.

9.2.1 A secondary method shall be provided and shall be available for use in the event of a failure of the CAD system.

9.3 Security.

9.3.1 CAD systems shall utilize different levels of security to restrict unauthorized access to sensitive and critical information, programs, and operating system functions.

9.3.2 The PSAP shall have the ability to control user and supervisor access to the various security levels.

9.3.3 Physical access to the CAD system hardware shall be limited to authorized personnel as determined by the PSAP.

9.3.4 Operation of the CAD system software shall be limited to authorized personnel by log-on/password control, workstation limitations, or other means as required by the PSAP.

9.3.5 The CAD system shall provide network isolation necessary to preserve bandwidth for the efficient operation of the system and processing of emergency calls.

9.3.5.1 The CAD system shall provide measures to prevent denial-of-service attacks and any other undesired access to the CAD portion of the network.

9.3.5.2 The CAD system shall employ antivirus software where necessary to protect the system from infection.

9.4 Emergency Call Data Exchange.

9.4.1 The CAD system should have the capability to allow emergency call data exchange between the CAD system and other CAD systems.

9.4.2 The CAD system should have the capability to allow data exchange between the CAD system and other systems.

9.5 CAD Capabilities.

9.5.1 The installation of a CAD system in emergency service dispatching shall not negate the requirements for a secondary dispatch circuit.

9.5.2 Software that is a part of the CAD system shall provide data entry; provide resource recommendations, notification, and tracking; store records relating to all emergency calls and all other calls for service and status changes; and track those resources before, during, and after emergency calls, preserving records of those emergency calls and status changes for later analysis.

9.5.2.1 The Public Safety Answering Point shall put in place safeguards to preserve the operation, sustainability, and maintainability of all elements of the CAD system in the event of the demise or default of the CAD supplier.

9.5.2.2 The system applications shall function under the overall control of a standard operating system that includes support functions and features as required by the Public Safety Answering Point

9.6 Computer Aided Dispatch (CAD) Performance.

9.6.2 The Computer Aided Dispatch system shall recommend units for assignment to calls.

9.6.2.1 The Computer Aided Dispatch system shall ensure that the optimum response units are selected.

9.6.2.2 The Computer Aided Dispatch system shall allow the Telecommunicator to override the CAD recommendation for unit assignment.

9.6.2.3 The Computer Aided Dispatch system shall have the ability to prioritize all system processes so that emergency operations take precedence.

9.6.3 The Computer Aided Dispatch system shall detect errors and/or faults and failures.

9.6.3.1 The Computer Aided Dispatch system shall automatically perform all required reconfiguration as a result of the faults or failures.

9.6.3.2 The Computer Aided Dispatch system should queue a notification message to the supervisor and any designated Telecommunicator positions.

9.6.4 Under all conditions, the Computer Aided Dispatch system response time should not exceed 2 seconds, measured from the time a Telecommunicator completes a keyboard entry to the time of full display of the system response at any position where a response is required.

9.6.5 The Computer Aided Dispatch system shall be available and fully functional 99.95 percent of the time, excluding planned maintenance.

9.6.6 The Computer Aided Dispatch system shall include automatic power-fail recovery capability.

9.7 Backup.

9.7.1 The Computer Aided Dispatch system shall include a data backup system, utilizing either removable media or independent disk storage arrays dedicated to the backup task.

9.8 Redundancy.

9.8.1 The failure of any single component shall not disable the entire system.

9.8.1.1 The Computer Aided Dispatch system shall provide switchover in case of failure of the required system component(s).

9.8.1.2 Manual intervention by Telecommunicators or others shall not be required.

9.8.1.3 Notwithstanding automatic switchover, the Computer Aided Dispatch system shall provide the capability to manually initiate switchover.

9.8.1.4 Computer Aided Dispatch Systems that utilize server and workstation configuration shall accomplish automatic switch over by having a duplicate server available with access to all the data necessary and required to restart at the point where the primary server stopped.

9.8.1.5 Computer Aided Dispatch Systems that utilize distributed processing, with workstations in the operations room also providing the call processing functions, shall be considered to meet the requirements

of automatic switchover, as long as all such workstations are continually sharing data and all data necessary to pick up at the point where the failed workstation stopped are available to all other designated dispatch workstations.

9.8.2 Monitoring for Integrity.

9.8.2.1 The system shall continuously monitor the Computer Aided Dispatch interfaces for equipment failures, device exceptions, and time-outs.

9.8.2.2 The system shall, upon detection of faults or failures, send an appropriate message consisting of visual and audible indications.

9.8.3 The system shall provide a log of system messages and transactions.

9.8.4 At least one spare display screen, pointing device, and keyboard shall be available in the Public Safety Answering Point for immediate change-out.

Section 10 Testing

10.1 General.

10.1.1 Tests and inspections of all systems shall be made at the regular intervals.

10.1.2 All equipment shall be restored to operating condition after each test or emergency call for which the equipment functioned.

10.1.3 Where tests indicate that trouble has occurred anywhere on the system, one of the following shall be required:

(1) The Telecommunicator shall take appropriate steps within their scope of training to repair the fault.

(2) If repair is not possible, action shall be taken to isolate the fault and to notify the official responsible for maintenance.

10.1.4 Procedures that are required by other parties and that exceed the requirements of these standards shall be permitted.

10.1.5 The requirements of this Section shall apply to both new and existing systems.

10.2 Acceptance Testing.

10.2.1 New equipment shall be provided with operation manuals that cover all operations and testing procedures.

10.2.2 All functions of new equipment shall be tested in accordance with the manufacturers' specifications and accepted Public Safety Answering Point practices before being placed in service.

10.3 Power.

10.3.1 Emergency and standby power systems shall be tested in accordance with the manufacturer's specifications and accepted business practices.

Section 11 Records

11.1 General.

11.1.1 Complete records to ensure operational capability of all 911 system functions shall be maintained for a minimum of three years.

11.1.2 Compliance with the requirements in this section shall begin with the purchase or lease of all equipment and services after June 30, 2011.

