

**FEASIBILITY ANALYSIS
FOR
ESTABLISHING A REGIONAL DISPATCH
CENTER (RDC) FOR THE TOWNS OF
DANVERS, HAMILTON, AND
MANCHESTER-BY-THE-SEA, MA**

AUGUST 2017

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REPORT



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INTRODUCTION

MRI (Municipal Resources, Inc.) was engaged by the Town of Danvers, Massachusetts, to evaluate and assess the opportunities and challenges associated with the Danvers dispatch center providing dispatching services for other communities in the region, including Hamilton, and Manchester-by-the-Sea, thereby establishing joint regional call and emergency communications center operations for police, fire, and emergency services. The three communities will use this information to assist them in determining the operational feasibility and fiscal costs related to each of the several options for establishing the Danvers Regional Dispatch Center (RDC).

MRI is a firm dedicated to providing professional, technical, and management support services to municipalities and schools throughout New England and the Northeast. We are an established New Hampshire corporation and provide local government management consulting, recruitment, and selection services to municipal governments, fire departments, police departments, public works departments, libraries, schools, and other government agencies. Among the areas of expertise available are department assessments, organizational studies, personnel recruitment, personnel administration, collective bargaining, community and economic development, budget/finance, and general management. MRI has a particularly

strong public safety group with nationally recognized expertise in police, fire, and emergency services.

We are a New Hampshire corporation operating from a primary office in Meredith, New Hampshire, with a field office in Northampton, Massachusetts. We are registered to do business in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New Jersey, New York, and Pennsylvania. However, our market focus and expertise is New England based. We are intimately familiar with New England local government forms, culture, and issues, and pride ourselves on our ability to place our recommendations for change in a context appropriate to New England local government.

Our philosophy is to help our clients solve problems and provide realistic solutions for future success. We do not put forth idealistic, unachievable, or narrowly focused solutions.

Our objectives are always:

- To help agencies obtain maximum value for their limited tax dollars.
- To identify and help communities manage the risks associated with public safety functions.
- To raise public awareness of the value and professionalism of their public resources.
- To help local leaders develop and execute plans that best meet their community's unique needs, given the resources available.

PURPOSE, SCOPE, AND METHODOLOGY

Public Safety Communications are at the heart of the effective and efficient provision of community-wide emergency services. Dispatchers must have the ability to receive critical information, process the information quickly and properly, disseminate the information to appropriate first responders, and maintain all data records required for the specific nature of the incident. These critical tasks can be much more daunting when resources are scarce and equipment is outdated or obsolete. Current technologies and effective leadership are critical in achieving communications interoperability, defined as, *"the ability to exchange voice and data on demand, in real time, when needed and as authorized, for responders both within their agency and across jurisdictional boundaries"*. Achieving true interoperability requires an infrastructure that facilitates sharing of information. The goal is to make strategic emergency management and tactical incident management possible. Achieving this goal can present

significant challenges considering that there is tremendous diversity among 9-1-1 centers. As technology becomes more sophisticated and the public's expectations regarding emergency services grow, the world in which public safety communications operate has changed, significantly increasing the demands on the system.

Since the terror attacks on September 11, 2001, the challenges of communications interoperability have been at the top of local, state, and federal government priorities, as made apparent by the United States Department of Homeland Security's drive towards interoperability over the past decade. In addition, the Commonwealth of Massachusetts has been aggressively encouraging regionalization of emergency communications and dispatch operations to not only facilitate interoperability, but to dramatically reduce the number of Public Safety Answering Points (PSAPs) in the state. In addition to federal funding opportunities, the Commonwealth has been awarding significant grants, both competitive and non-competitive, to PSAPs weighed heavily toward those who are already, or who plan to, regionalize. The goal of communication regionalization is to develop a high-standards communication center, maximizing the quality of the service provided, while creating a cost savings to the towns that participate based on their current communications strategy and needs. The political and fiscal climate to encourage PSAP consolidation has been on an upward trajectory since about 2006, resulting in opportunities for local governments.

This study takes into account the financial ability and fiscal commitment of the potential partners to undertake this endeavor, as well as suggests appropriate modifications to the communications delivery systems to provide interoperability and optimum response time and service to the participating communities. The study is also designed to determine whether the current communication systems are effective in accomplishing certain goals, or should they be modified to better achieve those goals. We have attempted to produce a report containing recommendations that will assist the three communities in setting a clear course of action for future improvements, by emphasizing the communities' present capabilities and needs, and how these can provide the foundation for a strong partnership in the future between the communities and their individual emergency services organizations.

To that end, this study included the following aspects:

1. A comprehensive evaluation of the current facilities and technology in the existing and proposed Danvers dispatch center and an assessment of Danvers's ability to host such a consolidated emergency communications operation. This assessment included, but was not limited to, the following:
 - An evaluation of the current dispatch space
 - An evaluation of the proposed expanded dispatch space

- An evaluation of current and proposed upgraded dispatch equipment
 - An evaluation of the compatibility of systems and equipment between the three communities
 - Evaluation of the potential to further expand operations
2. Development of cost projections for facilities, technology, and training to make Danvers operable to serve as host.
 3. Identified methods for providing connectivity and redundancy in order to deliver 9-1-1 calls from each of the three communities to a proposed host community, with appropriate levels of back-up to provide for continuity of operations.
 4. Performing an interoperability assessment and developed cost estimates to connect all involved jurisdictions to the proposed host community.

To accomplish this task, members of the study team requested, and were provided with, the following information and documentation: community demographic data, existing rules, regulations, and standard operating procedures/guidelines for the communication centers, maps, square mileage calculations, budgets for the communication center, as well as the town, service trends and call volume data from the centers, appropriate collective bargaining agreements, mutual aid agreements, a list of communication lawsuits, personnel rosters, department organization charts, and annual reports. MRI consultants met with local officials, the chiefs of the police and fire departments from each community, and the dispatch supervisor for the Danvers dispatch center. These meetings were held in each of the three interested communities so site visits could be made to each of the existing communication centers to evaluate the existing infrastructure.

A total of 17 specific tasks were incorporated into the completion of this project.

1. Determined the technical requirements needed to support a RDC for the three communities, and make a recommendation as to the feasibility of Danvers hosting the RDC.
2. Conducted on-site assessments of the dispatch facilities and capabilities. This included an evaluation of existing sites, development of an equipment inventory, and an assessment of operations currently utilized to determine the feasibility of other options such as off-site placement of certain equipment.

3. Conducted an analysis of computer aided dispatch (CAD) software to be used and options for the interface or purchase of a records management system (RMS), which included compatibility with cruiser laptops or other mobile devices.
4. Conducted a thorough assessment of existing communication center operations and provided recommendations regarding state regulatory and statutory requirements that may have an impact on the creation or operation of a RDC.
5. Conducted a thorough assessment and provided recommendations as to the type, amount, and cost of additional or consolidated voice and data systems, radio systems, telephone systems, and other related equipment that should be purchased in order to provide the RDC with the most up-to-date technology and equipment available.
6. Performed an interoperability assessment and developed cost estimates to connect all the jurisdictions to the host community.
7. Conducted an assessment on the impact that a RDC would have on the Insurance Services Office (ISO) ratings.
8. Evaluated the current methodologies employed in each community pertaining to the process of alarm signals, and identified the most advantageous way to consolidate the reception of these signals.
9. Conducted a thorough assessment of the staffing requirements for the RDC and developed recommendations in regards to related costs, including budget development, cost allocation, and operational issues.
10. Identified SETB grant opportunities and compared how this grant potential will equate to the cumulative grants currently received.
11. Conducted a thorough assessment and provided recommendations concerning other transitional issues, both operational and human resource related.
12. Conducted an assessment of, and developed recommendations for, a training program for public safety dispatchers, including initial and continuing training.
13. Developed an interoperability plan that takes into account and optimizes the reuse of existing communications infrastructure.

14. Worked with the SETB to identify how the Commonwealth would approach the technical and procedural plans for connectivity and redundancy for 9-1-1 calls from each community to the host community.
15. Developed cost projections for facilities, technology, and training to make the Danvers RDC operable as the host public safety dispatch facility. This included providing several cost allocation models that have been successfully implemented in comparable RDCs.
16. Consulted with several reputable vendors to develop cost estimates for various components needed for the RDC.
17. Consulted with representatives of the towns and selected vendors to assess and analyze various options for connecting Hamilton and Manchester to the RDC.

Once the community specific data was preliminarily analyzed, a series of searches were completed for existing standards and industry “best practices” to be used for comparison to the proposed regional dispatch center. Several studies exist for extrapolating center configurations, budget recommendations, and staffing/call volume standards. These studies were then used as the foundation to begin the development of various recommendations for the RDC, including projections for relevant costs and savings to the participating communities. While not specifically evaluated in this study, it is the opinion of the MRI study team that the recommended facility for this RDC could easily handle the addition of several more similar sized communities should they wish to join this regional endeavor.

Recommendations for the advancement of this proposed endeavor are made in a series of important categories. These recommendations are not intended to be exclusive if adopting this communication strategy; however, they are designed to approximate many of the foreseeable hurdles during a transition to a regional emergency communications center.

EXECUTIVE SUMMARY

Municipal Resources, Inc. (MRI) was engaged by the Town of Danvers, Massachusetts, to evaluate and assess the opportunities and challenges associated with the Danvers dispatch center providing dispatching services for other communities in the region, including Hamilton, and Manchester-by-the-Sea, thereby establishing joint regional call and emergency communications center operations for police, fire, and emergency services. The three communities will use this information to assist them in determining the operational feasibility and fiscal costs related to each of the several options for establishing the Danvers Regional Dispatch Center (RDC).

This study takes into account the financial ability and fiscal commitment of the potential partners to undertake this endeavor, as well as suggests appropriate modifications to the communications delivery systems to provide interoperability and optimum response time and service to the participating communities. The study is also designed to determine whether the current communication systems are effective in accomplishing certain goals, or should they be modified to better achieve those goals. We have attempted to produce a report containing recommendations that will assist the three communities in setting a clear course of action for future improvements, by emphasizing the communities' present capabilities and needs, and how these can provide the foundation for a strong partnership in the future between the communities and their individual emergency services organizations.

To that end, this study included the following aspects:

1. A comprehensive evaluation of the current facilities and technology in the existing and proposed Danvers dispatch center and an assessment of Danvers's ability to host such a consolidated emergency communications operation. This assessment included, but was not limited to, the following:
 - An evaluation of the current dispatch space
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 - An evaluation of the compatibility of systems and equipment between the three communities
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2. Development of cost projections for facilities, technology, and training to make Danvers operable to serve as host.
3. Identified methods for providing connectivity and redundancy in order to deliver 9-1-1 calls from each of the three communities to a proposed host community, with appropriate levels of back-up to provide for continuity of operations.
4. Performing an interoperability assessment and developed cost estimates to connect all involved jurisdictions to the proposed host community.

Once community specific data was analyzed, a series of searches were completed for existing standards and industry “best practices” to be used for comparison to the proposed regional dispatch center. Several studies exist for extrapolating center configurations, budget recommendations, and staffing/call volume standards. These studies were then used as the foundation to begin the development of various recommendations for the RDC, including projections for relevant costs and savings to the participating communities.

The MRI analysis of the proposed Danvers Regional Dispatch Center leads us to the conclusion that overall this will be a beneficial endeavor for all participants, and Hamilton and Manchester joining and transferring their dispatch operations there is very feasible. The new Danvers’ dispatch center, which is scheduled to open around August 2017, will initially be equipped with four fully functional dispatch consoles, with the capacity to expand up to two additional.

Our analysis indicates that the projected annual cost savings to all three potential participants in the Danvers RDC could be significant. First, the RDC itself will reduce the cost of providing dispatch services to the three communities (including current grant offsets) from \$1,264,908.00 to about \$1,005,479.00, a savings of \$259,429.00. The support grants that all communities receive annually from the state E9-1-1 department will increase from a total of \$95,816.00 between the three communities, to \$116,902.00 for the RDC, an increase of \$21,086.00. In addition, the proposed RDC will receive an additional \$331,470 in RDC/RECC operational funding from the state. This reduces the overall RDC operational cost that must be funded by the participants to \$557,107.74, a potential reduction in locally funded expenses of \$707,800.00. Although all three communities do have some local operational concerns they may or may not need to address; even calculating some offsetting additional local expenditures to mitigate these issues or concerns, which could total as much as \$160,474.00, the financial benefits that we project are still significant resulting in potential savings of at least \$547,000.00.

- Danvers will save approximately \$234,788.68 reducing their per capita cost from \$23.88 to \$15.02, a savings of \$8.86.
- Hamilton will save approximately \$157,711.10 reducing their per capita cost from \$42.89 to \$22.57, a savings of \$20.32.
- Manchester will save approximately \$141,385.49 reducing their per capita cost from \$49.49 to \$25.01, a savings of \$24.48.

As a result, based upon the significant projected cost savings that Danvers, Hamilton, and Manchester could realize from by the formation of the Danvers RDC, it is MRI’s strong recommendation that the three communities continue to actively pursue this endeavor.

The new dispatch center will be fully outfitted with the latest state of the art equipment and technology for its operations. All of the existing Danvers, Hamilton, and Manchester personnel

are well trained and experienced. The capital equipment reimbursement grants from the state E 9-1-1 department that are available to communities that are exploring shared services or regional endeavors should allow all three communities to acquire necessary equipment and also upgrade their own town emergency communications systems with the latest technology (some technology upgrades will be necessary in the various towns to allow connectivity with the RDC) as part of the process of establishing connectivity with the RDC. This will also allow the communities to build necessary redundancy into their overall emergency communication systems.

It is MRI's recommendation that fiber optic lines be utilized to connect the various police and fire communications and repeater sites in each town. The connection from Hamilton and Manchester to the Danvers RDC would be over a microwave link which is considered to be the most reliable.

The installation of safe rooms with audio visual connections that can provide a secure safe area for potential crime victims to await the arrival of police should eliminate another concern that municipalities' frequently have: "what happens when someone needs assistance and the police station may no longer be staffed around the clock?".

In order to be able to participate in a regional emergency dispatch center, all three communities need to be operating off the same CAD. Considering the variety of CAD/Dispatch systems in place among the three communities, Danvers thought it prudent to perform a comprehensive internal study of available software packages and their current statuses. A seven-member committee was assembled, consisting of police, fire, and technology personnel, to review the most widely deployed systems in the Commonwealth and evaluate their operational and financial feasibility. This process is still underway.

The first step to establishing the RDC is for all three of the potential participants to sign an Inter-Municipal Agreement. This agreement, which would require approval from the Board of Selectmen in each town, establishes the legal basis for the towns to participate in the joint endeavor. It is also necessary before the state 9-1-1 department will recognize the regional center and consider awarding state 9-1-1 development grant funding for the project to update and/or acquire equipment necessary for the RDC to operate.

Under the proposed RDC, the Town of Danvers will be the authority for the center. The RDC will be a function of, and solely under, the auspices of the Town of Danvers. The Towns of Hamilton and Manchester (as well as any others that subsequently join) will contract with Danvers to provide them specified emergency dispatching and communications services. This scenario is relatively easy to implement in that it requires only agreement between the three potential participants. Legislative approval is not necessary.

In order to assure that the other participants are satisfied with the service and their needs are being met in an ongoing manner, it would be wise for Danvers to establish an advisory operational board comprised of the police and fire chiefs (or their representatives) from each of the participating communities. This board would be responsible for assisting with developing the operational procedures used by the RDC. Since the development of a standard set of procedures and protocols for police and fire are vastly different endeavors, consideration should be given to the formation of a police subcommittee to address law enforcement concerns, and a separate fire subcommittee to work on fire and EMS issues.

In addition to the capital equipment grants mentioned previously the commonwealth also has what are known as *Support and Incentive Grants*. The purpose of these is to provide general financial and incentive based funding to assist with the costs of operating public safety answering points (PSAPs) and regional emergency dispatch centers. These grants will reimburse the RDC for a range of allowable expenses. The amount the state projects the Danvers RDC will receive in FY 2018 for *Support and Incentive Grants* is \$116,902.00. In addition, the amount estimated for *Regional and Regional Secondary PSAP and Regional Emergency Communications Center Development Grants* (intended to support the development and startup of regional and regional secondary PSAPs and RECC/RDCs, including the expansion or upgrading of existing facilities and operations to maximize the effectiveness of emergency 9-1-1 and dispatch services as well as enhance regional interoperability) is \$331,470.00. The total amount the state calculates the RDC will receive from these two grants is \$448,372.00, which will be used to offset the overall cost of the start-up and/or annual operations of the RDC. These calculations are also based upon the exact configuration of this proposed RDC. Changes to the communities that are included and/or excluded will impact the available funding levels.

We believe that it would be most cost effective for the RDC to be staffed primarily by full time employees, but supplemented with some part time personnel. Under our recommended staffing plan, the RDC would be staffed by twelve (12) full time and two (2) part time personnel. Whichever staffing model the RDC ultimately utilizes, there should be a minimum of two (2) dispatchers on duty, per shift, 24 hours a day.

Unless there is some compelling reason to do otherwise such as a facility in one community that produces an inordinate number of emergency responses (at least several per day), the simplest and most equitable way to apportion cost share for this type of endeavor is for each community to pay based upon their population, and the percentage of the total that their population represents to the entire RDC. Under a strictly population based funding system, since cost share is determined by percentage of total population, each community would automatically fund any increases in the RDC budget proportional to their overall contribution. The percentages for population would only need to be adjusted once every ten years when new census figures are released.

COMMUNITY	POPULATION	PERCENTAGE OF POPULATION SERVED AND RDC OPERATING BUDGET FUNDING
DANVERS	26, 493	66.2%
HAMILTON	7,764	19.4%
MANCHESTER	5,775	14.4%
TOTAL - 3 TOWNS	40,032	100%

Whenever possible, the goal of every municipal governing body should be to ensure that the level of service received by the tax payers/stakeholders is not diminished when considering significant changes in how operations are conducted. The MRI study team feels very confident that the level of service that will be offered by the Danvers Regional Dispatch Center may provide an improvement in the level of service available to the towns and their citizens. The center will be adequately staffed and have the ability to handle simultaneous/multiple incidents effectively and efficiently, something that would be difficult for Hamilton and Manchester to do at the present time with only a single call taker/dispatcher working in each community. The potential life-saving benefits of having sufficient personnel on duty to be able to perform proper emergency medical dispatch operations is, in and of itself, a significant positive.

It is important to note that the purpose of the executive summary is to offer a brief synopsis of the key issues and recommendations found in the study as an overview of the complete report. It is not intended to provide the reader with a detailed analysis of the results in a few pages. The complete report should be read, in all of its detail, to gain a full understanding of the many considerations, facets, and complexities associated with the formation of the proposed Danvers RDC as evaluated by Municipal Resources, Inc. (MRI).

COMMUNITY PROFILES: BACKGROUND AND LOCAL INFORMATION

TOWN OF DANVERS

The Town of Danvers is located in Essex County, approximately 17 miles northeast of downtown Boston. It is approximately halfway between Boston and the New Hampshire state border. According to the United States Census Bureau, Danvers had a 2010 population of 26,493, an increase of 5.1% from 2000. The town covers an area of 14.1 square miles, of which 13.3 square miles is land and 0.8 square miles is water. With a population density of 1,898 people per square mile, the town is classified as an urban community. The Danvers River provides direct access from the town to the Atlantic Ocean.

The town consists of a mix of residential, commercial, and industrial occupancies, which surround the highly-developed town center. Interstate 95 and Massachusetts Route 128 both pass through the town, just east of their junction in Peabody. U.S. Route 1 also passes through town, with a large junction with Interstate 95 in the northwest end of town. Danvers is bordered by Topsfield to the north, Wenham to the northeast, Beverly to the east, a small portion of Salem to the southeast, Peabody to the south and southwest, and Middleton to the northwest.

Public safety services in Danvers are provided by full-time police and fire departments. The Danvers Police Department is comprised of forty-six sworn police officers, who are supported by four administrative staff (not counting dispatchers). The Danvers Police Department was accredited in 1986, making it the first municipal law enforcement agency within the Commonwealth of Massachusetts to become nationally accredited.

The Danvers Fire Department provides fire, rescue, and first responder emergency medical services response with forty-nine sworn, full-time personnel, operating from two stations. Transport emergency medical services at the advanced life support (ALS) level are provided by Lyons Ambulance Service, a private ambulance company, which has served the town since 1904.

Dispatching services for both the police and fire departments, along with Lyons Ambulance, is provided as a function of the Danvers Police Department. The department employs nine civilian dispatchers, including a dispatch supervisor. The current dispatch center occupies approximately 350 square feet, and is located in a cramped area on the first floor of the police station. The station is currently undergoing an extensive renovation and expansion that will include a much larger (799 square foot), state of the art, dispatch area on the second floor.

TOWN OF HAMILTON

Hamilton is a rural-suburban town in the east central portion of Essex County. Located on Boston's north shore suburbs, the town had a population of 7,764 as of the 2010 census. The town covers an area of 14.7 square miles, of which 14.2 square miles is land and .7 square miles is water. Its location on the north shore provides easy access to the Atlantic seashore with its reservations, beaches, and boating.

The town is primarily residential, with some scattered commercial occupancies. It includes many historic houses and pastoral landscapes. It also has a rich equestrian heritage, which remains strong due to the influence of the many horse farms and of the Myopia Hunt Club, which holds frequent equestrian events, including polo, most Sunday afternoons. At the time of this report the town has no manufacturing type industry and no industrially-zoned land.

The town is protected by a police department staffed with thirteen sworn officers. The fire department is a combination organization consisting of both full-time career, and part-time call, personnel. EMS transport services are provided under contract by Beauport Ambulance which deploys an advanced life support (ALS) unit, 24/7 from the fire station.

Hamilton is closely tied to its sister town, Wenham, sharing a school system, library, recreation department, and commuter rail station. Until 2013, the two communities also shared a regional emergency communications center. At that time, Wenham decided to move their communications to the Essex County Communications Center. In 2010, the community of Hamilton-Wenham was listed among the "Best Places to Live" by Boston Magazine.

The Hamilton dispatch center is located in the town's approximately ten-year-old public safety building, which also houses the fire and police departments. It is located on the first floor of the building, and the dispatchers serve as receptionists for visitors to the police and fire departments. The center is new and modern, with the main operational room occupying 500 square feet in the middle of the building. There is also a dispatch supervisor's office located off the main room.

TOWN OF MANCHESTER-BY-THE-SEA

The Town of Manchester-by-the-Sea lies along the north shore of Massachusetts Bay, which in turn leads to the Atlantic Ocean. According to the United States Census Bureau, the town has a population of 5,775, which can increase to well over 10,000 on summer days. It covers a total area of 18.3 square miles, of which 9.2 square miles is land and 9.1 square miles is water. There are seven beaches lining the coast, and several small islands dot the coast, the largest being Kettle Island and House Island. There are several protected areas within town, including Cedar Swamp Conservation Area, Cheever Commons Conservation Area, Coolidge Reservation, Dexter

Pond, Owl's Nest Nature Preservation Land, Powder House Hill Reservation, and Wyman Hill Conservation Area.

Manchester-by-the-Sea is bordered by Beverly and Wenham to the west, Hamilton to the northwest, Essex to the north, and Gloucester to the east. The town is located 24 miles northeast of Boston. The town is served by a stop along the Newburyport/Rockport Line of the MBTA Commuter Rail, providing service from Rockport along the North Shore, to Boston's North Station.

The town's public safety services consist of a police department with a total of twenty-five officers. Of these, fourteen are full-time and eleven are part-time. The fire department operates from a single station and is staffed by a combination career/call force of sixteen personnel. Thirteen are full time career staff are supplemented by three call members. The fire department provides the EMS service to the town at the ALS level.

Manchester-by-the-Sea's emergency dispatch center is located inside the police department area of the Town Hall. The main entrance to the Manchester Police Department is only accessible by the stairs; however, there is ADA accessibility in the rear of the building. The dispatch center occupies about 200 square feet.

COMMUNITY	POPULATION	SQUARE MILES	AVERAGE ANNUAL CALL VOLUME 2014 – 2016*	REPORTED COST TO OPERATE DISPATCH CENTER **	DISPATCH CENTER PER CAPITA COST
DANVERS	26,493	14.1	29,170	\$717,103.00	\$27.07
HAMILTON	7,764	14.9	8,382	\$357,975.00	\$46.11
MANCHESTER	5,775	18.3	6,979	\$320,146.00	\$55.43
TOTAL 3 TOWNS	40,032	47.3	44,531	\$1,395,224.00	AVERAGE \$34.85

FIGURE 1: BASIC COMMUNITY STATISTICS

* Only includes incidents where a police or fire response was necessary. So, for police these numbers do not include administrative log entries such as roll calls, generator tests, building security checks, self-generating MV stops, directed patrols, house checks, selective radar enforcement, answering routine, non-emergency phone calls, etc. For fire, they do not include inspections, permits, and similar types of non-emergency activities.

