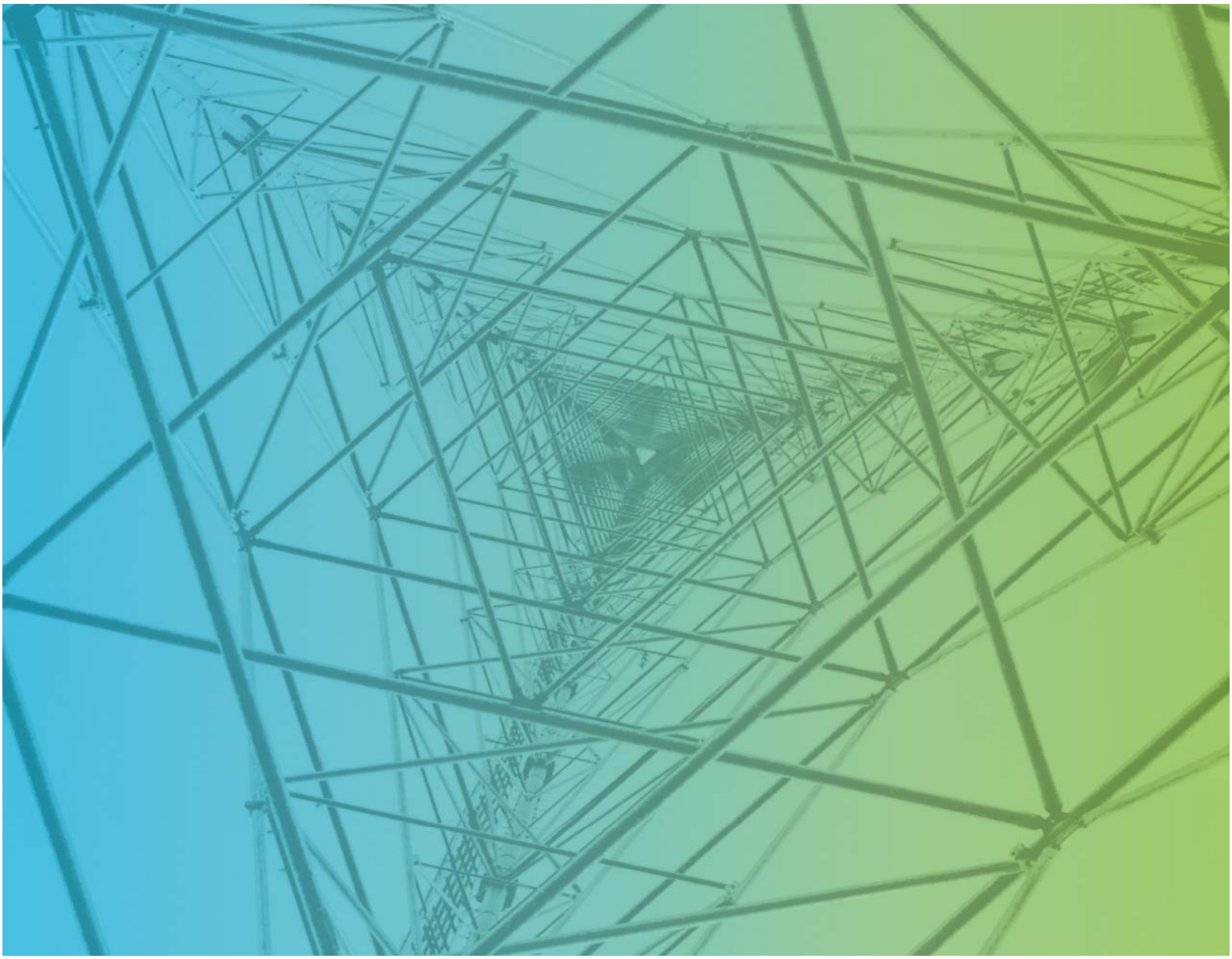
AECOM

October 8, 2010

Final Regional Emergency Communications Center Feasibility Study

Town of Monson, MA



AECOM
Building Engineering
20715 Timberlake Rd. Suite 106
Lynchburg, VA 24502
www.aecom.com

434 239 9200 tel
434 239 9221 fax

October 8, 2010

Chief Stephen Kozloski
Chief of Police
110 Main Street
Monson, MA 01057

Final Monson RECC Consolidation Study

Dear Chief Kozloski:

Please find attached a copy of the Final Monson RECC Consolidation Study for the Towns of Monson, Palmer, ande Hampden. All comments we have received have been addressed and incorporated in this document.

We understand that the situation is somewhat undefined at this point and some supporting Commonwealth programs are not yet settled. We can easily add a fourth option in one of two scenarios; one with three additional towns in Hampden County, and one with a broader Pioneer Valley association. However, at this point we understand that you wish the report to stand with the three presented options.

With that in mind we will present this final report. If you need further please do not hesitate to contact me if you have any questions.

For AECOM,

James Mike Dye, ENP
Vice President, Communications Technology
Building Engineering

cc: Adrienne Haskins, AECOM

Table of Contents

1.0 Introduction

The Town of Monson, Massachusetts Regional Emergency Communications Center Study focuses on the feasibility of consolidation of three independent Towns located in western Massachusetts. The Towns of Monson, Palmer, and Hampden are included in the original scope of work specified by the Request for Proposals. Currently the Town of Monson, the Town of Palmer, and the Town of Hampden, each operate their own PSAP and E9-1-1 dispatch center. Due to continued budget constraints and declining revenues, each locality is interested in exploring the concept of sharing their public safety dispatch centers and other regional efforts to improve efficiencies and service to their citizens. Through a formal Request for Proposals (RFP) process, AECOM was selected to complete the tasks identified by the Towns and their representatives.

The Regional Emergency Communications Center Study was designed to answer the following questions:

- Analysis of public safety operational, preparedness and response; benefits or disadvantages.
- Identification of location and back up location for regional PSAP or RECC.
- Analysis of how an RECC would affect the array of services provided to dispatch entities and ability to respond to 9-1-1 calls.
- Analysis of how an RECC would affect interoperability of communications systems on local, regional and statewide basis.
- Analyze the ability to share currently separate services between PSAPs such as, but not limited to, CAD systems, mapping systems and radio systems.
- Demonstrate capacity for 9-1-1 surge capacity.
- Analyze the capacity for coordination of local and regional police, fire and EMS resources including response to routine events and major disasters.
- Demonstration that a satisfactory arrangement can be made regarding PSAP governance, SOPs accountability, service, standards and control.
- Demonstration that initial costs are justified based on proposed work and expected benefits including the potential for ongoing operating or capital cost savings.
- Estimation of one-time and recurring costs.
- Analyze personnel structure and costs at each agency, including analysis of the core and additional services provided by current personnel and estimated personnel costs for staffing a regional PSAP or RECC, along with cost to maintain or increase other public safety services such as lock-up monitoring expenses, administrative duties and walk-in traffic at existing local agencies.
- Analysis of compatibility of CPE, radio, mapping, telephone and related equipment owned or operated by current PSAPs and need for equipment at new regional PSAP or RECC.
- Identification of financial resources available to provide ongoing support for project so it may be sustainable into future years.

During the month of May 2010, a team of personnel from AECOM conducted interviews and dispatch center surveys. Approximately nineteen interviews were conducted. The three existing dispatch centers were surveyed and extensive information was gathered on the systems and facilities currently in use.

AECOM was tasked with the following:

- Demonstrate cost effectiveness or ineffectiveness of proposed project.
- Provide a comprehensive review of all of the participating agencies considering the following: collective bargaining agreements, personnel policies, job descriptions, training requirements, compensation and benefits, and reporting lines. Include an analysis of potential labor relations or legal issues related to merging staff from the various departments into one RECC, and make specific recommendations for a successful transition.
- Provide an examination of potential legal and organizational structures for the RECC. Recommend a structure that will be allowable by law, and suitable in practice for all participating agencies.

- Examine the current dispatch facilities at the Town of Monson, Town of Hampden and Town of Palmer, and validate or invalidate the need for new physical plant for all three purposes, including examination of potential for increased opportunities for cost-sharing in the future communications technologies and dispatch equipment.
- Review the advantages of partial or full consolidation, and submit a written recommendation to the Town of Monson.
- Examine best practices from other, similar cities relating to operation, staffing, training, management and governance of consolidated, intra-town PSAP/Emergency Dispatch/EOC and submit written report to the Town of Monson.

This report addresses those tasks and is outlined below:

SECTION 2 of the report describes the Current Communications Environment;

SECTION 3 describes the functional attributes a consolidated public safety communications center should have;

SECTION 4 discusses the current communications problems and concerns;

SECTION 5 identifies and analyzes alternative designs for a consolidated center;

SECTION 6 presents AECOM's cost estimates;

SECTION 7 contains AECOM's conclusions and recommendations.

We wish to thank the Towns of Monson, Palmer, and Hampden and their staff for the support we received during the initial phase of this project. With the help of the Chiefs, Officers, Dispatchers, and with the cooperation of the other agencies in the Towns, we were able to gather the critical information needed to complete this report. We also appreciate the timely response of all parties to our draft forms, surveys, and emails. Your prompt replies and honesty in your own assessments have contributed to a successful project completed on time. On behalf of the AECOM Project team, thank you for your support of this critical project.

2.0 Current Communications Environment

This section defines the current dispatch operations and communications environment in the Townships of Monson, Palmer, and Hampden. A brief discussion of the overall community environment and the projected changes in population are also included. Descriptions of the current operations for each of the three localities involved in this study are provided, and the duties performed by the dispatch staff of the centers are reviewed.

2.1 Current Community Environment

Monson is a small rural town settled in a valley with scenic rivers and warm hospitality. In 1759, a group of residents in the town of Brimfield petitioned the General Court and formed what would be called Monson. The first Town Meeting was held in 1760.

Because of the abundant waterpower in these hills, manufacturing was a major activity. Beginning in the 1600's, there were mills and factories located in what became Monson – sawmills, woolen mills, gristmills. There were also blacksmiths, carriage makers, leather works and cider mills. There was a mill to extract linseed oil from flax; an industry to gather bog iron; a lead pipe manufacturer; a turning lathe for rifle barrels; a tannery and a large granite quarry that supplied building materials not only to Monson, but throughout the northeast (all of the granite buildings and foundations in town are made of Monson granite). By the late 1800's there were several hat factories, sending hats to the New York market.

The mill owners were not only extremely wealthy – at one time, Main Street with its row of mansions was called "Millionaire's Mile" – but generous: giving the town funds for Memorial Hall, the (Lyon Memorial) Library (c.1882), the Soldiers monument (c.1884), and Flynt Fountain monument (c.1882) among others. Today, Monson continues to operate with the Open Town Meeting form of government with elected Selectmen.

Palmer, known as the Town of seven railroads, is comprised of four villages that make up the Town. The villages of Bondsville, Depot Village, Three Rivers, and Thorndike comprise the town and are governed by a Town Council. Palmer's history of growth and prosperity reaches far back into the days of the revolution. Long noted for its railroad access, Palmer was the picture of industrialism and a northeastern boom town. Many industries and businesses thrived in the area. Business such as The Thorndike Company, The Boston Duck Company, and the Palmer Co., harnessed the power of the Swift, Chicopee, and Ware Rivers and built huge textile factories. The sleepy villages near these mills became the villages of Bondsville, Three Rivers, and Thorndike.

Along the southern border of the town, in 1839 the Western Railroad completed laying tracks that connected Palmer to neighboring communities. Along the intersection of the rail lines, train activity led to the building of commercial, educational, and residential centers. The area was aptly named Depot Village. The prosperity brought by the rail lines would change in the 20th century as the domestic market and trade initiatives changed. Palmer suffered setbacks in the 1960's due to relocation by Colorado Fuel and Iron, and a fire at the Bondsville Mill complex.

However, in a show of its true resiliency, the citizens of Palmer have continued to rebuild and persevere and are again entering a period of growth.

Hampden is a small country town captured by the gentle hills and sloping mountains that surround it. The Scantic River meanders through town and brings reminiscences of the old plowshops, tanneries and blacksmith shops that once edged its shores. The Historical Society, housed in Old Academy Hall, displays the Sunday-go-to-Meeting clothes, diaries and yellowed letters that tell poignant stories of those who once called Hampden home.

Today, new homes dot the hillsides but the population has hovered under 5,000 for many years. This is due in part to its topography and in part to its wetlands. It is this very feature that has brought to Hampden the Audubon Society's Laughing Brook Wildlife Sanctuary, built around the former home of Thornton W. Burgess, well-known

storyteller and author of children's nature books. Young people are very important to Hampden and the town's schools reflect that fact.

Hampden has a volunteer fire department, a town meeting form of government with three elected Selectmen, a small post office where people call each other by name, and residents or visitors can walk its un-side walked roads at any hour in complete safety and without fear. All in all, town residents feel it is a place one is reluctant to leave in the morning and relieved to find waiting at the end of the day. Hampden, its citizens feel, is changing yet changeless, quiet yet alert, remembers its past yet ensures its future. The town is a true bit of Americana.

TABLE 2-1 shows the change in the population since 1990 and the projected population for each locality through 2030, capturing a 40 year snapshot of past and future growth projections.

Table 2-1
Population Projections

Locality	1990 Census	2000 Census	2008 Estimate	% Change 1990-2008	2010 Estimate	2020 Estimate	2030 Estimate	% Change 2000-2030
Monson	7,776	8,359	8,952	15%	9050	9350	9700	16%
Palmer	12,054	12,497	12,933	7%	13000	13175	13365	7%
Hampden	4,709	5,171	5,400	15%	5500	5750	5947	15%
Totals	24,539	26,027	27,285	11%	27,550	28,275	29,012	11%

2.2 Current Dispatch Environment

Each of the three Townships in this study operates in separate public safety dispatch centers. The dispatch centers function as primary public safety answering points, directly receiving incoming wireline and wireless 9-1-1 calls. Each center dispatches for multiple agencies. TABLE 2-2 is a listing of the dispatch centers and the agencies they dispatch. The centers also dispatch resources for non-public safety agencies, especially after normal business hours.

Table 2-2
PSAPs and Dispatched Agencies

Monson	Palmer	Hampden
Monson PD	Palmer PD	Hampden PD
Monson Fire-EMS	Palmer Fire	Hampden Fire
	Three Rivers Fire	
	Bondsville Fire	
	Palmer Ambulance	

2.3 Town of Monson

The Town of Monson Police Department currently serves as the primary PSAP for the town, dispatching police, fire, and EMS services for its citizens. The center currently operates 24/7 with four full time, and three part time dispatchers.

The Town has recently upgraded its dispatch consoles from a Motorola Command Star Lite to Motorola MIP 5000. The Command Star Lite is still in place and serves as a secondary dispatch position.

2.3.1 Monson Police Department

The Monson Police Department currently has 11 full time sworn officers. There is one chief, three sergeants, and seven patrol officers. The dispatchers are also employees of the Police Department and answer directly

to the Chief of Police. The department employs one 32 hour per week administrative assistant and a part time animal control officer.

Each Sergeant has additional duties. One Sergeant serves as Administration, one serves as dispatch liaison, and the last serves in training. The only special service offered is one K-9 Unit. The department operates three shifts which are: 8AM-4PM, 4PM-12PM, and 12PM-8AM.

The department has Mobile Data Terminals (MDT) in its vehicles. The vehicle fleet is comprised of late model Dodge Chargers and Durango(s). The department is housed in the lower level of the Town Building and is accessed by a locked door operated by the dispatcher on duty.

The Monson Police Department operates on high band VHF frequencies on a single repeater site which is controlled via RF from dispatch.

2.3.2 Monson Fire - EMS

The Monson Fire and EMS Department is a combination department staffed by both career and volunteer firefighters and emergency medical providers. Chief Robinchaud has served as Chief since 2008, and has been with the department for 23 years. In addition to fire protection and EMS service, the department also completes inspections and has an active year round fire education and safety program conducted primarily through the schools.

There are two career personnel on duty from 7AM-5PM, and from 5PM-3AM. Career firefighters are also on call from 3AM-7AM. There are approximately 50 volunteers of the department. The department responds to an average of 1200-1300 calls for service annually. This includes EMS medical responses.

EMS is provided at the intermediate level, and Paramedic back up is available if needed from nearby agencies and neighboring towns upon request. The paramedic agency providing back-up depends upon call location and other factors determined by EMS units on scene.

The fire department has already reached ninety percent compliancy with FCC narrow banding guidelines. Currently, there are no interoperability issues or concerns with neighboring jurisdictions. The Fire Department is dispatched via tone outs from Monson PD dispatch. There are currently no tiered response plans entered into the CAD system, thus the responsibility of which apparatus to respond is left to the discretion of the on-duty fire officer.

2.3.3 Monson Police Department Communications Center

The Monson Police Department currently has four full time and three part time dispatchers. There are no supervisors, dispatchers answer directly to the Chief of Police. Dispatchers provide services for the Monson Police Department, Monson Fire-EMS, and animal control.

Dispatchers work shifts from 8AM-4PM, 4PM-12AM, and 12AM-8AM. Typically, they will work set shifts rotating as needed, or working overtime as needed, to cover for sickness or vacation.

The following activities and functions are performed by the Monson PD dispatchers:

- Answer incoming 9-1-1 calls.
- Answer incoming administrative telephone calls
- Dispatch the Monson Police Department
- Dispatch the Monson Fire-EMS Department
- Dispatch Animal Control
- After-hours call answering for City Departments
- NCIC/CJIS/LEAPS checks

- Warrant/Article entry and confirmation
- File maintenance
- Monitor security cameras
- Handle police-department walk-ins after normal business hours
- Enter summons, warrants, arrests, and incident reports into records management system

The dispatch center is located inside the Monson Town Building at the intersection of Main Street and State Street. This building is shared with other township agencies. The police department is located at the rear of the building. The dispatch center is approximately 618 square feet. There are a total of two dispatch positions in the center with room to add more.

This building was previously used as a school, prior to being condemned, and was then turned into the town building. The building is showing signs of aging and is well over 75 years old. There are signs of water damage and mold throughout the building. The building is not currently outfitted properly to handle modern dispatch equipment.

Extensive electrical renovations have been done throughout the building, and a new 125 kW diesel Generac generator with a 400 gallon fuel tank has been installed at the south end of the building.

There are four wireline 9-1-1 trunks, four wireless 9-1-1 trunks, and two administrative telephone lines. The center has deployed Phase II wireless for all carriers that serve the town.

Monson PD uses PLANT CML VESTA PALLAS telephony answering position workstations, TriTech IMC CAD software, and one Motorola MIP 5000 VoIP, graphical console and one Motorola CommandStar Lite desktop console unit with Microphone.

The building does not have a dedicated equipment room to house all the network equipment. The CAD servers, 9-1-1 CPE server equipment, and the radio console switch are all located in separate rooms.

TABLE 2-3 shows the available metrics for the Monson Police Department Communications Center.

Table 2-3
Monson Police Department Dispatch

Activity	Call Volume 2010
Wire-line 9-1-1	1550
Wireless 9-1-1	325
VOIP 9-1-1	
Total 9-1-1 Calls Received	1875
Wireless Call %	
Average 9-1-1 Answer Time (in seconds)	
Average 9-1-1 Talk Time	
Abandoned Call %	
Other Emergency Calls Received	
Administrative/Non-Emergency Calls	49864
Average Talk Time Administrative/Non-Emergency Calls	2 MIN
Average Answer Time (Administrative/Non-Emergency Calls)	5 SEC
Outgoing Calls	210
Average Talk Time (Outgoing Calls)	3 MIN
Police Calls For Service Dispatched	1895
Police Officer Initiated Calls	3470
Fire Calls Dispatched	180
Emergency Medical Calls Dispatched	674
NCIC/CJIS Inquiries (by communications center)	5038
NCIC/CJIS File Maintenance Activity (by communications center)	50
NCIC/CJIS Administrative Messages Sent (by communications center)	5

2.4 Town of Palmer

The Town of Palmer Police Department currently serves as the primary PSAP for the town, dispatching police, fire, and EMS services for its citizens. The center currently operates 24/7 with five full time dispatchers. Part time dispatchers were eliminated from the budget in the last couple of years due to decreased funding.

2.4.1 Palmer Police Department

The Palmer Police Department consists of three patrol areas and three officers per shift. Currently there are nineteen full time sworn officers which include one Chief, one Lieutenant, three Sergeants, one school resource officer (who also works patrol), and one court officer (who also works patrol). The department provides routine law enforcement activities including; traffic, patrol, criminal warrants, and investigations. Each Sergeant is responsible for a shift and reports to the Lieutenant. The Lieutenant position is fairly new and is not covered by the collective bargaining agreement.

2.4.2 Palmer Fire Department

The Palmer Fire Department is a career fire department with three full time employees including the Chief. There are twenty-seven on call firefighters that are paid hourly when on duty. The department responds to an average of 400 calls annually and is funded through a special purpose tax district. The department offers specialized services for confined space rescue and is currently working towards training and equipment for swift water rescue.

Palmer Fire Department is dispatched by the Palmer PD via two-tone signaling. Palmer Fire also has pole boxes that can be pulled by citizens to report fires. The alarm pages out the fire department and activates sirens. An alarm box in the station records the location of the specific pole box that has been activated. The

Fire Department has recently purchased a Signal Communications (SigCom) Vision 21 monitoring and control unit and placed it in dispatch to record the alarms. The new method is not yet in service.

Palmer Fire operates on a high band VHF frequency shared with Bondsville Fire.

2.4.3 Three Rivers Fire Department

The Three Rivers Fire Department has one full time employee, the Fire Chief. The balance of firefighters are on-call and receive an annual stipend of approximately $2300 for their service to the fire district. The department responds to an average of 140 calls annually and is funded through a special purpose tax district. The department offers specialized services for high angle and confined space rescue.

Three Rivers Fire Department is dispatched by Palmer PD via two-tone signaling; however, Three Rivers Fire Department has its own VHF channel used by Palmer PD for dispatch.

2.4.4 Bondsville Fire Department

Bondsville Fire Department is all volunteer and responds to an average of 90 calls annually. Volunteers receive an annual stipend of approximately $1200-1300 dollars for their service to the department. Funding for the department is provided through a special purpose tax district.

Bondsville shares a High Band VHF frequency with Palmer Fire and is dispatched by Palmer PD.

2.4.5 Palmer Ambulance Service

Palmer Ambulance Service is a non-profit corporation providing intermediate level EMS service to the Town of Palmer. The service consists of 23 employees. There are two administrative employees and seven full time EMS providers. Palmer Ambulance has one 24/7 ambulance, and two ambulances working twelve hour shifts daily.

Palmer Ambulance runs approximately 2300 calls annually and is dispatched by Palmer PD on the PD channel. Palmer Ambulance provides the 9-1-1 Emergency Response service for the town, and also does convalescent transports. The run breakdown is approximately fifty percent emergent transports and fifty percent non-emergent transports. The dispatch services have been provided free of charge since Palmer Ambulance began operating.

2.4.6 Palmer Police Department Communications Center

The Palmer Police Department currently has five full time dispatchers. The Senior Dispatcher serves as a Supervisor for the center. The center provides services for the Palmer Police Department, Palmer Fire Department, Three Rivers Fire Department, Bondsville Fire Department, and Palmer Ambulance Service. Dispatchers work shifts from 7AM-3PM, 3PM-11PM, and 11PM-7AM. Typically they will work set shifts rotating as needed, or working overtime as needed, to cover for sickness or vacation.

The following activities and functions are performed by the Monson PD dispatchers:

- Answer incoming 9-1-1 calls
- Answer incoming administrative telephone calls
- Dispatch the Palmer Police Department
- Dispatch the Palmer Fire and EMS Departments
- Dispatch Animal Control
- After-hours call answering for City Departments
- NCIC/CJIS/LEAPS checks
- Warrant/Article entry and confirmation
- File maintenance
- Monitor security cameras

- Handle police-department walk-ins after normal business hours
- Enter summons, warrants, arrests, and incident reports into records management system

The dispatch center is located inside the Palmer Town Building at the intersection of Main Street and Sykes Street. This building is shared with other township agencies. The police department is located at the rear of the building. The parking lot is not fenced in, but the police vehicles have their own designated parking area at the rear of the building. Visitors and other employees in the building share a general parking lot on the west and east sides of the building.

The dispatch center is secured by an electronically locked door and a glass window in the visitor area. The dispatcher on duty is able to electronically unlock the door from the operator position. There are two operator positions side-by-side in the police office. Both positions are capable of call-taking and dispatching. Palmer Police Department is using Wright Line console furniture.

The building does not have a designated equipment room, and is not designed to properly handle modern communications equipment. The telephone demarcation point and Customer Premise Equipment (CPE) is located downstairs in the basement, in a storage area. The radio console switch, control stations, and voter comparator equipment are located upstairs in the attic.

A new diesel Generac generator with a fuel tank has been installed at the south end of the building. At the time of this survey the generator has not been properly grounded or fenced in.