11.2 Acceptance Test Records and As-Built Drawings.

After completion of acceptance tests, the following shall be provided:

(1) A set of reproducible, as-built installation drawings.

(2) Operation and maintenance manuals.

(3) Written sequence of operation.

(4) Results of all operational tests and values at the time of installation.

11.3 Electronic Records

11.3.1 For software-based systems, access to site-specific software shall be provided to the PSAP.

11.3.2 The PSAP shall be responsible for maintaining the records for the life of the system.

11.3.3 Paper or electronic media shall be permitted.

11.4 Training Records.

11.4.1 Training records shall be maintained for each employee as required by the PSAP.

11.5 Operational Records.

11.5.1 Call and dispatch performance statistics shall be compiled and maintained.

11.5.2 Statistical analysis of emergency call and dispatch performance measurements shall be done monthly and compiled over a one (1) year period.

11.5.2.1 A management information system (MIS) program shall track incoming emergency calls and dispatched emergency calls and provide real-time information and strategic management reports.

11.5.3 Records of the following, including the corresponding dates and times, shall be kept:

(1) Test, emergency call, and dispatch signals

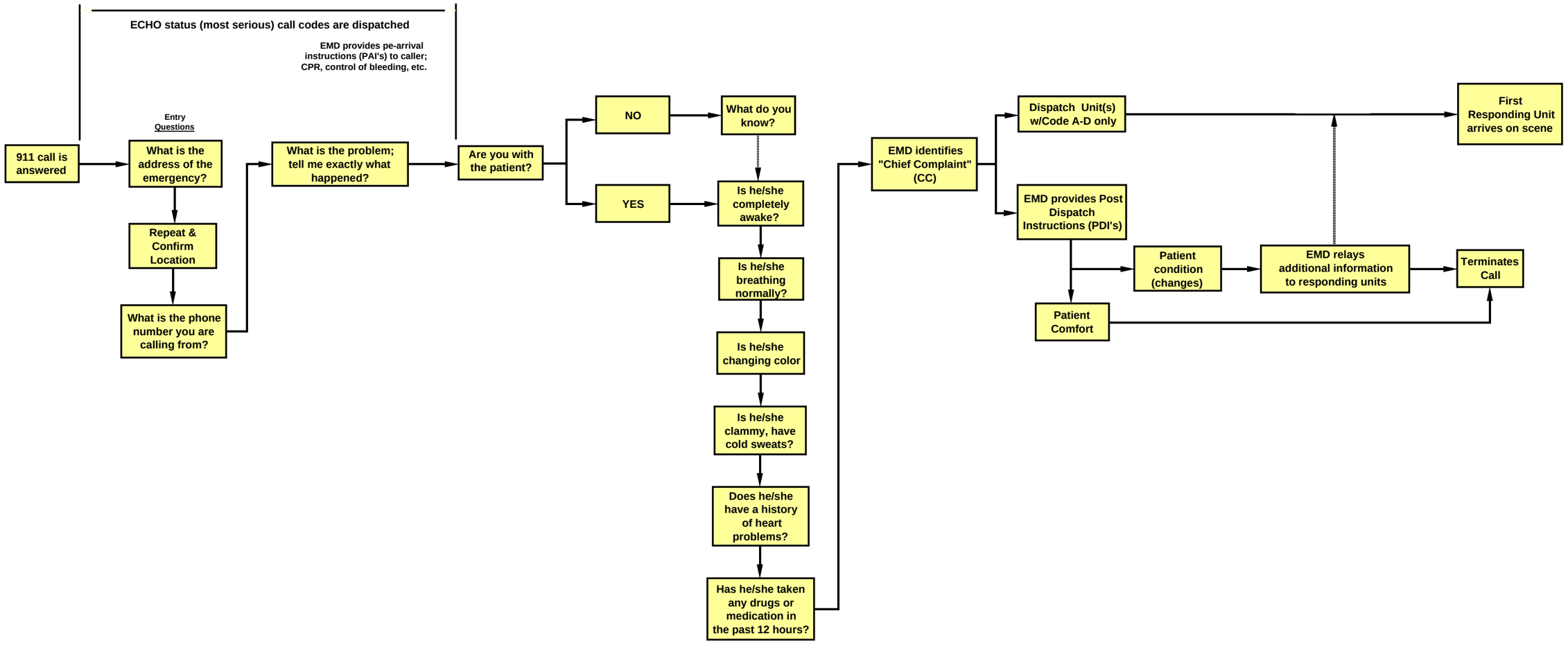
(2) Circuit interruptions and observations or reports of equipment failures