** Gross operating cost that does not consider any offsetting revenue and grants.

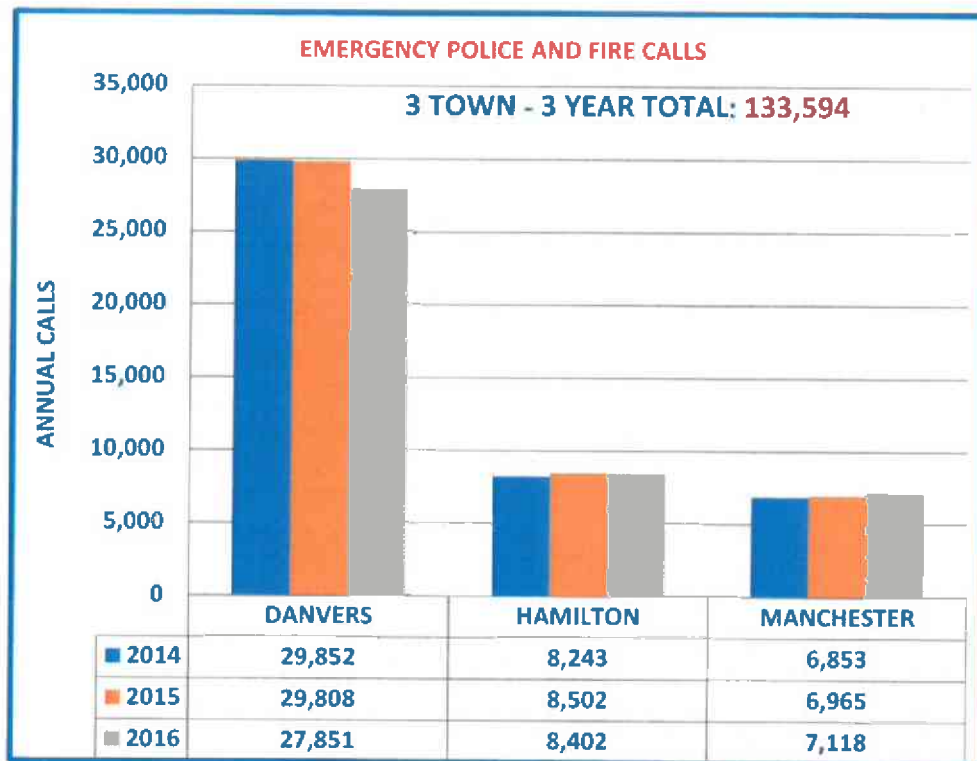


FIGURE 2

Only includes incidents where a police or fire response was necessary. So, for police these numbers do not include administrative log entries such as roll calls, generator tests, building security checks, self-generating MV stops, directed patrols, house checks, selective radar enforcement, answering routine, non-emergency phone calls, etc. For fire, they do not include inspections, permits, and similar types of non-emergency activities.

EXISTING COMMUNICATIONS SYSTEMS AND INFRASTRUCTURE

TOWN OF DANVERS

Danvers current dispatch center consists of two dispatch consoles, one for each dispatcher normally on-duty. There is a smaller, much older console in one corner that serves as a back-up unit. The dispatch center also serves as the quasi reception area for the police department.

The center currently utilizes a combination of Astro Tech, Verizon 9-1-1, and Avaya communications equipment. The new dispatch center will be equipped with Motorola MCC7500 K2 Core Dispatch console systems, and a 9-1-1 system manufactured by General Dynamics. There are a total of thirteen 9-1-1 lines into the dispatch center, and twenty-eight other business and administrative lines. Phone service is provided by both Verizon and Comcast.

Both the Danvers police and fire departments utilize UHF radio frequencies for their communications. The police department radio frequency is 472.3125 MHz. The fire department's frequency is 483.3375 MHz. Fire radio transmissions are simulcast over the primary fire channel and to the Vision 21 voice fire alarm unit located in the fire stations. The fire department utilizes its primary fire channel for the vast majority of its communications.

In addition to handling all 9-1-1 call taking and emergency communications for the police and fire departments, the dispatch center is the initial answering point for all non-emergency and business calls to the police department. They monitor the Department of Public Works radios and receive after hours calls for the power company. The dispatchers also monitor security cameras located at the electric substation and Danvers High School. The video monitors are Video Insight units with the information transmitted over the town owned fiber optics network.

There is currently no official back-up location within the town to relocate the dispatch center should it become disabled, or if the police station should need to be evacuated for any reason. The fire department indicated they could probably handle dispatch in an emergency, but they would need some time to get it ready, which may not be available. The state E 9-1-1 department has assigned the City of Beverly as the 9-1-1 emergency backup answering point for the Town of Danvers.

At the time of this assessment, Danvers has five transmission/receiver sites that are used for their public safety communications system. This system is reported to work very well and more than adequately serves the needs of the town and its public safety departments. The various sites are connected to the dispatch center through leased copper lines owned by Verizon. Verizon is no longer providing support for copper lines as they consider this to be obsolete technology.

Transmission/Receiver Sites

Main transmitter/Receiver # 1 is located on the Hallstead property, 1300 Kirkbride Drive (the former Danvers State Hospital site). The equipment is located in a secured, environmentally controlled building. The building is equipped with a propane powered back-up emergency generator. Secondary back-up is provided by UPS battery power packs, one each for police and fire. There is also a combiner unit located in the building.

- Equipment: Motorola Quantar model # T5365A repeater (Serial # 509CYP0066)
- Connections: Verizon FDDA private telephone lines (copper)
- Antenna: On top of Monopole 130' tower

- Total Height: 232'



Figure 3 (left): 130' cell tower at former Danvers State Hospital site with police and fire antennas mounted on it. Figure 4 (right): UPS battery back-up power units at former Danvers Hospital site which provide redundancy in the event emergency generator also fails during a power outage. Fire and police radios each have a UPS unit which can provide up to 12 hours of power.

Standby transmitter/Receiver # 2 is located at the Danvers Police Station, 120 Ash Street. This is a standalone capable repeater, operating as a remote receiver on the comparator. The transmitter is utilized as a standby unit when the primary transmitter is out of service. However, coverage from this transmitter is limited due to its location and the fact that the elevation of the antenna on the radio tower is just 55' high. The dispatch center is completely backed up for standby power by an emergency generator.

- Equipment: Motorola MTR3000 Repeater model # T3000a (Serial #512CMV0414)
- Connections: Internal cable from basement radio closet to comparator in dispatch center
- Antenna: On 55' radio tower located in the rear of the police station
- Height: 35'
- Comparator: Motorola Spectra-Tac model T17866 comparator (Serial #273CYP0008) is located in the communications room of the police station.



Figure 5 (left): Transmitting phone lines in basement of Danvers PD connecting radios to various remote sites. Limited coverage from this site due to height of tower.

Figure 6 (right): 6' x 12' radio room which will continue to be utilized for equipment in the new dispatch center.

Receiver # 3 is located at Danvers Fire Headquarters, 64 High Street. This site has back-up power for the repeater system that is supplied by the station's emergency generator.

- Equipment: Motorola Astro-Tac model # T5589A receiver (Serial # 677CXP0019)
- Connections: Verizon RTNA private telephone lines (copper)
- Antenna: Located on the roof of the fire station
- Height: 22'



Figure 7 (left): Danvers Fire Headquarters with a roof mounted antenna for Receiver #3.

Figure 8 (right): Receiver unit at Danvers FD.

Receiver # 4 is located at the Recovery Center of America building (former Hunt Hospital), 75 Lindall Street. The site is equipped with a back-up power supply for the repeater.

- Equipment: Motorola Astro-Tac model # T5589A receiver (Serial # 677CXP0018)
- Connections: Verizon RTNA private telephone lines (copper)
- Antenna: Located on the roof of the building
- Height: 106'



Figure 9: Receiver site #4 at RCA building (formerly Hunt Hospital) with small antenna on rear of roof.

Receiver # 5 is located at Danvers High School, 64 Cabot Road. This site has a back-up power supply for the repeater.

- Equipment: Motorola Astro-Tac model # T5589A receiver (Serial # 677CJT0000)
- Connections: Verizon RTNA private telephone lines (copper)
- Antenna: Located on roof of school academic wing
- Height: 42'



Figure 10: Receiver site #5 at Danvers High School connected to antenna on the roof of the academic wing.

New Dispatch Center



Figure 11: New addition being constructed at Danvers Police Department that will house the state of the art dispatch center on the second floor.

As has been previously noted, the town has currently undertaken a major renovation and expansion of the police department facility. This includes the construction of a new, state of the art, environmentally controlled dispatch center located on the second floor of the building. The main dispatch area will encompass just under 800 square feet and be able to accommodate six complete, fully functional dispatch consoles. Initially the town planned to install four fully functional consoles. The remainder will be installed in the future as operations require them.

There are currently three answering points in the dispatch center for 9-1-1 calls. The town is working with the state 9-1-1 department to increase that number to four.

The server room for all of the radios, and what is called “back room” equipment, is 224 square feet. It has significant room for expansion that may be necessary for future growth. The dispatch supervisor’s office is 142 square feet. There is also a break room, locker, and bathroom facilities for the dispatch center personnel. The new center will be very secure and fully self-sufficient for the purpose of handling emergency dispatch and communications operations whether just for the Town of Danvers, or as the location of a RDC.

TOWN OF HAMILTON

The Town of Hamilton dispatch center is located in the approximately ten-year-old Public Safety Building, which also houses the police and fire departments. It is located on the first floor of the building and the dispatchers serve as receptionists for visitors to the police and fire departments. The center is new and modern, with the main operational room occupying 500 square feet. There is also a dispatch supervisor’s office located off the main room. This center once was a regional center, with the Town of Wenham being dispatched from here as well. Wenham moved to the Essex County Dispatch Center in June 2013. The building is equipped with a 275 KW auto-start emergency generator that provides for full operation of the dispatch center, as well as the fire and police stations. In addition, the dispatch center also has a UPS battery back-up system as a secondary back-up system. The dispatch center is presently managed by the Chief of Police and operates under its own budget.



Figures 12 (left) and 13 (right): The Hamilton dispatch center is modern and spacious. The space and infrastructure could be maintained as a back-up location for the Danvers RDC.

All of the backroom equipment is installed in two climate controlled, dedicated rooms that were designed for this purpose. They are located on the second floor, directly above the dispatch center. The 9-1-1 server room occupies 360 square feet and has significant space available for expansion. The radio equipment room is located in the same area. It is presently only utilizing about 1/3 of its capacity so it also has considerable potential for expansion and the addition of more equipment.

The Hamilton dispatch center handles all E 9-1-1 calls and emergency communications in the town, as well as, all routine telephone traffic for the police, fire, and EMS agencies. It is also the after-hours communications coordinator for (and regularly monitors) DPW, animal control, and the harbor master. The center is the control point for the BAPERN 3 and North District.

The center uses a Motorola MCC5500 three position dispatch console, with two fully functional dispatch stations. This console has plenty of room to allow for expansion should the center's mission be expanded once again. There is additional dispatching and communications capability with a small one position station located in the dispatch supervisor's office. This station which primarily serves as a back-up has all the capabilities of the two primary stations.

The Hamilton police and fire departments utilize radio systems that are located on very different bands. The fire department operates on a VHF frequency band. The DPW operates on a similar frequency. The police department operates on a UHF frequency.

➤ Fire radio frequencies

- ✓ Main frequency: Transmit - 158.7525MHz DPL346
Receive - 155.9400MHz TPL 127.3
- ✓ Fire ground frequency: 156.0000 MHz TPL 127.3
- ✓ Fire District 5: 154.0700

- Police radio frequencies
 - ✓ Main frequency: 417.175
 - ✓ North Tac: 470.4875

- DPW frequency: 156.180

Also in the center are two Motorola mounted two-way radios; one UHF (Police), and one VHF (Fire). These radios serve as back-ups to the main console in the event of an equipment failure. These radios also monitor surrounding communities for multiple reasons, including, but not limited to, mutual aid and as BAPERN (Boston Area Police Emergency Radio Network) control, monitoring of included towns' activity not transmitted on BAPERN.

The Massachusetts E 9-1-1 Department provides Hamilton with ten 9-1-1 lines, one published two-way number, and a single one-way incoming phone line. This equipment is standard "Vesta Pallas" technology, with Orion Map Star call mapping software. Currently 9-1-1 calls originating from cell phones are routed to the Hamilton dispatch center from the Essex County Regional Operations Center in Middleton or the Massachusetts State Police Headquarters in Framingham. The center also has four non-emergency lines, three police department non-emergency lines, and one fire department non-emergency line. The existing telephone system includes internal transferring and voice mail capabilities for all personnel, including the police and fire departments. Verizon and Comcast both provide the phone service for the town.

The state provided recording equipment for the 9-1-1 lines has the capability to be used to record any additional lines that might be needed. The center has two, four channel, instant playback recorders. One recorder is at each main dispatch station to record incoming and outgoing phone calls, and police and fire radio traffic. The fourth channel is different on each recorder in order to have a fifth channel recording capability. One of these records the Hamilton DPW frequency and the other records BAPERN North District frequencies.

The dispatch center is equipped with a Keltron system owned by L. W. Bills which is used to monitor fire, medical, and burglar alarms for residents and businesses of the community. The town itself has about 20 municipally owned buildings that are monitored free of charge, at an estimated cost savings of \$4,200.

The dispatch console is equipped with a Zetron Voc-Alarm that is used to alert the fire department, and Beauport Ambulance, which responds from the fire station. It has alert capabilities for the fire department including dual tone (PD & FD), single tone (FD), EMS tone (FD), and the fire department evacuation tone. There is also a security unlock for the station doors, as well as, two alerts for the fire whistle, single blow (noon and medicals), and 5-5-5

blow (fire calls). The console has capabilities to patch, as well as simulcast, on multiple frequencies.

The center monitors nine video cameras that provide surveillance throughout the facility.

The state E 9-1-1 department has assigned Ipswich as the 9-1-1 emergency backup answering point for the Town of Hamilton. Ipswich was also selected by Hamilton to be their alternate emergency communications center in the event their center is out of service.

Transmission/Receiver Sites

Police and fire share transmit and receive sites located at three sites throughout the town.

Main Transmitter/Receiver Site # 1 is located at Gordon-Conwell Theological Seminary, 130 Essex St. This site is equipped with an emergency auto-start generator, and 1500 VA UPS battery back-ups on both the police and fire bases.

- **Equipment:** Police: Motorola UHF Quantar used as main transmitter and voting receiver for day-to-day operations.

Fire: Motorola VHF MTR-2000 used as main transmitter and voting receiver for day-to-day operations.
- **Connectivity:** To Public Safety Building, 265 Bay Road

Police: Four wire data grade 3002 FDDA copper Telco circuit

Fire: Two, Two wire RTNA copper circuits
- **Antennas:** Police: Celwave PD-1151 antenna on penthouse.

Fire: Celwave PD-220 5.25 db Super Station Master antenna on penthouse.
- **Height (above sea level):** 231'

Back-up transmitter/Receiver site #2 is located at the Public Safety Building, 265 Bay Road. This is also the location of the town's dispatch center and has the on-site capability for all the

frequencies used by the town. This facility is equipped with an automatic start emergency generator to provide back-up power to the entire building.

➤ Equipment:

- ✓ Police and Fire: Two Motorola Spectra TAC voting comparators equipped for five sites each. (Two sites are spare since Wenham moved to the Essex County RECC.)
- ✓ Police: Motorola Quantar UHF voting receiver with local backup batteries used for day-to-day operations and as back-up wireline controlled transmitter.
- ✓ Fire: Motorola VHF MTR-2000 voting receiver used as base station from Console.
- ✓ County Fire: Motorola Radius 1225 VHF mobile wireline controlled from console.
- ✓ BAPERN Control Station: Motorola Quantar voting receiver with separate dedicated Astro-Tac receivers for Area Wide 3 and North District channels and digital capability via Motorola DIU.
- ✓ Motorola XTL VHF &UHF Mobiles for surrounding communities, etc. mounted in center of console.

➤ Antenna: 90' Roan SSV Tower

➤ Height (above sea level): 136.5'

Receiver site #3 is located at the Pingree School, 537 Highland Street. This site houses two voting receivers for the police and fire department main channels. It has 12-hour battery back-up for both receivers.

➤ Equipment: Police: Motorola Astro-Tac UHF voting receiver

Fire: Motorola Astro-Tac VHF voting receiver

➤ Connectivity to dispatch center:

Police: Four wire data grade 3002 FDDA copper Telco circuit

Fire: Two, Two wire RTNA copper circuits

➤ Antennas:

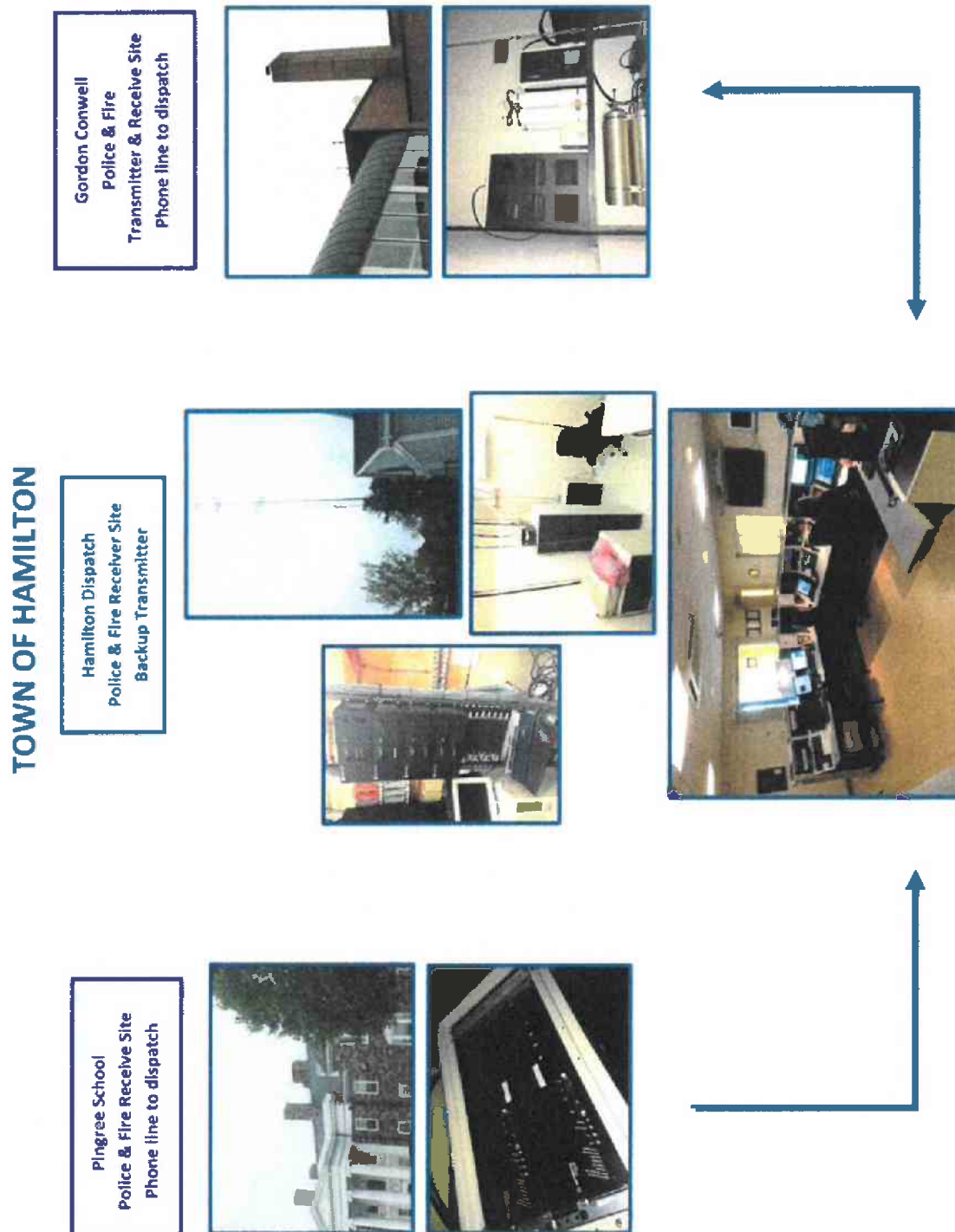
Police: Celwave PD-201 antenna on chimney / roof.

Fire - Approximately 3 db antenna on chimney/roof.

➤ Height (above sea level): 76'

Overall, the Town of Hamilton has a very good radio communication system that has been periodically updated and is maintained on a regular basis.

FIGURE 14
TOWN OF HAMILTON TRANSMISSION/RECEIVER SITES AND CONNECTIVITY



TOWN OF MANCHESTER-BY-THE-SEA

Manchester-by-the-Sea's emergency dispatch center is located inside the police department area of the Town Hall. The building is very old and is not ADA compliant or accessible. The main entrance to the Manchester Police Department is only accessible by the stairs. The building has a 30 KW generator, which provides back-up power for all equipment located within the building. This includes the police department, dispatch center, and emergency operations center (EOC), which is located on the second floor of town hall.

The dispatch center has recently undergone an expansion and modernization, including the installation of new equipment. The dispatch center is now located in a secured area with all the necessary safety requirements for this type of operation.



Figures 15 (left) and 16 (right): The Manchester dispatch center has been significantly upgraded and modernized over the past few years.

This center is utilizing a new Zetron 4010 one position button & LED analog dispatch console system. The console monitors seven channels: Manchester Police main channel (472.2375 MHz PL 131.8Gz 12.5 MHz), Manchester Fire main channel (159.3375 MHz), DPW main channel (159.76 MHz), BAPERN North District, BAPERN area wide channel 3, and BAPERN area wide channel 4. As with Hamilton, the Manchester police and fire departments utilize radio systems that are located on very different bands. The fire department operates on a VHF frequency band. The DPW operates on a similar frequency. The police department operates on a UHF frequency.

In the attic of the building, there are two radio cabinets. One contains a BAPERN radio control station and the other is a back-up repeater for the police department. There is also a Manchester Fire CDM1250 unit located on top of one of the cabinets that is connected to the main radio console. A new radio comparator for the fire department is also located in this area. Additional radio equipment, which provides the town with a back-up communications system, is located on the second floor in room adjacent to the EOC. The attic area does have heat, but

not air conditioning. This causes concern over the potential for the equipment to be overheated.

The Massachusetts E 9-1-1 agency provides Manchester with four wire 9-1-1 lines, four wireless 9-1-1 lines, one published two-way number, and a single one-way incoming phone line. This equipment is standard “Vesta Pallas” technology, with Orion MapStar call mapping software. Currently, all wireless calls are routed to the Manchester dispatch center from the Essex County Regional Operations Center in Middleton or the Massachusetts State Police Headquarters in Framingham.

No unique sound, ring, or other similar notification is employed to allow the dispatcher to know if an incoming call is an emergency or not. Emergency calls should be easy to distinguish from routine business calls. Longtime residents still remember and use the emergency line from pre-9-1-1 establishment.

Subsequent to our onsite fact finding and the preparation of the draft report, the MRI study team was informed that the Manchester dispatch center had upgraded their hardware to the NexGen dispatching system. This system has replaced some of the older, obsolete, and sensitive equipment that was previously being utilized. It also provides the department with upgraded mapping integration including accurate location software which incorporates current GIS photo imaging and cell phone GPS locating capabilities. In addition, dedicated speakers with distinctive sound and volume for 9-1-1 calls have reported to have been installed on both levels of the police station. While we did not view any of this new equipment, we concur with the police department’s assessment that it has addressed some of the deficiencies that we noted in our report.

The 9-1-1- equipment is located on the second level of the police station, in what is called the 9-1-1 D Mark Telco Closet/9-1-1 room.

The center also maintains five general telephone lines for the police department. Phone service is provided by Verizon. The phone system includes internal intercom and voice mail capabilities for all personnel including the police dispatchers and administrative personnel. Dispatch has two back-up phone handsets which serve as back-ups to the main phone system in the event of an equipment or power failure. The department uses standard state provided recording equipment to record all incoming 9-1-1 and routine telephone calls, as well as, all police and fire radio traffic. This system is equipped with an instant playback system that can be used for both incoming/outgoing calls, and police/fire radio traffic.

Manchester no longer has a municipal fire alarm system. This dispatch center does not directly monitor any fire, medical, or burglar alarms. All of those calls are received by telephone from central monitoring stations.

The center provides all communications, both emergency and non-emergency, for the police department. The dispatcher's console has alert capabilities for the fire department, including dispatch alerting tones and the emergency evacuation tone. It also has frequency patch and simulcast capabilities. However, the dispatch center only provides initial dispatch for the fire department, and then serves as a back-up, if needed. When a 9-1-1 call is received that requires a fire department response, dispatch immediately notifies the fire department. However, at that point, the fire department takes over their own communications, unless the nature of the incident requires all on-duty personnel to respond. In that case, dispatch will maintain radio communications until the first off-duty firefighter arrives back in the station and takes over the communications responsibility. At the time of this assessment, the police department is getting ready to take over dispatching operations for the fire department. They are awaiting the moving of some final phone lines to complete this transition.

The dispatch center is also responsible for the monitoring of the DPW radios and notifying the on-call DPW person about those types of emergencies.

In the event of a need to evacuate the dispatch center, the Town of Rockport would assume responsibility for answering 9-1-1 calls and handling emergency communications.

Manchester police and fire do not have a common or shared location for transmitting, receiving, and repeating their radio communications.

Transmission/Receiver Sites - Police

Manchester Police have three transmitter and receiver sites.

Main Transmitter/Receiver Site # 1's location is Power House Hill. The primary radio transmitter is located in a secure masonry building. The equipment is located in a locked radio equipment cabinet and is equipped with a UPS battery power back-up system. The distance from the police station to this site is 1,430 feet.