The electrical equipment, radio equipment, tower, and dispatch operator equipment are not grounded to meet TIA/EIA-ANSI-J-STD-607 or Motorola R56 standards and guidelines. The PLANT CML equipment is bonded and protected from lightning strikes and transient voltage surges.

The electrical provider for this building is National Grid. The main electrical feed is 208Y/120V, 3-phase. The telephone service provider is Verizon. There are a total of four wireline and four wireless emergency trunks coming into the dispatch center, as well as two administrative lines

Palmer PD uses PLANT CML VESTA PALLAS telephony answering position workstations, Tri-Tech IMC CAD software, and Orbacom TDM 25 graphical radio console position equipment.

The building does not have a dedicated equipment room to house the network equipment. The CAD servers, 9-1-1 CPE server equipment, and the radio console switch are all located in separate rooms.

Table 2-4 shows the available metrics for the Palmer Police Department Communications Center.

Table 2-4
Palmer Police Department Dispatch

Activity	Call Volume 2010
Wire-line 9-1-1	1950
Wireless 9-1-1	1050
VOIP 9-1-1	
Total 9-1-1 Calls Received	3000
Wireless Call %	
Average 9-1-1 Answer Time (in seconds)	
Average 9-1-1 Talk Time	
Abandoned Call %	
Other Emergency Calls Received	
Administrative/Non-Emergency Calls	7500
Average Talk Time Administrative/Non-Emergency Calls	
Average Answer Time (Administrative/Non-Emergency Calls)	
Outgoing Calls	450
Average Talk Time (Outgoing Calls)	
Police Calls For Service Dispatched	15349
Police Officer Initiated Calls	3119
Fire Calls Dispatched	312
Emergency Medical Calls Dispatched	2300
NCIC/CJIS Inquiries (by communications center)	
NCIC/CJIS File Maintenance Activity (by communications center)	
NCIC/CJIS Administrative Messages Sent (by communications center)	

2.5 Town of Hampden

The Town of Hampden Police Department currently serves as the primary PSAP for the town, dispatching police, fire, and referring EMS services for its citizens to American Medical Response (AMR). The center currently operates 24/7 with four full time and two part time dispatchers.

2.5.1 Hampden Police Department

The Hampden Police Department is staffed with nine sworn officers and the Chief of Police. The nine officers consist of two Sergeants with the remaining officers serving as patrol officers. There are currently 12-15 reserve officers who are certified and have the same arrest authority as the full time sworn officers.

The Police Department handles all routine law enforcement operations including patrol, traffic, arrest; criminal warrants, schools, and Governor mandated campaigns such as “click it or ticket” and “DWI awareness” programs.

The Police Department operates on high band VHF frequencies.

2.5.2 Hampden Fire Department

The Hampden Fire Department is an all volunteer department that has recently seen a significant change in leadership. The current Chief and deputy Chief were recently elected and are progressing towards the development of SOG/SOP’s for the department, and run cards for dispatch.

The fire department consists of 30 volunteers and one station. Hampden PD dispatches the fire department via two-tone voice pagers and audible sirens. The department provides only fire protection services and is funded by the town with an annual budget of $30,000 dollars.

The department recently received a grant, and is in the process of upgrading its communications system. The department currently operates in low band VHF which creates interoperability problems with neighboring jurisdictions. The grant will fund replacement of radios and fixed equipment to enter into VHF high band and make the department narrowband ready.

2.5.3 American Medical Response (Contract EMS)

American Medical Response (AMR) is under contract to provide EMS services to the Town of Hampden. This is done with one unit stationed in East Longmeadow which serves both towns. AMR is the largest pre-hospital medical transport company in western Massachusetts, and can provide backup units if needed. AMR receives calls for service from Hampden PD and handles its own dispatch and EMD services. Hampden PD is solely responsible for transferring the call.

The contract states that AMR must respond within ten minutes and the current average is nine and one-half minutes. There are no interoperability issues as all AMR units have the Hampden frequencies in mobile radios. However, primary communications are maintained in-house between the AMR PSAP and its own units.

AMR provides paramedic level service to the town.

2.5.3.1 Hampden Police Communications Center.

The Hampden Police Communications Center is located in the PD directly in front of the PD's window for service and serves as the primary PSAP for the Town of Hampden. The department is staffed by four full time and two part time dispatchers. The PSAP answers calls for service for the police department, fire department, transfers EMS calls to AMR, and three administrative lines for the police department, fire, and EMS.

The following activities and functions are performed by the Hampden Police Department staff:

- Answer incoming wireline, wireless and VoIP 9-1-1 calls
- Answer incoming administrative telephone calls
- Dispatch the Hampden Police Department
- Dispatch the Hampden Fire Department
- Transfer EMS calls to AMR EMS Service
- Dispatch Animal Control
- Monitor security cameras and alarms
- NCIC/CJIS/LEAPS checks
- NCIC/CJIS/LEAPS hit confirmations

The dispatch center is located inside the Hampden Town Building / Library at the intersection of Main Street and North Road. This building is shared with other township agencies. The police department is located on the bottom floor of the building. The parking lot is not fenced in and the police vehicles share the parking lot with other town employees. There is a guyed tower mounted on the roof of the building.

Access to the dispatch center, and the rest of the police offices, is through an electronically locked door from the vestibule/visitor area. The dispatcher on duty is able to electronically unlock the door from the operator position. There are two operator positions side-by-side in the police office. One position is able to dispatch, the other position is only able to answer incoming phone calls.

There are a total of five surveillance cameras located throughout the building: inside rear door, inside front door, rear parking lot, front parking lot, and the holding cell.

A new 60 kW diesel Cummins Onan generator with an integrated fuel tank has been installed at the west end of the building, in the parking lot. The generator has bollards installed around it to protect it from being hit by vehicles.

The electrical equipment, radio equipment, tower, CAD servers, and dispatch operator equipment are not grounded to meet TIA/EIA-ANSI-J-STD-607 or Motorola R56 standards and guidelines. The PLANT CML equipment is bonded and protected from lightning strikes and transient voltage surges.

The electrical provider for this building is National Grid. The main electrical feed is 208Y/120V, 3-phase.

The telephone service provider is Verizon. There are a total of four wireline and four wireless emergency trunks coming into the dispatch center, as well as two administrative lines.

Hampden PD uses PLANT CML VESTA PALLAS telephony answering position workstations, TriTech IMC CAD software, and a Motorola CommandPLUS desktop console unit with Microphone.

The building does not have a dedicated equipment room to house all the network equipment. The CAD servers and 9-1-1 CPE server equipment are all located in separate rooms.

Table 2-5 shows the available metrics for the Hampden Police Department Communications Center.

Table 2-5
Hampden Police Department Dispatch

Activity	Call Volume 2010
Wire-line 9-1-1	647
Wireless 9-1-1	165
VOIP 9-1-1	
Total 9-1-1 Calls Received	812
Wireless Call %	
Average 9-1-1 Answer Time (in seconds)	
Average 9-1-1 Talk Time	
Abandoned Call %	
Other Emergency Calls Received	
Administrative/Non-Emergency Calls	5000
Average Talk Time Administrative/Non-Emergency Calls	
Average Answer Time (Administrative/Non-Emergency Calls)	
Outgoing Calls	336
Average Talk Time (Outgoing Calls)	
Police Calls For Service Dispatched	7012
Police Officer Initiated Calls	4887
Fire Calls Dispatched	214
Emergency Medical Calls Dispatched	297
NCIC/CJIS Inquiries (by communications center)	
NCIC/CJIS File Maintenance Activity (by communications center)	
NCIC/CJIS Administrative Messages Sent (by communications center)	

3.0 Requirements of a Consolidated Dispatch Center

The 9-1-1/dispatch consolidation project the Towns are considering will have wide reaching effects on public safety operations in the area. This would not just be an improvement in dispatch operations but a profound realignment of how the departments and communications operations relate to, and intercommunicate with one another. This section will describe some of the complex issues involved.

Recommendations for a communications center can only be made after a complete understanding of what is required is applied. We will also discuss some effective means of managing the communications operations that have worked in similar cases.

Modern public safety communications systems have developed to support the operations of the public safety agencies they serve. The public safety communications system in the community typically performs four basic functions: receive & classify calls for assistance; support agency operations (dispatch); interagency communications; and data systems access. In order to perform these functions, a variety of systems and procedures are employed. Here we describe the operation of the most critical of these systems.

3.1 Communications Center Systems

A modern communications center is comprised of at least two separate functions: Operations and Technology. Since its inception 40 years ago, the 9-1-1 system has become the primary means of communications from the public to the public safety agencies. Communications center operations involve dispatch protocols, very intensive personnel scheduling and management issues, and statistical and records release maintenance. Communications center technology involves the management of the 9-1-1 telephone technology, computer aided dispatch systems, recording systems, radio systems, and other ancillary support systems.

3.1.1 Operations

Communications center operations personnel typically receive little recognition and are asked to function in one of the most complex and stress filled work environments in existence. Included in 9-1-1 operations management are dispatch functions for all of the member agencies involved with the center. This normally means that center personnel must be proficient in police, fire and emergency medical protocols. The differing disciplines have their own characteristics that create scheduling and staffing challenges.

- Police - An extremely high volume of calls typically characterizes police dispatch. Most traffic involves small numbers of units sent to a large number of incidents.

Most police agencies do not have sufficient units; therefore many times police calls for service are held and prioritized. The officers in the field, rather than the dispatcher, originate a large percentage of the dispatch activity. The dispatch work is largely reactive to field operations. This creates a constant, unrelenting requirement for dispatch attention.

- Fire - Fire dispatch normally has less call volume than police, however the calls that are dispatched are much more complex and time consuming. Fire radio traffic has a smaller number of calls involved with a larger number of units sent to each incident. Working with fire departments comprised of mainly volunteer personnel adds an additional degree of complexity. Workload for the dispatcher is generally driven by complaints received over the telephone rather than from the field. By definition, fire calls are considered emergency calls unless otherwise specified.

- EMS - Medical dispatch also has a lesser number of calls for service than police. These incidents also normally involve multiple agencies. While none of the dispatch centers involved in this study currently provide medical pre-arrival instructions, medical incidents have become the most time consuming of all

for dispatchers. Again, workload is driven by complaints received over the telephone rather than from the field.

The results: while police will have the preponderance of calls numerically, the actual workload for fire and medical can easily equal that of police. In essence, the dispatchers in each of the centers and 9-1-1 management must balance the conflicting needs of these disciplines, while attempting to meet differing dispatch procedures for each agency.

In general, persons calling 9-1-1 requesting a response from a public safety agency are in stressful situations. Many times these situations are a matter of life and death. Other situations may cause significant emotional distress. People under stress frequently do not communicate as effectively as when they are not under stress. In addition, callers may make demands that are not possible to meet. The 9-1-1 operations personnel who deal with these callers may be impacted by the emotional state of the callers. In turn, this may impact the community's perception about the level of service being provided.

The quality of service provided through consolidation depends upon numerous factors; accuracy and reliability are two of the key factors. Other factors include personnel selection, training, shift personnel, supervisory and operational procedures, and telecommunicator workload. Much more than E-9-1-1 dispatching must be considered.

Providing accurate and reliable communications depends on a number of factors. One of the most critical is providing a communications system that is adequately staffed with highly trained and experienced personnel. Over the past 30 years, there have been significant changes in public safety communications centers. The centers have become much more dependent upon technology. The infusion of technology has not only improved the quality and capabilities of the service being provided, it has increased both the complexity of the job of the public safety telecommunicators and the scope of the training required to perform the required duties. What cannot be overlooked is the required basic job knowledge, skills, and abilities are as important now as they ever were. The job essentially remains one of receiving and communicating information to and from people. All of the technology in use is there to assist in the communications process. Careful planning and attention to detail is required to assure that the technology assists rather than hinders that process. Not only do communications personnel need to be skilled in communicating, they must also be proficient in the use of each different system and equipment used in the center.

Many emergency communications centers struggle to attract and retain trained staff. A number of centers are effectively working with half of their authorized staff. Not only are they lacking in the number of people on staff, but, in some centers, a large number of those on staff are still in training, not yet capable of filling a position. Turnover is frequently cited as a problem as well. Conversely, some centers report they are fully-staffed, have little turnover, and have eligible candidates on the waiting list. There are a number of factors that affect the ability of an ECC to attract and retain staff. The work environment is often a major factor.

A number of studies have shown a correlation between the employees' perception of the adequacy of the physical environmental factors of the workplace and their productivity. Employee perception that the workplace environment is inadequate can result in increased absenteeism, lowered employee satisfaction, decreased productivity, and reduced quality. All of these can contribute to decreased customer satisfaction. An emergency communications center has at least two sets of customers, the public and the public-safety agencies and departments served by the center. The perception that the workplace is inadequate can lead to both psychologically unhealthy employees and a psychologically unhealthy organization.

Dispatchers may have non-emergency dispatch related duties to perform for their agency, including record keeping, administrative telephone duties and dispatch for agencies outside of public safety. Staffing for such collateral duties must be considered when operations are moved to a centralized dispatch center. Once resolved, efforts must then focus on improving dispatch service quality.

Personnel scheduling and management are full-time vocations in themselves. With a national average of 20% per year turnover in staff, employee selection, retention, and training become serious concerns. Often times, it is necessary that new employee training is ongoing. This requires staffing and management attention as well.

Operational procedures and standards are an equally important aspect of any public safety communications center. Public safety in each community has evolved based, in large measure, by the standard of service demanded by the community being served. This is especially true of the operations of public safety communications centers. There are a number of "national" standards that can be used as guidelines by governing bodies in establishing the level of service being provided to the community.

The Association of Public Safety Communications Officials, International (APCO); the National Emergency Number Association (NENA), the Commission on Accreditation for Law Enforcement Agencies (CALEA); the National Fire Protection Association (NFPA); the Federal Emergency Management Agency (FEMA), and others have each established various standards and guidelines that provide guidance to public safety agencies on their communications systems and facilities.

The National Emergency Number Association (NENA) promotes research, planning, training and education as well as the technological advancement, availability and implementation of a universal emergency telephone number system (9-1-1). NENA has developed a series of technical and operational information and requirements documents focused on the public safety answering point (PSAP) aspects of a public safety communications center. NENA's *Call Taking Operational Standard/Model Recommendation* (NENA 56-005).

The NENA standard for answering 9-1-1 calls states Ninety percent (90%) of all 9-1-1 calls arriving at the Public Safety Answering Point (PSAP) shall be answered within ten (10) seconds during the busy hour (the hour each day with the greatest call volume, as defined in the NENA Master Glossary 00-001). Ninety-five (95%) of all 9-1-1 calls should be answered within twenty (20) seconds.

The National Fire Protection Association is an international nonprofit membership organization which develops consensus codes and standards, research, training, and education on fire prevention and public safety. The NFPA's *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems* (NFPA 1221) provides guidance on many public safety communications matters including communications center design and operations. Public safety communications centers and systems must function under all conditions. They must provide the highest degree of reliability feasible in order to assure continuous functionality. The provisions contained in NFPA 1221 when implemented are key aspects of having a reliable, continuously functioning center.

NFPA 1221 establishes that:

- Ninety-five percent of alarms shall be answered within 15 seconds and 99 percent of alarms shall be answered within 40 seconds.
- Ninety-five percent of emergency dispatching shall be completed within 60 seconds.

In a clarification from previous editions, the 2007 edition of the standard indicates that the sixty second time period begins when the call is answered at the dispatch center, and ends with the commencement of the dispatch.

In situations where calls are transferred from the primary public safety answering point, NFPA 1221 stipulates:

- Where alarms are transferred from the primary Public Safety Answering Point (PSAP) to a secondary answering point, the transfer procedure shall not exceed 30 seconds for ninety-five percent of all alarms processed.

A centralized communications center by its nature also becomes the point where the preponderance of public safety statistics are created and compiled. Basic statistics are the numbers of calls for service and response times. Also, because of the recording systems, the center receives many requests for news releases and investigatory tapes. In a combined agency center, the various procedures and authorizations to release such information create a supporting specialty of records management. An important element to assuring that the system operates as it should is the on-going collection and analysis of system metrics.

3.1.2 9-1-1 Technology

A complex and multifaceted technology supports any modern communications center. One of the primary subsystems is the Enhanced 9-1-1 telephone technology.

Each of the communications center in this study have their own 9-1-1 system. Until recently, each 9-1-1 Center or PSAP (public safety answering point) was normally equipped with its own 9-1-1 switch. Also known as an ANI/ALI controller, this is the equipment that provides the Automatic Number Identification (ANI) and Automatic Location Information (ALI) to the dispatchers. There is an extensive database for wireline telephones, the Master Street Address Guide (MSAG) maintained to ensure that this ANI & ALI information is correct. It includes a listing of all valid address ranges within the jurisdiction.

In the past few years, 9-1-1 Customer Premises Equipment (CPE) has featured the integration of the telephone and computer. Modern 9-1-1 customer premise equipment is computer based and integrates several different applications. Most suppliers of the integrated workstation include “instant recall recorders” and integrated Telecommunications Device for the Deaf (TDD) for communications, with hearing and speech impaired callers as standardized options. Depending on the option and the vendor, some of the options are included at no additional charge, and some are relatively low cost. By using the replay recorder and TDD included with the telephone, the 9-1-1 center can avoid having to purchase separate, expensive pieces of equipment. In addition to the integration of the functions, operation is significantly easier. The U.S. Department of Justice has interpreted the Americans with Disabilities Act (ADA) legislation to mean that each 9-1-1 position must be equipped with a device capable of communicating with the hearing and speech impaired 9-1-1 caller. The Justice Department has further held that any silent 9-1-1 call arriving at a PSAP must be interrogated to make sure it is not a TDD call.

Depending upon the age and manufacturer of this equipment, the existing system in any municipality may have very limited expansion and adaptation capacity. For example, first generation 9-1-1 switches generally do not provide abandoned call notifications. In this current litigious environment, abandoned call notification is a necessity. An abandoned call occurs when the caller has disconnected prior to the dispatcher answering. The caller’s number and location are known to a center via ANI and ALI. But, if a center does not attempt to reconnect the caller or recognize a need to do so, then the center could face extreme liability and negative publicity. In first generation 9-1-1 equipment, the operators could only discern an abandoned call by realizing that the ANI and ALI printers were activated. The abandoned call notification system presents an alarm to dispatchers and supervisors.

As 9-1-1 CPE becomes increasingly computer-based, the use of a standard digital protocol has become more important. The Transmission Control Protocol/Internet Protocol (TCP/IP) or IP has become the standard for digital communications. Many commercial telephone systems now are IP-based. Newer 9-1-1 CPE uses IP

for communications between the 9-1-1 switch and the answering positions. The 9-1-1 network however still uses analog communications between the selective router and the PSAP.

When the 9-1-1 system was developed in the 1970's, the digital technology now in use didn't exist. In order to provide the highest degree of reliability, it was necessary to separate the 9-1-1 system from the remainder of the telephone network. Separate, dedicated circuits were installed between the local telephone company wire centers or central offices to the selective router, and then from the selective router to the PSAP. In order to provide the telephone number of the caller, the Centralized Automatic Message Accounting system (CAMA) which was the long distance message accounting system was adapted for use by the 9-1-1 network. The CAMA system operates using analog signaling techniques. By today's standards, CAMA is slow and very limited. There is a concerted effort to develop the standards for the next generation of the 9-1-1 network. That network will be able to accept and deliver to the PSAP inputs from a wide variety of devices.

The Master Street Address Guide (MSAG) is a critical element in any wireline Enhanced 9-1-1 system. The primary purpose of the MSAG is to assist in routing 9-1-1 calls to the proper PSAP. Telephone exchange boundaries and political boundaries are often different. The MSAG is used to direct calls originating in a jurisdiction to the PSAP that answers calls for that jurisdiction. There is a fair amount of work required to keep the MSAG current, especially in areas where there is new development. The MSAG can also be used to indicate which agency has jurisdiction for a particular location.

Beginning in the late 1990's, wireless enhanced 9-1-1 began to be deployed throughout the country. Because wireless callers are by definition not in a fixed location, a different technology was needed to provide the location of wireless callers in an emergency. This has placed additional demands on the PSAP's. Wireless 9-1-1 calls require that the 9-1-1 equipment be capable of receiving two ten digit telephone numbers, as well as location information expressed as latitude and longitude. Many older 9-1-1 systems are not capable of fulfilling that requirement. In addition, the PSAP needs some form of computer-based mapping system to rapidly convert the location information to a dispatchable address. In addition, the 9-1-1 equipment must allow the telecommunicator to refresh, or rebid, the ALI information in order to obtain the wireless callers location.

Wireless enhanced 9-1-1 service has presented significant challenges to the communications industry. Not only are there the PSAP equipment issues noted above, the provision of accurate caller location information within acceptable ranges has been especially controversial. Federal Communications Commission (FCC) Rules and Regulations provide for the use of two different technologies in providing caller location information. The technology deployed by most of the wireless service providers uses the Global Positioning System. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites. A GPS receiver is placed in each handset and uses the signals from the satellites to calculate the handset's location. A GPS receiver must be locked on to the signal of at least three satellites to calculate a two dimensional position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's three dimensional position (latitude, longitude and altitude). Currently, the technology deployed in wireless networks only determines the latitude and longitude. FCC Rules and Regulations require that the location information be within fifty meters (50) for sixty-seven percent (67%) of calls and one hundred fifty meters (150) for ninety-five (95%) percent of calls.

The other method of providing location data uses network-based technology. There are several different ways that the network-based technology works. The essence is that the location of the caller is determined by differences in the signal at multiple towers. The more towers that receive the signal, the more accurate the location information will be. For network-based solutions, the FCC Rules stipulate one hundred (100) meters for sixty-seven percent (67%) of the calls, 300 meters for 95 percent of calls.

The Cellular Telephone Industry Association (CTIA) estimates that, as of June 2008, approximately ninety-three percent of the adult population of the United States has a wireless communications device. The CTIA

further estimates that those 262,720,165 devices generate 106,215,000 9-1-1 calls each year. The most recent estimates by the CTIA also indicate that approximately sixteen percent of households in the United States only have a wireless telephone.

The exponential increase in wireless devices has significantly impacted public safety communications centers. As noted above, over one hundred million wireless 9-1-1 calls are received nationwide each year. For the most part, there has been little, if any, reduction in wireline 9-1-1 calls received at the PSAP. In many cases, the influx of incoming calls has not resulted in any increase in the staff in the communications center. In addition to the increased total number of calls, PSAP's receive many more calls about the same incident than before. Often these calls take longer to process since the mobile caller may be uncertain of his or her location, and it can take thirty seconds or more to retrieve the location information from the wireless carrier.

Voice over the Internet (VoIP) telephony is another new technology that is creating additional requirements for the 9-1-1 system. As the need for greater capacity and improved reliability has grown, telecommunications are moving to use digital rather than analog signaling methods. Internet Protocol (IP) is a common format for digital communications. Digitized voice messages can be transmitted using IP or VoIP. VoIP impacts the 9-1-1 system three different ways. First, many newer 9-1-1 systems use IP technology between the telephone switch and the individual workstations. Secondly, VoIP is being viewed as the favored technology to replace the CAMA trunks, between the 9-1-1 selective router and the 9-1-1 center. Thirdly, callers using VoIP technology make telephone calls over the internet. VoIP calls interface with the conventional telephone network at the VoIP service provider's points of presence, which may or may not be in the local community. There are significant issues that must be resolved in order to assure that a 9-1-1 call is routed to the correct PSAP. Current VoIP technology may not provide for the transmission of the caller's physical location, along with the voice call. Some VoIP telecommunications service provider networks, however, are not compatible with the existing E-9-1-1 infrastructure. The Federal Communications Commission has ordered that VoIP service providers provide 9-1-1 service. Three phases have been identified for the transition to a fully-E-9-1-1 capable system for VoIP calls:

- **I1** - routing to 10-digit administrative numbers allowed, stationary (fixed) service only, no caller location transmitted, but no modifications required by PSAP's to handle incoming calls.
- **I2** - no routing to 10-digit numbers, stationary and nomadic service, caller location transmitted, ALI database modification required, no modification required by PSAP's.
- **I3 -** no routing to 10-digit numbers, stationary, nomadic and mobile service, caller location transmitted, PSAP modifications required, ALI database replaced by domain name server.

Because this is a new and rapidly evolving technology, many of the details have yet to be resolved. As with wireless 9-1-1, several different phases have been identified for VoIP 9-1-1 service. Some VoIP providers are able to provide a level of service similar to enhanced 9-1-1. Others are not able to provide the enhanced features at this time.

The telephone hardware must also be sized to accommodate a centralized center's workload. Often this limitation will require an expansion of the 9-1-1 switch subsystem or replacement of the entire 9-1-1-switch subsystem.

3.1.3 Computer Aided Dispatch (CAD)

Currently each of the centers operates its own, separate CAD system. While the Towns of Monson, Palmer, and Hampden use the same software, the systems are not interconnected. There is no interoperability between the various systems. An integrated, full -featured Computer Aided Dispatch subsystem would certainly be a necessity in a centralized communications center with the volume of activity anticipated in the consolidated center.