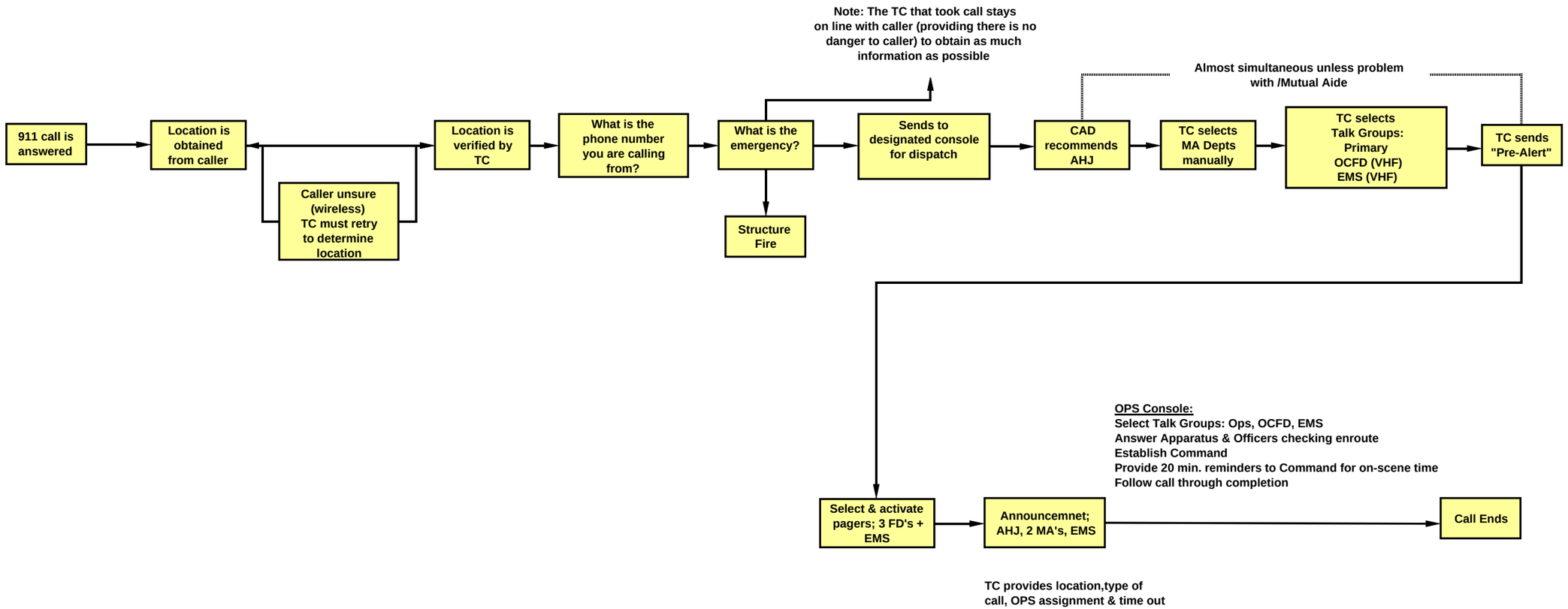
(3) Abnormal or defective circuit conditions indicated by test or inspection

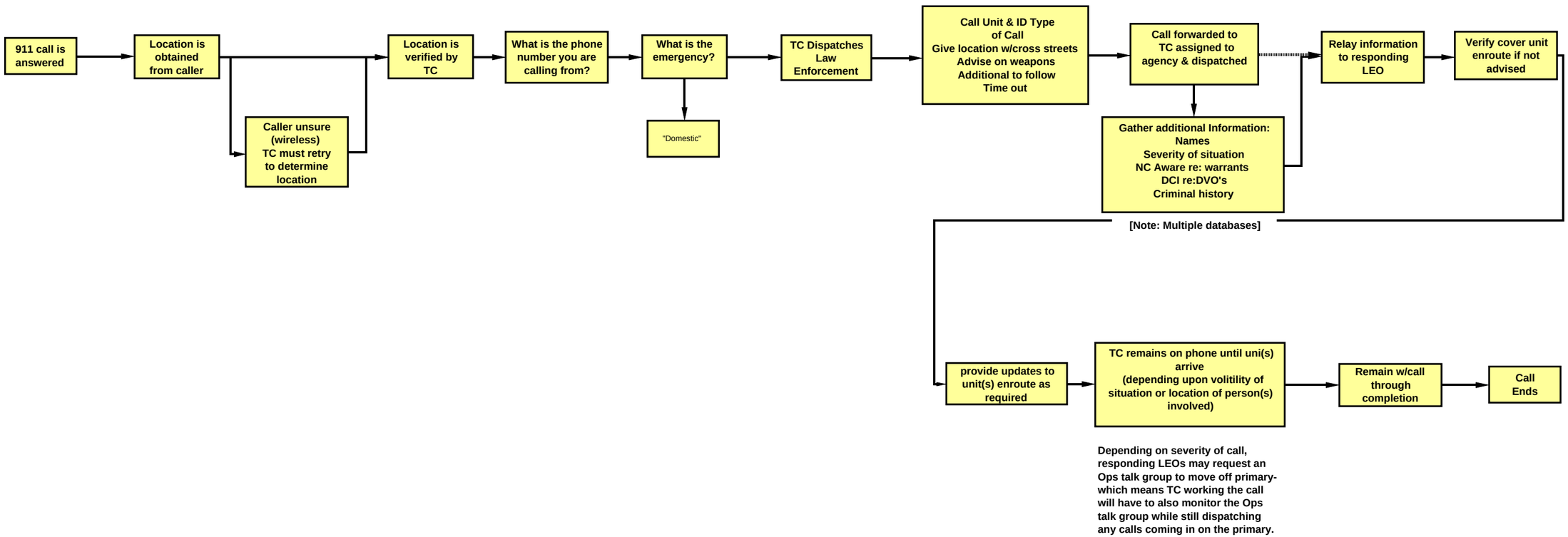
11.6 Maintenance Records.

11.6.1 Records of maintenance, both routine and emergency, shall be kept for all emergency call receiving equipment and emergency call dispatching equipment.

11.6.2 All maintenance records shall include the date, time, nature of maintenance, and repairer's name and affiliation.


ECHO status (most serious) call codes are dispatched
EMD provides pe-arrival instructions (PAI's) to caller; CPR, control of bleeding, etc.
Entry Questions
911 call is answered
What is the address of the emergency?
Repeat & Confirm Location
What is the phone number you are calling from?
What is the problem; tell me exactly what happened?
Are you with the patient?
NO
What do you know?
YES
Is he/she completely awake?
Is he/she breathing normally?
Is he/she changing color
Is he/she clammy, have cold sweats?
Does he/she have a history of heart problems?
Has he/she taken any drugs or medication in the past 12 hours?
EMD identifies "Chief Complaint" (CC)
Dispatch Unit(s) w/Code A-D only
First Responding Unit arrives on scene
EMD provides Post Dispatch Instructions (PDI's)
Patient condition (changes)
EMD relays additional information to responding units
Terminates Call
Patient Comfort


Note: The TC that took call stays on line with caller (providing there is no danger to caller) to obtain as much information as possible
Almost simultaneous unless problem with /Mutual Aide
911 call is answered
Location is obtained from caller
Caller unsure (wireless) TC must retry to determine location
Location is verified by TC
What is the phone number you are calling from?
What is the emergency?
Structure Fire
Sends to designated console for dispatch
CAD recommends AHJ
TC selects MA Depts manually
TC selects Talk Groups: Primary OCFD (VHF) EMS (VHF)
TC sends "Pre-Alert"
OPS Console:
Select Talk Groups: Ops, OCFD, EMS
Answer Apparatus & Officers checking enroute
Establish Command
Provide 20 min. reminders to Command for on-scene time
Follow call through completion
Select & activate pagers; 3 FD's + EMS
Announcemnet; AHJ, 2 MA's, EMS
Call Ends
TC provides location,type of call, OPS assignment & time out



Depending on severity of call, responding LEOs may request an Ops talk group to move off primary- which means TC working the call will have to also monitor the Ops talk group while still dispatching any calls coming in on the primary.