➤ Equipment:

- ✓ Motorola Quantar model T5365 470 MHz to 490 MHz four wire full duplex wire line voting base repeater
- ✓ RF power set for 90 watts output on A/C Mains, 45 watts output on batteries
- ✓ Motorola Quantar Battery Charging System (Serial # 448CCV0012)

- Connectivity: Verizon RTNA two wire copper circuits
- Antenna Height (above sea level): 126'

Back-up Transmitter/Satellite Receiver/Stand-by Receiver Site #2 is located at the Manchester Police Headquarters, 10 Central Street. This site is the location of the comparator for the entire police radio system. There is also a fire radio located on the second floor, with other radio equipment. The entire building is serviced by a back-up emergency generator.

- Equipment (located in attic):
 - ✓ Motorola model MTR 3000 (T3000A) four wire Wireline base-repeater
 - ✓ Four wire Wireline Voting Receiver (Serial # 5121NE0252)
 - ✓ RF Power Set for 85.1 watts output on A/C mains and 8.0 watts output on batteries.
- Connectivity: Cat 5 Wirelines to Zetron 4010 1 position console with analog copper wire connection
- Antenna Height (above sea level): 35' (poor elevation)

Primary Satellite Receiver Site #3 is located on the DCR-DEM fire tower located on Southern Avenue in Essex.

- Equipment: Motorola model T5589A AstroTAC 470 MHz to 490 MHz, four wire Wireline voting receiver (serial #: 677CDP0002)
- Connectivity: Verizon RTNA two wire copper circuits
- Antenna Height (above sea level): 261'

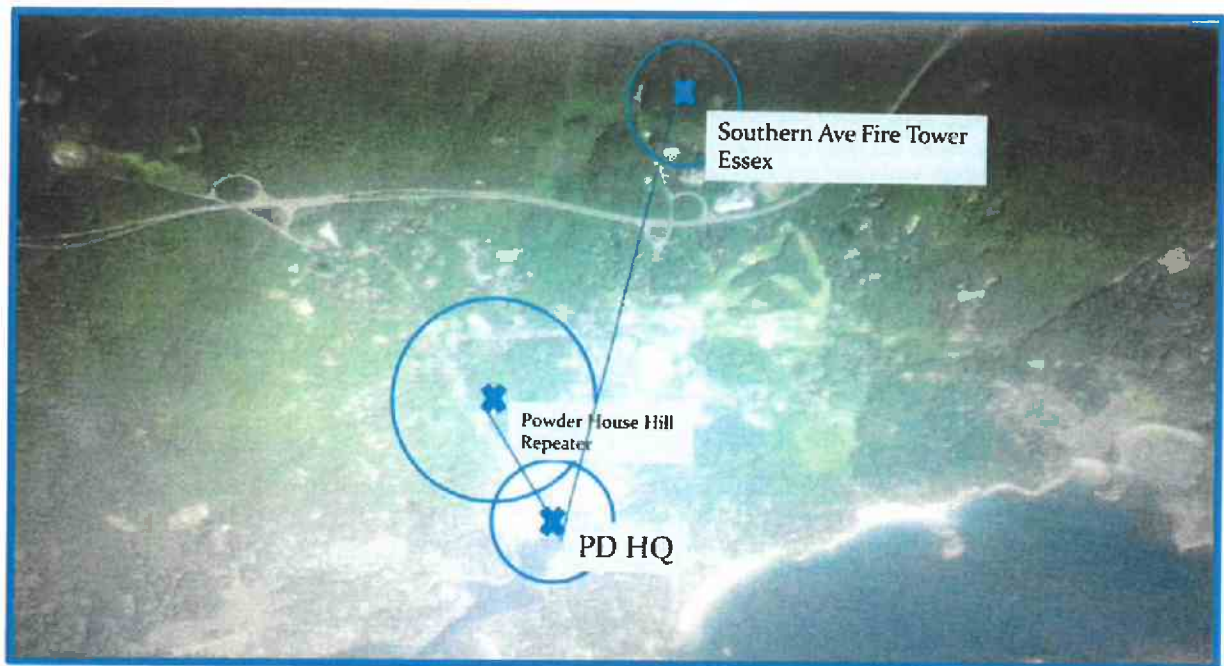


FIGURE 17: MANCHESTER POLICE COMMUNICATIONS SITES
Diagram courtesy of Manchester Fire Department

Manchester Police are reported to have “dead zones” in radio and thus critical communications coverage at various locations throughout the town. The most significant area of concern is that any point on Route 128, past Pine Street, is completely dead.

MANCHESTER BY THE SEA POLICE DEPARTMENT

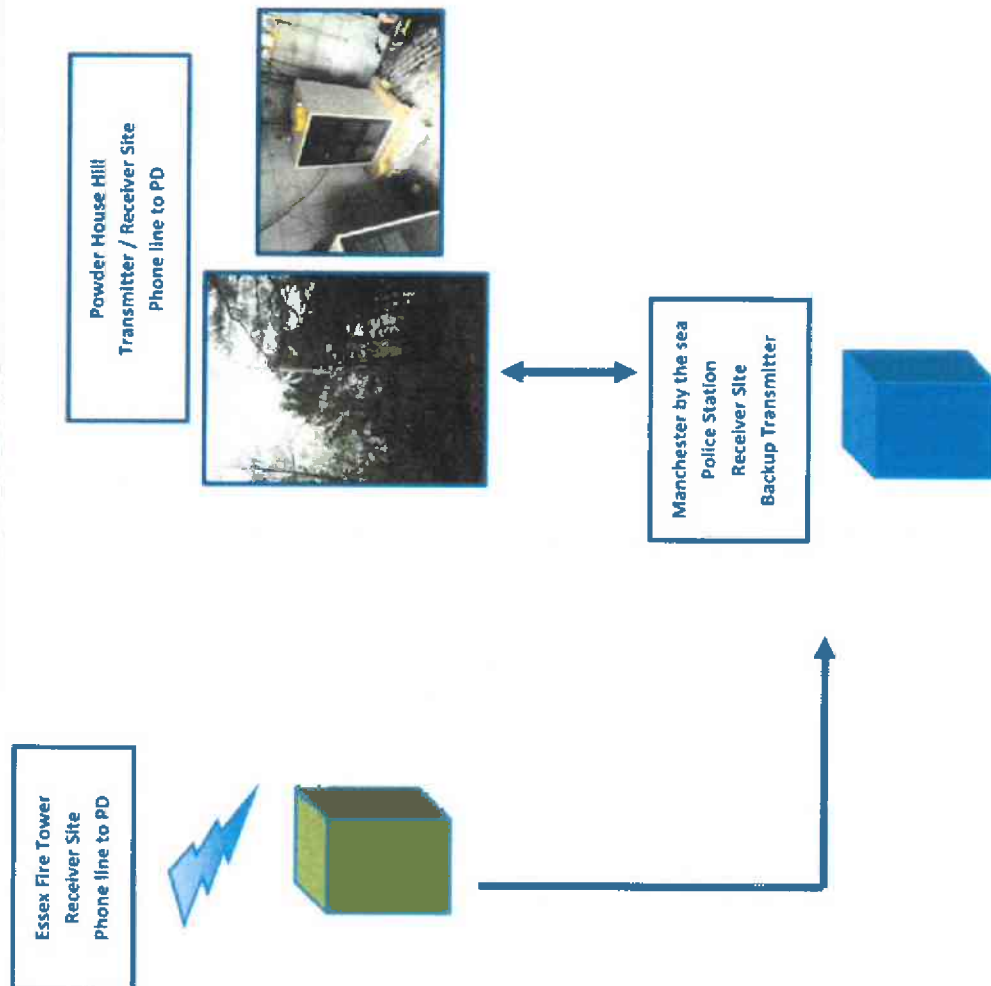


FIGURE 18
MANCHESTER POLICE TRANSMISSION/RECEIVER SITES AND CONNECTIVITY

Transmission/Receiver Sites – Fire

Manchester Fire has four transmitter/receiver sites.

Main Transmitter/Receiver Site # 1 is located on a cell tower at the DPW composting site at 193 School Street on the north side of town. It is located approximately one mile from the fire station. The site is secured.

This location has no back-up generator to provide emergency power to the fire communications equipment. When the power goes, out a portable generator must be taken to the site to power the equipment. The equipment is located in a standard radio lock box which has no climate control. It is equipped with battery back-up; however, there have been issues with the batteries failing. It is our belief that this problem could be caused by the temperature fluctuation due to lack of climate control.

➤ Equipment

- ✓ Motorola model MTR 3000 with JPS pilot tone generator
- ✓ Motorola model MTR 2000 repeater

➤ Connectivity: Verizon RTNA two wire copper circuits

➤ Antenna Height (above sea level): 196'

We believe that there is an issue with the way the phone lines are connected to the transmitter on site. From the connection in the radio cabinet, the wires are run through plastic pipe above ground. Sections of pipe are buried under piles of dirt and other debris. This situation creates significant vulnerability to the entire communications link, and there is the very real possibility of losing the connection if something happens to the pipe. Of further concern, the plastic pipe is connected to a telephone pole with an exposed plastic phone connection box. This also creates vulnerability in the system because it can be tampered with very easily. The antenna on the cell tower appears to need updating.

Back-up Transmitter/Receiver Site #2 is located at Manchester Fire Headquarters, 12 School Street. This site does have a back-up generator that provides emergency power to the entire building.

The voting system remote site receiver for the system is located at fire headquarters. The back-up communications equipment is also located there. The base radio at the fire station has its antennas mounted on the exterior of the building. The fire station is also

equipped with a UHF MED base radio; however, it has reportedly not been updated or narrow banded.

- Equipment:
 - ✓ Motorola model MTR 3000 with JPS pilot tone generator
 - ✓ Comparator for Fire Radio system
 - ✓ Motorola model MTR 2000 repeater
- Connectivity: Analog copper wire connection
- Antenna Height (above sea level): 65' (limited elevation)

Receiver Site # 3 is located at the City of Gloucester Fire Department, Magnolia station, at 30 Fuller Street in Gloucester. The site is reported to have a back-up generator to supply emergency power.

- Equipment:
 - ✓ Motorola model MTR 3000 with JPS pilot tone generator
 - ✓ Motorola model MTR 2000 repeater
- Connectivity: Verizon RTNA two wire copper circuits
- Antenna Height (above sea level): 85' (limited elevation)

Receiver Site # 4 is located at the Landmark Middle School, 167 Bridge Street. This is the location of a voting system remote receiver. The existence of back-up power at this facility is unknown.

- Equipment:
 - ✓ Motorola model MTR 3000 with JPS pilot tone generator
 - ✓ Motorola model MTR 2000 repeater

- Connectivity: Verizon RTNA two wire copper circuits
- Antenna Height (above sea level): 100' (moderate elevation)

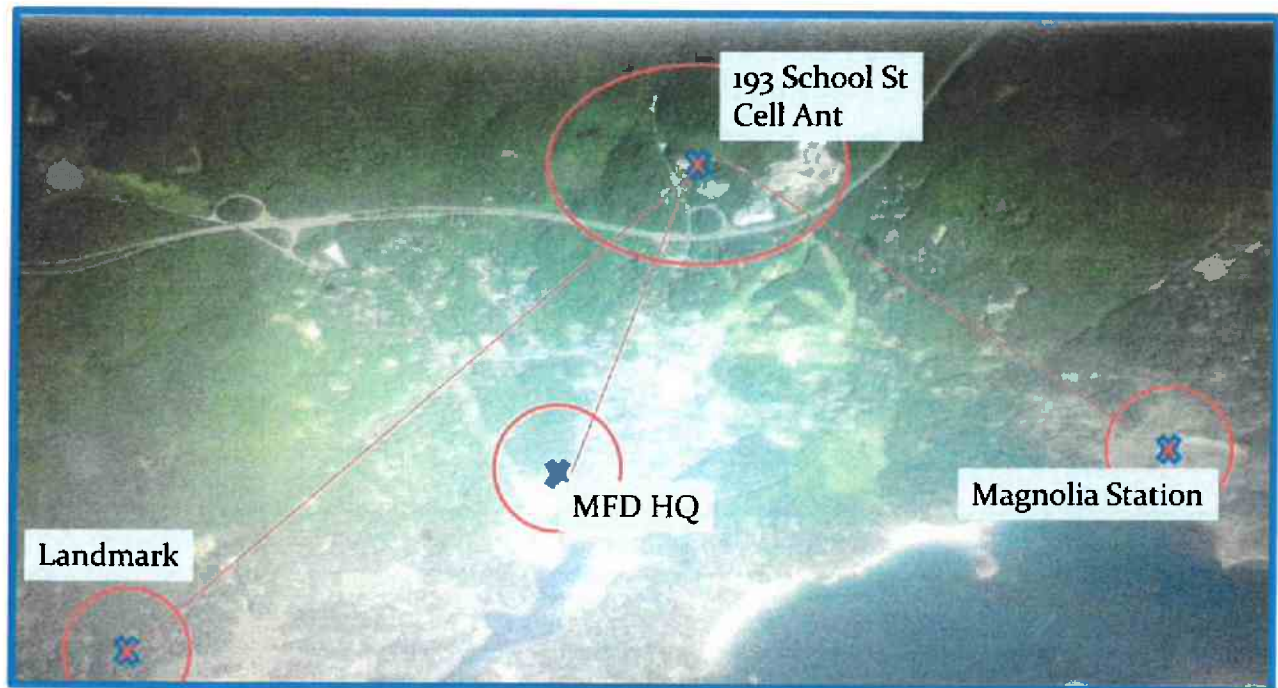


FIGURE 19: MANCHESTER FIRE COMMUNICATIONS SITES
Diagram courtesy of Manchester Fire Department

The Manchester Fire Department also reports that they have experienced dead zones in their communications at various locations in town. Some specific dead zones for them include the water treatment plant, an issue identified during a large diameter hose training session in October 2016, and the Plains area, identified during a fire in March 2015. Route 128 South in the vicinity of Gordon College is also cited as a problem area.

MANCHESTER BY THE SEA FIRE DEPARTMENT

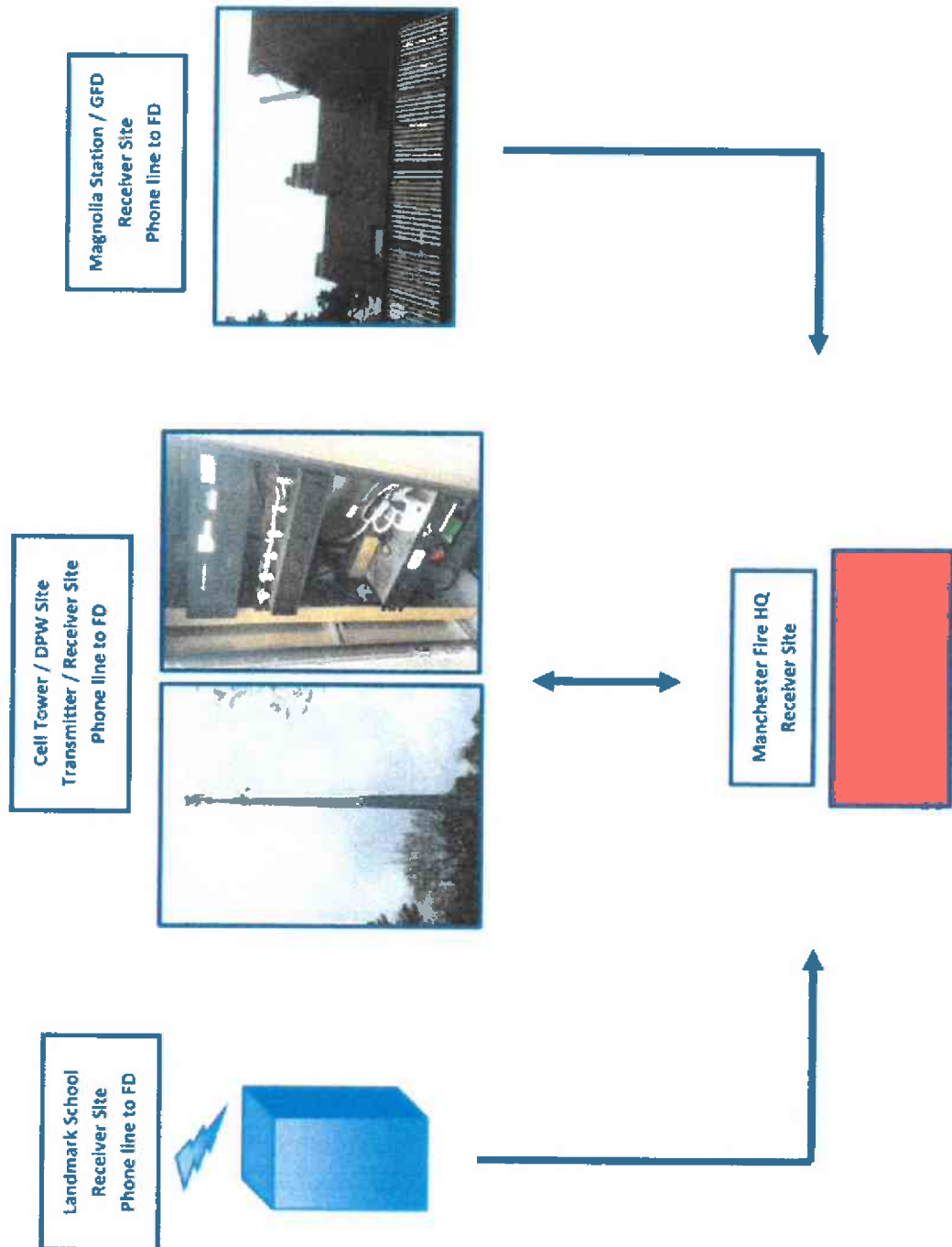


FIGURE 20
MANCHESTER FIRE TRANSMISSION/RECEIVER SITES AND CONNECTIVITY

SYSTEM REDUNDANCY/INTEROPERABILITY – THREE TOWNS

None of the three municipalities have any means of redundancy for individual transmitter or receiver sites; however, some do have backup transmitters in various other locations within the area. In addition, the now obsolete copper line systems are all linear, not looped systems. What this means is that a single break in any link in the system (power outage, tree fall, wire down), can potentially result in a significant operational dead zone. This situation is of greater concern in a community such as Manchester that already has identified dead zones in the community, even with all system components fully operational.

All three towns are part of the Boston Area Police Emergency Radio Network (BAPERN). This UHF radio network is a means of communication between towns in eastern Massachusetts. While this system is not intended for daily use dispatching, it is a means of interoperability between all three towns and their neighboring communities.

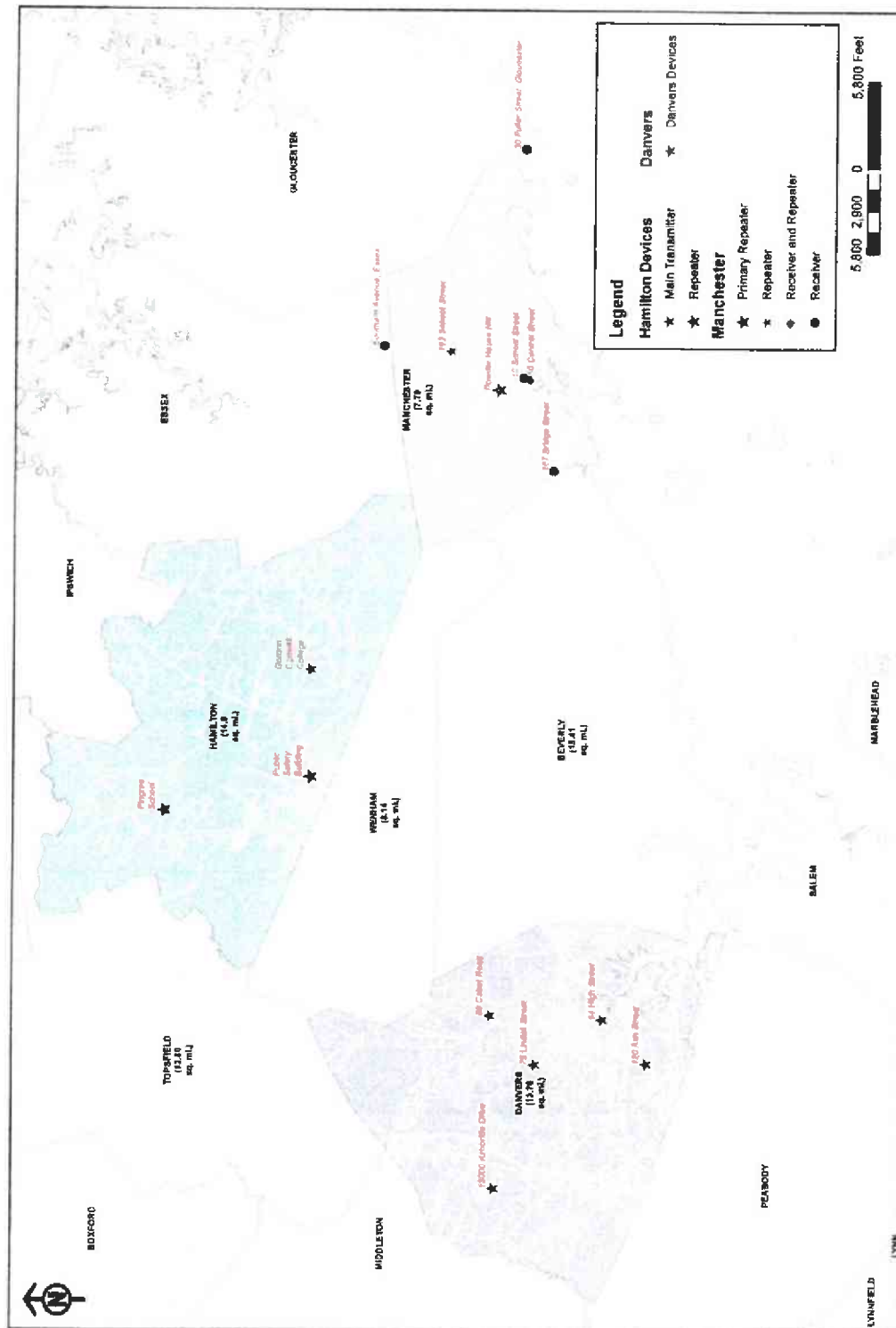


FIGURE 21
MAP OF ALL TRANSMISSION/RECEIVER SITES IN DANVERS, HAMILTON, AND MANCHESTER

COMPUTER AIDED DISPATCH SYSTEM/PROGRAM

After evaluating the Computer Aided Dispatch (CAD) and reporting programs/systems currently in use the MRI study team determined that the three communities are not currently using the same programs and systems. In fact, they are utilizing three different systems.

Danvers is utilizing the QED CAD and RMS systems. They have used this system since about 2003. The system is used by the police, dispatch, and fire. QED has mapped out the entire town to provide pin mapping on every location within Danvers. When units are dispatched to a call, the location is pinned in the vehicle exactly at the location.

The fire department utilizes the Firehouse management and recordkeeping system for their operations. They informed the team that the two systems interface very well with each other and information is easily transferred and shared. The annual costs associated with the QED system totals about \$15,200, which is divided evenly between the police and fire departments.

Hamilton is using Tri Tech Software Systems IMC computer aided dispatch program and reporting systems. They have the dispatch, police records, fire, and administrative modules. This system has the capabilities to link to the registry of motor vehicles system, 9-1-1 back fill, and includes an emergency medical dispatch (EMD) program. They are currently using EMD protocols set forth by Priority Dispatch operated through the International Academies of Emergency Dispatch.

Manchester is using Micro Systems Pro IV CAD and reporting system. Included with this system are capabilities for logging calls for service, residential and business data, master names, and property and evidence data. It also serves as the departments' booking software. Pro IV is able to import motor vehicle crash reports created using Easy Street Draw software. The department presently uses EMD protocols set forth by Power Phone. Both hardcopy and computer based methods are available for use by dispatchers. The Micro Systems CAD is very old and would not meet the needs of a regional emergency dispatch center.

Both the QED and Tri Tech systems have a good track record when used as the CAD program for regional emergency dispatch systems. In the past, Manchester has considered switching to Tri-Tech which has more components and capabilities, and is perceived to be more user friendly than the Micro Systems program and system they currently utilize. However, they have not been able to obtain adequate funding to allow purchase of the program and associated transfer of existing data.

In order to be able to participate in a regional emergency dispatch center, all three communities need to be operating off the same CAD. As Danvers is presently using the QED software system, this is the system that the RDC CAD system can be developed from. The Tri Tech IMC system is also a good system should Danvers decide to convert to that system. In the

end, the town needs to utilize the system that best meets their specific needs. Any participants in the RDC would need to update or replace their systems to ensure compatibility with the Danvers system.

Considering the variety of CAD/Dispatch systems in place among the three communities, Danvers thought it prudent to perform a comprehensive internal study of available software packages and their current statuses. A seven-member committee was assembled, consisting of police, fire, and technology personnel, to review the most widely deployed systems in the Commonwealth and evaluate their operational and financial feasibility. Danvers is now in the process of conducting site visits to area departments to observe offerings from the various vendors.

The purchase of the necessary hardware and software updates to allow all three communities to operate off of the same CAD system would be covered under the State E-9-1-1 grant program. Both QED and Tri Tech are approved vendors under the state bid IT Contract.

FIRE ALARM SYSTEMS AND FIRE DISPATCHING

Each of the three towns has the ability to dispatch their own fire department and EMS provider to emergencies. These are all older systems and are not compatible with each other so they would not work for the regional dispatch center.