Incident information is entered into the CAD system by the call-taker. The system verifies the address in the geographic data base, and may provide recommendations on response based on the location and nature of

the incident. Currently, incident information must be entered by each center that will be dispatching resources. Three separate databases must be maintained.

The geographic database (GEOFILE) can become quite complex as well, due to the differing service disciplines (police, fire, and medical) often with differing jurisdictional boundaries. This results in multiple agencies of similar type, within one system. This frequently requires the CAD system to generate different case and run numbers for the same incident. The MSAG will show which jurisdiction covers a given address range. The CAD GEOFILE typically recommends specific units to respond to a given location whereas the MSAG only indicates the jurisdiction. The GEOFILE and the MSAG must remain coordinated. The CAD must also interface with all computer and records systems that reside downstream from it. Agency records systems should receive direct input from the CAD system for basic elements, such as incident numbers, date and time, location, and investigating officer.

As it is a part of the system, the mobile data system must also interface with the CAD in order to package and transfer information over the air. There is also the National Crime Information Center (NCIC), and local criminal justice databases, as well as the 9-1-1 switch itself with which the CAD must communicate.

As noted above, location information for wireless 9-1-1 callers is expressed in latitude/longitude coordinates. The CAD must, therefore, be adaptable to latitude/longitude points and translating that to a location in the CAD system. As noted above, a computerized mapping system is used to plot the location on a map and assist in converting the location information to a dispatchable address. The other two centers use two different mapping systems. Typically, the mapping system is interfaced with both the 9-1-1 system and the CAD system to facilitate transfers of information between the systems. This is not the case in any of the three centers studied in this report.

Generally, a CAD system should allow for easy entry of incident information, recommend the resources to be dispatched to the call, track the status of the units both in relation to the incident and otherwise, maintain records of those calls and time related to it, and provide assorted records and reports for analysis and documentation.

A number of the systems being marketed as CAD systems are more focused on the records management and incident reporting aspects rather than on the dispatch aspects. While they may be suitable for use in smaller agencies, these systems may not be suitable for use in larger centers.

Agencies looking to implement or upgrade their CAD system should focus on the functionality, as it pertains to dispatch operations. Common CAD functions include:

- Event Entry
- Event Prioritization
- Unit Recommendation for Assignment to Calls
- Time-stamping
- Address Verification
- Unit Status Monitoring/Recording
- Alert Timers
- Call History
- 9-1-1 Interface
- Paging Interface
- Radio System Interface
- Mobile Data Interface
- Mapping System Interface

These are just a few of the more common features and functions of a modern CAD system. It is important during the procurement to define what functions and features are required. As prospective systems are

reviewed, there needs to be appropriate assurances that the system will have adequate capacity to handle the anticipated workload. This should not include the regular average workload for the studied center, but must focus on estimated peak workloads. What happens when a major event adds extra units to the system? What happens when an unusual occurrence results in a call volume several times larger than the normal call volume? Does the system have sufficient capacity to handle the demand?

3.1.4 Support Systems

Within any 9-1-1 center, there are ancillary subsystems that also require technical management. For example, the logging recorder subsystem must be sized to the needs of the 9-1-1 center and also to the recording needs of the agencies that require their radio traffic recorded. Other examples of ancillary systems include: generators, uninterruptible power supplies (UPS), and internal security subsystems.

As noted above, computerized mapping systems are an essential requirement for those centers receiving wireless 9-1-1 calls. Just as the CAD geo-file and the MSAG need to be synchronized, the computerized mapping systems must also be updated and synchronized with the other files. In addition, many communities have developed Geographic Information Systems (GIS). It is important that all of the appropriate systems are coordinated and kept current.

3.1.5 System Integration

Intelligent Workstation is the term that has been applied to computer based 9-1-1 answering position equipment that includes computer telephony integration. These workstations help resolve many of the issues facing PSAP's. There are several integration levels available. Basic integration allows the use of the same keyboard to access multiple computers. A manual switch is used to switch between the computers. A second level of integration allows the use of one computer, serving as a workstation to switch between multiple applications running on multiple host computers. The third and highest level of integration allows for a more complete interface between the various applications. An example of this is an interface between the 9-1-1 system and a CAD system. Through the use of a programmed interface, caller information is transferred from the 9-1-1 system and reformatted so that it is displayed in the appropriate fields in the calls for service screen of the CAD screen.

While the use of intelligent workstations solves a number of issues, there are also a number of potential concerns with their implementation that must be considered. First, is the possibility that the applications are incompatible? Even when applications use the same operating systems, problems can occur when similar commands between applications cause undesired results. Often what is called multi-tasking actually refers to the ability to do multiple tasks in rapid succession. This may create problems when applications compete for priority. Even when the operating system of the workstation does permit true multi-tasking, problems may occur when two or more applications try to use the same portion of a computer's memory at the same time. Another potential problem involves human factors. A telecommunicator may need to view multiple applications at the same time. For example, a call-taker may need to see the 9-1-1 display screen, the CAD call-taking screen, and a digitized map. It may become difficult to view all three applications at the same time on one screen. Multiple monitors may be needed. Integration of multiple applications is not only possible; in many cases it is desirable. Because of the potential problems involved, any integration effort must be done with a great deal of care and caution.

3.1.6 Additional Considerations

In addition to the number of computer monitors, cabling requirements have changed dramatically. Previously, with the older analog technology, several multiple-pair cables were needed between each position and the connection point. New digital communications techniques have dramatically changed that. The new trend is to use computer networking techniques to interconnect the various terminals with the "back-room". This has greatly reduced the amount of cabling that must be run. However, as more applications become networked, the capacity of the network must expand. To that end, TIA/ANSI/NEMA Category 6 or 7 cabling is

recommended for all new installations. These new categories of cabling permit data transfer speeds of up 600 Mbs.

Each of the various systems changes at different rates. In addition, system components require change at different rates. For example, application software may receive major updates on a yearly basis; computer operating systems, such as Windows, change about every five years. Computer central processors may need to be replaced every three to five years, while the monitors and other peripherals need replacement at different times. The cabling may last for a much longer time.

The communications center must be able to accommodate the frequent changes and the changes on varying schedules. While this means that after the initial purchase, all of the systems will not need to be replaced at the same time, it means that changing and updating is constant and must be accommodated, financed, and implemented.

3.2 9-1-1 Consolidation

A change in the 9-1-1, or dispatch system, will not affect the number of calls for service, but it will impact how they are handled.

Even major leaps in technology can only reduce processing time by minimal amounts, and certainly not enough to produce a reduction in staff. The most dramatic cost savings in personnel will be in areas where personnel were used for activities other than dispatch. Most public safety dispatchers perform a multitude of administrative tasks in support of their employer. While consolidation in a centralized center may remove these non-9-1-1 functions from the dispatchers, the functions must be satisfied in some form. Estimating how these tasks impact workload and staffing levels can be very difficult, especially because these duties are largely non-quantifiable and vary widely between centers.

3.2.1 Consolidation

A consolidated center requires diverse centers to be brought together under one management with common operating platforms. A consolidated center offers many advantages. The consolidated center can take advantage of common electrical, HVAC, and emergency power subsystems. The employees can be cross-trained and the schedules can be combined for added personnel efficiency. A consolidated center would create an arrangement that is more flexible, and amplifies the commonalties in fire and medical dispatch. The technical issues here become the 9-1-1 equipment, administrative telephones, computer-aided dispatch, and recording equipment. The 9-1-1 equipment must be sized for the consolidated dispatch operation. The telephone sets themselves must also accommodate the new larger number of non-9-1-1 lines. One operating platform for the consolidated 9-1-1 operation would be a necessity. Any new CAD could feed multiple records management systems. This single CAD must be able to upload into the various records management systems. A consolidated Center would require a single recording system.

3.2.2 Co-Location

If multiple 9-1-1 centers are co-located, then they will remain separate operations in the same building. This presents an entirely different set of issues. In this scenario, there would be different management of the multiple operations and equipment could be different as well. In a co-located operation there would be multiple 9-1-1 switches. Because of the equipment that routes the 9-1-1 calls from the provider to the center, the calls cannot be divided any other way. The CAD and recorder systems in this scenario could remain separate.

The most challenging issues involve personnel, resulting from multiple staffs with their own schedules and supervision. This would be the least efficient use of personnel.

3.2.3 9-1-1 Center Design

Because of the critical functions performed at public safety communications centers, considerable care is required in the location, design and construction of a center. The location should be chosen carefully and be as far from known hazards as feasible. For example, the lowest floor in a communications center should be above the 100 year flood plain. There also needs to be adequate drainage so that localized flooding will not occur. Facilities that use hazardous chemicals should not be close to the center. Careful consideration is needed when considering a location near a rail line or major highway that is used to transport hazardous chemicals. The Federal Emergency Management Agency recommends that a ten-mile radius around a critical facility be thoroughly investigated. A significant leak of an Extremely Hazardous Substance (EHS), such as chlorine, could necessitate the need for protective actions including evacuation as far as ten miles from the incident. Possible terrorist actions could expand that emergency action zone. A hazard analysis should result in a threat rating – how likely is the facility to face the particular threat(s).

It is important that the site has adequate drainage. Even though it may be above the flood level, there must be adequate drainage and provisions for storm water runoff so that localized flooding won't occur during heavy rains or rapid snow melt.

A quiet area with low surface traffic is recommended. Multiple access routes are also advisable so that the center is always accessible. Caution is advised to avoid locating the center in a high crime area. Typically, dispatch staffs are predominately female. It is not unusual for employees to be coming and going from work individually or in small groups. It is strongly recommended that secure parking be provided for employees.

The availability of communications facilities is another key concern. The 9-1-1 system requires numerous circuits from the 9-1-1 service provider. Ideally fiber and other high capacity communications facilities from multiple providers will be available as well. Many of the communications systems, including 9-1-1, are migrating to Internet Protocol based systems and will need the availability of high capacity cabling such as fiber optic.

Terrorism is real, evolving, and continues to increase in frequency and lethality throughout the world. Critical facilities, such as an Emergency Communications Center are frequently the target of attack by those seeking to disrupt government, avenge a perceived wrong, or for other similar reasons. The Department of Defense has developed guidelines to minimize the likelihood of mass casualties from terrorist attacks. While mandatory for DoD facilities, they are highly recommended for use in critical facilities such as the EOC. One of the key provisions is to maximize standoff distances to keep those intending on doing harm as far away from the building as possible. The recommendation is to that vehicles should be kept away from the building. Cleared vehicles, such as employee's personal vehicle should be allowed to get no closer than twenty-five meters (eighty-two feet) from the building. All other traffic should be kept at least fifty meters (one hundred sixty-four feet) away. If sufficient standoff distance cannot be provided, additional remediation steps must be taken to provide the required protection.

Access to utilities is another important consideration. Ideally the site will have access to multiple power grids so that diverse feeds can be installed. Availability of high capacity telecommunications circuits, including fiber optic cables, from multiple vendors is highly desirable. Critical circuits should be routed to the facility using diverse routing.

The proper design of critical communications facilities is a complex task. Public safety communications systems and public safety communications facilities should function under all conditions. The facility should be designed to withstand the anticipated hazards. Any effort to enhance the security and survivability of critical communications facilities should consider all of the hazards that the facility may face. The impact of technology on emergency communication systems and facilities is becoming increasingly significant. Technological advances have affected the way public safety agencies and corresponding centers operate daily. Technology affects every aspect of doing business directly and indirectly. In order to meet future

needs for the next 15 to 20 years, a critical communications center should be designed with the following considerations in mind:

- Avoiding fixed objects (walls, furniture, etc.) when practical
- Selecting equipment and peripherals such as displays, keyboards, and computers that can change and move as much as possible
- The infrastructure (data and power cables, etc.) need to be moveable and reconfigurable
- The space should be as open as possible, and raised flooring and high ceilings should be used
- Adequate equipment room space must be provided
- Extra attention must be focused on electrical grounding and anti-static flooring

The PSAP must also comply with ADA requirements that state facilities and equipment must be readily accessible and easily used by persons with disabilities.

As the equipment in critical communications centers become more integrated and computer-based, there is a definite trend towards equipping them with more ergonomic furniture. A number of manufacturers offer adjustable furniture so personnel can raise or lower a chair or work surface to a comfortable position. Many new models allow adjustments from sitting to standing. This amenity is especially helpful when dispatchers and call takers are expected to spend prolonged periods at a workstation.

The consolidation/co-location issue has profound effects on the room design. It will directly impact the number of console positions in the center. In the equipment room, this will dictate the size and quantity of CAD processors, 9-1-1 switching equipment, and recording equipment. These requirements, in turn, will be used to determine the floor space, electrical, and HVAC needs.

3.2.4 9-1-1 Position Descriptions

Dispatcher - A dispatch position will normally contain radio controls, a 9-1-1 telephone with associated screens, and two CAD screens (one call taking and one unit status). A fourth screen is often used to display the computerized map.

Call Taker - A call taker only requires a 9-1-1 telephone with associated screens, a map display, and a call taking CAD screen.

At least one call taker should also be equipped with the commercial alarm terminations. In a co-located center, call takers would have to be replicated for the differing CAD and 9-1-1 equipment. This would require twice as many call takers.

Supervisor – A typical supervisor's position would have at least one more computer display. The position would have additional controls for internal alarms, system controls, and console override access.

In all but the largest centers, all of the positions, except for the supervisor's position are typically set up as dispatch positions so that each position can do all of the functions. This option allows maximum flexibility as staffing and workload changes over the life of the center.

3.2.5 9-1-1 Space Characteristics

The dispatch area should be characterized by these features:

- ADA compliant
- Raised flooring
- Bookshelves, or other storage, for ready access to manual reference materials
- Lighting should have a wide range of adjustments. Individual lighting at each position is preferred
- Lockers – dispatchers should have available personal storage space for coats, headsets, reference texts, and other materials
- Adequate restrooms for male and female employees located nearby

- Equipment room for electrical, HVAC, generator, and UPS
- Storage
- Break/common area located nearby
- Training and administrative office space
- Adequate and secure parking facilities

3.2.6 Dispatch Protocols

Consolidation of dispatch operations also requires consolidation of dispatch protocols. Much discussion is required before operations commence to resolve service level issues. Some centers have chosen to have all agencies follow the same protocol, while others have chosen to permit differences between the agencies. Advances in computer aided dispatch systems have facilitated allowing different protocols. There is still a need to establish common call classes and recommendation tables in the CAD.

This may require participating agencies adopting the same set of signals and codes. They would have to agree on the number of units assigned to a particular call class and the priority level. Consolidation, therefore, involves a great deal of cooperation between all agencies.

Incident information is entered into the CAD system by the call-taker. The system verifies the address in the geographic data base and may provide recommendations on response based on the location and nature of the incident. Currently, incident information must be entered by each center that will be dispatching resources. Thus, three separate databases must be maintained.

The geographic database (GEOFILE) can become quite complex as well, due to the differing service disciplines (police, fire, and medical) often with differing jurisdictional boundaries. This results in multiple agencies of similar types within one system. This will sometimes require the CAD to generate different case and run numbers for the same incident. The MSAG will show which jurisdiction covers a given address range. The CAD GEOFILE typically recommends specific units to respond to a given location whereas the MSAG only indicates the jurisdiction. The GEOFILE and the MSAG must remain coordinated. The CAD must also interface with all computer and records systems that reside downstream from it. Agency records systems should receive direct input from the CAD system for basic elements, such as incident numbers, date/time, location, and investigating officer.

As it is a part of the system, the mobile data system must also interface with the CAD in order to package and transfer information over the air. There is also the National Crime Information Center (NCIC) and local criminal justice databases, as well as the 9-1-1 switch itself with which the CAD must communicate.

As noted above, location information for wireless 9-1-1 callers is expressed in latitude/longitude coordinates. The CAD must, therefore, be adaptable to latitude/longitude points and translating that to a location in the CAD system.

Generally, a computer aided dispatch system should allow for easy entry of incident information, recommend the resources to be dispatched to the call, track the status of the units both in relation to the incident and otherwise, maintain records of those calls and related times, and provide assorted records and/or reports for analysis and documentation.

This section addresses the common elements and equipment required for a dispatch center to operate. Whether the center is a stand alone, consolidated, or co-located 9-1-1 facility, the requirements for functionality are the same. Thus, when evaluating the feasibility of consolidation options, one must consider the capital expense and operating budgets of maintaining multiple centers and equipment versus maintaining one center with costs shared among participating jurisdictions.

4.0 Problems and Concerns

The protection of life and property is a high priority for all levels of government in the United States. Based on the needs of their communities, the Townships of Monson, Palmer and Hampden have developed a public safety system that meets the needs of their communities. Each has been diligent in its effort to provide service to their respective communities and are to be commended for their efforts.

The systems, networks, and dispatch centers meet the basic day-to-day needs of the communities. The centers become overloaded during busy periods. Public safety systems must function under all conditions. When unusual events occur, the issues and concerns highlighted in this section can limit the ability of the public safety agencies involved in this study to respond as effectively as needed in such a situation.

Public safety communications centers generally provide four functions for the agencies and communities they serve:

- Public Access, which is the way the public, accesses the public safety agencies.
- Command and Control Support, which is communication within a particular agency in support of operations.
- Interagency Coordination, which involves communications with other agencies and departments.
- Information Systems Access, which provides access to the various local, regional, state, and national information systems.

Each of the dispatch centers have operated as a self-sufficient entity for a long time. Because each locality functions independently, each center has followed a diverse path to meet the needs of their respective communities and its citizens. This diversity presents some challenges in consolidating services. This section will explore the major issues with the current situation and concerns we have identified in moving towards a regional emergency communications center. The identification of the issues is based on the interviews we conducted with various agency personnel and on our personal observations.

4.1 FCC Narrow-banding Mandate

While not an issue directly related to dispatch center consolidation, the Federal Communications Commission "Refarming" initiative has a significant impact on each of the localities and the public safety agencies involved in this study. All of the agencies use radio channels in the frequency bands that are subject to the Federal Communications Commission's "narrowbanding" order.

Narrowbanding is proceeding to increase spectrum efficiency in the Private Land Mobile Radio (PLMR) bands below 512 MHz. The "Refarming Proceeding", as it became known, introduced major changes in these bands. In the VHF high band, where existing 25-kHz (wideband) channels were spaced at 15 kHz, new narrowband channels were created 7.5 kHz from existing channels. The new channels may only be licensed for bandwidths of 12.5 kHz or less. The FCC also updated the rules to set a fixed deadline for all users to transition to 12.5 kHz operation. The deadline for conversion to 12.5 kHz efficiency is January 1, 2013 for all licensees. After that date, all licensees in the bands 150-512 MHz must operate at a spectrum efficiency of one voice channel per 12.5 kHz of bandwidth. With its decision to set deadlines for the transition to 12.5 kHz operation, the FCC has provided much-needed clarity to the narrowbanding issue. Agencies may legally continue to operate its existing 25 kHz VHF and UHF systems until 2013, but will eventually face a reduction in bandwidth, which will result in a reduction in coverage. Base, mobile and portable radios capable of narrowband operation are readily available, but tone and voice pagers are not available on a widespread basis at this time. Those pagers capable of narrowband operation are significantly more expensive than the current models. In addition all of the Federal Communications Commission radio licenses must be modified.

This process could be a significant drain on both the scarce financial resources and staff time available over the coming years.

Table 4-1
Radio Channels Used

	VHF	UHF	800 MHz
Monson Police Department		WMLEC	
Monson Fire-EMS			
Palmer Police Department		WMLEC	
Palmer Fire Department			
Three Rivers Fire Department			
Bondsville Fire Department			
Palmer Ambulance Service			
Hampden Police Department		WMLEC	
Hampden Fire Department	Low Band		
American Medical Response			

* Blue indicates UHF capabilites
*Green indicates VHF capabilities
*Red indicates 800 MHZ capabilities

4.2 Budgetary Issues

Each of the localities involved in this study is facing unprecedented challenges and financial pressures as each strives to provide services to the community. Not only has the amount of funding received from the Commonwealth of Massachusetts decreased; property values have also diminished. Additional growth and development has slowed. Income on investments has also decreased. It is forecast that the current economic situation may linger for some time.

As a result of the increasing scarcity of financial resources, each of the dispatch centers has a more difficult time maintaining their existing staffs and keeping their systems functioning. It is difficult to justify expenditures as governing bodies must make hard choices. Staff vacancies are not being filled. As the department's make changes in the services they are able to offer, the dispatch centers may be impacted.

Table 4-2
Dispatch Performance

Agency	Total 9-1-1 Calls Received	9-1-1 Calls per FTE	9-1-1 Calls per Citizen	Cost per 9-1-1 Call	Total Incoming Calls	Incoming Calls per FTE	Incoming Calls per Citizen	Cost per Incoming Call
Monson Police Department	1,875	469	0.21	$142.24	51,739	1,969	0.88	$5.15
Palmer Police Department	3,000	500	0.23	$125.40	10,500	1,750	0.81	$35.83
Hampden Police Department	812	917	0.68	$177.58	8,167	2,042	1.51	$24.81
Total/Average	**5,687**	**1,886**	**0.37**	**$148.41**	**70,406**	**5,761**	**1.07**	**$21.93**
NENA Study Small PSAPs	4,988	635	0.36	$57.01	6,868	850	0.47	$47.00
NENA Study Medium PSAPs	28,136	1,858	0.58	$13.91	52,926	3,459	1.09	$20.07
NENA Study Large PSAPs	121,187	3,202	0.77	$13.40	128,523	4,237	1.05	$18.22

Table 4-3
Current Personnel

Dispatch Center	FT Authorized	FT Actual	PT Authorized	PT Actual	On Duty Days	On Duty Afternoon	On Duty Nights
Monson Police Department	4	4	6	2	1	1	1
Palmer Police Department	5	5	0	0	1	1.50	1
Hampden Police Department	4	4	2	2	1	1	1
Total	**13**	**13**	**8**	**4**	**3**	**3.5**	**3**

4.3 Interagency Situational Awareness

Currently the three dispatch centers have either or no limited, ability to monitor the on-going activity at other dispatch centers. All of the agencies operate on their own channels. As a result, one agency is often unaware of events occurring with a neighboring agency.

4.4 Separate Computer Systems

Each of the dispatch centers has their own computer aided dispatch (CAD) system and Records Management System (RMS). One concern is that information is not shared between agencies. Information is shared between agencies either by telephone or in person. Because of the proximity of the communities, people travel back and forth frequently.

4.5 Use of Control Stations

The three localities operate a total of twenty-two different repeaters in order to cover their jurisdictions. Each of the repeaters is located at a site remote from the dispatch center. The centers use the control stations to access the repeaters. While this solution does work, it is not the recommended approach in order to provide the reliability normally associated with public safety radio systems. Industry standard practices recommend that the dispatch center have both the ability to control the remote repeater and to preempt other units. Using a control station essentially makes the dispatch center another mobile unit without priority access. The use of Microwave connectivity systems will provide a 99.999% reliability that is suggested for all public safety operations.

4.6 Dispatch Center Assessment

Each dispatch center discussed in this report - Monson Police Department, Palmer Police Department, and Hampden Police Department - were visited and documented during the assessment period of this report. During our site visits, AECOM assessed and rated each center on twenty different criteria. The results are described and shown in TABLE 4-4, each of the centers have areas that need improvement.

Table 4-4
Dispatch Center Assessment

Dispatch Center	Dispatch Center Size	Dispatch Center Condition	Equipment Area Size	Equipment Room Condition	Expansion Capacity	Radio Console System	CAD System	CPE System	PBX/Admin Tlephones	Furniture	Lighting	HVAC	Reliability	Generator	UPS	Back-Up Provision	Maintainability	Parking	Internal Facilities	Security	Fire Protection	Grounding & Surge Protection	Mapping
Monson Police Department	G	F	F	P	F	G	G	G	G	P	G	P	F	G	G	F	P	F	P	F	G	P	G
Palmer Police Department	P	F	P	P	P	G	G	G	G	G	G	P	P	G	G	F	P	F	P	P	P	P	G
Hampden police Department	P	G	P	G	P	F	G	G	G	P	G	F	F	G	G	P	P	F	F	F	F	P	G

P = Poor
F = Fair
G= Good
N= None

4.6.1 Dispatch Center Size

The dispatch center has sufficient space to house comfortably the dispatchers, call-takers, management and supervision, and technical support for the current dispatch operation as well as space for expected growth.

- Monson Police Department – Good – The dispatch center currently has two positions with enough room for expansion. The current dispatch area is 618 square feet.

- Palmer Police Department – Poor – The dispatch center currently has two positions installed. There is no room for future growth and the space appears to be cramped. The current dispatch area is 244 square feet.

- Hampden Police Department – Poor –The dispatch center currently has one full dispatch position and one call taker position installed. No room for future expansion. The current dispatch area is 128 square feet.