(10) *Extrication capability measure.* Percentage of calls requiring an extrication tool having one delivered to the scene within 8 minutes of call dispatch.
(11) *Employee illness and injury measure.* Percentage of employees acquiring an illness or injury as a result of participating in an EMS call.
(12) *Employee turnover measure.* Percentage turnover of EMS-trained employees per year.
(13) *Quality program measure.* Determination of whether an overall quality program, as described in (1) through (12), exists within the EMS system.
(14) *System user opinion measure.* Mail/phone survey to assess the satisfaction of system users with the system's performance.
(15) *Multicasualty event response plan measure.* An established plan to mitigate a multiple casualty disaster while maintaining sufficient resources to respond to the normal volume of emergency calls within the jurisdiction.

5.5.3.2.2 NHTSA. The National Highway Traffic Safety Administration (NHTSA) has published the document *EMS Performance Measures: Recommended Measures for System and Service Performance* using a consensus process to develop performance measures for EMS. The document contains indicators and attributes that EMS practitioners identified as critical for performance measurement and evaluation of any emergency medical services system. This resource describes the sources of required data, the formulas or questions necessary to examine critical components as well as other evaluation criteria parameters.

5.5.3.2.3 Other Measurement Methods. Accrediting bodies such as the Commission on Fire Accreditation International, the Commission on Accreditation of Ambulance Services, and others have published measurements and criteria for EMS systems.

5.6 Essential System Analysis Components. The nature of time presents a classic problem in semantics: The same term can have different meanings to different people. Additionally, tradition and unique EMS system design have created a language of time incomparability. The NFPA 450 EMS time template, shown in Table 5.6, is an attempt to solve this problem with consensus terms. The key to this time template is to differentiate clearly between discrete points versus intervals of time. Column A represents discrete points in time or time stamps that occur during an EMS call. Columns B and C label uniquely the elapsed time or intervals between the time stamps.

5.6.1 The lists in Table 5.6 are not exhaustive but represent typical core points in time and common operational situations. It is not expected that every time stamp be reported. Depending on the EMS system's complexity and level of technology, it is understood that a function interval may be long or instantaneous. However, when reporting EMS system performance, these consensus terms should be used.

5.6.2 Discrete Time Stamp. The term *time stamp* refers to the historical tradition in EMS during which call events were recorded by stamping a card that printed the hour and minute that was displayed at that moment on that clock. Today, times are often recorded automatically by computerized dispatch systems in hours, minutes, and seconds and are synchronized using the U.S. Naval Observatory's atomic clock. These time stamps define discrete moments at which certain events occur, recorded in hour:minute:second [hh:mm:ss] format. Discrete time stamps, collected in this way, allow the user to measure the interval between events. The system must have the ability to capture time stamps in a reliable, consistent, and accurate manner. Not all time stamps are available or collectible, while others are reported with varying degrees of accuracy. Sharing time stamp data across system components and synchronizing time recording devices are critical to establishing an accurate and reliable measurement process.

5.6.2.1 Function Intervals. An interval is the elapsed time between two discrete time stamps. Function intervals are the intervals between consecutive time stamps. The function interval describes the activity occurring at the task level of a single call. Function intervals allow analysis of each function that is taking place throughout the continuum of the event. Certain groups of consecutive functions describe processes.

5.6.2.2 Process Intervals. A process interval is made up of multiple, consecutive function intervals. A process interval is used to describe the elapsed time required to complete the agency's or system's objective. The process interval allows decision makers to establish baselines, monitor changes, benchmark to other systems, and create long-term plans.

5.6.3 Reporting System Data. When decision makers compare systems to benchmark performance, they must use consistent language to describe the function and process intervals. For example, the term *response time* is commonly used but not commonly defined. Therefore caution must be exercised to ensure that the term describes the identical functions or processes. Yet even when common definitions are used, response times may not be accurately compared. For example, some systems report "average" response times, which fail to adequately describe performance. Comparisons should therefore be based on "fractile" reporting, which, for example, may describe time performance with 90 percent reliability.

5.6.4 The terms defined in 5.6.4.1 through 5.6.4.3 are used in Table 5.6.

5.6.4.1 Column A Definitions.

(1) *Incident or onset time.* The time the incident occurred or the time that the symptoms developed.
(2) *Time of discovery of event.* The time that a third party or the patient becomes aware of the need for assistance.
(3) *Call for help.* The time that a third party or the patient first attempts to contact outside assistance.
(4) *First PSAP call time.* The time the telephone begins to ring in the first public safety answering point (or other designated entity).
(5) *Phone "off-hook" (answered in first PSAP).* The time that the telephone is answered in the first PSAP center.
(6) *Secondary dispatch phone rings — secondary PSAP (if appropriate).* The time the telephone begins to ring in the second public safety answering point (or the call screener). Many systems will not use secondary dispatch centers.
(7) *Secondary dispatch phone "off-hook" answered (if appropriate).* The time that the second PSAP or second dispatcher answers the phone, begins the interview, collects caller data, begins prearrival instructions.
(8) *Interview ends.* The time that the PSAP telecommunicator completes the interview with the caller. This time stamp may occur before or after resources are identified, or before or after units arrive on the scene.
(9) *Response resources are identified.* The time that the PSAP telecommunicator, through computer-aided dispatch or other means, identifies the appropriate resources to send to the scene of the emergency. For example, the telecommunicator may identify ambulance, fire apparatus, quick-response vehicles, police vehicles, specialty vehicles, or other appropriate resources.