Danvers does not use an alerting system for their fire stations. They use the 100 mil station bells and chimes for audible alarm and an encrypted radio voice alarm for messages. The message is also simulcast over the fire radio system.



Figure 22: Keltron fire alarm panel in Danvers dispatch center.



Figure 23: L.W. Bills fire alarm master panel located in Danvers dispatch center.

Danvers operates a 100-mil municipal fire alarm system for the receipt of alarms from master boxes located throughout the town. The dispatch center is equipped with an M/K Form 4 Fire Alarm Panel with a Keltron fire alarm read out that displays the address of the incident on a screen and a hard copy print out of the location. Bells and decoders connected to this system are also located at both fire headquarters and station 2. Most of the equipment located in the existing dispatch center will be replaced once the new center goes on line.

Danvers is planning to install a Vision 21 fire alarm system processor with a battery back-up in the new center. This system will include radio receiver modules with cable and antennas, a telegraph interface module, and remote display capabilities. With this system, the town will be able to continue to operate their existing 100 mil fire alarm service. They would also be able to introduce radio boxes into service if the fire department wanted them.

With the addition of this capability, Danvers would be able to accept and monitor alarms from any other community that is operating a 100-mil system of radio boxes. National Fire Protection Association (NFPA) Standard 72: *National Fire Alarm and Signaling Code* does recommend system redundancy to reduce the possibility of a complete system failure. As such, there should be a back-up system in the dispatch center. If the RDC becomes a reality, consideration should be given to the purchase of a second Vision 21 processor.

Hamilton dispatches their fire department and EMS by alerting tones, followed by an announcement over the primary radio frequency.

The town has a Keltron fire alarm panel located in the dispatch center. This system is privately owned by the L.W. Bills, but is monitored by the town. For Hamilton providing that service, Bills does not charge the town for monitoring the fourteen municipally owned sites (eight buildings and six wells) that are connected to this system. This is an old system, and should Hamilton decide to join Danvers in the RDC, it would not be possible to move it. In this case, L.W. Bills would move the accounts to their central monitoring station. However, the town would then be billed for the cost of monitoring their fourteen sites.

Manchester also dispatches their fire department by alert tones, followed by an announcement over the primary radio frequency.

The town does not have any municipally owned fire alarm system. All fire alarms are monitored and received by privately owned central stations which transmit any alarms they receive to the town's dispatch center.

CURRENT STAFFING AND TRAINING

The Town of Danvers currently has a total of nine full-time dispatchers, one of whom functions as the dispatch supervisor. These personnel are unionized and are covered by their own collective bargaining agreement.

Dispatchers currently work a rotating four day on, two day off schedule, which runs over a six-week cycle. The shift hours are: 1st shift - 9 AM to 5 PM; 2nd shift - 5 PM to 1 AM; 3rd shift - 1 AM to 9 AM.

The dispatcher's current collective bargaining agreement specifies a six-step program for personnel to advance from starting salary to the top of the pay scale. For 2017, the minimum salary is \$41,852.15 and the maximum base is \$51,389.05. The supervisor can earn a maximum of \$58,563.99 in base salary. The total FY 2017 personnel budget for the dispatch center is \$552,296.00 (not including benefits).

Given several vacancies over the past few years, overtime costs to staff the dispatch center steadily increased from 3,062 hours in 2013 to 4,936 in 2015 – a 61% increase. (Note: one vacancy creates 37.5 hours per week or 1,950 hours of OT per year.) The overtime cost decreased to 4,537 hours in 2016 and, with staffing now stabilized, so too, should overtime costs.

Dispatchers for Danvers all receive, at a minimum, a five-week basic state E9-1-1 academy, 250 hours of on the job training, Priority Dispatch EMD training, 40 hours annual in-service training provided by the town, including CPR, AED, and First Responder recertification. They also receive all annual state mandated E 9-1-1 training.

Danvers does have a dispatch Standard Operating Procedures (SOPs) manual that they follow for their operations. The Danvers Police Department is accredited, and the periodic reaccreditation process includes an evaluation of the dispatch SOPs.

The Hamilton dispatch center has a staff of four full-time and two part-time dispatchers. The latter work two days per week. All of these personnel are unionized and are covered by their own collective bargaining agreement. This group of dispatchers' average 7 years of experience. There are also four per diem dispatchers that staff shifts as needed. They are not covered by the collective bargaining agreement, or represented by the union. Their average experience is twelve years.

Hamilton utilizes an eight step pay scale for their dispatchers. This is specified in the collective bargaining agreement. In 2017, the starting salary is \$37,735.11 and the maximum salary is

\$50,592.24. The total FY 2017 salary budget for the dispatch center, not including benefits, is \$237,839.20.

Hamilton's dispatchers all receive, at a minimum, the state required: Vesta Pallas certification, APCO PST1, Priority Dispatch EMD certification, CPR, and DCJIS certification. They also maintain certificates in PowerPhone® Advanced Law Enforcement Dispatch, as well as PowerPhone® Advanced Fire Service Dispatch. In addition, each employee receives a minimum of sixteen hours of specialized workshops or other continuing education annually through various companies including, but not limited to, PowerPhone®, APCO, and MRI.

Hamilton does have a dispatch Standard Operating Procedures (SOPs) manual that they follow for their operations. The Hamilton Police Department received accreditation while the town was still providing dispatch services for Wenham. The accreditation process included an evaluation of the dispatch SOPs and no major deficiencies were noted. Most of the current dispatchers were working during the accreditation process and when they were also dispatching for Wenham.

Manchester employs three full-time personnel to staff their dispatch center; one supervisor and two full-time dispatchers. These personnel work Monday through Friday. A total of 48 hours per week are filled with by either two part-time dispatchers, full-time dispatchers on overtime, or by one of the department's sixteen trained reserve police officers. All of the police department's fourteen sworn full-time and ten part-time personnel are trained to the State requirements for 9-1-1 and EMD dispatchers. All are also certified as Emergency Medical Technicians.

Full-time dispatcher salaries in Manchester can range from \$47,618.00 to \$56,540.00. The FY 2017 salary budget for the dispatch center is \$205,606.00, plus an additional \$56,540.00 for weekends, for a total of \$262,146.00 (not including benefits).

All the Manchester dispatchers receive state 9-1-1 "Vesta" Pallas certifications, Association of Public Safety Communications Officials (APCO) PST training, and Power Phone EMD Certifications. They are all CPR and DCJIS certified. In addition, they receive sixteen hours of specialized workshops and other continuing education annually through Power Phone, APCO, MPI, and other entities.

TOWN	FULL-TIME DISPATCHERS	PART-TIME DISPATCHERS	PER DIEM DISPATCHERS	TOTAL
Danvers	9	0	0	9
Hamilton	4	2	4	10
Manchester	3	2	16*	21
				40

FIGURE 24 - CURRENT DISPATCH CENTER STAFFING

* All reserve police officers are certified as dispatchers.

TOWN	DISPATCH SUPERVISOR	FULL-TIME DISPATCHER MINIMUM	FULL-TIME DISPATCHER MAXIMUM
Danvers	\$58,563.99	\$41,852.15	\$51,389.05
Hamilton	N/A	\$37,735.11	\$50,592.24
Manchester	N/A	\$47,618.00	\$56,540.00
AVERAGE	\$58,563.99	\$42,401.75	\$52,840.43

FIGURE 25 - CURRENT DISPATCH CENTER SALARIES

TOTAL PERSONNEL BUDGETS FOR ALL THREE (3) COMMUNITIES: \$1,220,511.00 (including benefits).

STANDARDS AND BEST PRACTICES

The following provides a summary of the existing studies, “best practice” standards, and industry practices that were used for developing the recommendations listed later in the report.

APCO “PROJECT RETAINS” RESEARCH REPORT

Existing studies offer some recommendations for staffing and center configurations. The Association of Public Safety Communications Officials (APCO) is a professional organization that sponsored a 2005 study on Communication Center staffing and retention. According to the *APCO Project RETAINS¹ Research Report* (2005) (see Appendix A), there is no set equation to determine staffing levels in a communications center. Certain variables, such as total call volume, size of population served, number of services provided, and number of client agencies dispatched, will affect the staffing requirements, but there is no widely accepted process used

¹ Responsive Efforts to Assure Integral Needs in Staffing (RETAINS)

to calculate the “right” size center. Instead, proposed guidelines provide staffing approximations rather than concrete numbers. Often communications centers do not determine staffing levels proactively, but instead, staffing issues are managed reactively. Based on the samples studied in both APCO studies, smaller centers tend to determine staffing based on shift coverage needs and larger centers tend to staff for higher call volumes.

Some variables that have been used to compare communications centers, and should be used when analyzing the feasibility of a regional dispatch center for Danvers, Hamilton, and Manchester-by-the-Sea, are:

- Number of services provided (most common are Police, Fire, EMS, animal control, administrative services, emergency weather notifications, records, Hazardous Materials, DPW, and others);
- Number of organizations to be served with dispatch services (total number of above listed services multiplied by number of communities served, where applicable);
- Geographic area served;
- Population served; and
- Total call volume and/or number of calls resulting in dispatch of units.

According to this study, total “dispatched” calls (as logged by a CAD system) make up only 22.7% of all calls received at the communications center. This estimate allows for an approximated calculation on the total call volume received at a center based on its combined incident rates (see Figure 26).

Differences among centers (national sample, N=153)					Aggregate data developed from the three communities for the MRI study
	Average	Median	Minimum	Maximum	
Number of personnel	18	12	4	136	40
Number of services provided	7	8	1	13	26
Number of agencies they serve	12	6	1	131	17
Geographical area (sq. miles)	770	125	1	40,000	47.3
Population served	79,000	35,000	2,162	920,000	40,032
Total call volume (includes non-emergency)	238,000	82,000	2,000	9,344,000	Unknown
Total dispatched to the scene (characterized as emergency calls)	54,000	26,000	63	650,000	44,531 (3 YEAR AVERAGE)

FIGURE 26

APCO Project RETAINS Research Report, University of Denver Research Institute, Denver, CO August 2005, p.34

When evaluating staffing, this study also looked at retention/turnover rates, as well as the top influences for these rates. The average national retention rate for all centers is 83 percent, citing five factors that influence retention. These factors (in order of importance) are:

1. Employee perception that the center is fully staffed;
2. Average overtime hours per month;
3. Job complexity (the number of tasks reported as a regular part of the job);
4. Hourly base pay; and
5. Employee satisfaction with the work itself.

Interestingly, when comparing statistically significant retention rates by region of the U.S. (as defined by the Census Bureau), the RETAINS study found that the Northeast boasted the highest retention rate (92 percent), as compared with the South region with the lowest retention rate (79 percent). This suggests that for the purpose of this project, the goal retention rate should be closer to 92 percent, than the national average of 83 percent. Since some turnover is inevitable, the goal of communications center managers should be to manage it, not attempt to eliminate it.

A critical point made by the study relates to how much size affects a centers' turnover rate. Higher turnover rates (greater than 25 percent) were generally found in smaller centers (less than 10 employees). A smaller center also "feels" its turnover more than a larger center (20 or more employees) since smaller hiring pools complicate replacing even one employee. Consolidation is a recommended strategy when a specific study of the operational needs of the PSAP aligns with the needs to reduce turnover.

Finally, the study found that on average, a dispatcher working at a center reported as "fully staffed" by its managers handled just over 5,200 calls per year. Employees working at centers reported to be routinely understaffed handled more than twice as many calls per year, approximately 11,200. According to a National Emergency Number Association (NENA) study² used by the RETAINS project, the range of call volumes handled per dispatcher also varied by size of the center (see Figure 27).

	Population served	Avg. call volume/staff	Minimum*	Maximum*
A. Small	< 19,000	1,341	260	6,500
B. Medium	19,000 - 100,000	3,518	400	10,250
C. Large	100,000 - 140,000	4,004	1,600	10,000

FIGURE 27

* Minimum and maximum numbers have been rounded

The call volume data in Figure 2 is the most reliable data found for estimating staffing requirements and is used later in the report for recommendations on staffing models based on reported call volumes.

Some recent trends noted by APCO that should be considered and would be pertinent to the establishment of the RECC include³:

- Overtime: Voluntary in about one-quarter of centers and mandatory in about one-quarter of centers.
- Schedule: The most common type of schedule is permanent assignment (41%), followed by rotation by bid (28%).

² NENA PSAP Staffing Survey Report (2003).

³ APCO Website: <https://www.apcointl.org/> July 8, 2014

- Turnover Trends: Fifty-six percent indicated that employee retention has decreased over the past three years, 23 percent indicated that retention remained the same and 22 percent said that retention had increased.
- Retention rates increase as the hourly pay rate for new hires increases.
- Supportive supervision stands out as one of the most important variables that emerge in predicting employee commitment to the organization.
- Research on job complexity has often shown that this aspect of workers' jobs has long-term effects on cognitive styles, self-esteem, intellectual flexibility, and other variables.
- One of the most salient factors to emerge is the importance of employees' perceptions that their work is appreciated by the public and the media.
- Emotional distress of employees is important to consider for both the effect on the well-being of the employee and in regard to consequences in the workplace.
- Perceived recognition for the work that they do plays a key role and any gains organizations can make in improving this aspect of the job will likely pay off not only in terms of worker commitment and effectiveness, but also in their personal well-being.
- Lower psychological distress is found more often among employees who feel appreciated; older employees; and employees with more vacation hours.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) AND INSURANCE SERVICES OFFICE (ISO)

While not found in the current 2013 version, previous editions of NFPA Standard 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems* contained an equation to measure the "Number of Operators" Needed based on the volume of alarm calls. According to this standard⁴:

(b) "For jurisdictions receiving 600 to 2,500 alarms per year, at least one operator shall be on-duty in the communications center.

(c) For jurisdictions receiving more than 2,500 to 10,000 alarms per year, at least two operators shall be on-duty in the communications center."

⁴ NFPA 1221, *Installation, Maintenance and Use of Public Fire Service Communication Systems*, 1991, para. 2.

This standard is effective in performing the technical calculation of the Fire Suppression Rating Schedule (FSRS) for the Insurance Service Office/Commercial Risk Services (ISO/CRS), but offers little assistance in developing a staffing plan for a regional dispatch center that is responsible for multiple agencies. However, it also provides guidance on many of the infrastructure requirements necessary in a communications center that is established in accordance with current standards and recommended practices. Communications systems provide 10% of the calculations used by ISO to establish the community's PPC classification. It is anticipated that joining the regional dispatch system would have a positive effect on the ISO PPC rating of the three-member communities.

THE DEPARTMENT OF HOMELAND SECURITY (DHS)

The Department of Homeland Security has evolved out the devastating realization that the nation's communications capabilities are woefully insufficient. Out of the department's major goals and accomplishments, two significant reports related to interoperability were released.

SAFECOM

The SAFECOM program has been initiated by the Department of Homeland Security, and in 2004 released its' first national Statement of Requirements (SoR) for Wireless Public Safety Communications and Interoperability. This document is updated on a regular basis by DHS. These standards aid in defining the future requirements for communications, using voice and data systems for day-to-day operations, as well as for task force and mutual aid operations. The SAFECOM program offers the communications industry a resource for furthering research and development efforts with user-community demand. These standards are technology specific, and should be explored further when developing a technology and service systems implementation plan for any new or upgraded communication center.

Interoperability Continuum

The Interoperability Continuum was also developed by the Department of Homeland Security, as a local tool-kit for measuring communications interoperability. Five key elements are identified in order to achieve short-term and long-term communication goals. These goals are as follows⁵:

- 1) *Increase Frequency of Use:* Interoperable communications should be utilized for planned and emergency incidents, with the goal of availability for systems that are used regularly for managing routine, as well as, emergency incidents.

⁵ DHS Website (July 8, 2014). *Department of Homeland Security Fact Sheet: Achieving First Responder Communications Interoperability – a Local, State and Federal Partnership.*

- 2) Create Governance Structure: A common governance structure will improve interoperability by enhancing communications and coordination, establishing policies, and reducing jurisdictional conflicts.
- 3) Develop Standard Operating Procedures: Standard Operating Procedures (SOPs) with operational and technical components needed for individual agencies, then for multiple agencies working together on planned events and mutual aid emergencies, and ultimately for regional efforts that coordinate according to the National Incident Management System (NIMS) response elements.
- 4) Integrate Technology Solutions: Use changing technology to plan interoperability solutions, from the most limited of alternatives, to the most sophisticated options.
- 5) Conduct Training and Exercises: Training and exercises are essential for local agency and regional progress.

See Appendix B for the US Department of Homeland Security's Interoperability Continuum Report.

ANALYSIS AND RECOMMENDATIONS

The following pages contain recommendations to guide the development of the regional dispatch center. They also contain analysis and discussions relative to significant issues, and when necessary, explanations regarding how the recommendation was developed. This list is not exclusive, but identifies the major considerations and requirements related to regionalizing emergency dispatch and communications operations in the towns of Danvers, Hamilton, and Manchester-by-the-Sea.

I. DANVERS REGIONAL DISPATCH CENTER SITE

Although Danvers is the proposed location of the RDC, the MRI study team also conducted site visits to, and inspected the existing dispatch centers located in, Hamilton and Manchester-by-the-Sea. Based upon the information that we gathered, and these site visits, we believe that Danvers would provide an excellent, and the best, location for a proposed RDC involving the potential partners for this endeavor. As has been previously noted, Danvers has currently undertaken a major renovation and expansion of the police department facility. This includes the construction of a new, state of the art, environmentally controlled, dispatch center, located on the second floor of the building.

- Main dispatch area will encompass just under 800 square feet, approximately 60% larger than the largest of the other facilities.
- Able to accommodate six complete, fully functional dispatch consoles.
- Will initially be outfitted with four fully functional consoles. The remainder will be installed in the future as operations require them.
- Three answering points in the dispatch center for 9-1-1 calls.
- Danvers is working with the state 9-1-1 department to increase the number of 9-1-1 answering points to four.
- All brand new, modern, state of the art, equipment that will incorporate the latest technology.
- Dispatch supervisor's office is 142 square feet.
- Server room for all of the radios and what is called "backroom" equipment is 224 square feet. It has significant room for expansion that may be necessary for future growth.
- Equipped with a break room, and locker and bathroom facilities, for the dispatch center personnel.
- Redundancy of systems as building has both a back-up generator and UPS battery back-up systems to support electronic equipment.
- Very secure and fully self-sufficient for the purpose of handling emergency dispatch and communications operations.
- Danvers Police Department which currently operates the communications center is an accredited agency which includes dispatch operations.

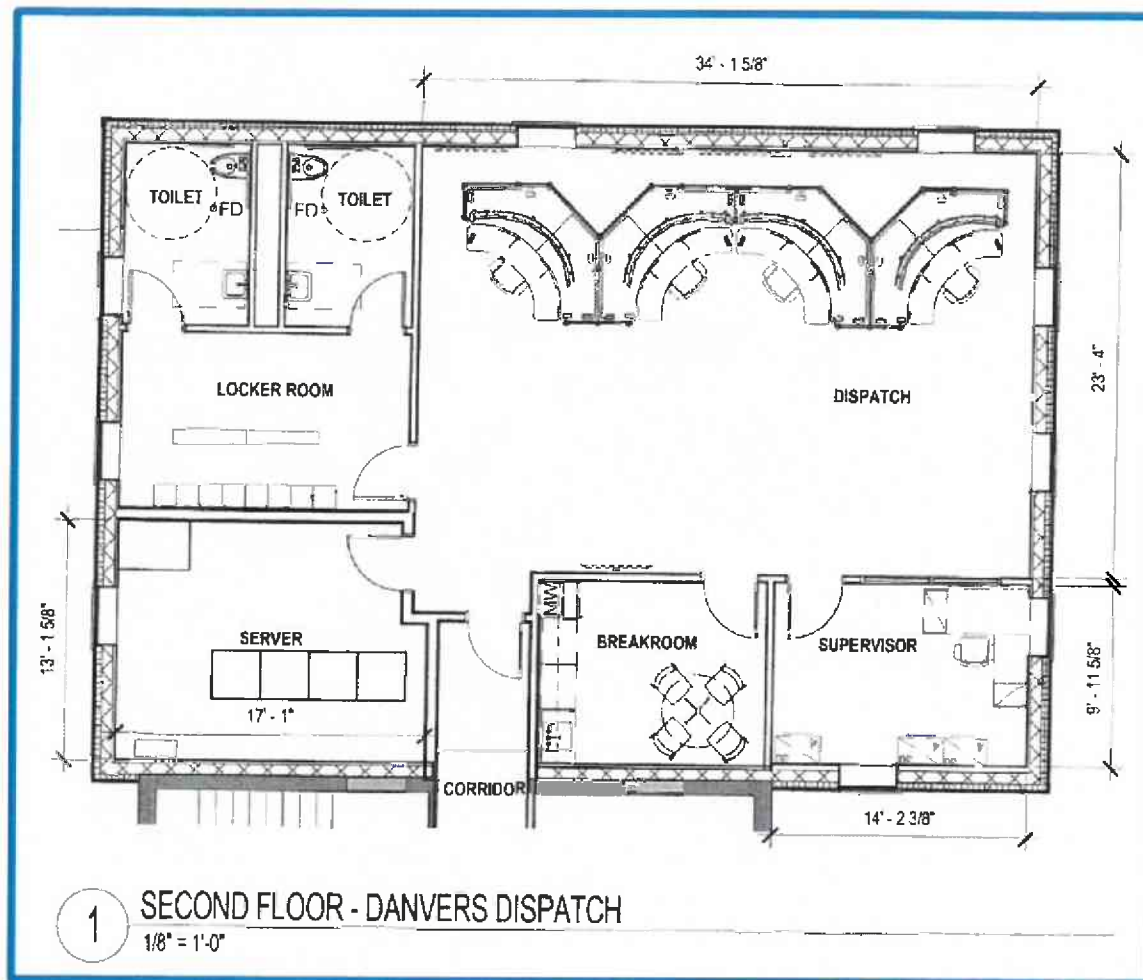


FIGURE 28: NEW DANVERS DISPATCH CENTER FLOOR PLAN

Recommendation I-1

After examining various options for establishing the Regional Dispatch Center, the soon to be completed state of the art dispatch center at the Danvers Police Department is the best location, is more than adequate to serve as the proposed regional facility, and includes room for future growth and expansion.

While not specifically evaluated in this study, it is the opinion of the MRI study team that the recommended facility for this RDC could easily handle the addition of several more similar sized communities should any other municipalities wish to join this regional endeavor. With Wenham's contract with the Essex RECC set to expire at the end of 2017, they would be a logical partner.

The Hamilton dispatch center is located in the town's approximately ten-year-old public safety building, which also houses the fire and police departments.

- Modern 500 square foot facility with three fully operational dispatch stations.
- Redundancy of systems as building has both a back-up generator and UPS battery back-up systems to support electronic equipment.
- 90' radio transmission tower on site.
- Town emergency operations center (EOC) located adjacent to dispatch is large enough to accommodate the needs of a regional EOC for all three towns should the need arise.
- Hamilton PD, which currently operates the communications center, is an accredited agency which includes dispatch operations.
- Facility previously served as a RECC.

Hamilton is also interested in trying to maintain their dispatch center infrastructure and designation as a public safety answering point (PSAP). They are concerned that if they lose the designation it will be difficult, if not impossible, to get it back. Since Danvers does not currently have a back-up center available to them, and Hamilton's center is fully equipped, the center could serve as a fully functional back-up should the Danvers' center be down for an extended period of time. This would be subject to approval by the state E 9-1-1 department.

Recommendation I-2

Since the Town of Danvers does not currently have a designated and equipped dispatch center to utilize as a back-up should the main facility need to be evacuated, or is rendered inoperable, consideration should be given to maintaining the existing Hamilton center and infrastructure to serve as a back-up facility/location for the RDC.

II. RDC COMMUNICATIONS AND CONNECTIVITY NEEDS

For the three communities to successfully regionalize their dispatch and emergency communications into one centralized facility, their current infrastructure must either be capable of being integrated with the equipment utilized by the other participants, or it will need to be updated and/or replaced. In addition, provisions will need to be made for the purchase and installation of equipment that will allow the various communities to connect their radio systems, emergency services facilities, and mobile resources into the regional center. These recommendations can be adjusted if only two towns decide to regionalize, or if additional communities seek to join the center at a later time.

There are some recommendations included in this section to correct and/or improve the current design and functionality of the individual towns' radio systems (not currently within the scope of work of this report). These will require additional research to evaluate further; however, they may have applicability and potential benefits relative to the proposed RDC.

As is noted later in this report, all three communities (as well as any additional ones that may wish to join the RDC) should replace all of their existing copper transmission lines with fiber optics. In all cases, the communities should give serious consideration to the redundancy that is built into their systems. This will minimize the chances of a catastrophic system failure from actually rendering the entire communications system inoperable.

Recommendation II-1

All of the participating towns should ensure, to the extent possible, that redundancy is built into their system(s). This will make the systems as secure and dependable as possible. New systems can operate with a combination of both microwave and fiber optic components.

Danvers has five sites that are used for their public safety communications system. The MRI study team was informed that this system works well and rarely has any significant issues. The town is presently in the process of considering expanding and enhancing the capabilities of their communication system. Among the options being explored are installing a microwave communications network that will function as their public safety communications system, and adding one or two additional receiver sites. The locations being considered for the receiver sites are at the Home Depot cell tower and the second at Folly Hill. Adding these sites would enhance an already very good communications system. However, the town should not invest in this enhancement unless tests showed a definitive need, or service will be improved significantly.