4.6.2 Dispatch Center Condition

The Dispatch Center is neat and clean. The area is organized.

- Monson Police Department – Fair – The center is not outfitted to handle telecommunication systems. The floor is painted concrete and equipment cables and power cords are not installed in accordance with approved industry standards. The Motorola MIP 5000 equipment is installed behind the console positions and is difficult to access for maintenance.

- Palmer Police Department– Fair – The dispatch area is neat and clean. The major concern is the desktop computers inside the furniture cabinets are covered in dust and do not appear to be cleaned on a regular basis. This may cause hardware failure in the near future. Dispatchers already complain of computers crashing daily.

- Hampden Police Department – Good – The dispatch area is clean and appears well organized.

4.6.3 Equipment Area Size

The dispatch center has sufficient space to house comfortably the equipment used to support the current dispatch operation as well as space for expected growth. There is sufficient space for radios, telephones, and computers.

- Monson Police Department – Fair – The Motorola MIP 5000 console equipment is located in the dispatch room and is cramped. However; the telephone equipment area is sufficiently large and the CAD server equipment area is large enough to comfortably fit the existing equipment and handle limited future expansion.

- Palmer Police Department – Poor – The telephone equipment cabinet is located in the basement in a storage area. This space is shared with storage boxes filled with old paperwork. The space is not sufficient for future growth. The radio console switch and radio equipment is located upstairs in the attic. There may be space available in the attic for future expansion based upon the floor strength. Dead fowl and other environmental hazards would require mitigation.

- Hampden Police Department – Poor – There is no dedicated area for all the equipment. The telephone equipment is installed in a storage area with a bathroom and the CAD/Security equipment is installed in the restroom connected to the Chief of Police office. There is no room available for future growth and current conditions are tight.

4.6.4 Equipment Area Condition

The equipment area is neat and clean. The equipment is installed in a professional manner.

- Monson Police Department – Poor – Current equipment areas are not suitable locations for equipment.

- Palmer Police Department– Poor – The telephone equipment is located in the basement with water pipes running over the equipment. The area is dusty and cluttered. The radio equipment is installed in the attic and is dusty.

- Hampden Police Department – Good – Even though the space is tight, all equipment areas are clean and well maintained.

4.6.5 Expansion Capability

The Center has sufficient unused space or the facility is designed in such a way as to be expandable both in aspects of dispatching area and equipment space.

- Monson Police Department – Fair – there is room for expansion of the dispatch center and equipment rooms with significant renovations.

- Palmer Police Department– Poor – There is no room for expansion in the dispatch center and no expansion capabilities in the current telephone equipment area.

- Hampden Police Department – Poor – neither the equipment room, nor the dispatch center has room for additional growth.

4.6.6 Radio Console System

The Console system adequately interfaces with and supports the radio system. Dispatchers easily operate the console system features. All controls and information readouts shall be clear and easily understood. The system supports headsets, foot controls, select and unselect audio, and other modern features.

- Monson Police Department – Good – Recently installed Motorola MIP 5000 VoIP radio console has been installed at the primary dispatch position. The secondary dispatch position is still using a Motorola Command Star Lite desktop radio console.

- Palmer Police Department– Good – currently using an Orbacom TDM 25 radio console and switch at both positions.

- Hampden Police Department – Fair – currently using a Motorola Command PLUS desktop console with limited features. While it is not a modern radio console, it is sufficient enough to handle the traffic related to the Town of Hampden under day to day operations.

4.6.7 Computer Aided Dispatch System

The CAD system adequately interfaces and supports the records management system. The dispatchers easily operate the system features. All controls and information readouts are clear and easily understood. The technology makes the dispatch and call taking easier and not more difficult. The system aids the dispatcher and call takers in answering calls, event locations, unit selection, report and incident numbering, and associative needs. Systems shall be designed for single entry and automation when possible to reduce work activities.

- Monson Police Department – Good – the current CAD system is TriTech IMC but is not currently configured to automatically populate ANI/ALI information from the PLANT/CML VESTA PALLAS. The CAD system itself is good and provides easier call taking, unit selections, locations, and incident numbering.

- Palmer Police Department – Good – the current CAD system is TriTech IMC but is not currently configured to automatically populate ANI/ALI information from the PLANT/CML VESTA PALLAS. The CAD system itself is good and provides easier call taking, unit selections, locations, and incident numbering.

  Hampden Police Department – Good – the current CAD system is TriTech IMC but is not currently configured to automatically populate ANI/ALI information from the PLANT/CML VESTA PALLAS. The CAD system itself is good and provides easier call taking, unit selections, locations, and incident numbering.

4.6.8 9-1-1 System

The 9-1-1 telephone system (CPE) operates seamlessly all in-coming 9-1-1 calls and out-going transfers. All controls and information shall be easy to read and understandable. The system requires few buttons pushes in operations.

- Monson Police Department - Good – using a PLANT/CML VESTA PALLAS switch with Computer Telephony Integrated (CTI) workstations. Telephone handsets are used in place of headsets.

- Palmer Police Department – Good – using a PLANT/CML VESTA PALLAS switch with Computer Telephony Integrated (CTI) workstations. Telephone handsets are used in place of headsets.

- Hampden Police Department – Good – using a PLANT/CML VESTA PALLAS switch with Computer Telephony Integrated (CTI) workstations. Telephone handsets are used in place of headsets.

4.6.9 PBX/Administrative Telephone System

The PBX telephone system operates seamlessly all in-coming administrative calls and all out-going telephone lines. All controls and information are easy to read and understandable. The system requires few buttons pushes in operations.

- Monson Police Department – Good – the administrative telephone lines are integrated into the PLANT/CML VESTA PALLAS equipment cabinet through the Nortel Network BCM 400 call manager unit.

- Palmer Police Department – Good – the administrative telephone lines are integrated into the PLANT/CML VESTA PALLAS equipment cabinet through the Nortel Network BCM 400 call manager unit.

- Hampden Police Department– Good – the administrative telephone lines are integrated into the PLANT/CML VESTA PALLAS equipment cabinet through the Nortel Network BCM 400 call manager unit.

4.6.10 Dispatch Workstation Furniture

The furniture is a full featured design. The design allows raising and lowering the work positions, tilting work surfaces, management of the required cables and power cords. The design of the furniture assists the dispatcher and call takers with a convenient and comfortable layout.

- Monson Police Department – Poor – each operator position has three 70-inch by 30-inch stationary, flat-top desks configured into a horseshoe. These desks are not ergonomic.

- Palmer Police Department – Good – The workstations allow raising and lowering of the some of the monitors and keyboards. Other monitors are placed on non-adjustable surfaces which can result in the monitors being at different heights. That can make it more difficult for the communications officer to adjust his or her vision as they view the different monitors. The workstation furniture is in generally good condition and is ergonomic. It is spaced to allow each user sufficient room to operate and complete task efficiently. Wright Line dispatch furniture is being used in the dispatch center.

- Hampden Police Department – Poor – Wall mounted desktop space is being used in the dispatch center. Equipment is cluttered on the desktop due to lack of space.

4.6.11 Lighting

The dispatch center is lighted in such a manner as to improve the operating environment. This includes individual controlled task lighting, natural light and/or windows, non-glare, and in-direct lighting.

- Monson Police Department – Good – Six (6) 2'x4' fluorescent light fixtures in the ceiling. Natural lighting provided by four (4) windows

- Palmer Police Department – Good – Four (4) 1'x4' fluorescent indirect light fixtures suspended from the ceiling. Natural lighting provided by two (2) windows

- Hampden Police Department – Good - 2'x4' fluorescent light fixtures in the ceiling, and additional natural lighting provided by windows.

4.6.12 Heating, Ventilating, and Air Conditioning (HVAC)

The dispatch center has an effective heat and air conditioning system that provides for a wide range of conditions, from chilly nights to hot days. Humidity is controlled. There is sufficient movement of air and infusion of fresh air to allow the dispatch area to have a non-stuffy atmosphere. The equipment space is maintained at the recommended temperature and humidity levels.

- Monson Police Department – Poor – While the HVAC appeared adequate in the dispatch area, there were obvious on-going environmental control issues apparent in the equipment rooms during our survey.

- Palmer Police Department– Poor – Inadequate HVAC system throughout the building. Temperature and humidity is not controlled at all in the equipment areas, and the dispatch center has a window unit behind position 2.

- Hampden Police Department – Fair – adequate HVAC in the dispatch area and each equipment area has an individual window unit installed. HVAC is adequate to control current equipment heat loads.

4.6.13 Reliability

The systems that support the dispatch operation shall be reliable. Failures shall be far between and the dispatcher shall have a sense of confidence that the systems will be running when needed.

- Monson Police Department – Fair – The systems are generally reliable although outages do occur.
- Palmer Police Department– Poor – Dispatchers complain of daily crashes in CAD system workstations.
- Hampden Police Department – Fair – The systems are generally reliable although seldom outages do occur.

4.6.14 Generator

The emergency generator for the dispatch center provides adequate support for the operations including the HVAC system. The fuel is sufficient for 168 hours of operation at full load.

- Monson Police Department – Good – recently installed a 125 kW diesel Generac generator with a 400 gallon fuel tank.
- Palmer Police Department – Good – the emergency power generator was reported to be reliable and adequate for the communications centers needs. Fuel supplies are adequate for greater than 168 hours.
- Hampden Police Department – Good – recently installed a 60 kW diesel Cummins Onan generator with an integrated fuel tank.

4.6.15 Uninterruptable Power Supply (UPS)

The uninterruptible power supply for the dispatch center provides adequate support for the emergency operations. The capacity is sufficient for 1 hour of operation at full load.

- Monson Police Department – Good – all PLANT/VESTA equipment and workstations are on an EATON PowerWare 9170 UPS. CAD servers are on individual rack mounted UPS's. CAD and radio console workstations/desktops are on individual UPS units.
- Palmer Police Department– Good–all PLANT/VESTA equipment and workstations are on an EATON PowerWare 9170 UPS. It is not clear if the Orbacom TDM 25 switch has its own individual UPS unit or not. The Orbacom dispatch console workstations are on an individual UPS unit.
- Hampden Police Department – Good - all PLANT/CML VESTA PALLAS equipment and workstations are on an EATON PowerWare 9170 UPS. CAD servers are on individual rack mounted UPS's. CAD and radio console desktops are on individual UPS units.

4.6.16 Back-Up Provisions

An alternative dispatch center is maintained that is capable, when staffed, of performing the emergency functions performed at the primary center. The alternate center is separated sufficiently from the primary center to ensure the survivability of the alternate center.

- Monson Police Department – Fair –agreements with Palmer.
- Palmer Police Department – Fair – agreements with Monson.
- Hampden Police Department – Poor – no plans were noted during surveys.

4.6.17 Maintainability

In the rare occasions when a system or device fails the repairs are quickly begun and performed. Overall there is a high confidence level that the system will be kept running.

- Monson Police Department – Poor – Limited support available. Systems are currently maintained by a full-time police officer with prior IT background.
- Palmer Police Department– Poor – two of the dispatchers have assumed this responsibility
- Hampden Police Department – Poor- little support available

4.6.18 Parking

The Dispatch center has easy outside parking access with mass transit and traffic access. The parking lot shall be well lighted and secure.

- Monson Police Department – Fair – While there is generally adequate parking space available; the spaces available are not in a secure lot.
- Palmer Police Department– Fair – While there is generally adequate parking space available; the spaces available are not in a secure lot.
- Hampden Police Department – Fair – While there is generally adequate parking space available; the spaces available are not in a secure lot and located behind town offices and library.

4.6.19 Internal Facilities

The dispatch center is designed with adequate break areas, restrooms, and quiet rooms. The restrooms are located near to but not in the dispatch area. There are un-recorded telephones for personal use.

- Monson Police Department – Poor – while restroom facilities are provided, they are not immediately adjacent to the dispatch center. Employees take breaks and eat meals in dispatch area. Dispatchers must call an officer off the road to come in and man radios in order to have restroom breaks. There are no unrecorded lines for personal use.
- Palmer Police Department– Poor – while restroom facilities are provided, they are not immediately adjacent to the dispatch center. Employees take breaks and eat meals in dispatch area. Dispatchers must call an officer off the road to come in and man radios in order to have restroom breaks.
- Hampden Police Department – Fair – While the break areas and restroom facilities are provided, they are not immediately adjacent to the dispatch center.

4.6.20 Security

The dispatch center is designed with controlled access to the Center using locked doors and closed circuit cameras for entrance controls. The exterior of the facility is well lighted and secure. Where a communications center has windows, the Windows shall be a minimum of 4 ft (1.2 m) above floor level and shall be bullet resistive if they are accessible to the general public. Windows that are required to be bullet resistant shall be configured so that they cannot be opened.

- Monson Police Department – Fair – The dispatch center is secured by a door with a keyless combination door lock. There is a glass window in the vestibule where all visitors must check-in. The dispatcher on duty has to physically get up from their workstation and open the door to allow visitors into the room. There is a surveillance camera located inside the vestibule that is monitored by the dispatcher. There are

two (2) 360° view external surveillance cameras located on the rear of the building; located on the north and south ends of the building. Windows are not bullet resistant. The exterior door is lighted.

- Palmer Police Department– Poor – Access to the dispatch center and the rest of the police offices is through an electronically locked door from the vestibule/visitor area. There is only one security camera monitored by dispatch and that is to monitor the holding cell. The incarcerated have gotten out of the holding cell and walked right past dispatchers and out the building. Sometimes the back door in the Sergeants' work area is left open and people can walk right on in. The windows are not bullet resistant.

- Hampden Police Department – Fair – Access to the dispatch center and the rest of the police offices is through an electronically locked door from the vestibule/visitor area. The dispatcher on duty is able to electronically unlock the door from the operator position. There are a total of five (5) surveillance cameras located throughout the building and are located at the following locations: inside rear door, inside front door, rear parking lot, front parking lot, and the holding cell. Windows in the dispatch center are not bullet resistant and are open during certain hours of the day for airflow.

4.6.21 Mapping

Each call taking and dispatch position has ready access to an integrated computerized mapping system that manages, analyzes, and displays all forms of geographically referenced information or location information in a timely manner.

- Monson Police Department – Good – using PLANT/CML Orion MapStar version 5.2, build 026.

- Palmer Police Department–Good – using PLANT/CML Orion MapStar version 5.2, build 026.

- Hampden Police Department– Good – using PLANT/CML Orion MapStar version 5.2, build 026.

4.7 Interoperability

While the public safety agencies involved in the study use radio channels in the same frequency band and each agency has installed the radio channels of the other two localities in this study, the agencies generally have not installed the interoperability channels to allow communications with agencies outside of the immediate area. Since units from nearby areas could be involved in incidents in either jurisdiction, improved interoperability is required.

4.8 CJIS/NCIC

Criminal justice computer databases permit authorized criminal justice agencies to check for warrants, stolen items, and articles. Integration with other databases also allows for verification of a driver's license status and vehicle registration information. In any consolidation environment, access to this information is critical in performing law enforcement operations.

4.8.1 Legal Responsibility

Information from these systems is used to detain and arrest wanted persons and/or persons in possession of stolen property. The agency that comes into contact with such a person and makes an arrest is depending on the originating agency to have provided accurate information. The liability for false arrest, or improper confiscation of items, rests solely with the agency inputting the data. This information must be accurate and completely up-to-date at all times. Failure to do so may result in an agency being denied access to the system.

4.8.2 Ten – Minute Responses

One of the checks and balances in the system that most directly affects a dispatch operation is the "10-minute response". This can best be described by an example: An officer in Florida stops a vehicle and enters the registration into the system. This particular vehicle has been put into the system as stolen by a member of the

Monson Police Department. The computer system will immediately notify the officer in Florida that the vehicle has been reported as stolen by an out-of-state police department. The computer system also notifies the local department immediately that one of its vehicles is being detained in Florida. The local department has 10 minutes to confirm or disaffirm that the vehicle is, in fact, stolen.

This example requires constant attention to the CJIS/NCIC system and immediate access to accurate records. The gravity of this situation is evidenced by the fact that mistakes will cause innocent persons to be arrested. In a consolidated environment, if a dispatcher is unavailable to perform these tasks, then other personnel must be available to perform them. Wide area records computer systems might allow dispatchers to perform this service remotely, but the database information must be impeccably maintained.

4.8.3 Article Entry and Clearing

Items in the system must be entered in specific formats. This applies to persons, warrants, vehicles, guns, and articles. In each department there is a CJIS/NCIC operator that enters, clears, and modifies these items. Personnel who perform this function must be certified by the NCIC and the Commonwealth of Massachusetts. These entry functions should best be done on a 24-hour basis. To the extent that consolidation displaces dispatchers at each PSAP, other personnel must be assigned.

4.8.4 Non-Law Enforcement Agencies

There are provisions in the NCIC organization for non-law enforcement agencies to have access to the system. These agencies are normally non-enforcing criminal justice agencies (NCIC 'N' designator) and/or public safety dispatch agencies (NCIC 'P' designator). These agencies may make inquiries only and not entries or confirmations in the system. They also cannot obtain criminal history record information (CHRI). A consolidated dispatch center should gain access to the system as a public safety dispatch agency.

4.9 Warrants

Mandates by the Federal Bureau of Investigation, which operates the National Crime Information Center (NCIC), require that "an agency receiving a hit confirmation request should consult the original warrant and/or case file in order to provide the most accurate response." Currently, each of the primary law enforcement agencies will keep the active warrants in a location that is easily accessible to the dispatch staff twenty-four hours a day. If a dispatch consolidation takes place, provisions will need to be made to assure that the NCIC mandates can be met without unduly creating an additional burden on the agencies or dispatch.

In addition, all entries must periodically be validated. Validation (vehicles, plates, fugitives, missing person entries) requires the entering agency to confirm the record is complete, accurate, and still outstanding or active. This too can be a time consuming process and provisions will need to be made to assure that the validation is accomplished in an acceptable manner.

4.10 Lock Up Facilities

Each Police Department has expressed concerns about lock up facilities, especially related to consolidation of such services. The Town of Monson currently hand cuffs prisoners to a bench where they are monitored by the dispatchers. There is no jail or other lock up facilities available to Monson at this time.

The Palmer Police Department has a lock up facility that is monitored via video by the on duty dispatcher(s). During on site interviews a story was relayed whereby a prisoner escaped using a paper McDonald's cup and ran behind the on duty dispatchers to escape via the squad room's open door. It has been assessed that a problem also currently exists with the door lock to the holding cell area.

Hampden has what is likely the best lock up facility among the three Townships, but lacks adequate space for any expansion to accommodate additional cells.

5.0 Analysis of Alternative Solutions

As the Towns of Monson, Palmer, and Hampden begin the review of the following recommendations by AECOM, it is important to recognize that the assumptions made and presented here are based upon current and known situations within the Commonwealth and nearby jurisdictions as they relate to PSAP consolidation. As consolidation studies continue in the Commonwealth, participating agencies and jurisdictions within each study may change. Similarly, funding mechanisms offered by the Commonwealth may be changed, decreased, or ended by the time regional centers gain official commitments from its participating agencies. As such, the Towns are encouraged to move swiftly in identifying potential partners and funding opportunities.

As part of our study, AECOM examined a number of possible alternative solutions to the issues and problems cited by the participants in this study. This section presents the three most logical alternatives. The alternatives included are:

- Option 1 - No Consolidation – Maintain Existing Situation
- Option 2 - Shared Services
- Option 3 - Form Combined RECC

Each of the alternatives is discussed in terms of the organization, staffing, technology, and space aspects. After the alternatives were identified, we analyzed each in the context of the issues, problems and requirements identified by the study participants and listed both the advantages and disadvantages of each alternative. The advantages and disadvantages of each of the alternatives are discussed in this section.

Previous sections of this report addressed the current situation, the requirements for a consolidated center, and the issues and problems currently encountered. The costs associated with each of the alternatives are outlined in Section 6. Section 7 includes AECOM's recommendations.

5.1 Technological Assumptions

In developing and analyzing the alternatives, certain assumptions, as shown below, have been made.

5.1.1 Interoperability/Interagency Coordination

Each of the three dispatch centers currently use separate channels for law enforcement and fire communications. While all of the agencies use radio channels in the VHF band, the use of multiple channels significantly limits interoperability between the agencies. As noted in Section 4, Federal Communications Commission requirements will necessitate upgrades to the system.

5.1.2 Computer-Aided Dispatch (CAD) System

Computer-Aided Dispatch (CAD) systems allow public safety operations and communications to be augmented, assisted or partially controlled by an automated system. It can include, among other capabilities, computer controlled emergency vehicle dispatching, vehicle status, incident reporting, and management information.

Most importantly, the CAD tracks the status of incidents and public safety units and recommends units to assign to the call. All aspects of a CAD system must be optimized for rapid response and system reliability. Since time is of the essence, the CAD system must accurately provide a data and time stamp for every activity. Properly designed and implemented CAD systems increase the accuracy and reliability of the public safety dispatch process. Call processing time is reduced. Case and assignment numbers are created and tracked automatically. CAD systems collect the initial information for an incident and then provide the information to one or more records management systems. The CAD system also supports other activities that assist in the effective use of public safety resources, including shift change roll call, "Be on the lookout" (BOLO) files, and the ability to schedule a call in the future.

Currently, each of the dispatch centers operates and maintains its own separate CAD system. While all of the PSAP's use the same software vendor, none of the systems are interfaced or interconnected; therefore; sharing of data is not possible. This is particularly troublesome when multiple dispatch centers are dispatching the same fire departments and rescue squads.

5.1.3 Records Management Systems (RMS)

A Records Management System (RMS) is an agency-wide system that provides for the storage, retrieval, retention, manipulation, archiving, and viewing of information, records, documents, or files pertaining to department operations. The RMS covers the entire life span of records development, from initial generation until the process to which it is complete. An important part of RMS is a comprehensive computer program designed to enter and track appropriate statistical data and provide the agency management staff with the information needed to manage the agency. The RMS system also must interface with appropriate state and federal databases so that automated reporting can occur. Statistics are gathered on City, State, and federal levels and, ultimately, provide a nationwide view of activity as it is reported by public safety agencies throughout the country. The data is used to indicate the levels and nature of crime, fires, and, soon, emergency medical activity and to provide a reliable management tool for decision makers of the criminal justice community. NIBRS provides law enforcement with the tool to fight crime by producing detailed, accurate, and meaningful data. NIFRS does the same for the fire service and the National EMS Information System Dataset (NEMSIS) will do the same for emergency medical services. An effective RMS allows single entry of data while supporting multiple reporting mechanisms. Frequently, the RMS is interfaced with the CAD so that when calls are closed in CAD, the call record is transferred to the RMS to facilitate the capture of all relevant information without having to re-key the data into the RMS.

Currently, there are three separate law enforcement RMS systems in use in the three law enforcement agencies. Each agency uses IMC Law RMS. There is little to no exchange of information between the systems. A regional records management system, especially involving the law enforcement agencies could provide significant enhancements in the ability of the law enforcement agencies to exchange information.

The fire departments participate in the Massachusetts Fire Incident Reporting System. This is the statewide system for tracking fire related emergencies. Each individual department maintains its own local records. These systems are not interfaced with the CAD system.

The EMS providers also file reports on each incident they respond to. Each rescue squad maintains its own records and files reports with Medical control and other locations as required. The systems are not interfaced with CAD.

5.1.4 9-1-1 System

Currently, the 9-1-1 system nationally is in a state of flux. Over the last decade, wireless 9-1-1 has become a reality. Internet telephony is growing significantly. The 9-1-1 network is transitioning from a separate, dedicated, circuit-based infrastructure to one that is digital, using Voice over Internet Protocol (VoIP). The current vision is that the system will migrate to a private Emergency Services Network called ESInet. This will allow considerably more flexibility and capabilities than currently exist.

5.1.5 Mapping/Geographic Information Systems

A Geographic Information System (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information or location information. A GIS allows for the display of database information on a visual map. While the GIS does not contain any maps or graphics, it creates maps and graphics from the information contained in the databases.

It does this by displaying information in layers. Some of the layers commonly used in public safety communications centers include streets, pipelines, creeks, railroads, fire hydrants, cell tower locations,

municipal boundaries, public safety response districts, and so forth. These layers can be turned on or off as needed. Some form of computerized mapping became a requirement for PSAPs with the deployment of wireless 9-1-1 since wireless caller location information is received by geographic coordinates (latitude and longitude) rather than specific addresses. As the 9-1-1 network migrates to the next generation, this will be even more critical.

The three PSAPs in this study each maintain their own GIS and mapping display systems. Maintaining data integrity within each GIS and keeping the data synchronized with other, existing databases, such as the 9-1-1 Master Street Address Guide (MSAG), and the CAD geo-file requires high levels of coordination and is a frequent challenge.

Integration of the GIS with the various other applications and systems is complex and challenging. Ideally, the 9-1-1 call location data is seamlessly transferred from the 9-1-1 system to the mapping system and then to the CAD system so that the caller's location is displayed as a dispatchable address and entered correctly into the CAD call for service form.