Table 5.6 Essential System Analysis Components

Column A Discrete Time Stamps	Column B Functional Intervals	Column C Process Intervals
(1) Incident or onset time	(1) Recognition interval (1 to 2)	(1) Event activation (1 to 4)
(2) Time of discovery of event	(2) System access interval (2 to 3)	(2) Citizen reaction (2 to 4)
(3) Call for help	(3) Switching interval (3 to 4)	(3) Call processing (4 to 11)
(4) First PSAP call time	(4) Answer interval "A" (4 to 5)	(4) System response (4 to 14)
(5) Phone "off-hook" (answered in first PSAP)	(5) Routing interval (5 to 6)	(5) Unit response (11 to 14)
(6) Secondary dispatch phone rings — secondary (PSAP) (if appropriate)	(6) Answer interval "B" (6 to 7)	(6) Patient management (14 to 19)
(7) Secondary dispatch phone "off-hook" answered (if appropriate)	(7) Interrogation interval (5 or 7 to 8)	(7) Event to treatment (1 to 15)
(8) Interview ends	(8) Resource selection interval (8 to 9)	(8) Scene management (13 to 17)
(9) Response resources are identified	(9) Alert interval (9 to 10)	(9) Unit cycle (11 to 20)
(10) Dispatch time	(10) Acknowledgment interval (10 to 11)	
(11) Unit acknowledgment	(11) Turn-out interval (11 to 12)	
(12) Unit en route	(12) Travel interval (12 to 13)	
(13) Unit arrived on scene (wheels stopped)	(13) Patient access interval (13 to 14)	
(14) Patient contact	(14) Initial treatment interval (14 to 15)	
(15) First intervention time	(15) Initial result interval (15 to 16)	
(16) Time of result of first intervention	(16) On-scene patient care interval (16 to 17)	
(17) Unit left scene (wheels turning)	(17) Transport interval (17 to 18)	
(18) Arrived at destination	(18) Care transfer interval (18 to 19)	
(19) Transfer of care	(19) Unit-ready interval (19 to 20)	
(20) Available for service		

(10) *Dispatch time.* The time the responding unit was notified by the telecommunicator.

(11) *Unit acknowledgment.* The time that the response unit(s) acknowledged that they have received the notification.

(12) *Unit en route.* The time that the vehicle first begins moving toward the scene.

(13) *Unit arrived on scene.* The time that the vehicle comes to a complete stop at the scene.

(14) *Patient contact.* The time that responding personnel first arrived at the patient's side.

(15) *First intervention time.* The time that the first intervention, such as an IV, defibrillation, CPR, extrication, and so on, is begun.

(16) *Time of result of first intervention.* The time that the responder first identifies results of the first intervention. For example, when extrication occurred, when return of spontaneous circulation occurred, and so forth.

(17) *Unit left scene.* The time that the vehicle first begins moving from the scene.

(18) *Arrived at destination.* The time that the responding unit arrived at the hospital or transfer point.

(19) *Transfer of care.* The time that responsibility for treatment was transferred from a prehospital provider to another — when the hospital personnel physically take over care of the patient.

(20) *Available for service.* The time the unit was available for response.

5.6.4.2 Column B Definitions.

(1) *Recognition interval (1 to 2).* The elapsed period starting with (1), Incident or onset time, and ending at (2), Time of discovery of event.

(2) *System access interval (2 to 3).* The elapsed period starting with (2), Time of discovery of event, and ending at (3), Call for help.

(3) *Switching interval (3 to 4).* The elapsed period starting with (3), Call for help, and ending at (4), First PSAP call time.

(4) *Answer interval "A" (4 to 5).* The elapsed period starting with (4), First PSAP call time, and ending at (5), Phone "off-hook" (answered in first PSAP).

(5) *Routing interval (5 to 6).* The elapsed period starting with (5), Phone "off-hook" (answered in first PSAP), and ending at (6), Secondary dispatch phone rings.

(6) *Answer interval "B" (6 to 7).* The elapsed period starting with (6), Secondary dispatch phone rings, and ending with (7), Secondary dispatch phone "off hook" answered.

(7) *Interrogation interval (5 or 7 to 8).* The elapsed period starting with Phone "off-hook" answered in primary or secondary PSAP and ending with (8), Interview ends.

(8) *Resource selection interval (8 to 9).* The elapsed period starting with (8), Interview ends, and ending with (9), Response resources are identified.

(9) *Alert interval (9 to 10).* The elapsed period starting with (9), Response resources are identified, and ending with (10), Dispatch time.

(10) *Acknowledgment interval (10 to 11).* The elapsed period starting with (10), Dispatch time, and ending with (11), Unit acknowledgment.

(11) *Turn-out interval (11 to 12).* The elapsed period starting with (11), Unit acknowledgment, and ending with (12), Unit en route.

(12) *Travel interval (12 to 13).* The elapsed period starting with (12), Unit en route, and ending with (13), Unit arrived on scene (wheels stopped).

(13) *Patient access interval (13 to 14).* The elapsed period starting with (13), Unit arrived on scene (wheels stopped), and ending with (14), Patient contact.

(14) *Initial treatment interval (14 to 15).* The elapsed period starting with (14), Patient contact, and ending with (15), First intervention time.

(15) *Initial result interval (15 to 16).* The elapsed period starting with (15), First intervention time, and ending with (16), Time of result of first intervention.

(16) *On-scene patient care interval (16 to 17).* The elapsed period starting with (16), Time of result of first intervention, and ending with (17), Unit left scene (wheels turning).

(17) *Transport interval (17 to 18).* The elapsed period starting with (17), Unit left scene (wheels turning), and ending with (18), Arrived at destination.

(18) *Care transfer interval (18 to 19).* The elapsed period starting with (18), Arrived at destination, and ending with (19), Transfer of care.

(19) *Unit-ready interval (19 to 20).* The elapsed period starting with (19), Transfer of care, and ending with (20), Available for service.