The municipal IT department is also exploring the cost of expanding the town's fiber optics system throughout the town, eventually linking all town owned facilities. At this point, Comcast and Verizon are both potential vendors and eventually one could serve as the primary and the other as a back-up. Should this project move forward, the first phase to be completed would serve as a link for the connection of the public safety communication network (Note: This is now in the process of being done). The town is also looking at the cost to construct a 110' monopole tower at the police station that would replace the existing 55' tower. Since the police station is the backup for the main transmitter for the entire public safety communications system, the new tower would significantly enhance the existing system and provide it with some true redundancy.

The initial phase of the communications upgrade project could create a hybrid system that would initially using a combination of some fiber optic and microwave. Future modifications to the system would create full microwave and fiber optic systems, thus producing redundancy. Either one of these options would probably be satisfactory for the town. It is anticipated that a

decision will be made soon so the system will be operational prior to the opening of the new dispatch center.

Recommendation II-2

The Town of Danvers should give serious consideration to connecting all of their transmitter and receiver sites with either a microwave system, fiber optic link, or a combination of both.

Recommendation II-3

The Town of Danvers should only consider an additional receiver site if it is determined by the town, through a radio system coverage technical analysis, that the site is needed to attempt to eliminate any deficient coverage areas in the existing system.

Recommendation II-4

The Town of Danvers should give serious consideration to the installation of the new 110' monopole tower at the police station. The added height of this tower (doubling the current height of 55') would enhance the overall communications system particularly since the police station is the location of the back-up transmitter.

The Town of Hamilton has a very good and extremely reliable radio communication system. The MRI team was not informed of any areas in the town where service is not adequate. This system has been updated and serviced on a regular basis. At the time of this assessment the town was not planning any significant upgrades to the system.

Recommendation II-5

The Town of Hamilton should give serious consideration to connecting all of their transmitter and receiver sites with either a microwave system, fiber optic link, or a combination of both. This system upgrade can be phased in over time, but should start with the connection from the public safety building to the main transmission site at Gordon–Conwell Theological Seminary.

The Town of Manchester has recently significantly updated their dispatch center, including the installation of new equipment. However, this upgrade did not include transmitters or receivers. At the time of this assessment, the town utilizes separate transmitter and receiver sites for police and fire. The police department has three transmitter/receiver sites, while the fire department utilizes four. Based on the existing transmission sites being separate, the distance from the police station to their main transmission location at Powder House Hill is approximately 1,430', while the distance from the fire department to the cell tower at 193 School Street is approximately 5,280". Both departments utilize their respective headquarters as their back-up transmitter and receiver sites. The antenna for the backup transmission location for the police department at the police station is 35', and for the fire department at their headquarters is 65', which are both quite low to provide adequate communication coverage.

A basic assessment of the Manchester public safety communication system and discussions with personnel by the MRI study team identified that both the police and fire departments have areas in town where there is limited or even no radio coverage. These areas are known as “dead areas” and can create communications issues during emergency incidents. Effective emergency scene communications are a mission critical component of police, fire, and EMS operations. The lack of adequate emergency communications capabilities in certain areas of the town can create serious personnel safety issues that need to be addressed and corrected. The team was informed that the town is looking to upgrade its emergency communications and some preliminary needs assessments have already been completed.

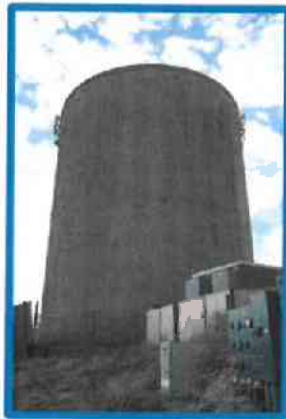


Figure 29: Manchester water tower on a centrally located hill in the town.

Manchester has recently had a communications review conducted which identified weaknesses in its system. The town should continue to explore the possibility of establishing a joint police and fire radio transmitter and receiver site. The town has identified the municipally owned water tower as the possible site for combined transmitting and receiving sites for both the police and fire departments. The other sites could then be linked to this location. The distance from the police station to the water tower is about 4,892'. The water tower site is centrally located, is the highest point in town, and would provide an antenna elevation of approximately 180'. The height of the antenna provides a clear line of site to both town hall and the cell tower on School Street. This will also provide the option of utilizing a point-to-point microwave system.



FIGURE 30: MANCHESTER COMMUNICATIONS SYSTEM WITH CO-LOCATED TRANSMISSION AND RECEIVER SITES ON THE WATER TOWER
Diagram courtesy of Manchester Fire Department

The improved efficiency from co-locating the radio sites would allow Manchester to more cost-effectively replace older equipment, while simultaneously increasing security and hardening the infrastructure at their key communication sites. It would also allow them to possibly add another link at the transfer station which would not only improve public safety communications but also allow the DPW to link on to the system. The specific benefit to this project is that there would only need to be one communications link into Manchester from the RDC. Under the town's existing radio system, two links will be required to connect the town to Danvers' dispatch center; one to the Manchester Fire Department comparator site, the other to the Manchester Police Department comparator site. Another possible benefit is the location of water tank would allow for the use of a microwave direct line of site system saving on the cost of leased lines between Manchester and Danvers.

Recommendation II-6

The Town of Manchester should consider establishing a joint police and fire communications system transmitter and receiver site at the centrally located town owned water tower. This should result in an overall improvement in communications for all town departments.

Recommendation II-7

The Town of Manchester should consider moving its communications system radio comparators to a secure and climate controlled location at the Pine Street water tower site. Moving this equipment will probably eliminate the need for the Power Hill tower, and the microwave link from there to the police station, significantly reducing the project cost.

Recommendation II-8

The Town of Manchester should consider connecting all their transmitter and receiver sites with either a microwave system, fiber optic link, or a combination of both. This system upgrade can be phased in over time but should start with the connection from the public safety locations to the main transmission/receiver site and later include the repeater locations.

Recommendation II-9

The Town of Manchester should explore potential options for increasing the height of the communications system antennas at both the fire and police departments.

There are several viable options for establishing the connection that is necessary to connect the Hamilton and Manchester radio systems to the Danvers RDC.

OPTION 1: MICROWAVE

A licensed 18 GHz microwave system is the preferred choice for primary connectivity from the Danvers RDC, located at 120 Ash Street, to Hamilton and Manchester. Microwave connections require clear line of site between hops, so the links identified below are needed to get from the Danvers RDC location to each of the comparator locations in Hamilton and Manchester. These suggested microwave links will be used replace the existing leased copper lines from the voter receiver/comparator to the transmit sites.

Danvers and Hamilton have shared comparator sites for police and fire communications, which requires only one microwave link to each town's high point/tower site, and from the tower site to the comparator site as follows:

Link 1: Danvers RDC to Hunt Center, 75 Lindall Street, Danvers

Link 2: Danvers Hunt Center to Folly Hill, Danvers (new site)

Link 3: Folly Hill, Danvers to Gordon Conwell Seminary, 130 Essex Street, Hamilton

Link 4: Gordon Conwell Seminary, Hamilton to Hamilton Public Safety Building, 265 Bay Road, Hamilton

Link 5: Gordon Conwell Seminary, Hamilton to Manchester water tower, Pine Street

As previously discussed above, Manchester does not currently have any shared sites for fire and police communications. Therefore, one microwave link would be needed from the Hamilton high point/tower site to a high point/tower site in Manchester, in this case the water tower. Three additional microwave links to the individual police and fire comparator sites would also be required. As recommended above, consideration should be given to upgrading Manchester's radio system to co-located sites.

Link 6: Manchester water tower, Pine Street to cell tower, 193 School Street, Manchester

Link 7: Manchester water tower, Pine Street to Powder House Hill, Manchester
*This site would require a minimum of a 100' tower to be installed to provide proper coverage.

Link 8: Manchester water tower, Pine Street to Manchester Police Department, 10 Central Street, Manchester
*This site would require a minimum of an 80' antenna to provide proper coverage.

This system is based on the existing locations of the radio transmission equipment presently being utilized by the three communities. Danvers would need to install a microwave unit at Folly Hill which is not one of the existing sites. At a minimum, Manchester would need to mount a microwave unit on the Pine Street water tower, and would also need raise the height of their antenna at Powder House Hill and the police station.

Figure 31, on the next page, is a potential microwave system design schematic. The towers indicated are required for proper 18GHZ microwave link system operation and coverage. It may be possible to omit the links to the Manchester Police Department by having the police and fire comparators moved to the Pine Street water tower. This would eliminate the need for the Powder House Hill tower site and link to the Police HQ. If both the fire and police department main transmitters are relocated to the Pine Street water tower, another microwave link could be eliminated. The cost savings of cutting the additional microwave links would be significant.

Microwave is considered by some to be a more reliable option than others for connectivity. Although the initial capital expenses are greater, it offers long-term cost savings as there is no middle company to deal with, no monthly user fees, and all the equipment is locally owned (although the same holds true with municipally owned fiber systems). In addition, it allows for future expansion of other users and/or systems on the microwave hops, if the agencies choose, or there was a desire to bring additional communities into the RDC.

As will be described in greater detail under *Option 2: Fiber Optic Lines*, Danvers has committed to connecting their own internal repeater sites utilizing fiber optic lines. However, the microwave option will probably still be the option of choice to connect both Hamilton and Manchester with the Danvers RDC.

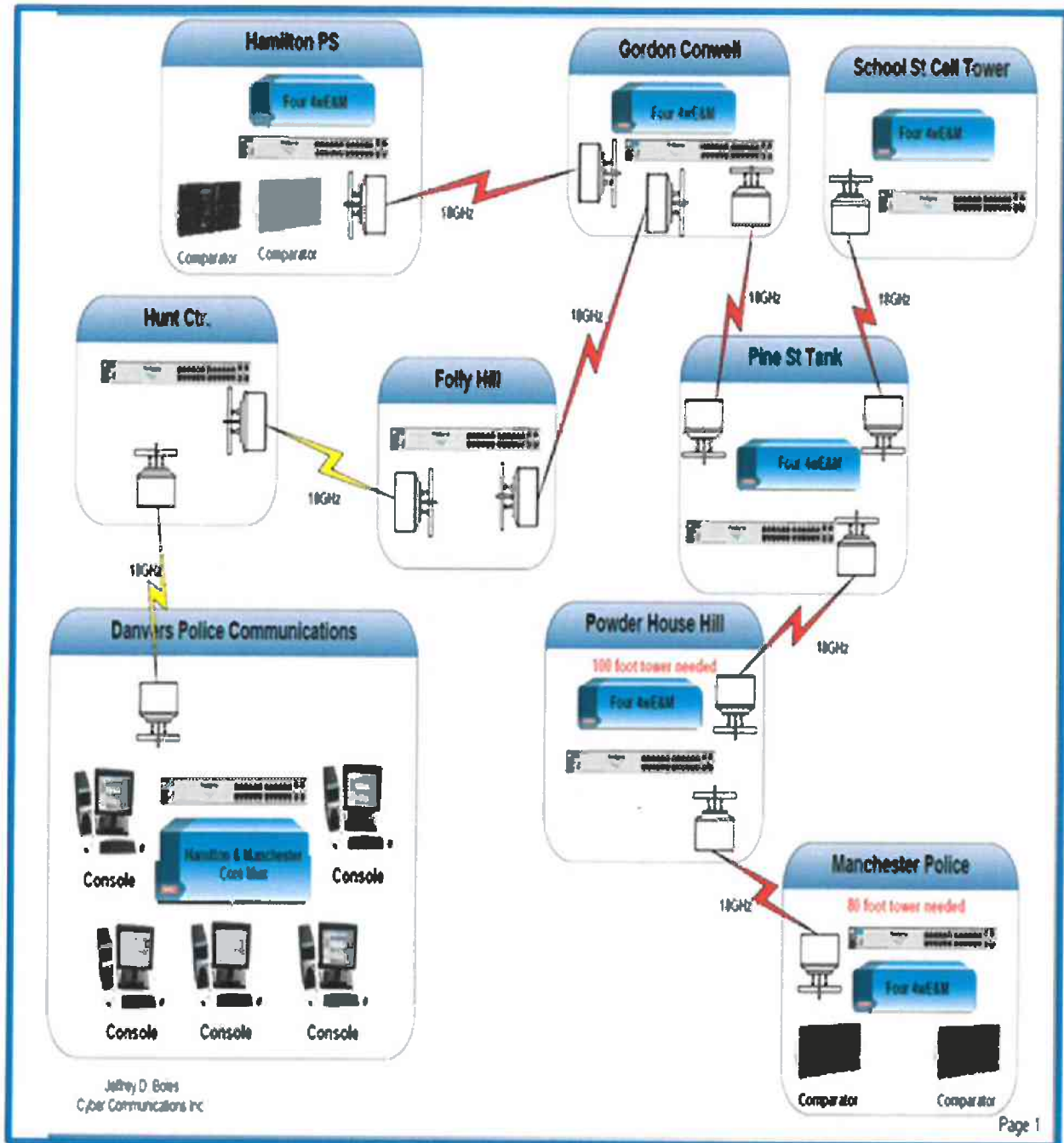


FIGURE 31: POSSIBLE DANVERS, HAMILTON, AND MANCHESTER REGIONAL PUBLIC SAFETY COMMUNICATIONS MICRO-WAVE NETWORK
Diagram provided by, and courtesy of, CyberCom Inc.

OPTION 2: FIBER OPTIC LINE

The second option for connecting all three towns into the RECC is by utilizing leased fiber optic lines. This option is also very reliable but costlier in the long run due to the monthly fees required for leases. Three lines would be needed as follows, unless Manchester moved to a combined site, in which case only two lines would be needed:

Line 1: Danvers RDC to Hamilton public safety building (fire & police departments)

Line 2: Danvers RDC to Manchester Police Department

Line 3: Danvers RDC to Manchester Fire Department

Fiber optic lines have less of an initial capital expense than purchasing and installing microwave hardware and infrastructure. However, there still are initial capital expenses in addition to recurring monthly costs (if the lines are leased). A multiplexer will be needed at each end of the fiber connections to convert the signals back to analog after travelling through the fiber. The host site (Danvers) will require a larger multiplexer. At each remote site (Hamilton and either one or two Manchester sites), a smaller, less costly multiplexer will be required.

Monthly fiber optic fees are between \$900 and \$1,200 per line, per month, depending upon the capacity needed. There are no initial installation costs through Verizon; however, if there is no existing fiber optic in the area of the site, there may be construction costs to install the fiber, which are passed on to the customer. For this project, the monthly lease fees would be between \$1,800 and \$3,600. Construction costs would have to be determined at a later date, after the lease company researched the availability of fiber optic at each site.

Since town owned fiber systems are becoming more and more popular, there is the potential option that municipally owned fiber could be used to connect the sites instead of leased fiber. While this option has a significantly higher upfront cost that would need to be planned for through capital budget expenditures, in the long term, it will probably be more cost effective over the line's normal life expectancy. In addition, the town owns and controls their own lines, although they would also be responsible for maintenance on them. The town(s) could also initially utilize leased lines until such time as they were able to finance and install their own dedicated system.

The MRI study team was informed that subsequent to our field evaluations in Danvers that the town has committed to a major capital investment in its municipally owned fiber system. They are in the process of looping in (connecting) all the town's public safety facilities and repeater sites with municipally owned fiber lines. They then plan to connect the remainder of the town's buildings to the system. We believe that this is a very good investment for the town, one which will more than adequately meet their communications needs moving forward.

OPTION 3: BASE RADIOS

The final option for connectivity would be using base radios in the Danvers RDC to transmit off the tower located there. When the radio is keyed up in Danvers, the RF signal would go from the tower to the closest receiver site in Hamilton or Manchester. This option is not recommended for primary daily use, but would offer a means of redundancy to one of the two previously discussed options.

This option will allow for the use of some existing infrastructure (base radios) that exist in the existing dispatch centers and public safety departments. Depending on the channels involved in the regionalization initiative, additional VHF and UHF base radios will be needed to supplement the existing equipment so there will be no shared radios between the UHF and VHF users. Again, this option should not be considered as the main source of communication connectivity because the RF signal will not be as strong as the system level connection offered by either microwave or fiber optic. However, this option is a good, lower cost back-up/redundancy solution for the communities.

Recommendation II-10

The Danvers RDC should install a micro-wave system as the primary means of connectivity between communication sites and emergency services facilities in Hamilton, and Manchester with the RDC.

Recommendation II-11

The Town of Danvers should continue their project to connect all public safety facilities and communications repeater sites with the municipally owned fiber optic system.

Recommendation II-12

The Town of Danvers should consider the addition of a new communications site on Folly Hill for their own system.

Recommendation II-13

The Town of Danvers should consider installing the new 110' monopole tower to replace the existing 55' tower at the police station.

Recommendation II-14

The Danvers RDC should consider using a combination of existing and new/upgraded VHF and UHF base station radios to provide back-up/redundancy to their emergency communications operation.

III. REPLACEMENT OF ALL COPPER CIRCUITS IN ALL THREE TOWN RADIO SYSTEMS

It is common in most radio systems to use leased copper circuits to connect satellite receiver sites (among other system parts) back to the systems' voter/comparator, usually located in the dispatch center. Although they often result in unreliable performance (due to the systems being linear rather than looped, quality control issues, service issues with the lease company, and prioritization issues with the circuits), municipalities still rely heavily on these circuits. Over the past several years, lease companies, such as Verizon, have started to make announcements that existing two and four wire copper lines will no longer be supported, nor will any new circuits be allocated. This includes RTNA, TLNA, FDDA and copper T1 POTS lines. This has already begun to take effect.

Leased fiber optic lines are the only lines that will be supported from this point forward. In all three towns' radio systems, copper lines are used as described above. Regardless of how the communities choose to connect into Danvers dispatch for the regionalization project, they all must consider migrating all existing copper circuits to an alternate solution. Similar to the three options discussed above, the alternatives to copper lines are microwave, fiber optic line, and RF. Unfortunately, leased fiber optic circuits are significantly more expensive than copper lines (a basic RTNA circuit is around \$60/month; a copper T1 is around \$350/month; compared to a fiber connection which runs \$900.00 to \$1,200/month depending upon the capabilities on the line). Microwave has a larger initial capital outlay, and RF is limited by distance.

This situation does not need to be resolved in order to move forward with the RDC project. However, it should be given serious consideration when evaluating the health of the existing towns' radio systems and future upgrades. This should be done irrespective of the final decision on forming the Danvers RDC. Among many other benefits, fiber optic systems are generally looped systems (whereas the old copper systems are linear) so a break in a line or other interruption will not normally render part of the system out of service. The necessary links are merely routed in another direction through the system.

As was discussed above, there is always the option that municipally owned fiber could be used to connect the sites instead of leased fiber. While this option has a significantly higher upfront cost that would need to be planned for through capital budget expenditures, in the long term, it will probably be more cost effective over the line's normal life expectancy. In addition, the town owns and controls their own lines, although they would also be responsible for maintenance on them. The town(s) could also initially utilize leased lines until such time as they were able to finance and install their own dedicated system.

Recommendation III-1

Consideration should be given to completely replacing ALL copper wire lines and connections in all three communities' radio systems with a fiber optic system. This system can be either installed and owned by the individual towns, or can be leased from a service provider. Each

town could also install the fiber optic line in phases gradually linking the various communications and repeater sites with the new system.

Recommendation III-2

The Town of Danvers should make it a priority to convert to a fiber optics link for connecting to both their transmitter and receiver sites, as either the primary or back-up system.

Recommendation III-3

The Town of Hamilton should make it a priority to convert to a fiber optics link for connecting the public safety building with the main transmission site at Gordon–Conwell Theological Seminary.

Recommendation III-4

The Town of Manchester should make it a priority to convert to a fiber optics link for connecting the main police transmitter and receiver site on Powder House Hill to the police station, and the main fire department transmitter and receiver site at the School Street cell tower to the fire station.

NOTE: Eventually, the RDC and its participating municipalities can utilize the fiber optic lines as their primary backup for the micro-wave transmission systems, and the UHF/VHF radios can become a secondary back-up option, increasing the redundancy in the system.

IV. DISPATCH CENTER CONSOLES

Once Danvers dispatch operations moves to the new center, it will be fully outfitted with all new equipment. Reportedly, nothing from the existing center will be moved over. The town has a contract with Motorola to install new MCC 7500 K2 Core Dispatch console systems for the Danvers Police Department. The new, state of the art system, was designed to replace the Motorola Gold Elite console system in existence now. All four consoles that will be installed initially will have the ability to meet the needs of the additional towns that may participate in the center. The new consoles are expandable in design, so if additional expansion of the center were to occur in the future they would only need to be updated with necessary radio channels and/or software. The benefit of this system is that it permits dispatchers to have all radio channels on one screen, using one common microphone to transmit. Costs to perform future upgrades will vary depending on how many channels are going to be added and the age of the current software/hardware at that time.

Recommendation IV-1

The Danvers RDC should ensure that the dispatch center consoles in the new facility permit dispatchers to have all radio channels on one screen, and use one common microphone to transmit.

V. COMPUTER AIDED DISPATCH SYSTEM

After evaluating the Computer Aided Dispatch (CAD) and reporting programs/systems currently in use, the MRI study team determined that the three communities are not currently using the same programs and systems. In fact, they are utilizing three very different systems.

Danvers is utilizing the Queues Enforth Development, Inc. (QED) CAD and RMS systems. Q.E.D has been providing multi-agency, multi-jurisdictional systems for nearly 28 years to regional dispatch centers throughout the country. They are also locally based in Massachusetts. In the Boston area, one of the larger systems they are currently providing is for the Cambridge Fire Department.

Danvers has been using this system since about 2003. The system is used by the police, dispatch, and fire. QED has mapped out the entire town to provide pin mapping on every location within Danvers. When units are dispatched to a call, the location is pinned in the vehicle exactly at the location. The fire department also utilizes the Firehouse management and recordkeeping system for their operations. They informed the team that the two systems interface very well with each other and information is easily transferred and shared. The annual maintenance costs associated with the QED system total about \$15,200, for Danvers which is divided evenly between the police and fire departments.

Hamilton is using IMC Tri Tech Software Systems (a subsidiary of Zuercher Technologies) computer aided dispatch program and reporting systems. They have the dispatch, police records, fire, and administrative modules. This system has the capabilities to link to the registry of motor vehicles system, 9-1-1 back fill, and includes an emergency medical dispatch (EMD) program. They are currently using EMD protocols set forth by Priority Dispatch, operated through the International Academies of Emergency Dispatch.

Manchester is using Micro Systems Pro IV CAD and reporting system. Included with this system are capabilities for logging calls for service, residential and business data, master names, and property and evidence data. It also serves as the departments' booking software. Pro IV is able to import motor vehicle crash reports created using Easy Street Draw software. The department presently uses EMD protocols set forth by Power Phone. Both hardcopy and computer based methods are available for use by dispatchers. The Micro Systems CAD is old and would not meet the needs of a regional emergency dispatch center.

Both the QED and IMC Tri Tech systems have a good track record when used as the CAD program for regional emergency dispatch systems. In the past, Manchester has considered switching to Tri-Tech, which has more components and capabilities, and is perceived to be more user friendly than the Micro Systems program and system they currently utilize. However,

they have not been able to obtain adequate funding to allow purchase of the program and associated transfer of existing data.

In order to be able to participate in a regional emergency dispatch center, all three communities need to be operating off the same CAD. As Danvers is presently is using the QED software system, which is a very good system, this is the system that the RDC CAD system can be developed from. The QED system utilizes a single server, single database system, which is supposed to simplify system management. It also incorporates many of the Massachusetts requirements, including, but not necessarily limited to, MA NIBRS with electronic submission, MAFIRS for Fire Incident Reporting, ProQA Paramount integration, E9-1-1 import to CAD, state specific Booking with Application for Complaint, MA CJIS approved interface to CAD, mobiles and records, integration with CopLink and AFIS systems from the State Police, SWISS submission to DCJIS for state-wide data sharing, and MA CRASH with electronic submission to the RMV.

The Tri Tech IMC system is also a good system, with an excellent track record in many Massachusetts communities, should Danvers decide to convert to that system. In the end, the town needs to utilize the system that best meets their specific needs. Any participants in the RDC would need update or replace their systems to ensure compatibility with the Danvers system.

Considering the variety of CAD/Dispatch systems in place among the three communities, Danvers thought it prudent to perform a comprehensive internal study of available software packages and their current statuses. A seven-member committee was assembled, consisting of police, fire, and technology personnel, to review the most widely deployed systems in the Commonwealth and evaluate their operational and financial feasibility. Danvers is now in the process of conducting site visits to area departments to observe offerings from the various vendors.

Recommendation V-1

The Town of Danvers should continue their internal review and evaluation of various CAD program options. The CAD program chosen should be an implementation based upon the results of this internal evaluation. Any communities that choose to contract with Danvers to receive service from the RDC will need to convert to the CAD system that Danvers selects.

The purchase of the necessary hardware and software updates to allow all three communities to operate off of the same CAD system would be covered under the State E-9-1-1 grant program. Both QED and Tri Tech are approved vendors under the state bid IT Contract.

VI. WORK STATIONS

Appropriate and integrated/compatible computer work stations will be required at all active work locations and at the RDC. Danvers will have four active dispatch communications stations in the new facility. In addition, work stations will be needed in the police and fire stations in each of the three-member communities. The number of work stations required would need to be decided by each individual town. Each police, fire, and EMS vehicle that will be so equipped will need to be outfitted with a Panasonic Toughbook mobile data terminal (MDT), emergency service capable tablets, or similar device.