5.1.6 Emergency Medical Dispatch

Emergency Medical Dispatch (EMD) is a systematic program of handling medical calls for assistance. The dispatch staff, using locally-approved EMD Guidecards, quickly and properly determines the nature and priority of the call, dispatches the appropriate response, and then gives the caller instructions to help treat the patient until the responding EMS unit arrives. Additional training is required beyond the basic dispatch training the employees now receive. The EMD program also includes a quality control program, involvement of medical control, and other elements.

As noted by the American Society of Testing and Materials, the emergency medical dispatcher (EMD) is the principle link between the public caller requesting emergency medical assistance and the emergency medical service (EMS) resource. As such, EMD plays a fundamental role in the ability of the EMS system to respond to a perceived medical emergency. With proper training, program administration, supervision, and medical direction, the EMD can accurately query the caller, select an appropriate method of response, provide pertinent information to responders and give appropriate aid and direction for patients through the caller. Through careful application and reference to a written, medically approved, emergency medical dispatch protocol, sound decisions concerning EMS responses can be made in a safe, reproducible, and non-arbitrary manner. These benefits are realized by EMS systems when appropriate implementation, sound medical management and quality assurance/quality improvement (QA/QI) at dispatch are provided within the EMD/EMS system.

None of the PSAP's involved in this study currently utilize EMD. This is due to only one dispatcher per shift and EMD requires two based on one dispatcher providing instructions via the phone, and a second to answer and dispatch 9-1-1 calls or radio traffic. The Commonwealth of Massachusetts has identified the need and will soon require EMD in all PSAP's across the Commonwealth. As such, each PSAP participating in this study will be faced with how to implement and staff a PSAP to regulatory standards, which will immediately mean doubling staff in each center.

Further, Monson Police Department is in the position of having trained dispatchers in EMD, but being too understaffed to utilize the training. This presents unique legal concerns relative to "perceived" liability and duty to act.

5.1.7 Logging Recorder System

Industry standards require both the continuous recording of emergency telephone conversations and radio transmission for long term retention as well as the capability of immediate playback of both recorded telephone and radio traffic.

These recording systems are an indispensable source of information for criminal, fire/EMS, civil, and internal investigations. They enhanced agency training and quality assurance programs. The ability to instantly replay a conversation while still recording other calls and radio transmissions can be the difference between life and death when a person requesting assistance is not able to repeat their request or the conversation is garbled, or spoken too quickly for easy understanding.

As 9-1-1, telephone, and radio systems become more complex, so do recording systems. In addition, some technologically complex systems may require dedicated recording systems.

5.2 Option 1 – Maintain Existing Situation – No Consolidation

This option would continue the status-quo with each of the three centers continuing to operate independently.

5.2.1 Organization

Since each center would continue to operate independently, no organizational changes would occur.

5.2.2 Staffing

The staffing levels would continue as they currently exist. However, each PSAP would be faced with doubling its staff in the near future to meet regulatory standards imposed by the Commonwealth. Under the "No Consolidation approach, each Town would be responsible for absorbing the increased staffing costs within its own budget annually going forward. Table 5-1 displays the current authorized staffing levels.

Table 5-1
Current Staffing

	Monson Police Department		Palmer Police Department		Hampden Police Department		Total	
	On Duty	Total	On Duty	Total	On Duty	Total	On Duty	Total
Manager/9-1-1 Coordinator								
Operations/Training Manager								
Tech Support Coordinator								
Office Asssitant								
Lead Dispatcher/Shift Supervisor	0	0	0	1	0	0	0	1
Dispatchers	1	4	1-2	5	1	4	3.5	13
Total	**1**	**4**	**1-2**	**6**	**1**	**4**	**3.5**	**14**

5.2.3 Technology

Each of the dispatch centers will continue to bear the full responsibility for updating and replacing their 9-1-1 system, mapping, radio consoles, dispatch workstation furniture, CAD and RMS systems, and recording system. Not consolidating will limit the benefits to be realized while increasing capital expenses for each Town. Interchange of information will continue to be less efficient than it could be which has proven to be less beneficial and decrease safety for both first responders and citizens alike.

5.2.4 Space

Each of the dispatch centers will continue to operate in their existing facilities. The centers are space limited, especially in their communications and computer equipment rooms. In this particular study, the costs of renovations will be extreme due to various factors at each PSAP.

For example, evidence of black mold in the Town of Monson, damp flooring, and unsecure dispatch facilities would add extreme variations of pricing due to mold clean up, structural studies, construction, and elevating

the dispatch flooring to remove equipment from a damp concrete surface. Additionally, adequate break rooms and rest room facilities should be incorporated into the dispatch center for nationally recognized guidelines. The most immediate need is air quality and regardless of the outcome of this study, the Town of Monson should immediately address these concerns. Additionally, equipment is located below a water pipe and grounded to same water pipe. This presents a significant risk of equipment loss in the event of a leak. Further, the area has little to no ventilation which will result in pre-mature failure of the equipment.

The Town of Palmer has similar cases that require immediate attention. Dead fowl carcasses are in the attic near critical pieces of equipment. Asbestos tiles are in use and present a hazard to employees. The Lock up area has experienced a prisoner escape that presented uncontrolled access to the open dispatch area and impacted the perceived safety of dispatchers. There are no restroom facilities or break areas nearby. Air quality was expressed to be “not capable of supporting human life” over a specified period of time. HVAC works poorly and dispatchers must turn off the window unit A/C before answering the 9-1-1 phones so they can hear. Dust within and around the area may contribute to pre-mature failure of equipment due to improper ventilation and air quality and serves as evidence of a poor environment.

Hampden Police Department is a much cleaner environment but has its own challenges. The PSAP desk is directly in front of the desk window. This presents an unsafe environment with ready access to dispatch. Dispatchers are faced with numerous distractions and interruptions since the window and PD operates around them. Furniture is not ergonomic nor laid out properly to make the space functional.

5.2.5 Lock Up Facilities

Under Option 1 - No Consolidation approach the Towns would see no change to Lock Up Facilities. The current situation would continue in each department.

5.3 Option 2 - Share Services without Consolidation

This option would see the three centers continue to operate independently, but share key systems including the 9-1-1 system, the CAD and RMS systems, and potentially the radio console system.

5.3.1 Organization

Since each center would continue to operate independently, no organizational changes would occur. There would need to be a Joint Powers Agreement (JPA) or Memorandum of Understanding (MOU) between the participating entities detailing the operation and responsibilities for stakeholders of the shared systems.

5.3.2 Staffing

The dispatch staffing levels would continue as they currently exist. However, each PSAP would be faced with doubling its staff in the near future to meet regulatory standards imposed by the Commonwealth. Under Option 1 - No Consolidation approach, each Town would be responsible for absorbing the increased staffing costs within its own budget annually going forward. A full-time technical support coordinator, who would be responsible for keeping the system and equipment in the dispatch centers up to date and functioning properly as well as maintaining the various data bases used by the centers, should be added. The current staffing levels are displayed in Table 5-1.

5.3.3 Technology

Each of the PSAPs has recently upgraded their 9-1-1 system recently. When the time comes to upgrade the existing systems, a shared 9-1-1 system could be implemented. The newest generation of 9-1-1 system technology uses internet protocol (IP) based systems. With this technology, it is feasible to share the system. Individual answering positions units would still be required, but the servers, switches, and routers can easily be shared between multiple locations.

Shared CAD and RMS could also be implemented. Software currently available allows multiple agencies to share the same system and still protect sensitive data from unauthorized viewing or alteration. A shared CAD system would allow some improvement in interagency situational awareness, and could be implemented independently of a shared RMS system.

A shared RMS system would do much to increase interagency awareness of events that have occurred in neighboring jurisdictions. Many of the currently available systems use a “Master Name Index”. With the Master Name Index, one agency can quickly learn if the subject they are dealing with has had dealings with other agencies participating in the system. As most of the systems are being used in public safety communications centers and agencies become IP based, further opportunities for sharing exist. By using IP-based system, common-off-the-shelf-components can be used rather than requiring special, more expensive products.

5.3.4 Space

Each of the dispatch centers will continue to operate in their existing facilities. Adequate, properly conditioned space for the shared technology will be required. In addition, each of the three entities will be responsible for any renovations or expansions. In this particular study, the Towns are still faced with significant cost related to making the current dispatch areas safe and accessible for normal center operations to continue in their current locations.

For example, evidence of black mold in the Town of Monson, damp flooring, and unsecure dispatch facilities would add extreme variations of pricing due to mold clean up, structural studies, construction, and elevating the dispatch flooring to remove equipment from a damp concrete surface. Additionally, adequate break rooms and rest room facilities should be incorporated into the dispatch center for nationally recognized guidelines. The most immediate need is air quality and regardless of the outcome of this study, the Town of Monson should immediately address these concerns. Additionally, equipment is located below a water pipe and grounded to same water pipe. This presents a significant risk of equipment loss in the event of a leak. Further, the area has little to no ventilation which will result in pre-mature failure of the equipment.

The Town of Palmer has similar cases that require immediate attention. Dead fowl carcasses are in the attic near critical pieces of equipment. Asbestos tiles are in use and present a hazard to employees. The Lock up area has experienced a prisoner escape that presented uncontrolled access to the open dispatch area and impacted the perceived safety of dispatchers. There are no restroom facilities or break areas nearby. Air quality was expressed to be “not capable of supporting human life” over a specified period of time. HVAC works poorly and dispatchers must turn off the window unit A/C before answering the 9-1-1 phones so they can hear. Dust within and around the area may contribute to pre-mature failure of equipment due to improper ventilation and air quality and serves as evidence of a poor environment.

Hampden Police Department is a much cleaner environment but has its own challenges. The PSAP desk is directly in front of the desk window. This presents an unsafe environment with ready access to dispatch. Dispatchers are faced with numerous distractions and interruptions since the window and PD operates around them. Furniture is not ergonomic nor laid out properly to make the space functional.

5.3.5 Lock Up Facilities

Under the Shared Services approach, the Towns would see no change to Lock Up Facilities. The current situation would continue in each department.

5.4 Option 3 Form Combined RECC

Under this option, the Towns of Monson, Palmer, and Hampden would consolidate their dispatch centers into one shared emergency communications center, with perhaps additional neighboring Towns to also join RECC. For the

purposes of this discussion, figures and numbers presented in this section represent only the three towns of Monson, Palmer, and Hampden as members of the RECC.

AECOM further understands the desire of each Town and it's elected leaders to maintain high levels of service to its citizens. As such, AECOM acknowledges that each Town is concerned with center size and scope of services and its impact upon current services. As such, AECOM can further assess the inclusion of other Towns from a budget and impact analysis should the three Town's included in this document recruit additional members of the RECC. AECOM already possesses data on some neighboring areas from previous and current engagements within Massachusetts.

5.4.1 Organization

The dispatch centers of the participating entities would be combined into a joint operation. There are a number of alternatives for organizing the centers. One agency could be designated as the lead agency, and the other agencies would then contract with that agency so the existing dispatch centers could co-locate, or three separate, independent dispatch agencies could be established. The organizational alternatives are more fully discussed in Section 5.7.

5.4.2 Staffing

The staffing for this alternative is shown in Table 5-2. The center would require one management position. There would need to be a center manager/9-1-1 coordinator. This position would be responsible for the day-to-day operation of the center, including staffing, training, and quality assurance. A full-time technical support coordinator, who would be responsible for keeping the system and equipment in the dispatch centers up to date and functioning properly as well as maintaining the various data bases used by the center, would be added. Based on AECOM's workload analysis process as shown in Appendix B, the combined center would require two dispatchers on duty 24/7. If this option were chosen, a more detailed staffing analysis would be required to determine the exact number of on-duty staff required in the center on an hour-by-hour basis.

Each Township would need to decide if it wished to keep the police station open twenty-four hours a day. During non-business hours, the dispatch staff serves people who come to the department. Many police departments are now closing the department outside of business hours. If the police department wished to keep the building open twenty-four hours a day, twelve records clerks would be needed, four at each station. This would keep one person on duty 24 hours during the week. Three records clerks would be needed to staff the desk during business hours only. There are currently 13 full time employees between the three towns. There would be a surplus of four dispatchers that could fill the records clerk positions within each Police Department.

Under Option 3, a shared Lock Up Facility would be included in the building for the combined Dispatch Center built by the three Towns. This area would be monitored by existing staff.

Table 5-2
Option 3 Full Consoidation

	Total	
	On Duty	**Total**
Manager/9-1-1 Coordinator		1
Operations/Training Manager		
Tech Support Coordinator		1
Lead Dispatcher/Shift Supervisor	1	4
Communications Officers	1	4
Total	**2**	**10**

5.4.3 Technology

Consolidation will enable an easier transition to future dispatch improvements and requirements.

- Computer Aided Dispatch System

  All three townships currently use the same CAD system. We strongly suggest that a regional RMS be implemented in conjunction with the CAD system. While not an absolute requirement, the CAD and RMS interface generally functions with fewer issues when the software is provided by the same vendor.

- 9-1-1 Customer Premises Equipment

  As noted above, the centers have upgraded their 9-1-1 systems recently and have capacity to serve the consolidated center. Consequently, the systems would not need immediate replacement. Because of advancements in technology, it is quite feasible that when a new 9-1-1 system is needed, one system will be capable of serving the needs of the center with little modification.

- Mapping and Geographic Information Systems

  Each of the localities currently maintains its own computerized mapping system. Each of the localities also maintains several related databases including the Master Street Address Guide (MSAG) and the CAD geographic information files (GEOFILE). The MSAG is used to correctly route 9-1-1 calls, and the CAD GEOFILE is used to determine response information. Keeping each of these databases synchronized requires significant effort. Because of the interconnected nature of the communities, a single consolidated system will provide significant enhancements in the accuracy and reliability of the dispatch system.

- Radio Consoles

  Radio consoles would need to be standardized within the consolidated center. Each jurisdiction would work together with proposed vendors to select an advantageous solution for the consolidated center within reasonable costs.

5.4.4 Space

The consolidated center should be sized to accommodate four positions. Four of the positions would be required immediately, with space allocated for one additional workstation in the future. While only two of the positions would typically be staffed, the two additional positions provide extra capacity for high volume situations.

A four position center would require approximately 2298 square feet of dedicated space along with raised flooring redundant routing for 9-1-1 and emergency telephone circuits, back-up power supplies, and HVAC systems. The space would be allocated as follows:

Dispatch Center (2 positions)	820 square feet
Equipment Room	118 square feet
Administrative Support	820 square feet
Holding Cells	540 square feet
Estimated Total	2,298 square feet

It must be noted that the space estimates are just that, estimates. Before any facility would be constructed, programming will be required to determine the exact space requirements. The space identified at Administrative/Support includes space for staff support (break rooms, lockers, etc.) building services as well

as offices for administrative personnel. The requirements may be reduced if the dispatch center were located in an existing building where this space could be shared with other building tenants.

5.4.5 Lock Up Facilities

Under Option 3, a new dispatch center would also include a new Lock Up Facility as discussed in previous sections of this Option.

5.6 Strengths and Weaknesses of Alternatives

As noted above, AECOM has investigated a number of alternatives to improve the provision of public safety communications services and public safety services in for the citizens of the Townships of Monson, Palmer, and Hampden. Here we discuss briefly the ability of each of these alternatives to meet the needs and requirements of the participating agencies and to address the issues and problems cited, while also focusing on the desires of Town leaders to maintain acceptable levels of town identity and service.

- **Option 1 - No Consolidation – Maintain Existing Situation**

  This alternative has traditionally been the selected option for many communities. Each agency has operated independently and the system has evolved to meet their changing needs. Communities, dealing with scarce financial resources, do not wish to make significant financial errors. In addition, the cost of change can be significant.

  Strengths: Retain maximum agency control since each agency is in charge of its own dispatch. Least disruption to current operations and allows most focus on individual communities.

  Weaknesses: The alternative provides no improvement to the most serious problems with the current situation. Significant duplication of equipment since each agency must purchase and maintain its own systems and equipment results in long term costs that continue to plague local budgets. No improvement of interagency situational awareness. No improvement in interagency communications (interoperability). The most significant weakness of this alternative is the condition and long term sustainability of the existing buildings housing the dispatch centers. Each building presents its own circumstances, some of which may relate significantly to employee health. This scenario also does nothing to address the forthcoming mandate by the Commonwealth to require two dispatchers for the implementation of EMD.

- **Option 2 - Shared Services**

  This alternative can be used to upgrade various systems to a common system.

  Strengths: Reduced cost of systems and equipment since only one system would be required instead of multiple systems. This approach would allow the implementation of a system with increased capacity since the costs would be shared. There may be some small improvements in interagency coordination and communications with shared systems.

  Weaknesses: This alternative provides only very limited opportunity for improvement in the most serious problems with the current situation. There is limited improvement in interagency situational awareness and interagency communications. The systems remotely located from dispatch centers. The most significant weakness of this alternative is the condition and long term sustainability of the existing buildings housing the dispatch centers. Each building presents its own circumstances, some of which may relate significantly to employee health. This scenario also does nothing to address the forthcoming mandate by the Commonwealth to require EMD which will require two dispatchers on duty.

- **Option 3 - Form Combined RECC**

  This alternative would consolidate each existing center into one consolidated center.

  Strengths: This alternative provides the greatest improvement in situational awareness and in interagency communications and coordination. Since the systems would be shared, significant improvements could be realized in the exchange of information between agencies. This alternative provides for the elimination of duplication of personnel, equipment, and systems resulting in significant long term savings for each Town.

  Weaknesses: There could be the perception of the loss of agency control in that general policies and procedures would be developed to meet the needs of all agencies rather than a single agency as now exists. A new facility and some new systems and equipment would be required. The location could be inconvenient for some agencies. But most importantly, dispatchers would be in an environment that is much safer and alleviates concerns with existing structures.

5.7 Governance Alternatives

In addition to the determination of which of the alternatives will be implemented, the organizational structure and governance of the shared system must be determined unless the communities choose to remain operating as they are and not create a shared communications center or communications systems. Several different methods of governing a shared emergency communications center and communications system have been used in different localities throughout the Commonwealth of Massachusetts and the nation with varying degrees of success.

These may be categorized into three broad alternatives:

- One existing agency expands its services to include the other agencies dispatch services
- Collocation of dispatch centers
- Consolidation into separate, independent agency

Following is a brief discussion of each alternative, and the comparative advantages and disadvantages of each.

5.7.1 Use Existing Agency

Under this alternative, one of the agencies that currently provide dispatch services would expand and assume responsibility for providing dispatch services for the other agencies. That agency would be responsible for the hiring of personnel, for establishing policies and procedures, providing and operating the various systems used by the center. In some cases where this method is used, the services are included without any charge to the other agencies. In other cases, agencies pay a fee to the hosting agency.

5.7.2 Collocation – Shared Services Alternative

With a collocation of dispatch services, each of the participating agencies would move its dispatchers into a shared location, but would retain full control of its personnel. The facilities and some systems would be shared, but operations and personnel would remain separate. Cost sharing agreements with each of the participating agencies would be required for the costs of the facility and the systems, but all operational costs would remain in each agencies budget.

5.7.3 Separate Organization

An independent authority focused on the delivery of public safety communications would be created through a JPA or MOU under this approach. Representatives of the participating localities and institutions would serve as the authorities governing body. The personnel involved in the provision of the services provided by the agency would be employees of that agency rather than employees of one of the participating localities or institutions. This model has been used successfully in a number of consolidations.

5.7.4 Discussion of Governance Alternatives

No two public safety agencies are identical. This is true with the three Towns participating in this study as well as across the Commonwealth, nationally, and worldwide as well. In the Towns of Monson, Palmer, and Hampden, there is a great deal of commonality in how the public safety dispatch services are provided. While there is some variation between the agencies, there is sufficient commonality so that a shared communications center is feasible. Each alternative identified above would provide improved situational awareness of what all of the public safety agencies were doing as well as improved interagency communications.

While the model of consolidating dispatch services under one of the existing agencies would be the simplest to implement, concerns over the ability of the other agencies to influence policies and procedures generally limits the desirability of this organizational alternative. An unintended consequence with this model often is a reported increase in interagency friction. Personnel from agencies other than the agency housing the dispatch operations often feel that they come second to the host agency whether than perception is accurate or not. Another distinct disadvantage of this is that the public could lose a significant amount of direct contact with all of the other agencies except for the host agency. Dispatch employees of the other agencies would either transfer to the host agency or to other positions in their current employer. This could result in significant employee disruption in terms of pay and benefits. Employee seniority would be significantly changed.

The second organizational alternative involves each of the existing dispatch operations being relocated into a new, shared facility. Each organization would retain responsibility and control of its own dispatch operations. Common facilities, such as break rooms, lockers, and so forth would be shared. It could be feasible to share systems as well. Since each of the employees assigned to dispatch would remain an employee of their previous employer, there would be no disruption of employee pay and benefits. There could be significant competition between agencies for employees, especially given the differences in pay and benefits between the agencies. There would be limited opportunity for more effective use of staff resources since each dispatch operation would be independently staffed.

The most common model of a shared communications center is the independent agency model. Under this model, a single agency provides the dispatch services for all of the participating agencies. All dispatch employees become employees of the dispatch agency. While this would cause significant disruption to the employees of the existing dispatch centers, the dispatch employees would all be employees of existing agencies. Typically, when consolidations occur, the adopted pay and benefits are at least equal to the highest being paid by the existing agencies. Two approaches are taken to employee seniority. One is that the employees bring their seniority with their previous agency with them; the other is that every employee starts with zero seniority. This alternative allows the most flexibility in the use of personnel, and as shown in the tables above, requires the fewest number of personnel assigned to dispatch. The most significant disadvantage of the shared center is that each agency would lose a degree of control over the dispatch operations.

With proper training, policies, and procedures, the negative effects of this can be minimized.

Table 5-3 summarizes the advantages and disadvantages of each approach.

Table 5-3
Governance Comparison

Existing Agency Agencies Contract with Existing Agency		Co-location Agencies Collocate Dispatch Operations		Independent Agency Separate Dispatch Agency Created	
Advantage	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**
Single Agency Responsibility	Loss of Agency Identity	Least Disruptive	Personnel Policy/Procedural Differences	Single Agency	Major Organizational Restructuring
Minimal Restructuring	Loss of Agency Control	Maintain Agency Control	Competition for Employees	Reduced Management Costs	Loss of Agency Identify
Reduced Management Costs	Limited Operational Input By Other Agencies	Maintain Agency Identity	Greater Facility Requirements	More Flexible Use of Staff	Loss of Agency Control
Reduced Employee Competition	Employee Disruption	Some Service Delivery Improvement	Greater Management Overhead	More Efficient Use of Technology	Multi-Agency Management
Some Service Delivery Improvement		Least Employee Disruption	Limited Staff Flexibility	Most Service Delivery Improvement	Most Employee Disruption

6.0 Opinion of Probable Costs

Cost projections were developed for both the staffing and the major categories of equipment as they apply to the general design of the three operational/consolidation scenarios described in this study. The cost information used in these projections is obtained from historical AECOM cost files and vendor pricing of comparable projects. The various costs are compared and weighted in order to derive average costs. This is what AECOM expects the pricing to be, and these prices are recommended for planning and budgetary purposes. While AECOM cannot guarantee price levels, successful competitive bidding typically results in savings on the list price costs. Below are described the various cost elements that make up the estimates.

Cost Elements – Equipment

Telephone Equipment (CPE)
Customer premise equipment is the telephone equipment that operates the Enhanced 9-1-1 system. It includes dual central processors and various message switches that interpret and produce the location and telephone number information that is received in multiple formats from the telephone service providers. AECOM has included the cost of an automatic call distributor/PBX to handle the administrative and non-9-1-1 calls for each scenario.

Computer Assisted Dispatch (CAD) Systems
CAD software can be a relatively simple program to keep a record of incidents handled by a public safety agency, or it can be a complex set of programs and external connections to fully support everything that a public safety communication center does. The complexity of the CAD program is usually dictated by the size of the public safety agency and the number of dispatchers working to support it. Like many things in life, it's easy to be attracted to a Chevy Suburban CAD program when all you need is a Smart Car. Matching your needs to the software's capabilities is sometimes half the project.

Simple CAD programs are often called "**calls for service**" programs, because they combine the features of a live, on-line, in-use CAD program with the more off-line features of a records management system.

In the **early** days, CAD systems consisted of mainframe or mini-computers located in a computer room, linked to so-called "dumb" terminals in the communication center showing text-based information. **Today's** systems use a client-server configuration, with data residing on a central computer, physically as small as a PC, linked to workstations that consist of mid-powered PCs. The arrangement allows central storage and retrieval of data, and redundancy in case one workstation stops working. Today's terminals are 19-inch or larger color models, and the software makes use of color, graphics and symbols to convey information.