5.6.4.3 Column C Definitions.

(1) *Event activation (1 to 4).* The elapsed time between the event and when the telephone first rings in the first PSAP. This process includes the recognition interval, the system access interval, and the switching interval, and is intended to measure a system's ability — using education, technology, or other means — to recognize that an emergency exists and to take immediate steps to access assistance.

(2) *Citizen reaction (2 to 4).* The citizen reaction process begins when an event is first discovered and ends when the telephone rings in the first PSAP. The citizen reaction process is intended to measure the system access interval and the switching interval. The process measures the system's ability to reinforce certain citizen behaviors and provides the means for those citizens to make appropriate access.

(3) *Call processing (4 to 11).* The call processing interval is the process that begins when the telephone first rings at the first PSAP and ends when responding units acknowledge that they are aware of the event. The processing interval includes the time required to appropriately answer the telephone in the PSAP, triage and route the call, interview the caller, provide instructions, identify and alert resources, and recognize that the alert has been received. This interval is intended to measure the system's ability to quickly process a request for assistance and notify the appropriate responding units.

(4) *System response (4 to 14).* The system response interval is the process that begins when the telephone first rings at the first PSAP and ends when the responders arrive at the patient's side. The system response interval is intended to measure the system's performance in responding to a call for assistance by considering the call processing interval, as well as the turnout, travel, and patient access intervals.

(5) *Unit response (11 to 14).* The unit response interval is the process that begins when the individual unit acknowledges that a response is required and ends with patient contact. The unit response interval is intended to measure an individual unit's performance in responding to a call for assistance by considering the turnout, travel, and patient access intervals.

(6) *Patient management (14 to 19).* The patient management interval is the process that begins when responders first make contact with the patient and ends when responsibility for the patient is transferred to another medical provider. The patient management interval is intended to measure the time committed by the system to meet the needs of the patient and reflects the system's ability to manage and monitor resources.

(7) *Event to treatment (1 to 15).* The event to treatment interval is intended to measure the system's ability to initiate treatment once an event exists. This interval is intended to measure the process that begins when the event occurs and ends when the first treatment is provided. This process may measure the time that responders, dispatchers, citizens, or others intervene as part of an organized EMS system design.

(8) *Scene management (13 to 17).* The scene management interval begins when the first vehicle stops at the scene of an event, and ends when the last patient leaves the scene. The interval is intended to measure the time required to manage the logistics of accessing the patient, providing initial treatment, packaging for transport, and leaving the scene.

(9) *Unit cycle (11 to 20).* The unit cycle process reflects the cycle time of an individual unit from activation to availability. The unit cycle process measures the time that a unit is assigned to an event and unavailable for other assignments.

5.6.5 Call Processing. System analysis considers call processing the manner in which calls are processed, as well as evaluation of the intervals required to complete the call and notify appropriate providers.

5.6.6 Call Processing Method. Community needs should dictate the way that resources are assigned and prioritized.

5.6.7 Call Processing Time Interval Standards. Call processing performance objectives should comply with existing standards. For example, NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, has established a standard that 95 percent of all emergency calls must be answered in 30 seconds. Dispatch of emergency response aid should be made within 60 seconds of the completed receipt of an emergency alarm.

5.6.8 Turnout (Activation) Interval. Turnout interval performance objectives should comply with existing standards. System analysis should consider the provider turnout interval, or the interval from response unit notification to movement of that unit to the location of the incident. For example, NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, establishes turnout time objectives of no more than 60 seconds.

5.6.9 Geography. System analysis should consider geography and the implications of local geography on service delivery.

5.6.9.1 Geographic Response Tools. A geographic information system (GIS) may be used as a tool to model existing service delivery for each EMS system component, such as first response, BLS or ALS care, or patient transportation services. Response capabilities for each mobile system component based on desired travel intervals can be modeled using a GIS system, identifying underserved areas of a jurisdiction, for either current or planned system designs.

5.6.9.2 Travel Interval. Travel interval objectives examined by a GIS analysis should parallel standards as established by the lead agency.

5.6.9.3 First Response. The community should establish response intervals for first responders that are appropriate for that community. The standards should be suitable for the local demographics, resources, medical needs, and geography. The intervals should be systematically monitored for compliance with the local standard.

5.6.9.4 Advanced Life Support. The community should establish response intervals for advanced life support, where available, that are appropriate for the community. The standards should be suitable for the local demographics, resources, medical needs, and geography. The intervals should be systematically monitored for compliance with the local standard.

5.6.10 Geographic Barriers. A GIS model may also identify potential barriers to delivery of care (for example, interruption of the road network by construction, flooding, or railroad crossings).

5.6.11 Distribution of Demand. A GIS may also identify the distribution of calls in a community and areas undergoing development that would require the expansion of services in the future.

5.6.12 Demographics. The system analysis should consider local demographics and the implications of those demographics on service requirements for a range of constituency groups.

5.6.12.1 Age. Age-related injuries and illnesses (for example, pediatric, adolescent, or geriatric) should be considered.

5.6.12.2 Socioeconomics. A community's socioeconomic structure and its associated injuries and illnesses (e.g., violent crime, lack of prenatal care, or neglect) should be considered.

5.6.12.3 Gender. Gender-related injuries and illnesses (e.g., disease rates and treatment plans) should be considered.

5.6.12.4 Culture and Ethnicity. Language, cultural diversity, and ethno-specific disease processes should be considered.

5.6.12.5 Local Industry. Industrial area injuries and illnesses (e.g., exposure to hazardous materials, injuries from machinery) should be considered.

5.6.13 Regulatory Environment. The EMS system should monitor the political and regulatory environments to analyze impacts on operations, funding, and personnel.

5.6.14 Additional System Needs. The system analysis should consider other features unique to the system, such as special hazards, needs, and conditions that will affect service delivery.

5.6.15 Disasters. The potential for disasters as a function of unique jurisdictional features, characteristics, and risks should be considered.