Recommendation VI-1

Working in conjunction with the Danvers RDC and IT Department, Danvers, Hamilton, and Manchester should determine the number of fixed and mobile work stations and MDTs/tablets they will need to accomplish their mission and communicate effectively with the center utilizing compatible equipment.

VII. MUNICIPAL FIRE ALARM SYSTEM

Equipment/hardware to allow the receipt of alarms from the municipal fire alarm systems will be required in the RDC. Both Danvers and Hamilton currently operate these systems. However, Hamilton's system is limited to just 14 locations in the town, all of them municipally owned. Should the town decide to join the RDC, their existing Keltron fire alarm panel is old and would not be able to be upgraded or relocated to the new facility. These locations would just be moved to L.W. Bills central station monitoring facility which would relay any alarms received to the RDC. Manchester does not have any municipal owned fire alarm systems. All fire alarms are answered by privately owned central stations.

Danvers operates a 100-mil municipal fire alarm system. The dispatch center is currently using a M/K Form 4 fire alarm panel with a Keltron fire alarm read out that displays the alarm address on screen and provides a hard copy a print out of the location. Bells and decoders are also located at fire headquarters and fire station # 2. Most of this equipment will be replaced once the new dispatch center becomes operational.

The Town of Danvers is planning to install a new Vision 21 fire alarm processor with a battery back-up, radio receiver modules with cable and antennas, telegraph interface module, and a remote display capability. This equipment will allow the town to continue to operate their existing 100 mil fire alarm system, but would also permit them to be able to add and/or upgrade to newer radio boxes. With this capability, Danvers would be able to accept and monitor alarms from any other town that may later join the RDC that utilizes a 100-mil system compatible radio boxes.

This system operates in the following manner. The Vision 21 alarm panel displays all call information received from the remote Vision 21 console. This info is inputted by the town in which the box is located. The call panel holds all received call from the Vision 21. (If a call is unacknowledged it will appear in the unacknowledged calls list.) The status panel maintains the current status of the connected Vision 21. It will also display any trouble conditions present on the system, as well as, any boxes that have been placed out of service.

In order to comply with the requirements of National Fire Protection Association (NFPA) Standard 72: *National Fire Alarm and Signaling Code*, and Standard 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, the RDC must have a primary and secondary receiver. The primary route for receipt of these alarms would be through direct lines. Two processers are required by NFPA 72 so a pair of RTNA copper lines would be used for each Vision-21 alarm processor. A repeater pass would transmit the alarms if the primary system would go down. Each fire station needs to have this updated equipment in order to receive and transmit the alarms.

Recommendation VII-1

The RDC should obtain and install the Vision 21 system and related hardware/software for the purpose of upgrading their fire alarm system receiving transmissions from Danvers.

Recommendation VII-2

NFPA Standard 72: National Fire Alarm and Signaling Code recommends dual redundancy in this system. Danvers should consider the purchase of a second Vision 21 processor to serve as a back-up in the dispatch center.

Recommendation VII-3

Danvers should consider maintaining the existing 100 mil fire alarm system and existing town owned copper lines (the 100-mil system will probably not work with fiber line); and upgrade the Vision 21 processor(s) to allow for the receipt of radio boxes.

NOTE: Since it appears that only Danvers is going to be utilizing this system at the present time, and the town needs to upgrade their system regardless of whether the RDC is formed or not, the cost of this system is not calculated into the RDC financial analysis. Should either of the current partners decide to install this type of system, or another community which would need it joins the RDC, the cost could be prorated at that time.

VIII. FIRE DEPARTMENT AND EMS ALERTING SYSTEM

Danvers does not currently use an alerting system for their fire stations. They use the 100 mil station bells and chimes for the audible alarm, and an encrypted radio voice alarm for the message. Although this system works well for the dispatching of the Danvers Fire Department,

it would not work for the fire departments in Hamilton and Manchester. Both of these departments utilize standard radio tone and voice messages to alert both the fire stations and their off-duty and call personnel via radio pagers.

A system that has been successfully (and widely) used in similar applications and has an excellent record of dependability is a Zetron fire alerting system. This system operates utilizing a voice over IP system. The system does require a lot of band-width for voice over IP, therefore, it is recommended by Zetron that it be run over fiber optic lines.

This system complies with the recommendations found NFPA 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems* for dispatch systems. The system is also expandable so additional consoles and/or fire stations can be added should the RDC take on more communities. The station alarm transponders include flexible alerting, control, and status capabilities. Dispatch announcements can be made via voice over internet protocol (VoIP), or radio. The dedicated console client application makes it easy to add additional operator positions, each capable of initiating dispatch commands and receiver alerts to and from any fire station. The system includes full CAD integration capabilities. It can also be utilized to control additional functions such as activating station lights, opening or closing doors, etc. The redundancy for this system, should it fail, would be to dispatch by way of land line phones.

Recommendation VIII-1

The Zetron fire alerting system should be installed in all dispatch operator consoles, the two Danvers fire stations, and the single stations in both Hamilton and Manchester. Consideration should also be given to installing it in the EMS stations in Danvers and Hamilton.

Recommendation VIII-2

The public address and speaker systems in each of the four stations should be upgraded as needed to maximize the capabilities of the Zetron system.

Recommendation VIII-3

Since the Zetron system requires a low latency connection for VoIP, and the manufacturer recommends it, the system should be operated utilizing fiber optic lines between the fire and EMS stations, and the RDC or the connectivity point to the RDC. Existing lines should be kept in place and maintained to the extent possible as a back-up.

IX. GOVERNANCE

The first step to establishing the RDC is for all three of the potential participants to sign an Inter-Municipal Agreement. This agreement, which would require approval from the Board of Selectmen in each town, establishes the legal basis for the towns to participate

in the joint endeavor. It is also necessary before the state 9-1-1 department will recognize the regional center and consider awarding state 9-1-1 development grant funding for the project to update and/or acquire equipment necessary for the RDC to operate. This equipment would include telephone and radio communications equipment, fire alarm equipment necessary to bring existing fire and master boxes into the new center, alerting system(s) to dispatch the fire departments and EMS, and the hardware and software necessary for updating and supporting the CAD program.

Some additional considerations that could be included in the Inter-Municipal Agreement include, but may not be limited to:

- A commitment to adhere to the standards and practices as set forth by the Massachusetts Police Commission Accreditation Program regarding dispatch services and training.
- A statement clearly identifying the scope of service to be provided, and records to be maintained and/or distributed to the participating departments.
- Language dealing with specific financial arrangements, and the duration, modification, and termination of any agreement.
- Specific arrangements for the use of equipment and/or facilities.
- A policy concerning the review of recordings made in the dispatch center. The policy should include authorization procedures.

Recommendation IX-1

As soon as they are legally permitted, the Towns of Danvers, Hamilton, and Manchester should formally execute the appropriate Inter-Municipal Agreements and contracts committing to the formation of the RDC and establishing the terms and conditions for its services and operations.

Under the proposed RDC, the Town of Danvers will be the authority for the center. The RDC will be a function of, and solely under, the auspices of the Town of Danvers. The Towns of Hamilton and Manchester (as well as any others that subsequently join) will contract with Danvers to provide them specified emergency dispatching and communications services. Under this scenario, the dispatch center personnel will be employees of the Town of Danvers. The chief of the Danvers Police Department will be responsible for the hiring, training, evaluating, discipline, and termination of the dispatchers. The employees would report directly to the police chief, or more probably, the dispatch center manager.

This scenario is relatively easy to implement in that it requires only agreement between the three potential participants. Legislative approval is not necessary. However, since it will be Danvers' operation, and the other communities will be provided service on a contract basis. Hamilton and Manchester need to be cognoscente of this fact.

In order to assure that the other participants are satisfied with the service and their needs are being met in an ongoing manner, it would be wise for Danvers to establish an advisory operational board comprised of the police and fire chiefs (or their representatives) from each of the participating communities. This board would be responsible for assisting with developing the operational procedures used by the RDC. The chiefs would also be able to immediately contact the dispatch center manager, or on-duty supervisor, to address any problems they had with dispatch during an incident that occurred in their town. However, since the development of a standard set of procedures and protocols for police and fire are vastly different endeavors, consideration should be given to the formation of a police subcommittee to address law enforcement concerns, and a separate fire subcommittee to work on fire and EMS issues. An advisory board comprised of the Danvers town manager, along with the managers of any other communities that are contracting for service might also be advisable to allow for discussions that would be appropriate for that level of management. These details can be negotiated and agreed upon as part of the contracts or agreements between the participants.

Recommendation IX-2

An advisory operational board, comprised of the police and fire chiefs of each participating community, should be created for the purpose of assisting with developing the operational procedures used by the RDC. Consideration should also be given to separate police and fire sub committees.

In order to facilitate what we believe would be the most straight forward lines of communications between the emergency services chiefs of the participating municipalities the following alternative organizational chart is recommended:

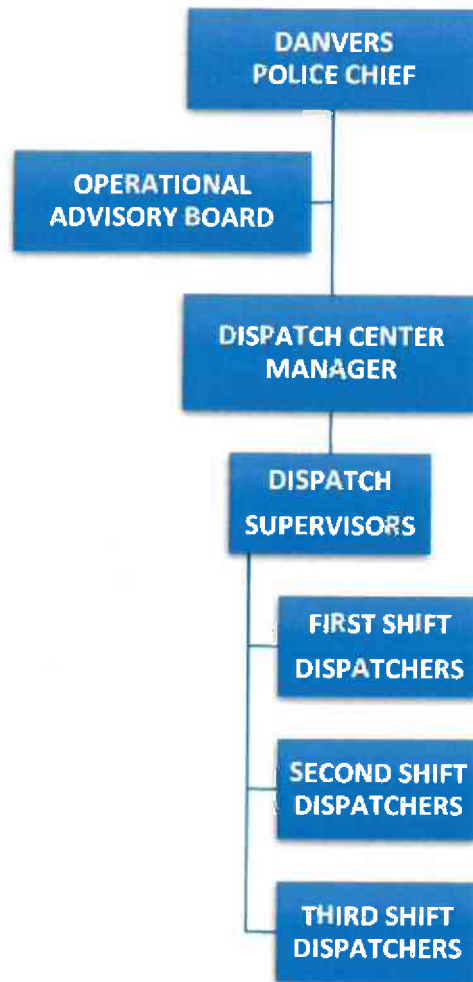


FIGURE 32: PROPOSED DANVERS RDC ORGANIZATIONAL CHART

It is anticipated that the dispatch center manager would work during the first shift and could provide the third staff member in the room to assist during times of high activity. The dispatch supervisor would work the second shift and could also fill in as the third dispatcher during major incidents and/or times of high activity.

X. ANTICIPATED CAPITAL START-UP COSTS AND GRANT FUNDING OPPORTUNITIES

The Commonwealth of Massachusetts has a very robust and wide- ranging grant funding program designed to underwrite the costs of setting up and operating emergency dispatch and communications centers. Some of these grants are competitive and others are not. However, for competitive grants priority is given to communities that are looking to consolidate or share services and those that are considering establishment of regional centers.

Support and Incentive Grants

The purpose of these is to provide general financial and incentive based funding to assist with the costs of operating public safety answering points (PSAPs) and regional emergency dispatch centers. This grant will **reimburse** the RDC for a range of allowable expenses. Examples of allowable expenses are as follows:

- Salaries for 9-1-1 telecommunicators who are emergency communications dispatchers or supervisors.
- Heat, ventilation, air conditioning, and other environmental control equipment
- Computer-aided dispatch (CAD) systems
- Radio consoles, equipment, and furniture
- Fire alarm receiving and alerting equipment associated with providing enhanced 9-1-1 service.
- Public safety radio systems (these reimbursements are for RECCs only)

Regional and Regional Secondary PSAP and Regional Emergency Communications and Dispatch Center Development Grants

The purpose of these grants are to support the development and startup of regional and regional secondary PSAPs and RECC/RDCs, including the expansion or upgrading of existing facilities and operations to maximize the effectiveness of emergency 9-1-1 and dispatch services, as well as enhance regional interoperability. This grant will also **reimburse** the RECC/RDC for allowable expenses. Applications for this grant program must be submitted prior to April of each year to be considered for approval. Examples of allowable expenses include, but are not limited to:

- Project management costs
- Personnel costs for RECC/RDC Administrator/Director: (hiring person prior to center start-up to allow them to guide and oversee critical components and benchmarks throughout the process)
- Transitional awards (remote cameras, remote printers, and security doors) and the one-time cost for the installation of such security measures.

- Architectural and engineering services
- Construction costs (construction materials, labor, consultant services)
- Equipment (Radio systems and consoles, CADs, record management system, fire alarm systems and alerting equipment. Approved consultant services associated with this equipment may be allowable.)

Training Grants

All primary PSAPs, regional PSAPs and RECC/RDCs are eligible to receive funding under the training grant program. This grant will **reimburse** the RECC/RDC for the following training and certification of enhanced 9-1-1 telecommunicators:

- Emergency medical dispatch (EMD) programs
- Quality assurance of emergency medical dispatch programs
- Other training programs approved by state 9-1-1 department

NOTE: All wage reimbursements authorized under the program must be allocated by the grantee in adherence to applicable collective bargaining agreements.

- Funding may be authorized for the expenses of live or online training courses, certification/recertification of personnel, 9-1-1 accreditation of PSAPs and RECC/RDCs, and quality assurance of EMS dispatch operations, to include applicable vendor fees, registration fees, and instructor fees. Funding may be authorized for the following approved national and industry-recognized professional organizations:
 - ✓ Association of Public Safety Communications Officials (APCO)
 - ✓ National Emergency Number Association (NENA)
 - ✓ Massachusetts Communications Supervisors Association (MCSA)

9-1-1 Equipment

The state 9-1-1 department supplies all of the required and necessary E 9-1-1 equipment to PSAPs and RECC/RDCs. They periodically evaluate all the 9-1-1 equipment and determine when equipment requires updating. They will then supply the necessary equipment. They will also determine how many dispatch stations will be put into operation at the RECC/RDC. This is determined by the number of calls the center is anticipated to answer. The formula for determination is part of the legislation.

The state 9-1-1 Department will consult with the RECC/RDC to select an appropriate 9-1-1 back-up center. They will recommend centers large enough to handle the increased work load and consult with both entities during the process. As a regional 9-1-1 center, the normal protocol is that all participants would fall to a single back-up as designated by the state rather than their individual back-ups that are now in place.

The following is a listing of the anticipated funding needs for capital expenses involved in the formation of the Danvers RDC.

CATEGORY	DETAILS	ESTIMATED COST
Communications Link		\$206,150.00
	Microwave links between Danvers RDC, Hamilton and Manchester-by-the-Sea Police and Fire.	
Fiber Optic System *		\$238,983.00
	Deployment of fiber optic links to all existing police and fire repeater sites in the Town of Danvers to provide system redundancy and support the conversion of radio traffic to Ip protocol.	
Radios and Antennas		\$35,000.00
	Connection of additional radios located at Danvers RDC to cover the Towns of Hamilton and Manchester police, fire, EMS, DPW, and other municipal agencies.	
110' Monopole Tower		\$128,559.00
	Purchase and installation of a 110' monopole tower at the main Danvers police and fire dispatch site to support adequate expansion of microwave links from that location to Hamilton and Manchester.	
Upgrade of Existing Police and Fire Communications Infrastructure *		\$287,000.00

CATEGORY	DETAILS	ESTIMATED COST
	Upgrades and/or replacement of all Danvers existing police and fire radio infrastructure and equipment to allow conversion of all systems and hardware at all repeater sites to IP and make all systems digital public safety P25 capable.	
Dispatch Consoles		\$6,500.00
	Possible upgrades/enhancements/connections to Danvers RDC MCC 7500 K2 Core Dispatch consoles with additional cards, software updates and communications equipment necessary to communicate with Hamilton and Manchester.	
Fire Alerting System		\$144,404.00
	Hardware and software necessary for Danvers RDC to alert the fire stations and EMS units in all three communities. This also includes an intercom/PA system for two-way communications between the RDC and the fire stations. For two consoles in RDC, not all four positions.	
Computer Aided Dispatch **		\$215,000.00
	Upgrade of existing Danvers dispatch center QED CAD software to accommodate additional towns served by RDC. This also includes the cost of converting and merging all previous run information and data into the new system from the current IMC Tri Tech and Micro Systems ProIV CAD and reporting systems currently used by Hamilton and Manchester, respectively.	
Hardware		\$20,000.00
	Citrix server and client license, work station desktop computers, mobile data terminals (MDTs), mobile messaging switch service, Dell Power Edge R720 servers, and telephone system upgrade.	
Safe Rooms***		\$111,000.00
	Construction of safe rooms at both Hamilton and Manchester police stations including installation of audio and visual monitoring and remote access control systems.	

CATEGORY	DETAILS	ESTIMATED COST
Danvers Dispatch Center *		\$200,000.00
	Expenses incurred by the Town of Danvers specifically related to designing and constructing the dispatch center to accommodate a regional operation.	
	TOTAL	\$1,592,596.00

FIGURE 33: CAPITAL NEEDS AND ESTIMATED COSTS

- * Expenses incurred by the Town of Danvers related solely to Danvers public safety operations and/or incurred prior to the approval and signing of inter-municipal agreements (even if they are directly related to the RDC project) can be submitted for reimbursement to the state 9-1-1 department. However, it is very unlikely that they will be approved. Only expenses incurred after the signing of the appropriate agreements are generally available for reimbursement even if they can be directly related to a regionalization project. MRI believes that approximately \$866,613.00 of the above total will be approved by the state for capital reimbursement.
- ** The cost of converting and merging all previous run information and CAD data into the new system from the current IMC Tri Tech and Micro Systems ProIV CAD and reporting systems currently used by Hamilton and Manchester would be \$37,696. If these two communities opted to maintain their existing systems in place for the short term the converting and transfer of this data could be funded in a subsequent budget year. It would be eligible for a state E 9-1-1 grant.
- *** This estimate is based upon estimates to construct the physical safe room enclosures, and, a quote received by MR for the installation of audio and visual monitoring equipment and remote access control systems. These estimates did not include some of the technology and other connections that would be needed to complete the installations.

Based upon the grant programs identified and described above, much of this equipment is available for reimbursement on a state E 9-1-1 grant. However, as noted with Figure 33, expenses incurred by the Town of Danvers related solely to Danvers public safety operations and/or incurred prior to the approval and signing of inter-municipal agreements (even if they are directly related to the RDC project) can be submitted for reimbursement to the state 9-1-1 department. However, it is very unlikely that they will be approved. Only expenses incurred after the signing of the appropriate agreements are generally available for reimbursement even if they can be directly related to a regionalization project. MRI believes that approximately \$866,613.00 of the above total will be approved by the state for capital reimbursement.

As these grants are only offered once a year, the timing of the application is very important. Missing of a grant cycle could result in at least a year's delay in moving the initiative forward. Once the grant was reviewed at the state level, and an award made, the necessary equipment would be purchased and installed. A significant benefit to this process is there would be no need for the towns to appropriate money through town meeting to purchase equipment, then await reimbursement at a later date.

Recommendation X-1

Once the necessary Inter-Municipal Agreements are approved by each town and properly executed, the Town of Danvers should apply for whatever state E 9-1-1 (and other) grants that are available to cover the start-up capital costs of establishing the regional center.

There are some additional capital expenses that Hamilton and Manchester may incur as a result of their stations no longer being staffed on an around the clock basis. Since these expenses address security concerns in the affected stations that are being created by the communities planning on joining a regional dispatch center, these costs may be covered by the state E 9-1-1 department. However, an assurance that the state will fund these ancillary capital expenses is far from certain and the communities should discuss the options directly with the state. The specific capital expenditures that Hamilton and Manchester are concerned about are:

➤ **Hamilton**

- ✓ The police department's armory, evidence, and records rooms would need to be alarmed and monitored when the building is unoccupied.
 - Installation cost is estimated to be \$15,000.
 - Monitoring cost has been established at \$250.00 per year.
- ✓ The police department administration would like the town to consider the installation of a new computer monitoring system for entrances and exits to the police department. This system would allow all personnel to have a Finger Operated Button (FOB) on their key chain for easier, but recorded, access. While not essential for the transfer of the communications function to Danvers, the security of the building would greatly be improved.
 - Projected cost of this system is \$32,000.
- ✓ **TOTAL HAMILTON COST: \$47,000.**

➤ **Manchester**

- ✓ The police department's armory, evidence, and records rooms would need to be alarmed and monitored when the building is unoccupied.
 - Manchester utilized Hamilton's quote for this project.
 - Installation cost is estimated to be \$15,000.
 - Monitoring cost has been established at \$250.00 per year.
- ✓ With the Manchester police station/town hall now unstaffed for part of each day, the police department believes the town should consider installing a security system in the town hall section of the building.
 - Cost estimate not provided.
- ✓ **TOTAL MANCHESTER COST: \$15,000.**

➤ **TOTAL COST – BOTH TOWNS: \$62,000.**

Recommendation X-2

The Towns of Hamilton and Manchester should consult with the State E 9-1-1 department to determine if capital expenses for ancillary needs related to joining the RDC will be covered under the capital grant program.

However, even if the state will not reimburse these expenses and the towns must ultimately allocate the necessary funds, the MRI team strongly believes they are not nearly significant enough to outweigh the potential benefits, and long-term cost savings, of joining the RDC.

The amount the state projects the Danvers RDC will receive in FY 2018 for Support and Incentive Grants is \$116,902.00. In addition, the amount estimated for Regional and Regional Secondary PSAP and Regional Emergency Communications Center Development Grants is \$331,470.00

The total amount the state calculates the RDC will receive from these two grants is \$448,372.00, which will be used to offset the overall cost of the start-up and/or annual operations of the RDC.

This is also the grant program that the RDC can apply to for reimbursement of capital expenses necessary to bring the center on line and connect the participating towns.

The following information regarding grant funding for Fiscal Year 2018 was provided by the Massachusetts E 9-1-1 department on April 25, 2017.

COMMUNITY	FY 2017 SUPPORT AND INCENTIVE GRANTS	FY 2017 TRAINING GRANTS	REGIONAL DISPATCH CENTER	TOTAL GRANT FUNDING
DANVERS	\$69,941.00	\$14,500.00	---	\$ 84,441.00
HAMILTON	\$15,001.00	\$10,000.00	---	\$ 25,001.00
MANCHESTER-BY- THE-SEA	\$10,874.00	\$10,000.00	---	\$ 20,874.00*
TOTAL THREE TOWNS	\$95,816.00	\$34,500.00	---	\$130,316.00
DANVERS RDC (PROJECTED)	\$116,902.00	UNKNOWN	\$331,470.00**	\$448,372.00

FIGURE 34: CURRENT AND PROJECTED E 9-1-1 GRANT FUNDING

- * Total 9-1-1 grant funding revised by Manchester during draft review to \$34,315.00 without further explanation or breakdown. This figure is different from the amount provided by the state 9-1-1 department as noted above.
- ** RDC projections are calculated based upon anticipated regional PSAP and RECC configurations for FY 2018. Timelines impacting current project(s) may impact these projections. Allocation amounts are further subject

to change in compliance with the following excerpt from the S&I grant guidelines "The percentages in clauses i to iv, inclusive, and the percentages of the total amounts allocated to each grantee eligible within such clauses i through iv may be adjusted by the State 9-1-1 Commission to ensure a proper allocation of incentive funds as more regional PSAPs and regional emergency communication centers are added. The amount allocated to a grantee may be adjusted or capped."

The above funding projections are calculated based upon the anticipated regional PSAP and RECC configurations for FY 2018 and are subject to adjustment. These calculations are also based upon the exact configuration of this proposed RDC. Changes to the communities that are included and/or excluded will impact the available funding levels. In addition, timelines impacting current projections could impact the projected funding levels. Finally, the amount/percentage of funding provided to each eligible grantee may be adjusted by the state 9-1-1 commissioner to ensure the proper allocation of incentive funds as more regional PSAPs and RECC/RDCs are added to the system.

The grant funding projections provided by the state are normally valid for a period of up to three years. Based upon the state E 9-1-1 department's standard practice, the estimates provided for the development of this report should be valid until April 25, 2020, at which time they will become void.

It is also very important to note that should the RDC be established, the Support and Incentive and Training grants for any of the participating towns would not be awarded. All future grants for those town's communications systems would be directed through the RDC.

XI. RDC CONFIGURATION, INCIDENT ANALYSIS, AND STAFFING

Appropriately staffing the dispatch center is a critical element of success. To be effective and efficient, we need to balance the staffing configuration around the system volume. As such, an emphasis needs to be placed on both quality and productivity. This is in large part a cost/benefit or risk management equation. The result should be a staffing model that is flexible and should allow for "staffing up" if, and when, the center expands to include other communities.

Based upon the MRI study team's evaluation of the current personnel information that was provided to us by the towns, it appears that the present dispatchers in all the communities possess the appropriate training and certifications required for their positions. In addition, it appears that they perform their duties in a very proficient manner.

It was noted by the MRI study team that some of the job descriptions are not up-to-date. For instance, Danvers, which will be leading the RDC, does not have a clearly defined job description for the dispatch supervisor. The administrative tasks that he performs seem to be a function of the need at the time, rather than a clearly defined set of roles and responsibilities.

The town also needs to develop a new, up-to-date job description for all dispatchers that includes the tasks associated with dispatching for police, fire, and EMS. The current job description is the result of a quickly revised police dispatcher job description that occurred when the police department assumed responsibility for dispatching the fire department.