CAD programs have essential elements or components that support the dispatcher's work:

- **Incident information** - This is a database of the incident data, usually obtained from a telephone caller, and including the location (house number and street name, commonplace name, intersection), caller info, and other information gathered by the dispatcher. When the incident is recorded in the database, CAD typically compares the location to previous entries, and then displays an alert if the new incident is related to a existing incident record, based both on the proximity of current incidents, and address matches on previous incidents.
- **E9-1-1 interface** - The CAD computer is electronically connected to the 9-1-1 system, so that the caller's telephone number and address information (ANI/ALI) are displayed on-screen, and automatically transferred to the appropriate fields of the CAD incident entry form.
- **Location verification** - Once the incident location is automatically entered from 9-1-1 or manually typed in, the CAD software matches it against the **GEOFILE** created by the agency when the software was first installed. The GEOFILE is a database of standardized locations, including specific house numbers and streets names, commonplace names (Jackson Park), and intersections. The GEOFILE insures that locations are within the jurisdiction, within a valid block number range, and are consistently entered and entered (which assists in later searches).

- **Information files** - Once the location has been verified, CAD links the incident to any of its information databases, including previous incidents at that same location, address alerts, free-form text information, telephone numbers, personnel lists, emergency medical dispatch procedures, fire pre-plans, HAZMAT info, suspect hazards, etc.
- **Incident display** - Once an incident is entered, CAD can display a list of the pending, current and past incidents, according to the dispatcher's assignment (telephones, radio, Beat 3, fire-police-EMS, special) and preference. Incidents are usually sorted by date, time and priority, but also by location, type of incident or other criteria, to make evaluation of the incidents quicker and easier.
- **Unit display** - CAD has a database of personnel and field units, which is used to display a list of active units. This database includes the unit ID, assigned personnel, special capabilities (K-9, SWAT, etc). The database is linked to the incident database, allowing the dispatcher to display unit status: in-service, out-of-service, etc. Using commands or on-screen buttons the dispatcher can change a unit's status or assign it to incidents.
- **Incident dispatch** - With information about incidents and units, the dispatcher can link an incident to one or more field units, which essentially **assigns** the units to the incident. Most CAD software will provide a recommendation of which units should respond, based on pre-determined tables or a unit's actual location from an AVL sub-system. Based on pre-determined tables, CAD also takes into account the type of incident (high danger, low danger), and type of unit (patrol, supervisor, canine, etc.) when making the recommendation.
- **Time-stamping** - whenever the dispatcher takes an action (enter a new incident, dispatch a unit, unit arrives on-scene, etc.), the computer records that time and links it to the incident and unit records for later review
- **Special features** - Some CAD software is focused on EMS or fire operations, and have standing order or jump crew capabilities.
- **Report generation** - to help analyze incident and unit activity, CAD allows production of reports listing all types of information, by ranges of date and time, and sorted by various fields.
- **External links** - The CAD computer and software can be linked to other computer systems, including the agency's E9-1-1 system (to automatically fill in the caller's name, address and telephone number), local-county-state-federal law enforcement databases (NCIC, warrants, vehicle registration, driver's license, stolen vehicle and property, etc.), master clock synchronization, radio systems (to show last unit that broadcast, or unit that pressed "emergency" button), mobile data, records management, paging, etc.
- **Mapping** - Many modern communication centers have installed computer mapping systems to assist them in handling Phase II E9-1-1 calls. These mapping systems can also be interfaced with the CAD GEOFILE to display units and incident locations.
- **Maintenance** - The software allows the system administrator to create and edit the various support files, and to make data back-ups of the various files.
- **Security** - CAD information is generally considered confidential for investigative reasons, for the privacy of victims and witnesses, and in some cases to comply with state laws (juveniles, etc.). The software provides a flexible method of assigning security levels for all the various types of information, the various CAD functions, and all users. This allows an administrator to very specifically assign access permissions to every user, limiting them to just what functions they are allowed to perform, and what information they are allowed to see.

We have estimated a software upgrade to allow all of the centers to operate on the same software platform and provide equipment changes in the center. The major expenses are in operator position hardware which includes:

- LCD Screens (3)
- CPU (computer)
- Keyboard and Mouse

Radio Console System

This equipment provides the connection for the dispatcher to the various two-way radio systems. The radio consoles also allow access to alerting and siren systems. The major expenses are in operator position hardware which includes:

- LCD Screens (1)
- CPU (computer)
- Keyboard and Mouse

- Audio unit (see description below)
- Speakers

The audio unit acts as a gateway between analog dispatch equipment, telephone interconnect devices, host data gateway and conventional or trunked digital radio systems.

Back-Up desktop control stations are also contained in the budget. They are not hardwired into the consoles. The control stations are used as a backup to console positions to provide a basic dispatch function in the event of total console failure.

Connectivity

Dependant on the chosen option there will be connectivity requirements between the operational locations. The intent of this study does not include a specific radio/microwave analysis; therefore only general plans are estimated. In the three options presented we are estimating the following:

- Do Nothing – no added connectivity
- Shared Services – Connectivity will be provided by additional telephonic T-1 and RT circuits.
- Form Combined Center with all three Townships – Connectivity will be provided by additional telephonic T-1 and RT circuits

Dispatch Console Furniture

The furniture workstations are sized based on the number of monitors and CPU's that will be installed at the positions. A supervisory workstation is larger due to additional monitors. Heavy-duty cycle, dispatch chairs are also provided.

Voice Loggers

Two types of recording functions are needed. One allows the on-duty telecommunicator to quickly retrieve a telephone or radio message in order to capture or verify information from their position. This is known as the instant recall recorder. The other's function is to capture and provide a record of events as they happened. This function is known as a logging recorder.

No new Digital Voice Logger (DVL) system is estimated based on the PSAP design. The instant playback feature is incorporated into the DVL system.

Spares Fixed

AECOM's experience indicates that the project should maintain a cache of spare parts for the equipment. Over the years our experience has shown that this cost element should be simple 1% factor of the value of the Fixed Infrastructure costs; including consoles, CADS, and CPE.

Contingency

In an ECC project of this size and complexity, unexpected occurrences and expenditures will happen and must be prepared for. Based on our experience, it is AECOM's opinion that a viable cost element for equipment contingencies should be set at 10% of the project's total cost.

Operational, Maintenance, and Replacement Estimates

The communities require a forecast of the on-going costs for the center and new PSAP arrangements in order to make valid decisions on the approach to using the systems. The challenge here is to accurately forecast the maintenance expenses into areas that are largely undefined at present and to determine how those expenses should be allocated to each of the participating communities.

The model described herein should not be interpreted as limiting future activities of the community to explore alternative funding opportunities or improved methods of financing system sustainability.

We have applied the following assumptions to our analysis:

- Fees for operations and maintenance support and for future equipment replacement should be billed to the participant agencies monthly.
- The sustainability model must provide for scheduled replacement of equipment.
- The O&M costs should be apportioned equally to all participating agencies based on their participation ratio.
- O&M services for the systems infrastructure is to be performed by one centralized support organization directed by the RECC Director.

The tables herein are efforts at that forecast, which will require modification as real time system operation experience is gained in the coming years. At this time, however, we must rely on experience gained in other environments and make many assumptions as to the cost factors. This section explains the assumptions that were used to create the tables.

Maintenance

For maintenance cost projections, we concentrated on the equipment category. For the equipment in the centers we have looked at the predicted capital costs and used a percentage based on experience of 2.5% of the costs per year for maintenance.

Operations

Operations costs differ widely from community to community. This difference is partly due to how communities list line items and account for budgeting the costs associated with providing E9-1-1 services. Additionally, Center Director's manage and create budgets based upon the size, individual needs, and operational differences across jurisdictions. The existing facilities are in differing conditions, causing operations costs to vary based partially on the age of the center. In Full Consolidation, we are attempting to apply a facility operations cost factor to a new facility, while having no prior experience in the operational expenses that may be accrued for that center. Based on nationwide data for similar facilities, it is AECOM's opinion that operations costs will be $4.00 per square foot for the facility. We applied this to the differing sizes of the facilities in options three (to be included in final report) and four; in option two it is assumed that operations costs remain the same as what each community is currently paying.

Building

In Option Three a new building will be required to accommodate the joint dispatch operations. While we cannot provide a professional estimate for the cost of a construction project, and therefore have not incorporated building costs in the tables below, AECOM can provide a rough order of magnitude estimate for this cost. The building required for a full center with 3 holding cells may cost more than $3,400,000.

Personnel

Personnel costs are always among the largest budget items. Each of the proposed options requires a different number of staff. This is discussed further in other sections but in general the staffing recommendations are:

- For the Shared Services – AECOM is displaying no change in the salaries and positions listed in Section 4, with the exception of adding one technician to service all three dispatch centers.

- For a Full Emergency Communications Center (ECC) – Including all three communities – AECOM recommends 2 personnel on duty at all times; with a Director position. All staff would be full-time employees. The required personnel would be:
  - Dispatcher – 9
  - Director - 1
  - Technician – 1

AECOM surveyed and analyzed the salaries of the existing centers. To arrive at cost projections for the above staffing, we used the following assessments: For dispatcher we took the average salary paid by each community, and then assumed all dispatchers would be paid at this rate. For the Director rate we estimated 125% of the Supervisor

salary rate. To account for fringes benefits and other expenses we have included an added 40% increase to each salary computation.

Capital Replacement

The community should plan ahead for the eventual replacement of the equipment in the ECC. We expect this to be on a ten year time frame for planning purposes. The costs for replacement are planned around an annual increase of 1.75% in costs. Due to the differences in equipment we have accounted for the replacement of the following systems and frequency:

- PC's & Laptops – 3 year cycle
- Servers & Routers – 5 year cycle
- Software Upgrades – 7 year cycle
- Radio console – 7 year cycle
- Dispatch furniture – 10 year cycle

We recommend that a fund be established for deposit of monies for future equipment replacement. This account should be an interest bearing account. We have assumed a 1.50% yield. Interest should accrue for application towards future equipment replacement costs. The funds should only be used for equipment replacement purposes unless otherwise directed by the community.

Participation Ratio

AECOM believes that the fairest way to divide costs between communities is to base cost per community on the community's participation ratio. This is a simple calculation of the number of calls generated by the individual community compared to the total number of calls generated by all communities, so that each community pays proportionally based on the load it places on the ECC. This ratio is used throughout these tables. Each community's portion is displayed in the appropriate columns based on their participation. It should be noted that the percentages are rounded to a whole percentage rather than using a fractional percent.

The cost forecasts will require modification as real time system operation information is gained in the coming years. At this time, however, we must rely on experience gained in other environments and make many assumptions as to the cost factors.

TABLE 6-0
OPINION OF PROBABLE COST
Monson Regional Emergency Communication Center
Participation Ratio

USER AGENCY	CALL VOLUME	POPULATION	PARTICIPATION RATIO
Monson	1,875	8,952	31%
Palmer	3,000	12,933	48%
Hampden	1,420	5,400	21%
TOTAL	**6,295**	**27,285**	**100%**

6.1 Option 1 No Consolidation – Maintain Existing Situation

6.1.1 Staffing

The staffing costs are the same as shown above for the 2008-2009 Fiscal Year. This information is a total derived from data provided by all potential participating agencies associated with this needs assessment.

6.1.2 Maintenance and Operations

This expenditure category includes such expenditure categories as equipment repair and maintenance, office supplies, training and travel, telephone, and similar non-capital expenditures. We have used the same figure as currently budgeted $83,621. Each agency currently uses its own 9-1-1 Equipment, CAD, RMS, consoles, workstations, DVRS, and other associated ECC equipment. This would continue as is with all future upgrade and replacement costs borne by each agency individually.

6.1.3 Current Expenditures

For the 2008-2009 Fiscal Year, the three entities have a combined budget total of $793,567 for the provision of dispatch services. The expenses are categorized as follows:

Personnel Services	$ 694,946	87%
Operating Expenses	$ 83,621	10%
Capital Outlay	$ 15,000	3%
Total	$ 793,567	

6.1.4 Renovations

During our surveys it became obvious that the facilities in the three communities which housed the 9-1-1/dispatch and equipment areas were in dire need of renovation. The existing conditions of mold contamination and oxygen deprivation will require an immediate renovation of these existing spaces even in a No Consolidation scenario. The expenses will be quite high because the HVAC, electrical, grounding, and lighting are in such a poor state. Again while we cannot provide a professional estimate for the cost of these renovation projects, and therefore have not incorporated building costs in the tables below, AECOM can provide a rough order of magnitude estimate for the costs of the three renovations. We would expect that the renovations required may cost more than $1,100,000.

6.2 Option 2 Shared Services between the Communities

Section 6.2 is AECOM's probable opinion of the costs for the Shared Services option.

6.2.1 Capital Equipment Expenses

Table 6-2-1 shows AECOM's opinion of the capital costs necessary to fully equip the ECC for use by the three communities. This amount covers the equipment and for the 6 positions currently staffed in the three centers. We are assuming using the new CPE server. Included are new CPE position equipment, new CAD operator position equipment and software, and new radio console equipment.

TABLE 6-2-1

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Capital Equipment Expenses

Option 2

COST ELEMENT	COST OPINION
TELEPHONE EQUIPMENT	$ 14,400
CAD SYSTEMS	$ 245,700
RADIO CONSOLE	$ 24,900
RENOVATIONS	$ -
VOICE LOGGER	$ -
VENDOR SERVICES	$ 75,800
SPARES - FIXED	$ 5,700
CONTINGENCY	$ -
TOTAL	**$ 366,500**

6.2.2 Capital Equipment Loan

If the capital expenses for the ECC are not covered by grant, it may be necessary to take out a loan to fully fund the consolidation. Table 6-2-2 shows the annual cost, per community, if the capital cost expressed in the previous section is paid for with a 10 year loan with an assumed government interest rate of 1.5%. Participation ratios are used to split the cost between communities, as explained above.

TABLE 6-2-2

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Expenses for 10 Year Loan for Equipment @ 1.5%

Option 2

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 12,359.43
Palmer	48%	$ 18,769.06
Hampden	21%	$ 8,361.81
TOTAL	**100%**	**$ 39,490.30**

6.2.3 Capital Equipment Replacement

In order to cover the expense of equipment replacement on a 10 year cycle, AECOM recommends an annual amount be paid into an interest-generating account. Based on AECOM's opinion of probable replacement costs and a 1.5% interest rate, Table 6-2-3 shows the annual cost per community for equipment replacement.

TABLE 6-2-3

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Expenses for 10 Year Capital Equipment Replacement @ 1.5% Return

Option 2

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 28,452.73
Palmer	48%	$ 43,208.37
Hampden	21%	$ 19,249.78
TOTAL	**100%**	**$ 90,910.87**

6.2.4 Salary Expenses

In order to have a fully qualified technician on hand for all centers as required, a new position will have to be created. Table 6-2-4 shows the probable annual salary cost for this employee, including fringes. Opinions on salary costs are based on the current salaries paid by the communities.

TABLE 6-2-4

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Salary Expenses

Option 2

COST ELEMENT	COST OPINION
DISPATCH STAFF	$ -
SUPERVISION	$ -
ADMINISTRATION	$ -
TECHNICAL	$ 68,432.00
TOTAL	**$ 68,432.00**

6.2.5 Salary Expenses per Community

Table 6-2-5 shows the probable cost per community for the salaries in Section 6.2.4.

TABLE 6-2-5

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Salary Expenses

Option 2

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 21,417.43
Palmer	48%	$ 32,524.55
Hampden	21%	$ 14,490.02
TOTAL	**100%**	**$ 68,432.00**

6.2.6 Maintenance

Table 6-2-6 shows the breakdown in Maintenance Costs for the new equipment.

TABLE 6-2-6

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Operations & Maintenance Expenses

Option 2

COST ELEMENT	COST OPINION
FACILITY OPERATIONS	$ 2,200
EQUIPMENT MAINTENANCE	$ 7,100
TOTAL	**$ 9,300**

6.2.7 Maintenance per Community

Table 6-2-7 shows the probable annual cost to each community to cover operations and maintenance expenses.

TABLE 6-2-7

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Operations & Maintenance

Option 2

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 2,910.66
Palmer	48%	$ 4,420.13
Hampden	21%	$ 1,969.21
TOTAL	**100%**	**$ 9,300.00**

6.2.8 Total Annual Cost per Community

Table 6-2-8 shows AECOM's opinion of what the probable annual cost will be for each community under a participation of the three dispatch centers. This cost includes salaries, operations and maintenance, and the funds necessary for equipment replacement. Costs for any loan as shown in Table 6-2-2 are not included. It must also be emphasized that these costs in the Shared Services will be in addition to the existing budget.

TABLE 6-2-8

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Savings

Option 2

USER AGENCY	2009 BUDGET	ANNUAL ASSESSMENT	ANNUAL BUDGETS
Monson	$ 266,699.00	$ 52,780.82	$ 319,479.82
Palmer	$ 376,202.00	$ 80,153.04	$ 456,355.04
Hampden	$ 144,196.00	$ 35,709.01	$ 179,905.01
TOTAL	**$ 787,097.00**	**$ 168,642.87**	**$ 955,739.87**

6.3 Option 3 Form Full Regional Emergency Communications Center

Section 6.3 considers the costs if all three communities participate in the RECC.

6.3.1 Capital Equipment Expenses

Table 6-3-1 shows AECOM's opinion of the capital costs necessary to fully equip the ECC for use by all three communities. This amount covers the equipment and furniture for 2 dispatcher positions, one supervisor position, one training position, and other necessary equipment. This does not include the cost of the building itself.

TABLE 6-3-1

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Capital Equipment Expenses

Option 3

COST ELEMENT	COST OPINION
TELEPHONE EQUIPMENT	$ -
CAD SYSTEMS	$ 404,300
RADIO CONSOLE	$ 161,400
DISPATCH CONSOLE FURNITURE	$ 45,900
VOICE LOGGER	$ 100,000
VENDOR SERVICES	$ 177,900
SPARES - FIXED	$ 14,200
CONTINGENCY	$ 71,200
TOTAL	**$ 974,900**

6.3.2 Capital Equipment Loan

If the capital expenses for the RECC are not covered by grant, it may be necessary to take out a loan to fully fund the consolidation. Table 6-3-2 shows the annual cost, per community, if the capital cost expressed in the previous section is paid for with a 10 year loan with an assumed government interest rate of 1.5%. Participation ratios are used to split the cost between communities, as explained above.

TABLE 6-3-2

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Expenses for 10 Year Loan for Equipment @ 1.5%

Option 3

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 32,876.43
Palmer	48%	$ 49,926.20
Hampden	21%	$ 22,242.64
TOTAL	**100%**	**$ 105,045.28**

6.3.3 Capital Equipment Replacement

In order to cover the expense of equipment replacement on a 10 year cycle, AECOM recommends an annual amount be paid into an interest-generating account. Based on AECOM's opinion of probable replacement costs and a 1.5% interest rate, Table 6-3-3 shows the annual cost per community for equipment replacement.

TABLE 6-3-3

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Expenses for 10 Year Capital Equipment Replacement @ 1.5% Return

Option 3

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 52,541.18
Palmer	48%	$ 79,789.13
Hampden	21%	$ 35,546.89
TOTAL	**100%**	**$ 167,877.21**

6.3.4 Salary Expenses

In order to have 2 fully staffed dispatch positions on duty at all times, 9 dispatchers are required, as well as one director as detailed above. Table 6-3-4 shows the probable annual salary cost for these employees, including fringes. Opinions on salary costs are based on the current salaries paid by the communities.

TABLE 6-3-4

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Salary Expenses

Option 3

COST ELEMENT	COST OPINION
DISPATCH STAFF	$ 460,779.48
SUPERVISION	$ -
ADMINISTRATION	$ 85,540.00
TECHNICAL	$ 68,432.00
TOTAL	**$ 614,751.48**

6.3.5 Salary Expenses per Community

Table 6-3-5 shows the probable cost per community for the salaries in Section 6.3.4.

TABLE 6-3-5

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Salary Expenses

Option 3

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 192,401.17
Palmer	48%	$ 292,180.75
Hampden	21%	$ 130,169.57
TOTAL	**100%**	**$ 614,751.48**

6.3.6 Operations and Maintenance

Table 6-3-6 shows the breakdown in Operations and Maintenance costs.

TABLE 6-3-6

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Operations & Maintenance Expenses

Option 3

COST ELEMENT	COST OPINION
FACILITY OPERATIONS	$ 9,200
EQUIPMENT MAINTENANCE	$ 17,800
TOTAL	**$ 27,000**

6.3.7 Operations and Maintenance per Community

Table 6-3-7 shows the probable annual cost to each community to cover operations and maintenance expenses as shown in Table 6-3-6.

TABLE 6-3-7

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Operations & Maintenance

Option 3

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 8,450.30
Palmer	48%	$ 12,832.63
Hampden	21%	$ 5,717.07
TOTAL	**100%**	**$ 27,000.00**

6.3.8 Total Annual Cost per Community

Table 6-3-8 shows AECOM's opinion of what the probable annual cost will be for each community under a full participation scheme. This cost includes salaries, operations and maintenance, and the funds necessary for equipment replacement. Costs for any loan as shown in Table 6-3-2 are not included. In should be noted that these expenses are in place of the existing expenses.

TABLE 6-3-8

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Expenses Participation

Option 3

USER AGENCY	PARTICIPATION RATIO	ANNUAL ASSESSMENT
Monson	31%	$ 253,392.65
Palmer	48%	$ 384,802.51
Hampden	21%	$ 171,433.53
TOTAL	**100%**	**$ 809,628.69**

6.3.9 Total Annual Cost Change per Community

Table 6-3-9 shows AECOM's opinion of what the probable annual cost change will be for each community under a full participation scheme. This cost includes salaries, operations and maintenance, and the funds necessary for equipment replacement. Costs for any loan as shown in Table 6-3-2 are not included.

TABLE 6-3-9

OPINION OF PROBABLE COST

Monson Regional Emergency Communication Center

Annual Savings

Option 3

USER AGENCY	2009 BUDGET	ANNUAL ASSESSMENT	ANNUAL SAVINGS
Monson	$ 266,699.00	$ 253,392.65	$ 13,306.35
Palmer	$ 376,202.00	$ 384,802.51	$ (8,600.51)
Hampden	$ 144,196.00	$ 171,433.53	$ (27,237.53)
TOTAL	**$ 787,097.00**	**$ 809,628.69**	**$ (22,531.69)**

7.0 Conclusions and Recommendations

As described in previous sections, the participants in this study are facing complex decisions as to how to proceed best with their public safety dispatch operations. During the course of this study, we have examined several different alternatives. The advantages and disadvantages of each alternative have been identified in Section 5. The three centers involved in this study are doing a good job in meeting the needs of its citizens and community. This study is not intended to fix anything – simply to identify current issues and formally make recommendations as they relate to PSAP consolidation.

Section 7 is designed to present AECOM's recommendations and to answer the specific questions asked in the original Request for Proposals issued by the Town of Monson, Massachusetts.

- Analysis of public safety operational, preparedness and response; benefits or disadvantages.
- Identification of location and back up location for regional PSAP or RECC.
- Analysis of how an RECC would affect the array of services provided to dispatch entities and ability to respond to 9-1-1 calls.
- Analysis of how an RECC would affect interoperability of communications systems on local, regional and statewide basis.
- Analyze the ability to share currently separate services between PSAPs such as, but not limited to, CAD systems, mapping systems and radio systems.
- Demonstrate capacity for 9-1-1 surge capacity.
- Analyze the capacity for coordination of local and regional police, fire and EMS resources including response to routine events and major disasters.
- Demonstration that a satisfactory arrangement can be made regarding PSAP governance, SOPs accountability, service, standards and control.
- Demonstration that initial costs are justified based on proposed work and expected benefits including the potential for ongoing operating or capital cost savings.
- Estimation of one-time and recurring costs.
- Analyze personnel structure and costs at each agency including analysis of the core and additional services provided by current personnel and estimated personnel costs for staffing a regional PSAP or RECC along with cost to maintain or increase other public safety services such as lock-up monitoring expenses, administrative duties and walk-in traffic at existing local agencies.
- Analysis of compatibility of CPE, radio, mapping, telephone and related equipment owned or operated by current PSAPs and need for equipment at new regional PSAP or RECC.
- Identification of financial resources available to provide ongoing support for project so it may be sustainable into future years.
- Demonstrate cost effectiveness or ineffectiveness of proposed project.
- Provide a comprehensive review of all of the participating agencies considering the following: collective bargaining agreements, personnel policies, job descriptions, training requirements, compensation and benefits, and reporting lines. The report should include an analysis of potential labor relations or legal issues related to merging staff from the various departments into one REC and should make specific recommendations for a successful transition.
- Provide an examination of potential legal and organizational structures for the RECC. The report should recommend a structure that will be allowable by law and suitable in practice for all participating agencies.
- Examine the current dispatch facilities at the Town of Monson, Town of Hampden and Town of Palmer, and validate or invalidate the need for a new physical plant for all three purposes, including examination of potential for increased opportunities for cost-sharing in the future communications technologies and dispatch equipment.
- Review the advantages of partial or full consolidation, and submit a written recommendation to the Town of Monson.