5.6.16 Medical Center Resources. The system analysis should consider resources available through local hospitals (e.g., frequency of hospital "diversion" status, resource hospital training, resupply of disposables and medications, ALS quality assurance).

5.7 EMS System Planning. Based on the comprehensive system analysis and the identified system priorities, the system should develop a plan for ongoing system design and improvements. Plan development should include the components specified in 5.7.1 through 5.7.7.5.

5.7.1 Roles. Identification should be made of the roles and responsibilities of each position type needed for the EMS system to function, based on the needs and wants of the community.

5.7.2 Financing. Annual operating budgets and capital budgets consistent with generally accepted accounting principles should be established.

5.7.3 Resource Allotment. Resources should be allocated appropriately between agencies in the system.

5.7.4 Master Planning/Forecasting. A master plan should be available that ensures that the necessary resources are available to the system and will meet the needs of future system requirements.

5.7.5 Disaster/Catastrophe Planning. The system should ensure that a plan is available to manage overwhelming or catastrophic events, including coordinating activities between and among providers.

5.7.6 Public Education and Injury/Illness Prevention. The system plan should include components required to prevent the need for emergency responses.

5.7.6.1 Traditional Programs. Traditional illness and injury prevention programs such as CPR and "Stop, Drop, and Roll" should be available and regularly provided to citizens in the system.

5.7.6.2 Other Programs. The prevention and public education plan should include analysis of the environment and an analysis of the need for special prevention programs such as water/cold safety, immunization, and basic emergency care.

5.7.6.3 Disaster Preparedness. The system should coordinate with emergency management programs to ensure that citizens are prepared.

5.7.7 Provider Support. The system plan should address and consider methods to support individual providers in the system.

5.7.7.1 Provider Training. Provider training and support programs should ensure that providers receive training sufficient to meet local needs and support to ensure their continued participation.

5.7.7.2 Provider Safety. The following provider safety programs should be in place to reduce the amount and severity of injuries incurred by providers:

(1) Equipment
(2) Training
(3) Accountability systems

5.7.7.3 CISM. Critical incident stress management (CISM) programs designed to reduce acute and chronic effects of stress related to job functions should be established.

5.7.7.4 Wellness. Health and wellness programs should be in place to monitor and support the overall wellness of providers.

5.7.7.5 Emergency Management. Disaster preparedness programs should be in place to meet the unique needs of providers during catastrophic events.

5.8 Continual Risk Assessment and Planning. The system should have in place a comprehensive process, articulated in a risk assessment plan and overall system design that provides continual analysis and mitigation of risk. The primary risk management processes include risk assessment (internal and external), risk elimination, risk avoidance and prevention, risk control, and loss control.

ORD-2012-057

ORANGE COUNTY
BOARD OF COMMISSIONERS

ACTION AGENDA ITEM ABSTRACT
Meeting Date: November 20, 2012

Action Agenda Item No. 7-b

SUBJECT: Implementation Strategy from the Emergency Services Workgroup on Recommendations from the Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Study, and Approval of Budget Amendment #4-C

DEPARTMENT: Emergency Services

PUBLIC HEARING: (Y/N) No

ATTACHMENT(S):

INFORMATION CONTACT:
F. R. Montes de Oca, 245-6100
Michael Talbert, 245-2308

PURPOSE: To receive an implementation strategy from the Emergency Services Workgroup regarding recommendations included in the Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Study, approve Budget Amendment #4-C for $414,500 in the current fiscal year, and incorporate the recommendations into the Budget & Capital Investment Plan (CIP) process for Fiscal Year 2013-14.

BACKGROUND: The Orange County Emergency Medical Services (EMS) provides pre-hospital care and transport to residents and visitors throughout the County. Originated from volunteer services, Orange County EMS began providing advanced life support ambulances in the 1980's. EMS is a branch of the Orange County Emergency Services Department and is staffed by dedicated paramedics and Emergency Medical Technicians around the clock. The EMS branch is the largest and highest-profile group within the department providing emergency response, patient care and patient transport from 400 square miles covering densely-populated urban settings to rural areas throughout the County. In addition to responding to 10,700 calls annually, EMS must be able to address extraordinary events such as multi-casualty incidents, large sporting events, stock car races and mass gatherings, assist at fires, evacuations and other disaster situations affecting public safety.

The Orange County 911 Center is the public safety answering point for residents to access emergency services agencies. It originated in the former Orange County Sheriff's Office at Columbia and Rosemary Streets in Chapel Hill. It is a branch of Orange County Emergency Services and is staffed by dedicated professionals around the clock.

On December 13, 2011 the Board discussed the Emergency Medical System Delivery and E911 Communications Center improvements. There was consensus that the County needed to develop a strategic plan to improve the County's Emergency Management Services Delivery System and E911 Communications Center. The Charge for the ESW included reviewing alternatives and making recommendations for the following:

System improvements for EMS Ambulance response times including but not limited to equipment, staffing, facility's and/or a strategic plan, to define data elements for meaningful analytical data as related to ambulance response time and to discuss and review that data.

Improvements for the E911 Communications Center including but not limited to technology, equipment, staffing, training and/or a strategic plan.

On March 22, 2012 the Board approved a contract with Solutions for Local Government, Inc. to develop a multi-year strategic plan addressing Emergency Medical Services System and E911 Communications Center needs.

At the August 30, 2012 Board Work Session, Mr. Steve Allan presented the final draft of the Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Study. Mr. Allan held meetings with stakeholders, presented and discussed his report, answered questions and solicited input. This included one meeting for the general public that was held on September 27, 2012.

Emergency Services Workgroup is recommending the following implementation strategy from the recommendations included in Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Study.

R-1. OCEMS should adjust Medic 5 and Medic 8 coverage hours.

The Workgroup recommends keeping 5 ambulances operational around the clock and add new 12 hour peak load ambulances as new ambulances are staffed and placed in service.

R-2. OCEMS should add an additional ALS Ambulance 9:00 am-9:00 pm, 12 hours/day, 7 days/week.