Recommendation XI-1

The Town of Danvers should develop job position descriptions and wage classification for each of the three levels of personnel outlined within the model.

Recommendation XI-2

The dispatchers currently employed by Hamilton and Manchester should be provided the first and primary opportunity to apply for, and be hired for, additional dispatcher positions at the Danvers RDC.

Recommendation XI-3

A critical policy that must be developed is one that allows/requires dispatchers to be recalled to work during times of major incidents or anticipated significant events.

INCIDENT ACTIVITY ANALYSIS

While society in general is slowly moving toward around the clock activity, Danvers, Hamilton, and Manchester still maintain a small portion of the day where activity, and thus emergency calls for service, is lower than the majority of the day. In Manchester and Hamilton this low activity period begins around 2:00 AM and ends around 6:00 AM. In Danvers, the slower period is narrower, lasting just two hours from about 3:00 AM until 5:00 AM. Overall, there is a gradual increase in calls starting around 7:00 AM and reaching a peak during the mid-afternoon hours. High incident rates generally continue into the late evening with a gradual tapering off of activity toward midnight. See Appendices C and D respectively for Danvers and Manchester incident breakdowns by hour.

Over the three-year period from 2014 through 2016, Danvers averaged 29,170 emergency (police, fire and EMS) incidents per year. This averages out to about 80 dispatched incidents per day, or four per hour. Hamilton averaged 8,646 incidents per year, 24 per day, or about one per hour. Manchester averaged 6,979 incidents per year, 19 per day, or .8 per hour.

If all three towns enter into an inter-municipal agreement for Danvers to provide the emergency dispatch, then for Hamilton and Manchester the call volume would increase by an average of 15,625 incidents (52.7%) per year. This would mean the number of incidents dispatched would increase by about 45 per day, or just under two per hour. This would increase the total number of incidents dispatched by the Danvers RDC to an average of 44,532 per year. The number of incidents would increase to 122 per day, or about six per hour. This number

does not include events such as self-directed motor vehicle stops, business security checks, routine welfare checks, etc., which can increase the number of incidents they handle significantly.

	AVERAGE NUMBER OF INCIDENTS PER YEAR	AVERAGE NUMBER OF INCIDENTS PER DAY	AVERAGE NUMBER OF INCIDENTS PER HOUR
DANVERS	29,170	80	4
HAMILTON	8,646	24	1
MANCHESTER	6,979	19	.8
TOTAL THREE TOWNS	44,532	122	6

FIGURE 35: INCIDENT COMPARISON BY COMMUNITY

The average length of time for each police incident dispatched is about 10 minutes; however, as would be expected significant incidents last much longer. Fire and EMS incidents tend to take longer, although specific data was not readily available. On medical emergencies, the dispatcher who took the initial call may need to stay on the phone to give lifesaving instructions to the caller until the first emergency responder arrives. This can often take several minutes. Incidents can often generate multiple or numerous 9-1-1 calls. Many incidents such as motor vehicle accidents also will generate a simultaneous response by all emergency services including police, fire, and EMS. It is also important to keep in mind that some estimates have found that only 20% of the calls an emergency dispatch center receives are 9-1-1 call. The remainder are for a multitude of other reasons.

This analysis indicates that the dispatch center needs to be staffed at a higher level during the day and evening shifts. The reduced call volume during the overnight hours indicates that the third (or midnight) shift can function at high levels of performance with less staffing. Provisions would need to be made to provide for increased staffing of the center when necessitated by a major fire, serious crime, or some other significant event such as a hurricane or blizzard where additional personnel would be required to respond to a significant increase in call volume. Additional staffing would also be required for major planned events in any of the communities.

Staffing

The current Danvers dispatch center has two dispatchers assigned to all shifts. There is only a single supervisor in the dispatch center organizational chart and he functions as part of that two-person crew. The shift times are 9:00 AM to 5:00 PM for the first (day) shift, 5:00 PM to 1:00 AM for the second (afternoon/evening) shift, and 1:00 AM to 9:00 AM for the third (overnight) shift. The dispatchers work a schedule of four days on followed by two days off. Over a six-week period, each dispatcher works 40 hours in four of the weeks and 32 hours in two of them. Over the six-week rotation the schedule averages 37.5 hours per week. It then repeats itself. All dispatch personnel are covered under a collective bargaining agreement with the Town of Danvers.

In this report, we present the towns with what we believe is a reasonable staffing plan. This scenario recommends the dispatch center as a standalone unit within the police department. As currently configured, the dispatch supervisor reports to the police department's administrative captain (20% of whose salary is paid for out of the dispatch budget). Although Danvers seems to be satisfied with this chain of command, as has been suggested previously under *Goverance*, it is the opinion of the MRI study team that the town should consider an alternative organizational structure where the dispatch center manager reports directly to the police chief rather than the administrative captain. We believe this will streamline the chain of command and lines of communications between Danvers and the police and fire chiefs of the participating communities. He/she will be responsible for all of the day-to-day administration and operations of the RDC. He/she would work a normal business work week but could be used to fill in as the day shift supervisor to avoid the need for paying overtime. We suggest a higher level of staffing during the day and evening hours along with the use of supervisors during this time to not only provide oversight of the dispatch center, but also to assist the manager, when necessary, with handling his/her administrative duties.

We believe that it would be most cost effective for the RDC to be staffed primarily by full-time employees, but supplemented with some part-time personnel. The following discusses assumptions that we made in calculating our projected costs and budgets.

RDC Manager

One manager position is recommended. This position is responsible for managing the day-to-day administration and operations of the center, and we believe consideration should be given to having him/her report directly to the Danvers police chief. At the present time, we believe the manger can continue to work on a rotating shift rather than going to a straight Monday to Friday administrative work week. During each rotation of four on, two off, the manager would have two days to perform administrative functions and other necessary tasks. The other two days he/she would also serve as first shift supervisor.

Shift Supervisors

To maintain a hierarchy within the organization, there are shift supervisors calculated at all times for the first (day) and second (afternoon/evening) shifts, and two days per week on the third (overnight) shift. There would be a total of three supervisors. One would work the first (day) shift on a normal four days on and two days off schedule. Two of the days would overlap with the RDC manager so he/she can concentrate on administration issues. A second supervisor would work the second (afternoon/evening) shift, also on the four days on, two days off schedule. There would also be a floating supervisor, also working four days on and two days off, who would float between the second (afternoon/evening) and the third (overnight) shifts. This

supervisor would work two afternoon/evening shifts when that supervisor is off, and two overnight shifts to provide part-time supervision there.

Full-time Dispatchers

According to the APCO RETAINS Study, for medium sized centers (serving a population between 19,000 -100,000), dispatchers average about 3,500 calls logged per year. For large centers (serving a population between (100,000 -140,000), dispatchers average 4,000 logged calls per year. When calculating the total number of dispatchers needed to staff the RDC based on call volume, the 3,500 calls per year average was used. This value was one of the factors used to approximate the number of dispatchers required for the center. It was then reduced by the number of on shift supervisors also working since they are a part of the recommended shift staffing. Based upon the expected average incident volume Danvers would need approximately 12.7 full-time equivalent positions.

Part-time Dispatchers

Because not all emergency communications centers employ exclusively full-time employees, the option does exist to utilize a percentage of the recommended number of dispatchers as part-time employees.

Recommendation XI-4

Whichever staffing model the RDC ultimately utilizes, there should be a MINIMUM of two dispatchers on-duty, per shift, 24 hours a day.

THIS IS A CRITICAL STAFFING REQUIREMENT.

Under our recommended staffing plan, the RDC would be staffed by twelve full-time and two part-time personnel.

1 - RDC Manager that would be responsible for day-to-day management and operations of the center. This person would also serve 50% of their time as a day shift supervisor.

3 - RDC Supervisors that would be working supervisors and would be primarily assigned to the first and second shifts. A supervisor would work on the third shift, two days per week.

8 – Full-time Call Takers/Dispatchers

2 - Part-time Call Takers/Dispatchers who will fill a minimum of 16 hours per week necessary to provide recommended staffing 24/7. These personnel can also be used to fill additional shifts (up to a maximum of 24 hours per week) created by full-time personnel on various types of leave.

Under this scenario, the first and second shifts will be staffed with three personnel, two dispatchers and one supervisor. The third shift will be staffed with two personnel, two nights per week, one dispatcher and one supervisor. Since there are two shifts each week on the third shift that will need a part-time fill in dispatcher, these are the days that the supervisor should work on this shift to provide additional oversight.

The following chart illustrates the staffing model for this option that utilizes an RDC manager to handle the day to day operations of the dispatch center.

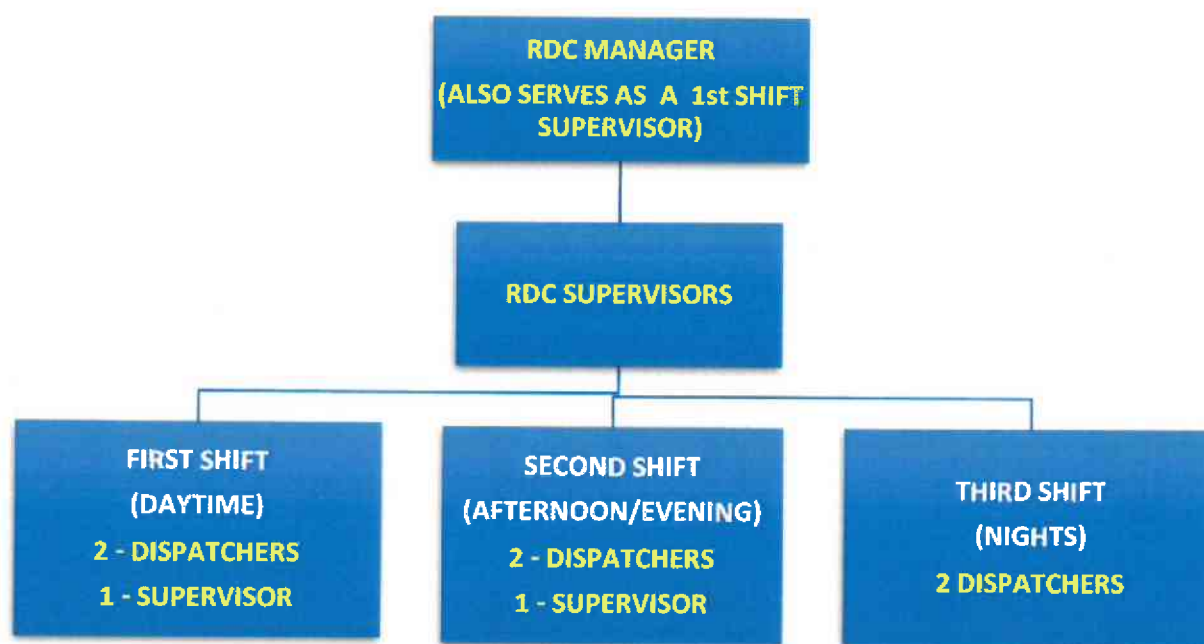


FIGURE 36: ALTERNATIVE STAFFING CONFIGURATION UTILIZING RDC MANAGER

When necessary, additional personnel can be assigned to any shift either through the use of floaters (probably supervisory personnel), part-time dispatchers, or full-time personnel on overtime. There is a total of 16 hours each week, on the third shift, that will need to be filled by part-time personnel.

Recommendation XI-5

In order to operate in the most cost-effective manner possible the Danvers RDC should implement a staffing plan which utilizes a combination of full and part-time personnel.

Recommendation XI-6

The RDC should employ a total of twelve full-time and two part-time personnel to provide proper staffing 24/7.

Recommendation XI-7

The full-time RDC staffing should consist of one manager, three supervisors, and eight call takers/dispatchers.

Recommendation XI-8

The RDC manager should split his/her time between administrative duties on two days, and serving as a first shift supervisor two days. If and/or when the administrative functions necessitate, the manager can be transitioned into a full-time administrative role.

Recommendation XI-9

The Town of Danvers should consider an alternative organizational structure where the RDC manager reports directly to the police chief rather than the administrative captain. It is our belief that this will provide a better line of communications between the emergency services chiefs of all of the participating municipalities.

Recommendation XI-10

Supervisors should be assigned to the first and second shift every day, and to the third shift two (2) days per week.

Recommendation XI-11

Whenever possible, the two available shifts each week on the third shift should be filled with part-time personnel.

Recommendation XI-12

The number of dispatchers should be adjusted based on call volume and population. This flexibility allows for staffing based upon needs, as well as, allowing for future growth.

XII. BUDGET AND FISCAL APPORTIONMENT

BUDGET

Salary Ranges

A competitive wage and benefits package will continue to attract well-qualified, and more importantly retain, employees, and can perpetuate the goal of creating a professional center with low employee turnover and higher morale. The salary figures used for calculations reflect the top salaries for the current Danvers employees, and since they are already trained and experienced, Step 3 of the salary scale for Hamilton and Manchester personnel who are hired by the RDC. The RDC manager and supervisors would also receive pay raises for their increased duties and responsibilities.

For the scenario of part-time employees, they were estimated using the first step for five, eight-hour shifts/week for 52 weeks, while all other employees were computed using a 37.5 average hours per week model.

Salaries Budget

This category was calculated using the salary for each category as mentioned above, multiplied by the number of employees in that category. Then each personnel category was added to calculate the total base salary for the center.

Benefits Budget

Based upon information provided by the Town of Danvers, the fringe benefit package for the dispatch personnel, including health care, averages about \$12,139.11 per employee.

Overtime Budget

The potential overtime budget was calculated using a figure of 8% of the base salary and benefits account for the full-time personnel only.

Holiday Pay Budget

Holiday pay was calculated by using eight full-time dispatchers, three supervisors, and one RDC manager. We used eight hours per day for twelve days per year.

Training Budget

This budget line was calculated using the figure of 2% of the basic salary account. Since all of the current dispatchers are already well trained, including those that may be hired from Hamilton and Manchester, the expectation is that they will have completed many of the basic training classes that we have recommended. However, there are still annual state mandated training programs, in addition to those which may be required in-house.

Town Support Budget

The Town of Danvers apportions a percentage of expenses incurred by various other departments and staff that assist the dispatch center with their operations. This includes 12% of the senior custodian salary (\$6,696.00), 2.75% of human resources and payroll (\$7,451.00), and 1.16% each of the benefits coordinator and the payroll specialist salaries (\$699.00 and \$656.00 respectively). These town support services total \$15,502.00 annually.

Operating Expenses Budget

According to industry data, expense budgets average approximately ten percent (10%) of the base salary line. This category includes such things as uniforms, CAD, radio and equipment maintenance, EMD maintenance, phones, purchase, and replacement of office equipment, office supplies, training, travel, subscriptions/publications, dues/memberships, etc. This category normally does not include utilities (electricity, fuel, etc.). Danvers current operating budget expenses total about 8.2% of the salary budget and it does include the cost of utilities.

Total

Sum of all budget items (base salaries, benefits, OT, Holiday, Training and operating expenses).

The current dispatch supervisor has six salary steps for his position title. He is currently in the top step. Being designated the dispatch center manager, and taking on two additional towns, his duties and responsibilities will increase. He will be responsible for interacting with the fire and police chiefs from Hamilton and Manchester. We believe that a salary increase of about 7% would be reasonable. Using his current base salary of \$58,563.99 (\$29.88/hour), the 7% raise would increase his annual salary by \$4,099.48 to \$62,663.47 per year.

The MRI study team recommends the creation of three additional supervisor's positions. We make an assumption that the personnel who will be promoted to supervisory roles will be the most senior and experienced Danvers personnel. We therefore also make the assumption that they are at the top of the six-step salary scale. To keep promotional salary increases consistent, we utilize the same 7% increase in base salary. Using the current top step dispatcher salary of \$51,389.05 (26.35/hour), the 7% raise would increase each supervisor's annual salary by \$3,597.23 to \$54,986.28 per year. The total salary increase for the supervisors would be approximately \$10,791.69.

Based upon the fact that Danvers currently has nine full-time personnel (four whom will possibly receive promotions), and a total of 12 would be needed to properly staff the dispatch center, there would be a need to hire three (3) additional personnel. The increase in personnel will allow the center to properly handle the additional 15,362 dispatches a year that will be generated by Hamilton and Manchester. This represents a 52.7% increase in annual dispatches for the center.

To calculate the salary cost for dispatchers we made the assumption that the four existing Danvers dispatchers who are not promoted are at the top of the salary scale earning \$51,389.05 per year. We also made the assumption that the four additional dispatchers hired would come from personnel who are currently working at Hamilton and Manchester. Since these dispatchers are already trained and experienced, we recommend that consideration be given to starting them at Step 3 of the Danvers salary scale which is \$44,783.55 per year.

The salary for part-time dispatchers is calculated at the first step of the dispatcher's salary scale which is \$20.12 per hour. Part-time personnel are needed to fill two eight-hour shift per week based upon our recommended staffing model. However, we project they could provide a cost-effective way fill additional shift vacancies and calculate three additional eight-hour shifts for them.

POSITION	NUMBER	HOURLY SALARY	ANNUAL SALARY (PER POSITION)	BENEFITS (PER POSITION)	CUMULATIVE TOTAL - SALARY AND BENEFITS
RDC MANAGER	1	\$32.14	\$62,663.47	\$12,139.11	\$74,802.58
SUPERVISOR	3	\$28.20	\$54,986.28	\$12,139.11	\$201,376.17
FULL-TIME DISPATCHERS	8	4 - \$26.35 4 - \$22.97	4 - \$51,389.05 4 - \$44,783.55	\$12,139.11	\$481,831.48
PART-TIME DISPATCHERS (5 – 8 HR SHIFTS/WEEK)	2	\$20.12			\$41,849.60
					\$799,859.83

FIGURE 37: PROJECTED SALARIES UTILIZING FULL AND PART-TIME PERSONNEL STAFFING

SALARIES	OVERTIME (8%)	HOLIDAY (8 HRS/ DAY 12 DAYS/ YEAR)	TRAINING (2%)	TOWN SUPPORT	OPERATING EXPENSES (10%)	TOTAL
\$799,859.83	\$63,988.79	\$30,145.92	\$15,997.20	\$15,502.00	\$79,986.00	\$1,005,479.74

FIGURE 38: PROJECTED OPERATING BUDGET UTILIZING FULL/PART-TIME PERSONNEL STAFFING

The projected Danvers RDC budget represents approximately a 40.2% increase over the existing budget for serving just the town of Danvers. However, as was previously noted, the center's workload, assuming both Hamilton and Manchester join, will increase by approximately 52.7%.

FINANCIAL APPORTIONMENT

There are several different methods that regional communications or dispatch centers use to determine the financial commitment necessary to fund operations from each participating community or agency. The first is where each participating community pays an equal share of the center's operating cost. In this case of a Danvers, Hamilton, and Manchester dispatch center, each town would pay one-third of the cost. However, this option is generally employed when all three communities are relatively similar in size and/or incident volume, or when they are considering a standalone regional endeavor. Neither is the case with the proposed Danvers RDC.

A second option that is utilized is for the participants to apportion costs based on call volume, population, and/or other demographic factors. Some regional centers utilize more complex formulas that incorporate more than one of those criteria to allocate cost share. However, as the center starts, much of the data necessary to appropriately (and accurately) divide these

costs are often not readily available. Also, allocating call volume into cost share can adversely impact communities that experience a major event or series of events during a year that could increase their call volume requiring them to assume a larger share of the financial burden. Examples could be a tornado touching down, plane crash, chemical leak, fire, etc.

A third option for funding is to assess each participating municipality a set cost per capita. For instance, in 2015 the established cost per person to participate in the Essex County RECC was \$16.26. While this option may be similar to the final (and recommended) option we present below, it is more complicated in that some type of formula must be developed to determine the per capita fee per participant.

Unless there is some compelling reason to do otherwise, such as a facility in one community that produces an inordinate number of emergency responses (at least several per day), the simplest and most equitable way to apportion cost share for this type of endeavor is for each community to pay based upon their population, and the percentage of the total that their population represents to the entire RDC. Utilizing this method will meet Danvers' stated desire to make the financial calculation for each community straight forward, and not penalize any community, for having a major incident or other unusual spike in call volume during any given year. In the end, Danvers plans to offer their town's services to other communities on a contract basis, so Danvers will ultimately be the authority that determines the funding formula for an RDC operation.

Under a strictly population based funding system, since cost share is determined by percentage of total population, each community would automatically fund any increases in the RDC budget proportional to their overall contribution. The percentages for population would only need to be adjusted once every ten years when new census figures are released. If additional communities joined the RDC at a later time, the percentage that each community pays can be easily adjusted based upon the new total population served.

Recommendation XII-1

The Town of Danvers should assess each community which contracts with it to provide emergency dispatch and communications services a fee based upon that community's percentage of the overall population served by the RDC.

COMMUNITY	POPULATION	PERCENTAGE OF POPULATION SERVED AND RDC OPERATING BUDGET FUNDING
DANVERS	26,493	66.2%
HAMILTON	7,764	19.4%
MANCHESTER	5,775	14.4%
TOTAL - 3 TOWNS	40,032	100%

FIGURE 39: RECOMMENDED FISCAL APPORTIONMENT BASED UPON POPULATION

Recommendation XII-2

The Town of Danvers should actively pursue grants for additional technology and equipment funding to assist with offsetting the costs of any necessary capital investments, as well as operating expenses, associated with the RDC.

XIII. UNSTAFFED “DARK” STATION ISSUES AND CONCERNS

One of the significant concerns (and as a result a possible major hurdle to the establishment of the RDC) of the Hamilton and Manchester police chiefs was the potential for their stations to be unstaffed or “dark” for the majority of the evening and overnight shifts, as well as, weekends and holidays. This situation eliminates the ability of civilians to walk into the police station to report incidents or seek police assistance, seek refuge from a possible physical assault, seek medical attention, etc. In addition, police station/dispatch lobbies and parking lots are sometimes used for the safe exchange of children involved in shared custody situations or disputes. This is done to take advantage of the safety that comes with close proximity to the eyes and ears of police/fire/dispatch personnel, as well as, having the transfers being recorded on camera.

Hamilton and Manchester dispatchers currently monitor cameras for observing prisoners in their cell blocks, and providing security surveillance inside and outside of stations, as well as, other buildings such as the electric department and school facilities. It is anticipated that the Danvers RDC would be able to assume responsibility for monitoring the security surveillance cameras that are currently in use in these communities. The cost of procuring the necessary technical equipment to facilitate this would in all probability be covered by capital grants, the same as all of new equipment costs are. Any recurring/monthly fees would be a part of the RDC normal operating budget. We do not believe that state law would permit prisoners to be held alone, in an unstaffed facility, so arrangements for either staffing of the station, or transferring the prisoner, would need to be made when this situation occurs.

This situation might provide another opportunity for a cooperative endeavor between Danvers, Hamilton, and Manchester. The Danvers police chief is open to discussions that might allow both Hamilton and Manchester to house their prisoners in the Danvers police station since it would be staffed and monitored. Another option for Hamilton and Manchester would be the Essex County holding facility.

Recommendation XIII-1

The Towns of Hamilton and Manchester should plan for the expedient transfer of prisoners from their station to an appropriate staffed holding facility during times when their station will not be staffed.

Once Hamilton and Manchester commit to joining the Danvers RDC then it would be very important that the towns build and/or establish a “safe room” at their police stations for the use of residents who may come to the station with an emergency at times it is not staffed. This could include, among other potential reasons, coming into the building to seek refuge and protection from a person who is attempting to assault or otherwise harm them, or a person suffering from a medical emergency. The room should be equipped with bullet and shatter proof glass and walls. Personnel in the RDC would need to be able to remotely control door access, and, have the ability to lock and unlock the door(s). Consideration should also be given to tying the door locking system into the main entrance door to the facility to provide a second means of ingress/egress for emergency response personnel. Since a person who entered, or sought refuge, in the safe room could be incapacitated by an injury or medical emergency, the RDC dispatchers must have the ability to unlock the doors to allow access by police or EMS personnel.

The Hamilton public safety building already has a safe room for their dispatch personnel. This room would need to be modified to provide civilian access if the town joins the RDC. Manchester plans to construct a safe room area in their police department lobby. The safe rooms need to be equipped with security cameras with both audio/visual connections back to RDC. If possible, the visual connection should go both ways so the person utilizing the safe room can see the dispatcher they are speaking to. This can provide them with an increased sense of security. To facilitate monitoring, an audio-visual intercom substation would be utilized. Pressing the button would notify a monitoring station within the Danvers RDC and from dispatch, bi-directional communications can be initiated.

Cameras should be trained in both the safe room and the entrances to the building and surrounding areas. A minimum of three high resolution IP cameras should be used in each facility. One camera will be contained within the audio/visual substation and should be able to be monitored independent of the two-way audio connection. A second IP camera should be a panoramic, ceiling mounted camera, in the ceiling of the safe room that covers the entire room. At least one (and possibly more) cameras should be directed toward the building entrance(s) and surrounding areas.

All audio and video footage and communications should be capable of being digitally recorded and maintained with a digital audit trail. To accomplish this, a server for this equipment should be located in a secure, remote location from the safe room itself. It would need to be configured so it can be accessed from the Danvers computer system network. However, it must be capable of being integrated into a network link that will connect the three facilities. The Danvers RDC should have a dedicated work station connected to the safe room network that is equipped with a monitor, speakers, and a microphone.