- Examine best practices from other similar cities relating to operation, staffing, training, management and governance of consolidated, intra-town PSAP/Emergency Dispatch/EOC and submit written report to the Town of Monson.

In order to make clear the answers derived from the research, analysis, and conclusions, AECOM has simplified the above points into simple to understand questions to provide its final recommendation(s). The answers to your specific questions are included throughout the various subsections below.

7.1 Should a consolidation occur?

A public safety Emergency Communications Center (ECC) functions as both the interface between the public and the public safety agencies of the community and provides coordination and support to those public safety agencies. An important part of the coordination and support an ECC provides to a given public safety agency is coordination with other agencies and responders. Any situation requiring more than one public safety responder requires coordination. That is true whether the responders are from the same or different agencies. More responders require more coordination. Coordination cannot occur without communications. Bringing the existing dispatch centers into the same room will result in significant enhancements to the interagency coordination that is required when more than one agency is responding to an emergency.

A shared communications operation, with proper implementation, also offers significant service improvements to all of the participants. By establishing high standards of performance, consistently assuring that those standards of service are achieved and further assuring that the center is properly organized, adequately staffed, responsive to the public safety providers and citizens, and well managed, the service provided to the citizens of the region maintains its excellence. The goal must be the operation of efficient, high-performing, customer-friendly organizations.

As discussed in Section 5, AECOM evaluated a number of alternative solutions as part of this study. The two most viable are:

- Option 2 - Sharing Services and Equipment
- Option 3 – Form Consolidated RECC

We also compared maintaining the current separate operations with these alternatives, and performed additional analysis on all three. Our analysis included the operational and financial aspects of each alternative.

Sharing services and systems, such as the CAD system, and 9-1-1 CPE, is a viable alternative, especially as these and other systems migrate towards being Internet Protocol (IP) based. Currently, support of the various systems used in the dispatch centers is provided by a number of individuals at each center as part of their many duties. These support duties are only a part of their duties. This is true for formal training and quality assurance. As the operations continue to evolve, and become more computer-based and specialized, a shared technical support coordinator would provide substantial benefit to all three localities.

- Our analysis of the consolidation alternatives determined that none of the existing facilities appeared to have sufficient space to house a dispatch center serving all three localities. Furthermore, significant building issues and safety concerns further constrain the Towns from using any of the existing structures. A new facility will be required if all three centers consolidate, and significant renovations are necessary should the Towns decide to do nothing. This would add start-up costs to this alternative, however as stated, doing nothing will require significant cost to renovate and make the existing centers safe, functional, and ready for additional dispatchers per the Commonwealth's mandates for EMD. We believe this makes this the alternative of **Option 1 - No Consolidation – Maintain Existing Situation** an unacceptable approach. The space requirements and building issues also create the same belief that an **Option 2 - Shared Services** approach is unacceptable at this time. Either of these options would be more feasible should the Towns renovate the existing facilities.

- **Option 3 - Form Combined Center with all Three Townships**. While this option seems attractive at first, it is fiscally demanding on the three Towns, each of which already struggle with funding. As seen in Section 6, the

costs of a building and recurring costs far exceed current expenditures. AECOM believes the Towns would struggle to reach the required funding levels and cannot adequately justify funding such an option at this time.

As stated below, AECOM's recommended solution is:

- **Continue to pursue Consolidation of Three towns dispatch services, pursuant to funding, while assessing the needs of neighboring communities and developing the possibility of new partners in the RECC.**

7.2 Who should participate in the Shared Emergency Communications Center?

Public safety communications systems must function under all conditions. Having an adequate, functioning back-up center is essential to assure the continuity of operations. The National Fire Protection Association's Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (NFPA 1221) stipulates that each jurisdiction shall maintain an alternate communications center that is capable, when staffed, of performing the emergency functions performed at the primary communications center. Sufficient facilities, prior planning and trained personnel are the critical key elements to having an adequate back-up center. Without any one of those three elements, chaos may result.

7.3 How should it be organized, governed, and staffed?

No two public safety agencies are identical. This is true not just in the Monson, Palmer, and Hampden communities, but nationwide and worldwide as well. While there are many similarities, each agency has evolved based on its own, local situation. There are many factors that have contributed to the current state of each agency. The creation of a shared emergency communications center will result in significant changes in the operations of each of the participating public safety agencies. It is critically important that the process of creating the shared center be focused on making positive improvements to all aspects of the delivery of public safety services to all of the citizens of and visitors to the central valley.

One of the first issues that must be resolved is the governance structure of the shared center. There are a number of models for the governance of a consolidated center. One possibility is for one of the existing agencies to absorb the dispatch operations of the other participants. Another model would be for two of the agencies to contract with the third agency. The third involves co-location of dispatch centers. Each co-located center operates independently of the other co-located centers. Facilities are shared, but operations are separate. The fourth alternative is an independent center, where a single department or agency provides the dispatch services for all of the participating agencies. These organizational alternatives were discussed in Section 5.

The model that would best serve the Towns is to create an independent agency focused on the provision of public safety communications services for the participants. The separate entity has been the model of choice in most successful consolidations that we have studied. We envision that the Emergency Communications Center would be a separate governmental authority. We recommend that a two-tiered governance structure be established to provide oversight of the agency. This would be a Board of Directors and a User Advisory Committee.

7.3.1 Emergency Communications Center Board of Directors

The Board of Directors for the joint dispatch authority should be comprised of participating members. One member would be appointed by each participating locality as members of the Board of Directors. It is recommended that the appointments be made from senior elected or appointed officials, such as the City and County Manager. The selection, however, shall be the individual decision of each participating entity. This board should be the general policy making authority for the dispatch operations. Its functions should include:

- Entering into contracts
- Acquiring, holding, or disposing of property
- Approval of authority's annual budget and expenditures
- Hiring, employing and terminating dispatch management staff
- Adopting and revising bylaws for its operations as well as the operations of the user advisory committee

7.3.2 User Advisory Committee

The second part of the governance structure is the User Advisory Committee. The User Advisory Committee should consist of senior representatives of the agencies served.

The function of the User Advisory Committee is to provide guidance and input to the Board of Directors and the Emergency Communications Center Director on operational and other appropriate issues. It is envisioned that the User Advisory Committee would work with the dispatch manager to develop appropriate standards and procedures concerning ECC performance, personnel selection and training, and other technical and operational issues as directed by the Board of Directors.

7.3.3 Emergency Communications Center Director

The Emergency Communications Center Director should be appointed by the Board of Directors, subject to the advice and consent of the User Advisory Committee. The Director should be responsible for many of the above duties initially established for the Board. For purposes of efficiency and consistency in management, many of the duties are outlined to the Board should be delegated to the Director. However, the Board should reserve the right of review and oversight.

The Director should be subject to the following standards:

- The Director should be responsible for managing the day-to-day operations of the center. The bylaws written by the Board should outline the powers bestowed upon the Director.
- Those powers should include, but not be limited to, the rights to hire, terminate, discipline, and manage personnel. However, the Board should reserve the right of review and to overrule a decision by the Director for serious personnel actions.
- The bylaws should specify when the Director may be involuntarily dismissed.
- AECOM recommends that the Emergency Communications Center Authority be established as an independent governmental agency.
- The ECC should be governed by a Board of Directors consisting of representatives of the participating localities.
- There should also be a User Advisory Committee consisting of senior representatives of the participating agencies.
- The Emergency Communications Center Director should be hired by the Board of Directors.

7.3.4 Dispatch Staff

As part of the policy and procedure development discussed below, employment standards and procedures will need to be established. Once that process is complete, recruitment and selection of the ECC dispatch staff can begin. Existing dispatch employees of the participating agencies should be encouraged to apply. Some may choose to remain with their existing agency. Others may choose to retire or seek other employment.

If a sufficient number of existing dispatch employees apply, then the selection process can begin. We suggest that open applications only be sought if sufficient qualified people cannot be found in the pool of current employees.

In addition to being trained on the new policies and procedures, the employees will need to become familiar with the operation of each of the participating agencies as well as the geography served by the ECC.

Towns should also consider the impact of employee selection with regard for the Collective Bargaining Agreements currently in place.

7.4 How should policies be made and changed?

The rules governing the ECC should be laid out in a set of Standard Operating Procedures (SOP). The ECC Director and the User Advisory Committee should develop the SOP jointly. The SOP should be subordinate to any contradictory local ordinance, Massachusetts Codes or laws, the Board by laws or any current labor agreement or one subsequently adopted. The Commission on Accreditation of Law Enforcement Agencies (CALEA) in conjunction with the Association of Public Safety Communications Officials (APCO) has developed an accreditation program for communications centers. Two hundred eighteen standards have been developed as a part of the program. These standards are organized into six topic areas:

- Organization
- Direction and Authority
- Human Resources
- Recruitment and Selection
- Training
- Operations

The standards represent the best professional requirements and practices and describe what the agency should be doing, not how they should be doing it. While we recommend that the ECC pursue CALEA Communications Center Accreditation, the standards are a useful guide to the establishment of policies and procedures regardless of whether accreditation is sought or not.

- **AECOM recommends that the ECC Director and the User Advisory Committee should jointly develop a Standard Operating Procedure Manual modeled on the CALEA Communications Center Accreditation Standards.**

7.5 Staffing Requirements and Personnel Issues

7.5.1 Administrative Staff

The ECC Director should have a Technical Support Coordinator to help manage the centers. The Technical Support Coordinator would be responsible for keeping shared systems; the system and equipment in the dispatch center, as well as maintaining the various data bases used by the center. We also suggest a full-time administrative assistant would be an important part of the administrative staff.

7.5.2 Operations Staff

As discussed in Section 5 of this report, AECOM recommends that there be a Shift Supervisor on duty in the ECC twenty-four hours a day. The shift supervisors would be experienced staff members who would be available to provide assistance and support to the staff in the event of questions as well as assure the smooth running of the ECC on an around-the clock basis.

The Director should develop standard operating procedures that ensure sufficient answering of incoming emergency calls. Even during peak periods of the day, staff at the communication centers should strive to answer at least 90% of incoming emergency calls within two rings (ten seconds) and complete 95% of emergency dispatching within sixty seconds.

Adequate staffing, as determined by the board and director, should be provided to ensure that those calls are answered in a timely fashion. We recommend a total of thirty full-time dispatchers and shift supervisors be hired in order to adequately staff the center in addition to the administrative staff.

7.5.3 Personnel Issues

Displacement Concerns:

In response to concerns expressed by current dispatchers about their future employment, it can be presumed that many of them will have the opportunity to transfer to the new organization. In addition, there will be a need for some positions to be retained at the employees' current departments for the collateral duties now currently being handled by the dispatch staff.

Rehiring & Seniority:

The ECC Director should be responsible for hiring the staff. The Director should give preference to dispatchers currently working in the participating entities. The standards for hiring new personnel will be set out in the directives that govern the communication centers. The board should decide compensation for the staff.

Tenure and seniority for dispatchers who have been displaced by the reorganization of the central communications center should remain (e.g., a dispatcher with 10 years of service at a particular department, should maintain his or her 10 years of service at a new center).

Existing dispatch employees of the involved agencies at the time of consolidation will also have the opportunity to apply for a position within their existing entity depending on their qualifications. The salary and benefits will be determined by the position the individual applies for.

Compensation & Benefits:

There should be one compensation and benefits package equal to that of the highest paid dispatcher within the current grouping (e.g., if one entity offers the best compensation package to its dispatchers, then the board should offer a comparable package to all of its dispatch staff). The compensation package should include health and retirement benefits.

7.6 What services should it perform?

The Emergency Communications Center should function as the primary Public Safety Answering Point (PSAP) for the participating towns, dispatch and coordinate resources for the agencies now being dispatched by the existing dispatch centers, coordinate with other public safety services, and maintain appropriate records of its operations.

Each of the dispatch centers currently answers telephone calls received on the respective non-emergency or administrative telephone lines after normal business hours as well as provide after-hours answering for other departments and agencies of their respective jurisdictions. Some of the centers answer these lines all of the time. We recommend that each supported department be responsible for answering their own lines during normal business hours and the shared communications center be given the responsibility for answering the lines at other times.

Departmental personnel currently come to the dispatch center to have dispatch personnel initiate an inquiry into one of the various state and national computerized information systems. With the possible relocation of the dispatch function, we recommend that terminals and printers, connected to the CAD and RMS systems be installed in each department. This will allow authorized personnel to receive information as required.

7.7 What equipment, systems, software and hardware are needed to in the combined center?

The five major equipment systems in a modern emergency communications center include the 9-1-1 system, the Computer Aided Dispatch (CAD)/Records Management System (RMS), the radio consoles, the logging recorder, and the workstation furniture. The public safety radio system is an essential element that extends beyond the ECC. The following contains AECOMs recommendations for each of these key systems.

7.7.1 9-1-1 Customer Premises Equipment (CPE)

Each of the PSAPs has installed a new 9-1-1 system. The systems are relatively new and employ current technology. However, a shared system is recommended.

7.7.2 Computer Aided Dispatch/Records Management

As has been stated, each of the dispatch centers operates and maintains its own separate CAD system. While all of the PSAP's use the same software vendor, none of the systems are interfaced or interconnected; therefore AECOM recommends an updated and shared CAD system be implemented using the existing vendor.

7.7.3 Radio Consoles

The radio console serves as the interface between the dispatcher and the radio system. As with the other systems in the ECC, radio consoles are increasingly computer-based. While standards-based radio systems, such as P.25, are frequently being implemented, console systems are not yet standards based. As a result, consoles from one vendor may not work with another vendor's radio system infrastructure. The selection of the radio console system will need to be coordinated with the selection of the radio system vendor.

7.7.4 Logging Recorder

In recent years the technology used in recording the telephone and radio traffic in dispatch centers has also changed significantly. Digital Voice Recorders, using computer based system are the standard in the industry. A new digital voice recording system with sufficient capacity to record and store the appropriate radio and telephone messages will be needed.

7.7.5 Dispatch Workstation Furniture

As with the evolution of the various systems used in the Emergency Communications Centers, significant changes have occurred in the furniture used in the dispatch center. Gone is the traditional desk with radios sitting on top. Gone too are the massive metal cabinets replete with switches and buttons. Now the typical dispatch position is equipped with multiple large monitors, multiple keyboards, and multiple computer mice. Each workstation typically has three or more personal computers. Cable management is a significant issue. Electrical requirements are extensive. Heat dissipation has significant impact on the heating ventilating, and cooling systems. These changes have lead to a redefinition of the workstation. The change in the way work is done, has also led to increased attention to ergonomics or human factors engineering. Most dispatch workstation furniture is user adjustable to accommodate the differences in sizes of the personnel using it. In addition, the workstations must be capable of withstanding the around the clock usage by a variety of users. Experience has shown that even top-of-the-line office furniture cannot withstand the around-the-clock usage.

7.7.6 Regional Radio System

As noted previously in this report, each jurisdiction has installed and maintains its own radio system or systems to serve its public safety agencies.

Monson, Palmer, and Hampden each indicated that their existing radio systems and equipment were not all 100% capable of meeting the Federal Communications Commission mandate for narrowband operation. All of the public safety radio systems must be capable of narrowband operation no later than December 31, 2012. Meeting this deadline will require an aggressive implementation schedule.

AECOM has extensive experience in the design and implementation of regional radio systems. Over the past twenty-five years, we have been involved in a large number of similar systems. We have developed a project methodology to bring the implementation of a new radio system to a successful conclusion.

- **AECOM recommends that a new regional radio system be implemented.**

7.8 Where should the initial consolidated center be located?

A multitude of factors influence the selection of the most appropriate site for a new PSAP. These factors must be understood at the outset so that clear decisions can be made by the governing authorities and for the citizens that the center will serve. The factors generally fall into five major categories: Functional, Natural Conditions, Man-Made Threats, Cost Issues, and Technological.

The process for selection is obviously one which involves rational criteria but may be influenced by political processes. Recognizing this, the relative risks and strengths of each site may be evaluated and adapted to the final site and building design. For example, a piece of property may be owned by a jurisdiction and therefore attractive from a cost perspective but may have inherent risks nearby such as a heavily traveled freight train route. Additional measures which might be required to protect the facility for this increased threat may offset the cost savings for the relatively free site. For this reason, it is recommended that an evaluation matrix be developed and include weighted criteria for all factors including cost and availability.

Functional criteria is the first overall category to be reviewed and may include such evaluation factors such as accessibility, convenience, multiple access points, site size, closeness to redundant facilities, and overall facility diversity/distribution. It is important in this criterion that the idealized site size be determined. This should include both the size of the facility and the site features such as parking, clearances and equipment. A site located on a primary road may be scored higher than one located on a secondary route, provided the primary road is easily accessible from a traffic perspective. Routes with frequent traffic jams are generally not desirable. Special events (such as major sporting events, which do not allow access to the site) should also be considered; even if they are not on the final criteria. The location should also be evaluated for the convenience to the employees in terms of commute distance. Locations on primary roads allow the possibility that employees may mass transit. The convenience of location next to population centers and businesses should be evaluated in relation to site visibility and security. Multiple access points are considered important so that there can be a separation of public and private vehicular traffic as well as a secondary means to enter/exit the site in emergencies. Sufficient space is needed to provide for adequate set-back for security purposes. Where feasible critical facilities should be set-back a minimum of twenty-five meters, (eighty-three feet) from public roadways. Zoning laws should be reviewed so that any restrictions such as tower height and building size and type might be identified. This can be a major hurdle if not identified early in the process.

Natural conditions include all features which impact the site utilization and/or are risks to the continuous operation of a critical facility. Natural waterways particularly navigable waterways or shipping lanes pose risk as a result of the potential for accidental spills, or catastrophic fire or explosion. For these reasons a buffer zone is usually assigned to this feature with a ranking related to the relative distance from the buffer.

Most standards for PSAP's today include criteria intended to discourage locations within flood prone areas. The standard is based on the United States Geological Services (USGS) designated 100-year flood zone designation. In general, no critical facility should be located in this zone and similarly should not be located in basement locations which can be subject to localized flooding. Wetlands pose a similar threat and hazard, while impacting the environmental conditions in the area. This impact can be mitigated but will cause additional site development costs.

Localized drainage patterns are perhaps the most important feature to review in the site selection process. Sites that have poor drainage and or have major surface drainage features like ditches or natural swales would be considered less desirable than sites with high spots and naturally occurring drainage away from the major building location. Adjacent roadways should be lower than the proposed building location.

Wind hazards are hard to evaluate on a localized basis except in rare cases. Hurricanes and tornados effect whole regions and therefore should be identified for mitigation and protection rather than for individual site selection. For example, for facilities designed in Atlantic coastal regions, the maximum wind speed recorded is usually the design condition required for structural and component hardening.

Man-made threats are easily identified and usually impact the selection of sites the most in terms of overall risk. These factors include roadways (particularly interstate highways), freight rail lines, chemical plants (or other industrial manufacturing facilities which handle toxic or explosive products) and military installations. The relative risks and subsequent buffer areas for each of these factors are usually identified by the local emergency management agency.

Interstate highways and freight line railways pose similar hazards and thus are usually assigned similar buffer zones (usually one mile on either side). Evaluation criteria can be weighed on relative distance from the buffer zones to the proposed site. The recommended protective action zone for some chemicals can exceed ten miles. Sites near nuclear plants are ranked according to the location either inside or outside the evacuation zone. Likewise chemical or other industrial facilities should have a ranking relative to the assigned buffer zone.

The location of potentially hazardous utilities to the project site (such as high voltage electric transmission lines, cross country gas or oil transmission lines) would tend to lower the desirability of the proposed site for a PSAP.

One criterion which is related to an earlier discussion of convenience and accessibility is the fact that these facilities generally should not be highly visible. Due to the critical natural of the function, public access in not crucial and visibility may lead to potential targeting. Likewise, locations next to regular special events or public target buildings should be avoided.

Costs are always a factor when consider prospective sites. This ranges from the acquisition, utilities availability and extension requirements, overall site grading and physical development and offsite improvements including upgrades and provision of redundancies.

Sites that are already owned are usually preferred and often the first evaluated. On the other end of the spectrum here is a site that requires all the acreage to be acquired through condemnation process, resulting in delays and additional service fees. Other options here include property that is donated but may include tax liabilities or restrictive covenants.

Higher ranking for economy is reserved for sites with all utilities including storm water, sanitary sewer, water, power, gas and data/telecommunications already located at or close by the project site. The availability of redundant utilities should also figure into the evaluation criteria. For example, it is desirable to have redundant feeds following diverse routes from the telephone company central office (CO) or from high speed fiber-optic lines provided either by the utility or the locality. Additionally, power availability from two different substations or two separate utilities is desirable. Utilities which must be extended to provide the required redundancy factors for the site are extremely costly and therefore are added to most cost factor evaluations.

Site development costs include overall grading, roads and parking areas. If there is a large amount of site clearing (tree removal) or leveling required to prepare the site for a building pad then costs can escalate. Generally, steep wooded sites fall into this higher cost category. Critical facilities can be constructed on these sites but costs are higher.

Sites for PSAPs should be evaluated on several **technological factors.** As mentioned earlier in the cost section, diversity of power and data/telecommunications is required for all these sites. If this is not possible then other means must be devised to overcome the redundancy issues. This may include additional generators, or microwave communication links. On site utilities such as well water and septic fields may be provided for remote sites. Finally, the site should be evaluated for the line of sight to adjacent structures or natural features which may have microwave towers or transmission sites.

The final analysis (due diligence) for completing the site selection for a PSAP may include a Phase One Environmental Site Assessment. This includes a data search for any jurisdictional wetlands and site specific archeological or historical significance. This review may require an option on the property, so that physical access to the site may be permitted. A complete analysis may also include soil test borings on the site to determine geologic

and soil conditions on the site. For example, if the site has large rock outcroppings just below the surface, excavation costs will be higher to level the site for a building pad. Soil borings may also reveal conditions which may require supplemental foundations such as pilings or drilled piers.

It is clear that the process of selecting a site for a new PSAP should be carefully considered. It is recommended that each criterion be weighted and ranked in a collaborative forum so that an objective scoring can be made for each potential site.

In addition to determining the location of the RECC, there are several other steps that will need to be taken before construction can begin. First is the Pre-Design Phase, which involves the development of the building program (space planning and functionality requirements), and the conceptual design. The Design Phase follows including Schematic Design, Design Development, and the creation of construction documents. The construction phase follows.

- **AECOM recommends that the RECC begin the design of a new facility as quickly as feasible.**

7.9 How Should the Shared Center be funded?

As discussed in Section 6; the recommended creation of a shared Emergency Communications Center will include some capital expenditures as part of the start-up of operations. While the amount required is significant, and the first year of operation will require the expenditure of more funds than the combined cost of operating the dispatch centers independently, the long term cost of the consolidation can result in cost savings for each of the jurisdictions.

Currently, the localities fund their respective public safety dispatch operations through a combination of budgets. Currently, each PSAP is funded through the Police Department. Matching funds are also received from the Commonwealth.

For the start-up costs, there are grants available from several sources. The Commonwealth of Massachusetts has aggressive funding plan for the consolidation of local PSAP's into a regional center. The program will provide funding for start up and building costs, equipment purchase, and recurring budget expenses. Among the items eligible for funding are 9-1-1 CPE, mapping systems, and CAD systems.

There are 26 federal grant-making agencies and over 900 separate federal grants-in-aid programs. There are 15 different types of federal assistance. These include seven financial types of assistance and eight non-financial types of assistance. We will focus on two of the seven types of financial assistance: Formula Grants and Project Grants. Formula grants allocate funds to states or local governments according to a distribution formula prescribed by federal law. The State Homeland Security Grant Program and the Law Enforcement Prevention of Terrorism grant program are two examples of formula grants. The amount appropriated by Congress is distributed to the states on the basis of population. Other formula grant programs use more complex formulas to distribute the grants. Block grants are a subcategory of formula grants. Block grant programs often have a wide range of eligible activities typically covering a general problem area. Two examples of block grants are the Community Development Block Grant and the Byrne Memorial Justice Assistance Program. The COPS Interoperable Communications grant program is an example of a project grant program. Project grants are also referred to as discretionary grants. Funding is provided for specific projects for a fixed period of time. Often there is a competitive process among the grant applicants.

There is a good possibility that grants will cover some of the cost of the equipment needed to initiate the consolidated operation. With some exceptions, grants generally will not cover the cost of the facility.

While grant funding will be a significant source of revenue for the shared Emergency Communications Center, the participating towns, the fire district, and the university will have to provide funding as well. A formula will need to be devised to allocate the funding requirements among participating entities. There are numerous examples of funding formulas available. Some use only one metric, such as 9-1-1 calls, radio transmissions, and so forth. The cost estimates in Section 6 are based on the number of 9-1-1 calls, as an example. Others use multiple factors. Central

Operations for Police Services in Muskegon County, Michigan uses a formula that includes population, equalized property values, and system usage. The Charlottesville, Albemarle County, University of Virginia Joint Dispatch Center uses a formula including population, index crime, and calls for service. These are just two of many examples. Here are some other examples:

Orange County, FL
Orange County primarily utilized impact fees to fund their radio system. They attached a $500 radio assessment fee to each single-family residential building permit in the County under the justification that it was the growth in the County that was causing the degradation of the system coverage and the need for an expanded radio system. The assessments are proportionally higher for larger commercial permits.