The Workgroup recommends a new 9am – 9-pm peak load ambulance and evaluate after 6 months to verify that the new ambulance has helped bring down the average number of move ups. This ambulance was approved in Fiscal 2012/2013 and will be placed in service as soon as new staff is trained and the new unit is available.

R-3a. Utilize available SORS/BLS ambulance for non-emergency patient transports.

R-3b. OCEMS should bring on line and staff a BLS ambulance to provide non-emergency patient transports.

The Workgroup recommends combining R-3 & R-3b into one recommendation. County staff and SORS are directed to collect & analyze additional call volume data bring back a recommendation to the Emergency Services Workgroup by January, 2013.

R-4. Assess Fire Department capabilities to meet BLS First Responder response time objectives.

R-5a. Schedule and implement Fire Department, Medical First Responder initiative which includes performance objectives.

R-5b. Staff and equip four (4) EMS Quick Response Vehicles (QRV's) for assignment, initially, 12hours/day, 7 days/week with shift start/end times to be determined by EMS.

The Workgroup recommends combining R-4, R-5a, and 5b into one recommendation. A working group, comprise of Emergency Services staff, representatives from Chief's Council, representatives from South Orange Rescue Squad and the County Medical Director is directed to discuss these issues and bring back a recommendation to the Emergency Services Workgroup by January, 2013.

R-6. Staff & equip six (3) 12 hour/7 day ALS ambulances at appropriate staging/base facility locations within (1) Zones 1 & 2, (2) Zones 7 & 5, and (3) Zones 6 & 8.

The Workgroup recommends that EMS staff and the County's Medical Director prepare a detailed 5 year implementation schedule for recommendation R-6 and brings back a recommendation to the Emergency Services Workgroup by December 11, 2012.

R-7. Hire a Paramedic Level Shift Supervisor @ 24/7.

The Workgroup recommends hiring 4 new Paramedic Level Shift Supervisor positions immediately. The Study recommends 5.1 position for a 24/7 Shift Supervisor, but Emergency Services staff recommended only 4 position. This is recommended to be funded in the current fiscal year, at an estimated annual cost of $267,500.

R-8. Prepare a detailed Space Needs Assessment 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.

R-9. Identify a minimum of nine (9) strategic locations, preferably no less than one (1) location within each major zone previously identified, for the potential location in each of a future EMS base.

R 10. The County should purchase/obtain identified sites (and/or buildings) for development.

R 11. Procure EMS base planning and design services.

R 12. Advertise, bid, and commence construction on designated EMS base facilities.

The Workgroup recommends tabling recommendations R-8, R-9, R-10, R-11 and R-12. EMS staff is directed to proceed with a space needs assessment while simultaneously exploring the

option of co-locating EMS Ambulances at fire departments. Staff is to bring back a recommendation to the Emergency Services Workgroup by January, 2013.

R-13. Hire a full-time, dedicated Data System Manager to be located as close as possible, preferably adjacent to the Communications Center, and answerable first to the Communications Center Operations Manager.

The Workgroup recommends hiring a dedicated full-time Data System Manager immediately in the current fiscal year, at an estimated annual cost of $74,250.

R-14. Hire a full-time, dedicated Training/Quality Assurance Officer to be located as close as possible, preferably adjacent to the Communications Center, and answerable first to the Communications center Operations Manager.

The Workgroup recommends hiring a dedicated full-time Training/Quality Assurance Officer immediately in the current fiscal year, at an estimated annual cost of $72,800.

R-15. Anticipating increasing responsibilities due to the number of new personnel forthcoming, hire an additional full-time Training/Quality Assurance Officer no later than the end of year-3.

The Workgroup recommends hiring an additional dedicated full-time Training/Quality Assurance Officer during year-2 or Fiscal 2014/2015, at an estimated annual cost of $72,800.

R-16. Prepare a schedule for the hiring and training of the identified Telecommunicator positions and identify the date to begin solicitation and acceptance of applications.

R-17. Hire 17 new, full-time Telecommunicators.

The Workgroup recommends combining R-16 and R-17 into one recommendation. The Fiscal 2012/13 Budget includes 4 new full-time Telecommunicators, which are included with the total of 17 recommended by the Study. The Workgroup recommends combining R-16 & R-17 to hire and train 13 new full-time Telecommunicators over 3 Fiscal Years. Recommending that 4 full-time Telecommunicators be added in Fiscal 2013/14, 4 additional Telecommunicators in Fiscal 2014/15, and 5 Telecommunicators in added in Fiscal 2015/16. The total position added over 3 years will be 13 Telecommunicators, with the estimated total cost of $585,000.

R-18. Purchase necessary AVL vehicle hardware for each new EMS vehicle purchased to enable compatibility with newly purchased CAD software and existing AVL system hardware.

Necessary AVL vehicle hardware already in place, no action needed.

R 19. Following the installation of recently purchased Communications Center software and the training of in-house personnel; organize and provide informational meetings to emergency service system members, particularly Fire Departments and Law Enforcement, with regards to the system's capabilities and the information that will be available to them for their use.

OSSI Software has been purchased and the 12 month installation process has started. The Workgroup recommends that the 911 Users Group be resurrected to meet at least 6 times per year and provide input for the 911 Communications installation and setup of the OSSI system.

R 20. From the Workgroup:

The Workgroup recommends that Page Track software, currently in use by the Fire Departments, be incorporated into the OSSI system if possible and utilized by 911 Communications. If Page Track remains a standalone system, it is recommended that 911 Communications use the system to support OSSI when possible.

FINANCIAL IMPACT: The Workgroup recommends funding $414,500 as outlined in the recommendations background in the current fiscal year and incorporate the remaining recommendations into the Fiscal Year 2013-14 Annual Budget & CIP process.

RECOMMENDATION(S): The Manager recommends that the Board receive the implementation strategy from the Emergency Services Workgroup regarding recommendations included in the Comprehensive Assessment of Emergency Medical Services & 911/Communications Center Operations Study, approve Budget Amendment #4-C for $414,500 in the current fiscal year, and incorporate the recommendations into the Budget & Capital Investment Plan (CIP) process for Fiscal Year 2013-14.