Cobb County, GA
Cobb County sold County owned property to finance the radio system upgrades. The County also added an impact fee of $15/ticket for traffic violations to fund the radio system.

San Bernardino County, CA
San Bernardino County is preparing to pursue a five zone simulcast, P25 trunked and conventional radio system covering over 20,000 square miles. They are leaning towards a monthly user fee of between $50 and $75 per radio to fund acquisition, operation and maintenance of their system.

Muskegon, MI
Muskegon charged local jurisdictions a monthly user fee based on a formula containing the jurisdiction population, the tax base, the number of calls for service, and the number of CJIS checks requested of the 9-1-1 center (for law enforcement agencies). They also utilized funds from the 9-1-1 surcharges. The financing for the system was obtained through a lease/purchase program managed by a local bank. Tax-exempt financing was provided at 70% of the prime rate. A dedicated millage was subsequently enacted to provide for continuing technological updates.

Commonwealth of Virginia
The Commonwealth of Virginia is building a statewide network for the Virginia State Police and other state agencies called STARS. The system will have approximately 130 sites and initial cost estimates were $330 million. They received general legislature funding for system.

State of Illinois
The State of Illinois received an initial $25 million federal grant to purchase new radio equipment for their new 146 site, statewide system constructed, owned and operated by Motorola through a public/private partnership. State and local jurisdictions lease airtime based on the number of radios approved for operation on the network.

Pima County, AZ
Pima County is planning to construct a wide-area, Project 25 (P25) trunked, simulcast 700/800 MHz two-way radio communications system covering over 10,000 square miles and designed to serve twenty fire departments and districts, eleven law enforcement agencies, and the Pima County Office of Emergency Management and Homeland Security. The County is utilizing a bond issued for the purpose, and already approved by the citizens through a special ballot. The County, in partnership with the City of Tucson, is also seeking supplemental funding through public grant programs from the U.S. Department of Homeland Security. The grant monies will be used to offset some of the acquisition costs, especially as they relate to specific equipment classifications covered by the federal grant.

Tomkins County, NY
Tomkins County is planning to build a ten (10) site, digital, trunked 800 MHz simulcast Land Mobile Radio (LMR) system with a connected microwave ring. This $15-20 million radio project will be primarily funded by

local bonds. The infrastructure, such as towers, equipment shelters, and site work will be bonded for 20 years. Other types of equipment will be bonded for up to 10 years, commensurate with the expected useful lifespan of the technology and hardware. Two public safety grants relating to the project, of approximately $500,000 each, have been received through the efforts of local congressmen.

Allegany County, MD

Allegany County, MD, has found a way to provide its first response agencies with advanced telecommunications services, such as enhanced interoperability, mobile high-speed data terminals and more, by using an innovative public/private partnership.

The Allegany County Network, AllCoNet2, is a carrier class communication network that provides high quality communication services to public safety, government, educational, commercial and residential users. AllCoNet was originally developed by the Allegany School System to bridge the "Digital Divide" in a cost effective manner to improve educational opportunities. As AllCoNet2 evolved over time, additional government agencies such as the libraries, City and County government and public safety agencies adopted it as a cost-effective, reliable solution to the need for interoperable communications including voice, data and video. Construction and operational costs are thus shared among a number of groups, rather than being borne entirely by Allegany County's public safety agencies.

Their outstanding public/private partnership received the ‘Smart Practice’ designation from the Federal Emergency Management Administration (FEMA) in 2006. This proven network has been the only municipal network to receive this designation and has been in operation since 2003. For more information on the principles behind their network.

As part of the development of the joint powers agreement for the creation of the ECC, a consensus will need to be reached on the specific formula that will be used. Appendix A of this report contains a comparison of the operating budget for the Regional Center versus the cost of continuing the current operations for the next twenty years.

- **AECOM recommends that the ECC develop a funding formula to cover those costs not funded by other means.**

7.10 Implementation Plan

The implementation of a Regional Emergency Communications Center is a significant, multi-faceted project. There will need to be close coordination between all of the activities in order to make certain that all of the activities occur in a timely manner. We suggest thinking of the project in four elements that must come together: The governance structure; dispatch facility and equipment, radio system, personnel selection and training, and policy and procedure development.

7.10.1 Governance Structure

- **Commitment to Participate**: Before any other activities occur, and as expeditiously as possible, each of the towns should formally commit to participate in the RECC. We suggest this be accomplished by December 31, 2010.

- **Draft Intergovernmental Agreement:** As soon as the involved entities have committed to the consolidation project, legal console for the entities should prepare the intergovernmental agreement and present it for adoption. All involved entities should adopt the agreement no later than March 31, 2011.

- **Recruit, select, and hire the Emergency Communications Center Director**

The creation of a RECC is a challenging undertaking. Finding the right person to lead that consolidation is an early step that is critical in the consolidation process. We recommend that the proposed scope of the

consultant discussed above be modified to include the development of a job task analysis and job descriptions for all the proposed positions. As soon as the job task analysis and job description development is complete, efforts should begin to recruit, select and hire the director. It is important that the director be brought on board as early in the process as feasible. The additional dispatch administrative positions recommended should be phased in over the next twelve months.

The administrative staff will have much to do in order to get the new facility and consolidated dispatch center in operation. It may be advisable to augment the staff with outside assistance.

7.10.2 Facility Development

Typically, the construction of a new public safety communications center takes a minimum of 18 months from the start of the design phase until the completion of construction. Installation and burn-in of the new equipment adds another 45 to 60 days on to the substantial completion of construction. The actual design of the facility should begin as soon as the commitment to participate is received from the entities involved. It should begin no later than August 1, 2010. As noted above, the design of public safety communications centers and emergency operations centers is a specialized field. It is important to the success of this that a firm with the appropriate experience be selected.

The following tasks are part of the development of the new facility:

- Subproject start — December 1, 2010
- Complete Space Planning for RECC — March 31, 2011
- Complete Dispatch Center Design — June 1, 2011
- Begin Dispatch Center Construction — September 1, 2011
- Dispatch Center Substantial Completion — June 30, 2012
- Cutover to Consolidated Center — September 2, 2012

- **AECOM recommends that the RECC begin the design and development of the new facility no later than December 1, 2010 and begin the procurement process for new 9-1-1 CPE, a new CAD system, radio consoles, and specialty furniture in a timely manner to allow the installation as soon as the new dispatch facility is substantially completed.**

Detailed functional specifications, based on the specific needs of the user agencies, will need to be developed, requests for proposals issued, proposals received and reviewed, negotiations conducted with the successful respondents, and the system implemented in close coordination with the building schedule. In order to achieve the coordination, the procurement process for this specialized equipment should begin shortly after the building contractor is selected. This process should begin about the time the construction of the facility starts.

7.10.3 Policy and Procedure Development

A comprehensive, well thought out uniform set of written directives, including standard operating procedures and policies will be a critical part of the operation of the shared communications center. Work to develop these directives should begin immediately after the director is brought on board with the goal of having them completed well before cutover.

- **AECOM recommends that the RECC Director be selected and hired no later than June 1, 2011.**

- **AECOM recommends that the development of the comprehensive policy and procedure manual be completed no later than June 1, 2012.**

- **AECOM recommends that the RECC dispatch staff be selected and begin training on the policies and procedures no later than June 1, 2012.**

The entities participating in this study face significant challenges as each seeks to provide high quality services to its citizens and visitors. The implementation of a Consolidated Emergency Communications Center is an opportunity to provide improved services while reducing the long-term costs to each community. This is made even more advantageous by the grant programs of the State Department. The implementation of a consolidated center is strongly recommended.

Appendix A Staffing

A.1 Introduction

The staffing of public safety communications centers is a complex issue. Having the correct compliment of staff on duty when needed is a significant challenge to public safety communications managers in many locations. There are a number of aspects to staffing that need to be addressed. These not only include personnel issues such as the number of authorized positions, the actual staffing complement, employee turnover, training, amount of overtime, paid leave amounts, sick leave amounts and so forth, but also include things such as the technology employed and the nature of the duties of the personnel. The appendix provides a brief overview of the various issues involved and then presents AECOM's recommendations for staffing for each of the consolidation models. The recommendations are based on common formulas used to determine staffing as modified by the available data from the agencies participating in this study.

While each public safety dispatch center is unique, staffing is a common issue present at every center. Insufficient staffing of a dispatch operation promotes excessive stress and employee burnout which in turn leads to higher turnover. A recent study by the University of Denver Research Institute for the Association of Public Safety Communications Officials, International Project RETAINS[i] identified five factors that predicted higher retention rates, in order of influence:

- Employees perception that the center was fully staffed
- Average overtime hours per month
- Job complexity
- Hourly base pay rate
- Employee satisfaction with working conditions

The study also identified eight factors that predicted higher employee satisfaction, in order of importance:

- Center performance
- Preparation and ongoing training
- Feeling appreciated by management
- Satisfaction with the shift selection process
- Satisfaction with the process for mentoring new trainees
- Feeling appreciated by their immediate supervisor
- The perception that there was a thorough and extensive application and selection process
- Feeling appreciated by the media

Just as understaffing a dispatch center creates problems, overstaffing creates its own set of problems:

- Internal morale is affected by boredom during periods of little work
- Low activity does not allow for a feeling of accomplishment or achievement
- Personnel may become more interested in entertainment than operations during periods of low activity

Finding the right staffing complement is an ever changing challenge. At best, they are only estimates based on assumptions and available data. There are several approaches to determining the number of people needed on duty at any time. Most staffing formulas use queuing theories to estimate the number of call takers needed. Most calculations are based on either First In First Out (FIFO) or Last In First Out (LIFO) disciplines. As Church and Church note,[ii] in public safety communications, the discipline is almost never either FIFO or LIFO. One of the reasons for this is that no visible line forms. In addition, the varying priority of messages affects the order in which the messages are handled. AECOM uses a method that analysis the various elements of the center's workload and estimates the staff needed to handle that workload within the established performance estimates. The specific tasks that are performed in the center must be identified first. Some of the tasks, such as answering incoming 9-1-1 lines, are easily quantifiable based on available statistics. Others, such as handling message traffic on the CJIS system, and various

supervisory tasks are not easily measured in terms of the time commitment involved. Each of the tasks takes a certain amount of time. While individual occurrences of the same task may take more or less time, an acceptable average time can be established.

Once the tasks have been identified and the average time requirements determined, there are two basic approaches to determining call volume and staff requirements. One involves a detailed data collection and analysis. The second approach uses an approximation approach. Since each of the three centers involved in this study collect and measure data in a slightly different manner, we have used a modified approximation approach to estimate the workload for the center. We have used the available data from the three centers to modify the calculations. For example, one model suggests that two 9-1-1 calls per day per 1,000 population can be expected. Using the 2008 population estimate for study area (117,170), the PSAPs would have been expected to receive an average of 334 incoming 9-1-1 calls per day. In 2008, the three PSAPs together averaged 171 calls per day. As this project moves forward, more detailed data can be collected and used to refine the estimates. Once a shared dispatch operation has been established, this type of analysis needs to be done on a routine basis to make sure the staffing is appropriate. The sampling period needs to be long enough to identify the differences caused by the hour of the day, day of the week, season and other factors such as a significant event. As a historical record is developed, changes in patterns, both on a seasonal and longer term basis, can be detected and adjustments made. Table A-1 shows the available metrics for the centers.

Table A-1
Comparative Activity

2008	Monson	Palmer	Hampden	Total
Wireline 9-1-1 Calls	1,550	1,950	647	4,147
Wireless 9-1-1 Calls	325	1,050	165	1,540
Total 9-1-1 Calls	1,875	3,000	812	5,687
Administrative Calls	49,864	7,500	5,000	62,364
Total Incoming Calls	51,739	10,500	5,812	68,051
Outgoing Calls	210	450	336	996
Total Phone calls	51,949	10,950	6,148	69,047
Police Dispatches	10,895	15,349	7,012	33,256
Police Officer Initiated	3,470	3,119	4,887	11,476
Fire Calls Dispatched	180	312	214	706
Medical Calls Dispatched	674	1,395	297	2,366
Total Dispatches	15,219	20,175	12,410	47,804
Total Calls per FTE	12,987	2,190	1,537	5,235

A.2 Emergency Communications Center Functions

The three communications centers involved in this study exist to support the public safety agencies participating in this study. As such the centers receive and classify calls for assistance from the public, select the appropriate response and alert the appropriate responders of the incident. Each of the centers tracks the status of responders they have responsibility for, provides access to various local, state, and national data bases, and provides coordination between various responders and agencies. In addition to answering the incoming emergency lines, each

center also answers a number of non-emergency telephone phone calls. In addition, the centers receive requests from the field to run inquiries into the various systems when the field units either do not have or are not able to use their mobile terminals. They also call for tow trucks and make other calls in support of the officers in the field. They provide similar services for the fire departments and rescue squads.

A.3 Task Analysis

Using studies done in other public safety communications centers, it is possible to develop reasonable estimates of the time used to support dispatch operations. Each of the agencies involved maintains some form of operational statistics. The agencies have provided the information to AECOM for our use in conducting this study. Because there are differences in the definitions and the level of detail available, limited data sets are available for computing the workload in the consolidated center. The following table contains the common statistics available from the three centers.

This activity data will be used to determine the workload generated and the staffing needed for the various combinations of centers discussed in the report.

The initial task in all three centers is the report of an incident. The majority of incident reports typically stem from 9-1-1 calls. The critical information needed includes:

- Location of the Incident
- Nature of the Incident
- Time Incident Occurred (In progress?)
- Other Hazards

Other information, which is not essential to initiate the dispatch, includes the following:

- Name of Person Reporting the Incident
- Names of Witnesses
- Name and Description of Parties Involved
- Other Descriptive Information

On calls reporting medical emergencies, additional information is gathered. This includes:

- Chief Complaint or Symptom
- Patient's Age
- State of Consciousness
- Breathing Activity

The location verification process is essential to a timely and appropriate response to any emergency. The implementation of enhanced 9-1-1 for wireline telephone service provides some time-saving assistance. However, studies have indicated that as many of forty percent of all incident reports made by wireline telephone do not originate from the address of the incident occurrence. In addition, wireless 9-1-1 calls may or may not initially provide location information. If the dispatcher must request the location information after they have answered the call. Generally, this request must be at least thirty seconds after the call has been initially answered. Many wireless callers are unable to provide accurate information on the location of the incident. Studies have shown that typical call processing time for wireless 9-1-1 calls is approximately fifty percent greater than for wireline calls. A typical wireline 9-1-1 call is handled in sixty seconds. The average processing time for wireless calls is ninety seconds.

Once the location of the incident is verified, it is entered into the Computer Aided Dispatch (CAD) system along with the nature of the incident and other appropriate information. Typically the information is entered as the dispatcher is taking the information. The call is also classified as to its severity. On some in-progress calls, the dispatch may be initiated while additional information is being obtained. This is usually done by one dispatcher remaining on the telephone while another dispatcher initiates the response. However, for the centers involved in this study, response is

delayed due to only having one dispatcher on duty per shift. This presents additional liability and increased response times under the current configuration.

In many cases, more than one telephone call is received reporting the same incident. These subsequent calls usually do not receive the full treatment once it is determined that the caller is reporting the same incident and does not have additional information that is needed.

Once the incident has been entered into the CAD system, the appropriate resources must be dispatched. This involves the selection of the proper resource based on the location and nature of the incident. The dispatcher must have an awareness of the availability of the resources under his or her control. The CAD system should provide a recommendation based on the resource, however, during interviews and center assessments conducted by AECOM it was determined none of the existing centers currently utilize this feature of the CAD systems. Police response is normally dependent on the availability of units to respond. When all units are busy, incidents are queued or stacked by severity and age. Frequently for incidents that are not high priority, the incident is stacked until the unit assigned to the area of the call is available. A certain amount of time delay in response to non-emergency incidents is not considered unacceptable Fire and EMS incidents are almost always treated as emergencies requiring immediate response. Some prioritizing of calls is done through emergency medical dispatch; although only one center is trained in EMD and is unable to utilize this service due to only having one dispatcher on duty. This will likely become an increasing issue as the Commonwealth of Massachusetts moves towards implementing the EMD requirement by PSAP's located within its borders. Most typically, the prioritizing of EMS calls involves determining if first responders should also be dispatched and if the responding units should respond using emergency lights and sirens.

The dispatcher must confirm the recommendations of the CAD system based on information that may or may not be in the system. This includes other events occurring, specific abilities needed for the incident response, upcoming shift changes, and so forth. In other words the dispatcher must independently develop a recommendation and then accept or modify any recommendation from the CAD system. While some police units are equipped with mobile computer terminals, most police and all fire and EMS calls are dispatched by voice since not all units are equipped with mobile computers and other units need to be aware of what the other units current status at all times.

For police calls, the dispatcher must first alert the unit or units to prepare to receive a message, be notified by the unit of its availability, broadcast the assignment and receive acknowledgement from the unit. Fire/EMS dispatch usually does not involve the availability reply. If the unit does not acknowledge the dispatch, the dispatcher must confirm receipt of the message, reinitiate the contact, or in the case of critical incidents, select other resources to respond.

Once the units have been dispatched, there will be radio messages from the unit to provide status changes (arrival, clear, etc.), to request additional information or resources and to provide information. The dispatcher may initiate additional messages as well to check the well-being to the responders, to provide or request additional information, and so forth.

In addition to the task related workload, typical operations involve three breaks away from the dispatch positions. Two of the breaks are typically ten minute breaks while the third, a meal break, is usually longer. Thirty minutes is a typical period. The AECOM workload analysis takes into account these periods when calculating the number of personnel required on duty.

A.4 Dispatch Configuration

Receiving and dispatching of calls for assistance are the two primary tasks of each of the public safety communications centers in this study. Each of the agencies has equipped all of its positions to handle both functions simultaneously. All of the dispatch centers operate as *single-stage operations*. In other words, all of the dispatchers have the ability to efficiently control all units. This is typically the most efficient method of dispatching. Some larger dispatch centers use a *two-stage operation*. In a two-stage operation, the call is taken by one person and the information is transferred to a second person who then dispatches the call. The two-stage operation becomes the

model of choice when the number of incoming calls requires multiple call-takers and the number of units being controlled requires multiple channels and dispatcher. A third model, *three-stage operations*, is used in only a few communities. Under this model, the 9-1-1 operator determines the location and nature of the call and transfers the call to the appropriate call-taker. The call taker then enters the information into the system and transfers the information to the dispatcher. The dispatcher then transfers the call. This model is not widely used.

AECOM recommends that the consolidated center use a modified single-stage operation. For most of the day, the single-stage model would be used. During peak times, however, supplemental personnel would be used in a call-taking capacity.

A.5 Workload Analysis Assumptions

AECOM's workload analysis process uses the activity data and task descriptions to estimate the time used to support public safety operations. Based on available data, the typical 9-1-1 call for law enforcement services occupies the call taker for approximately sixty seconds. The typical fire call occupies the call taker for forty-five seconds, and the typical emergency medical call occupies the call taker for one hundred ten seconds in centers where emergency medical dispatch protocols are used.[iii] Since Massachusetts has stated its intent to require EMD, AECOM has used this scenario in its assumptions for calculating workload. Radio traffic adds to the center's workload. For the average law enforcement incident, there will be a minimum of three radio messages. These consist of the dispatch and the unit's arrival and clear status changes. EMS incidents involve those same messages as well as additional status changes for the unit calling enroute to the scene and to the hospital, arriving at the hospital and returning to quarters. Fire incidents also add additional messages. Since many fire incidents involve multiple unit responses, the status change messages for calling enroute, arriving, clearing and returning to quarters are multiplied by the number of units arriving. In addition, incident command procedures commonly used by fire departments include additional messages concerning the status of the incident such as initial report, operations reports and requests, and so forth. The messages are transmitted so that the times can be documented in the incident record.

The workload at a dispatch center is not evenly distributed. Studies have shown that the busy day call volume is approximately forty percent higher than the average call volume.[iv] Yung and Dayharsh also noted that approximately ten percent of the days total call volume occurs during the busiest hour on the busiest shift; eight percent occurs during the busiest hour of the second busiest shift, and six percent of the daily call volume occurs during the busiest hour of the least busy shift. Other studies have shown that dispatch activity follows a pattern that repeats. That is Friday and Saturdays are typically busier than weekdays. Seasonal variations are consistent, and so forth. A review of the data furnished by the PSAPs in this study indicates that this estimate is reasonably accurate. We have taken the available data and computed the daily average, the average for the busiest day of the week and the average activity for the busiest hour of the busiest day. Those figures are shown in Table A-2.

Table A-2
Daily Averages

Actvity	Daily Average	Busy Day	Average Busy Hour
Total 9-1-1 Calls Received	16	22	2
Administrative Calls	170	239	24
Total Incoming Calls	186	260	26
Police Calls Dispatched	90.9	127	13
Police Officer Initiated	31.4	44	4
Fire Calls Dispatched	1.9	3	0
EMS Calls Dispatched	6.5	9	1

Using the estimated busy day figures, we can begin to estimate the workload and, as a result, the staffing is required to meet the performance goals. Using the busy day statistics, Table A-3 shows the estimated workload in seconds for the fully consolidated center.

Table A-3
Estimated Workload

	Daily Average	Busy Day	Busy Day Workload (seconds)	Busy Day Workload (minutes)
Total 9-1-1 Calls Received	16	22	1305	22
Administrative Calls	170	239	17891	298
Total Incoming Calls	186	260	19197	320
Police Calls Dispatched	90.9	127	11449	191
Police Officer Initiated	31.4	44	2634	44
Fire Calls Dispatched	1.9	3	230	4
EMS Calls Dispatched	6.5	9	679	11
Total Time Required			**34187**	**570**

It is then possible to divide the total seconds required by the seconds that one dispatch position is available to work per shift and determine the number of staff needed each day.[v] There are three thousand six hundred seconds in each hour. If each dispatcher is assumed to be sixty-seven percent efficient, that is they work measured activities forty minutes in each hour, one position is available to handle the above activities three hundred twenty-one minutes in an eight hour shift. In order to handle the activity above (2,557 minutes), a total of eight people are needed on duty each day[vi]. Using the activity distribution described above, we recommended the following four on-duty staff for each shift.

In addition to the personnel needed to handle those volume-influence positions, two additional positions will be needed on each shift to cover the other activities. One of those positions should be a shift supervisor. The staffing needed each day including these positions would then be five telecommunicators and a shift supervisor on duty on each shift.

In order to staff the twelve shifts every day, a total of thirty full-time telecommunicators and supervisors will be needed. This is based on each full-time employee's work year being based on 2,088 hours in a year. All of the time that the employee is unavailable to work (vacation, sick, and other leave as well as training time, breaks, and so forth) are subtracted from the 2,088 hours to provide the net available working hours per employee. For this project we estimated a total average of 411 unavailable hours leaving a net available work hours figure of 1,677 hours per full-time employee. This number was then used to divide the total number of hours needing to be covered.

In order to handle the activity (1,596) minutes a total of six people are needed on-duty each day. In addition to the personnel needed to handle those volume-influence positions, two additional positions will be needed on each shift to cover the other activities. One of those positions should be a shift supervisor. The staffing needed each day including these positions would then be four telecommunicators and a shift supervisor on duty on each shift.

In order to staff the ten shifts every day, a total of nine full-time telecommunicators and supervisors will be needed. This is based on each full-time employee's work year being based on 2,088 hours in a year. All of the time that the employee is unavailable to work (vacation, sick, and other leave as well as training time, breaks, and so forth) are subtracted from the 2,088 hours to provide the net available working hours per employee. For this project we estimated a total average of 411 unavailable hours leaving a net available work hours figure of 1,677 hours per full-time employee. This number was then used to divide the total number of hours needing to be covered.

We cannot emphasize enough that these are estimates. We highly recommend that detail data be collected between now and the actual consolidation. Among the data that should be collected are detailed 9-1-1 call and dispatch data. Ideally, the information should be collected for each hour of each day for a year in order to facilitate a more complete analysis. Unfortunately some of the agencies participating in this study were not able to provide this information in an automated manner.

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[iii] Yung, T.J and Dayharsh,, T.I. *The Design and Costing of 911 Systems*. Bureau of Justice Statistics, US Department of Justice. Washington, DC. 1980 (no longer in print). Updated by additional studies.
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[v] McClure, N.D, *Muskegon Central Dispatch Workload Analysis*. Unpublished paper.
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AECOM

Communications Technology

20715 Timberlake Road, Suite 106
Lynchburg, Virginia 24502
www.aecom.com