All systems and components associated with the safe rooms will need to be on an electric circuit that is tied into each facility’s emergency generator. In addition, they should be

equipped with UPS battery back-up to provide emergency power during the time it takes for the generator to start during a power outage.

A key consideration with establishing this type of network is the capabilities or strength of the wide area network (WAN) that needs to be established between the three locations. If a quality network connection cannot be established/procured and maintained from a utility provider such as Verizon/Comcast, then an alternative system must be utilized, because access to a private or public network is the center of this option. If an acceptable WAN cannot be established, then what is known as a federated cloud solution can be explored. Using the cloud to intercommunicate between the three facilities would negate the need for VPN connections, or expensive point to point WAN connections. However, this option will result in a reoccurring cost model such as monthly access and service fees.

Recommendation XIII-2

In order to provide an appropriate level of protection for citizens who might go to the now “dark” stations in an emergency, the Towns of Hamilton and Manchester should proactively and definitely address the resulting security concerns by providing at each of their facilities a safe and secure area of refuge, a “safe room” equipped with two way communications, audio/video monitoring, and remote access and control.

The other concern is that the functions of providing various public safety administrative support and assisting the public in each community would remain in their respective station. The MRI study was advised that in addition to greeting public walk-ins, answering phone and radio calls, and entering calls for service into a computer, the dispatchers also complete a myriad of other administrative tasks. In Hamilton, the dispatchers provide administrative support to both the police and fire departments.

The Hamilton Police Department has suggested hiring two full-time staff to provide administrative support to the police and fire departments, as well as to provide service for individuals that walk into the lobby for service. They project coverage hours of Sunday to Thursday from 8:00 AM to 8:00 PM, and Friday and Saturday from 8:00 AM to 12:00 AM. They project needing ninety-two hours of lobby coverage per week. These two positions would allow for eighty hours of coverage per week. The additional twelve hours of lobby coverage could be provided by one of the administrative personnel filling in on overtime, the hiring of part-time, as needed position, or police officers on overtime. They estimate the cost of two entry level administrative positions, including benefits, would be approximately \$103,168.00. An additional \$300 and \$600 per week would be needed in overtime. If the higher figure is utilized, this amounts to an additional \$31,200.00 per year, for a total cost of \$134,368.00. This does not include funding that needs to be budgeted for vacation and sick time coverage.

The Manchester Police Department has also suggested the hiring of two full-time equivalent positions to provide appropriate “lobby staffing” and take over various other administrative

duties. They project an additional need for answering and screening administrative calls, processing public records requests, accepting packages, retrieving mail, and maintaining the department's social media, and reverse 9-1-1 accounts. The police chief recommends filling these positions with personnel on a Monday to Friday schedule, with one person working from 7:00 AM to 3:00 PM, with the second staffing the station from 3:00 PM to 11:00 PM. A workload analysis completed by the department indicates that these hours represent the highest sixteen-hour period for police department walk-in traffic. The cost for providing this coverage would vary based upon the classification and longevity of the individuals selected for the positions. The department estimates a range of total salaries and benefits for the two requested positions to be between \$118,591 and \$132,313, with a potential midrange of \$128,444 utilizing Manchester's Fiscal Year 2018 municipal bargaining agreements.

The MRI study team is not convinced that the suggested personnel replacement needs of Hamilton and Manchester are fully justified. It is our belief that some of the duties performed by the dispatchers that are suggested for the new administrative personnel could possibly be reassigned to other administrative or staff personnel already employed by the towns. However, the availability of personnel already in place to assume additional duties is a decision that would need to be made internally. In addition, we do not believe there is a need for the stations to initially be open and staffed for the number of hours each day that is being suggested by the chiefs. Routine administrative business with the public and many of the other duties that have been identified can, for the most part, be conducted during normal business hours. If the town wants to have a more customer service friendly policy for town residents they could consider keeping the municipal building and/or police station open one night per week until perhaps 8:00 PM and/or Saturdays from 8:00 AM to 12:00 PM. An analysis of the actual experience in each community could then provide the basis for the hours being either extended or reduced as may be indicated. The number of hours of coverage decided upon would then, at least in part, drive future staffing needs. We also suggest, if the community decided to adopt these extended hours, they may want to consider offering a wide-range of community services, rather than just keeping a staff member on site for public safety business. Ultimately these are decisions that will need to be made by each town based upon what they believe will best serve their interests and those of their community.

Neither the Hamilton nor Manchester police departments are particularly busy. Hamilton averages just one dispatched call per hour and Manchester 0.8. If a member of the public comes to the police station in either community during the hours when the station is "dark", the person can utilize the communication's capability in the safe room to communicate with a dispatcher in Danvers, who will dispatch a patrol officer back to the station to meet with the person and attempt to provide them with whatever assistance they need.

It is the belief of the MRI study team that each town should initially consider no more than one full-time equivalent position to handle necessary administrative tasks for their police and fire departments. Hiring one full-time person in each town would cost Hamilton about \$67,184.00

and Manchester about \$64,222.00. Each town could possibly achieve further cost savings, while simultaneously providing additional hours of coverage to their stations, if they so desired, by hiring two part-time personnel, rather than one full-time employee, who they would not need to provide benefits for, and would probably not be eligible for overtime.

Recommendation XIII-3

The Towns of Hamilton and Manchester should each give consideration to initially hiring no more than one full-time employee to perform administrative duties for their public safety departments once dispatch operations move to the Danvers RDC. Consideration could also be given to hiring two part-time personnel, rather than one full-time employee.

XIV. TRAINING

Proper training for public safety telecommunications personnel is mission critical to the effective and efficient operations of emergency communications centers. The 9-1-1 operator or dispatcher is generally the first point of contact for the public during serious crises in their lives. How well they perform their job, and the key decisions that they make, can literally have life and death consequences.

The Commonwealth of Massachusetts requires that all personnel who work as 9-1-1 call takers and/or emergency services dispatchers complete a minimum amount of mandatory training. This training includes obtaining state 9-1-1 Vesta Pallas, Emergency Medical Dispatch (EMD), CPR, and DCJIS certifications. They also complete training based on the APCO PST1 7th edition. All of the current dispatchers meet these training and certification levels.

Once the RDC becomes operational, the dispatchers will be working in a somewhat busier and fast paced environment. They will also be working with a number of new and different agencies, ones whose operations and personnel they may not be familiar with. This will create a need to ensure that the dispatcher's skills are enhanced to such a level that they can confidently function during emergency situations with whichever the agency that is handling the emergency. One of the best ways to improve the knowledge, skills, abilities, proficiency and confidence of these personnel will be to provide them with additional appropriate training. This will allow them to function more effectively as an emergency Public Safety Telecommunicator. There are a number of resources available for obtaining this training.

APCO International is the world's oldest and largest organization dedicated to public safety communications professionals and supports a large U.S. membership base. This nonprofit professional and educational organization has been in existence since 1935. It serves the needs of public safety communications practitioners worldwide and the welfare of the general public as a whole, by providing complete expertise, professional development, technical assistance, advocacy, and outreach.

APCO offers affordable options for training and certification programs that are used throughout the country by emergency communications personnel. Classes are offered in a number of different formats and configurations. Contract classes offer the agency the opportunity to schedule the class(es) for their staff, in-house, and on a schedule, that meets their needs. Co-host classes are sponsored in conjunction with APCO, but provide the training opportunity to other communication centers and personnel in the immediate area. Danvers has expressed to the MRI team that they will be looking to partner with APCO to offer these types of regional training classes utilizing their training room. They also offer most classes in an online, internet based format. These classes are accessible 24/7, making them ideal for shift working emergency communications center personnel.

Recommendation XIV-1

In addition to completion of the minimum, basic training required by the Commonwealth of Massachusetts ALL personnel employed by the RDC should be required to complete the following advanced training/certification classes.

COURSE	DURATION	ON-LINE	COST PER PERSON
Public Safety Telecommunicator	5 days		\$309.00
	4 weeks	YES	\$379.00
EMD Program	3 weeks	YES	\$249.00
Emergency Medical Dispatch 5.3 (40 hours)	6 weeks	YES	\$439.00
Law Enforcement Communications	6 weeks	YES	\$439.00
Fire Service Communications	4 days		\$379.00
	6 weeks	YES	\$439.00
Disaster Operations & the Communications Center	1 day		\$199.00
	3 weeks	YES	\$249.00
Active Shooter Incidents for Public Safety Communications	1 day		\$199.00
	3 weeks	YES	\$249.00
Crisis Negotiations for Telecommunicators	1 day		\$199.00
	3 weeks	YES	\$249.00
Customer Service in Today's Public Safety Communications	1 day		\$199.00
	3 weeks	YES	\$249.00
Comprehensive Quality On Line	4 weeks	Yes	\$379.00

FIGURE 40: RECOMMENDED MINIMUM TRAINING FOR ALL DISPATCH PERSONNEL

Recommendation XIV-2

Based on their experience and ability one of the supervisors should be selected for the position of training officer to oversee and coordinate all training for the RDC. The manager and supervisors should also be certified to conduct, or at a minimum assist with, training for their personnel.

COURSE	DURATION	ON-LINE	COST PER PERSON
Communications Center Training Officer	3 days		\$349.00
	6 weeks	YES	\$439.00
Communications Training Officer Instructor	5 days		\$459.00
	6 weeks	YES	\$509.00
Emergency Medical Dispatcher Course Instructor	5 days		\$459.00
	6 weeks	YES	\$509.00

FIGURE 41: RECOMMENDED TRAINING FOR DISPATCH CENTER TRAINING OFFICER

Recommendation XIV-3

The RDC manager and supervisors should be required to complete appropriate supervisory, management, and leadership training courses, and/or certification programs.

COURSE	DURATION	ON-LINE	COST PER PERSON
Communications Center Supervisor Course	3 days		\$349.00
	5 weeks	YES	\$439.00
EMD Manager	1 day		\$199.00
	3 weeks	YES	\$249.00
Public Safety Communications Staffing & Employee Retention	1 day		\$199.00
	3 weeks	YES	\$249.00
Leadership Certificate Program	Offered Quarterly	YES	\$995.00

FIGURE 42: RECOMMENDED TRAINING FOR DISPATCH CENTER MANAGER AND SUPERVISORS

In order for all of the personnel employed by the RDC to complete all of the courses recommended for their level of responsibility, the total cost for training would be approximately \$60,036.00. This assumes the online option was chosen and personnel completed the training on their regular work shifts. It should be noted that most of the dispatchers have probably completed many, if not most, of the basic training classes, so the training funding needed will probably be significantly lower than this estimate. This training would be eligible for grant reimbursement and should be spread out over several budget years.

One training program that some regional dispatch centers have developed, and which have proven to be successful, allows the dispatchers to partake in “ride alongs” with the police and fire departments in the participating communities so they become familiar with those cities and towns. This is an important training tool, and alleviates one of the main concerns that towns’ often have regarding transferring their dispatch operations to a remote location, that is, “the dispatchers won’t know or be familiar with our town”.

XV. OPERATIONS

As identified in previous sections of this report, configuration, staffing, and deployment models will be critical to the successful operation of a regional dispatch center. Although Danvers is the authority for the center and will be providing the services under contract to the other towns, all of the participating towns have a stake in the center and how successful it will be at meeting their needs. As such, there should be some level of involvement by all the potential participants in its development and operations.

Recommendation XV-1

The RDC should utilize a common Computer Aided Dispatch (CAD) system for all incident reporting across all participating departments and agencies.

Recommendation XV-2

The RDC should maximize its technology and equipment alternatives by developing a technology based strategic plan (radio, data systems, etc.) that improves interoperability and creates redundancy in the system.

This strategic plan should be developed with input from the advisory operational board suggested in Recommendation IX-2 and key technology personnel from the host community. The technology based strategic plan should be reviewed by this group, at minimum, each fall (prior to the budget process), to ensure that ongoing technical implementations and upgrades remain aligned with technological expectations of the host community, subsequent goals of member communities, and capacity planning for potential future members.

Once the new dispatch center is operational, all of the new hardware and software systems and programs should be tested by the Town of Danvers and its own police and fire departments first, to be certain the systems are functioning correctly. This testing should last for a minimum of 60 days. When the time comes to start transitioning other communities to the RDC, it can be anticipated that there will be problems with moving all of the technology from one location to another. This is normal. However, it is advisable to transition one community at a time so that full attention can be given to dealing with their issues and ensuring that they are resolved

completely. Staff in each town will also need to be trained in the use of the new CAD program, as well as other components of the system.

Recommendation XV-3

Once the Danvers RDC is ready to accept the additional towns that want to join, it is recommended that there be a minimum of 60 days between the time each town transitions into the center. This will allow sufficient time for technical glitches to be resolved, and each of the outlying town's staff to get trained on the CAD program.

XVI. POLICIES AND PROCEDURES

Since each of the communities currently have separate policies and procedures, developing a common set of these documents will be essential in effective training and provision of service. All of the chiefs agreed that operational policies would need to be the same for all police departments and fire departments. It is imperative that dispatchers need to be responsible for only one set of SOPs, particularly when a potential life-threatening emergency is being handled. On the police department side, Danvers Police Department is nationally accredited, so their procedures have been vetted and approved. They can provide the basis for the new procedures with revisions as necessary to meet the operational needs of the other towns. The three fire departments would need to follow a similar process.

Recommendation XVI-1

The Towns of Danvers, Hamilton, and Manchester should create two working groups, one comprised of the police chiefs, and the other of the fire chiefs, to develop and implement all necessary operational policies and procedures.

Recommendation XVI-2

The Danvers RDC should develop a comprehensive policy and procedure manual that has four sections:

- ***Internal policies***
- ***Standard Operating Procedures – Police***
- ***Standard Operating Procedures – Fire and EMS***
- ***Rules and Regulations***

Recommendation XVI-3

In order to assist with facilitating effect operations, the Danvers RDC should develop a flow chart or check list for each type of event.

Recommendation XVI-4

The Danvers RDC should develop a comprehensive computer aided inventory of local, regional, and emergency management resources, with contact and community information.

Recommendation XVI-5

The Danvers RDC should develop a sign-off policy for all participating agencies.

XVII. OVERALL FEASIBILITY AND COST ESTIMATE/COMPARISON

The MRI analysis of the proposed Danvers Regional Dispatch Center leads us to the conclusion that overall this will be a beneficial endeavor for all participants, and Hamilton and Manchester joining and transferring their dispatch operations there is very feasible. The new Danvers' dispatch center, which is scheduled to open around August 2017, will initially be equipped with four fully functional dispatch consoles, with the capacity to expand up to two additional.

The new dispatch center will be fully outfitted with the latest state of the art equipment and technology for its operations. All of the existing Danvers, Hamilton, and Manchester personnel are well trained and experienced. The capital equipment reimbursement grants from the state E 9-1-1 department that are available to communities that are exploring shared services or regional endeavors should allow all three communities to acquire necessary equipment and also upgrade their own town emergency communications systems as part of the process of establishing connectivity with the RDC. This will also allow the communities to build necessary redundancy into their overall emergency communication systems.

The installation of safe rooms with audio visual connections that can provide a secure safe area for potential crime victims to await the arrival of police should eliminate another concern that municipalities' frequently have: "what happens when someone needs assistance and the police station may no longer be staffed around the clock?".

All three communities have some potential expenses they will need to budget for elsewhere if the RDC is established as the MRI study team recommends. Danvers may need to absorb about \$29,068.00 of the administrative police captain's salary since we recommend that an alternative table or organization be adopted that removes him from the RDC organizational structure. In addition, although we believe that at least some of the duties performed by the police dispatchers in Hamilton and Manchester may be able to be reassigned to other town personnel, it is not unreasonable for both towns to budget for one FTE position each to also assume some of those duties and responsibilities. Hamilton's estimated cost for a single position counting salary and benefits is about \$67,184.00, while Manchester's would be about \$64,222.00. Both towns could save money on the costs of fringe benefits and potential overtime expenses, as well as potentially cover more hours, by considering hiring two part-time employees, rather than one full-time one.

	CURRENT DISPATCH CENTER BUDGET WITHOUT GRANTS	NET CURRENT DISPATCH CENTER BUDGET WITH GRANTS	NET PER CAPITA COSTS WITH GRANTS	% OF RDC BUDGET	PROJECTED NET BUDGET COST WITH DANVERS RDC	GROSS PROJECTED COST SAVINGS	POTENTIAL OFFSETTING LOCAL EXPENSES	NET PROJECTED COST SAVINGS	PROJECTED PER CAPITA COST DANVERS RDC	PROJECTED PER CAPITA COST SAVINGS DANVERS RDC
DANVERS	\$717,103.00	\$632,662.00	\$23.88	66.2%	\$368,805.32	\$263,856.68	\$29,068.00	\$234,788.68	\$15.02	\$8.86
HAMILTON	\$357,975.00	\$332,974.00	\$42.89	19.4%	\$108,078.90	\$224,895.10	\$67,184.00	\$157,711.10	\$22.57	\$20.32
MANCHESTER	\$320,146.00	\$285,831.00	\$49.49	14.4%	\$80,223.51	\$205,607.49	\$64,222.00	\$141,385.49	\$25.01	\$24.48
TOTAL (3 Towns)	\$1,395,224.00	\$1,264,908.00	\$31.60	100%		\$694,359.27	\$160,474.00	\$533,885.27		
RDC*	\$1,005,479.74				\$557,107.74				\$13.91** \$17.92***	

FIGURE 43: DANVERS RDC FINANCIAL COMPARISON AND PROJECTED COST BENEFITS

* Danvers RDC budget figures are projections based upon available data, cost estimates, and anticipated grant funding and are based upon exact RDC configuration. **Total anticipated grant funding for the RDC with this configuration of towns totals \$448,372.00.**

** Average per capita cost for Danvers RDC based on entire population of 40,032 and utilizing just the operational costs of the RDC, not including the potential offsetting local expenses.

*** Average per capita cost for the Danvers RDC based upon the entire population of 40,032 and utilizing both operational costs of the RDC AND potential offsetting local expenses.

NOTE: The budget figures do not include training grant funding from the state E 9-1-1 department. This information was not available at the time this report was finalized.

As Figure 43 above illustrates, the projected cost savings to all three potential participants in the Danvers RDC could be significant. First, the RDC itself will reduce the cost of providing dispatch services to the three communities (including current grant offsets) from \$1,264,908.00 to about \$1,005,479.00, a savings of \$259,429.00. The support grants that all communities receive annually from the state E9-1-1 department will increase from a total of \$95,816.00 between the three communities, to \$116,902.00 for the RDC, an increase of \$21,086.00. In addition, the proposed RDC will receive an additional \$331,470 in RDC/RECC operational funding from the state. This reduces the overall RDC operational cost that must be funded by the participants to \$557,107.74, a potential reduction in locally funded expenses of \$707,800.00. As noted above, all three communities do have some local operational concerns they may or may not need to address. However, even calculating some offsetting additional local expenditures to address these issues, which could total as much as \$160,474.00, the financial benefits that we project are significant resulting in potential savings of at least \$547,000.00.

- Danvers will save approximately \$234,788.68 reducing their per capita cost from \$23.88 to \$15.02, a savings of \$8.86.
- Hamilton will save approximately \$157,711.10 reducing their per capita cost from \$42.89 to \$22.57, a savings of \$20.32.
- Manchester will save approximately \$141,385.49 reducing their per capita cost from \$49.49 to \$25.01, a savings of \$24.48.

Recommendation XVII-1

Based upon the significant projected cost savings that Danvers, Hamilton, and Manchester could realize from by the formation of the Danvers RDC, it is MRI's strong recommendation that the three communities continue to actively pursue this endeavor.

Although the MRI study team did not evaluate any data, or seek any perspective from Wenham, the fact that their contract with the Essex RECC expires at the end of 2017 makes them another potential partner that could eventually be added. We mention this because we believe that a community the size of Wenham could probably be added to the Danvers RDC without the need to increase on-duty, or overall staffing, which would result in additional potential savings by all of the current potential members.

Obviously, it is important to remember that whenever possible, the level of service received by the tax payers/stakeholders should not be diminished when considering significant changes in how operations are conducted. The MRI study team feels very confident that the level of service that will be offered by the Danvers Regional Dispatch Center may provide an

improvement in the level of service available to the towns and their citizens. The center will be adequately staffed and have the ability to handle simultaneous/multiple incidents effectively and efficiently, something that would be difficult for Hamilton and Manchester to do at the present time with only a single call taker/dispatcher working in each community. The potential life-saving benefits of having sufficient personnel on-duty to be able to perform proper emergency medical dispatch operations is, in and of itself, a significant positive.

A word of caution to all three communities regarding the type of cooperative relationship or “partnership” that this endeavor will be is important. Danvers will be the authority having full control and authority over the RDC. Both Hamilton and Manchester will contract with Danvers to provide the service and will be clients or customers. Nonetheless, these two communities will be major stakeholders in the RDC operation. One of the primary reasons that regional endeavors such as this fail is that one of more of the participants perceive, whether real or imagined, that they lack a real voice or control in how the system works or operates. As a result, the towns that are contracting for service will need at least some level of input in the operations of the center. If the recommended advisory board is created and comprised of representatives of all participating communities and departments, it is important that it meets on a regular basis, and that suggestions and recommendations that are made by consensus of the group are given appropriate consideration. This is an area both Hamilton and Manchester should fully vet prior to making a final decision on joining the RDC. It is very important that both towns’ police and fire chiefs will be satisfied (based upon an objective evaluation not pre-conceived bias or general opposition) with the services they will receive from the RDC and that transferring dispatch operation will meet their needs and the needs of their personnel.

XVIII. IMPLEMENTATION TIMELINE

Development of an accurate implementation timeline for an initiative such as the proposed Danvers RDC is difficult to do. Despite MRI’s positive recommendations contained in this report regarding the feasibility of this regional, shared services initiative, at this stage of the process there are still numerous variables, and even complete unknowns, that could impact the direction that the proposal takes as it moves forward. Most significant among these is that neither Hamilton nor Manchester have definitively committed to joining this regional endeavor. This makes sense since the purpose of this analysis was to objectively determine the feasibility of moving the initiative forward. At this point in the process, that is not unreasonable as each town needs time to study this report, and its recommendations, then initiate discussion within their community on whether this is the best option for them to pursue. This process will take some time.

Moving forward, Hamilton and Manchester, both of which expressed a possible interest in joining the RDC, and participated in this feasibility study, will ultimately need to make a preliminary decision regarding whether they are going to continue to participate in the process.

The decision of any one of the possible participants to not continue with the process will have significant implications for the others as well. Chief among these will be the amount of support, incentive, and operational grant funding that will be provided by the state to offset expenses. At that point options may include seeking other potential participants, moving forward with just two communities - which may still be beneficial to them, or abandoning the entire initiative.

Working on the assumption that all the participants will opt to continue with the process, discussions and negotiations must then commence on the details regarding services that Danvers will provide, under contract, to Hamilton and Manchester. Issues that will need to be decided include, but certainly will not be limited to, the level of input the other communities will have in operations and the costs associated with providing the services. Once an agreement is made on how the project will proceed, the first formal step to establishing the RDC is for all three of the potential participants to sign an Inter-Municipal Agreement. This agreement, which will require approval from the Board of Selectmen in each town, establishes the legal basis for the towns to participate in the joint endeavor. It is also necessary before the state 9-1-1 department will recognize the regional center and consider awarding grant money necessary for the project to update and/or acquire equipment necessary for the RDC to operate connect and have interoperability with Hamilton and Manchester.

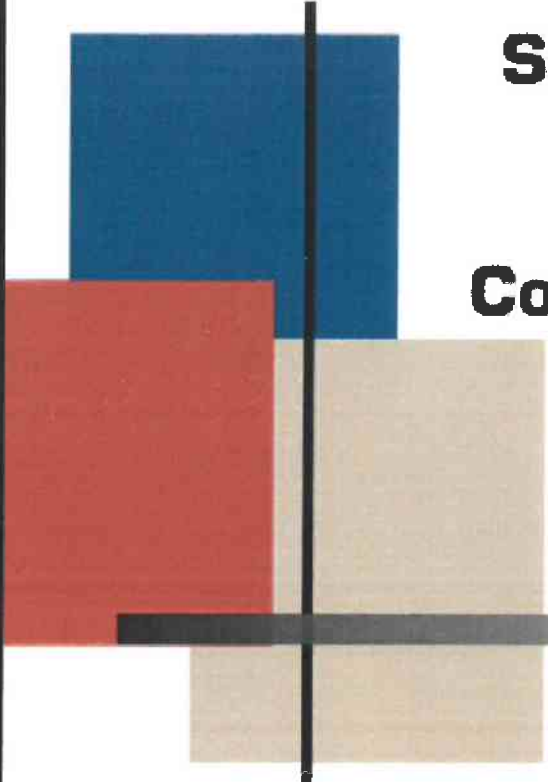
Once the Inter-Municipal Agreement is executed, and approved, the communities will need to work towards developing a time line for bringing Hamilton and Manchester on line, within a targeted time frame, and at appropriate intervals.

Throughout this process, each participating municipality, and each affected department within the towns, will need to develop specific, detailed plans for making the transition to the RDC. These plans must include back-up and contingency plans should unexpected hardware or software issues occur during the transition. Other issues that will need to be planned for include, but are certainly not limited to: training needs and related staffing challenges; preparing "lay off" plans; promoting and/or hiring the additional RDC staff; determining detailed equipment, hardware, and software needs; establishing time lines for installation of new equipment, hardware, and software at various locations; and ensuring that all equipment and processes are fully tested and operational prior to coming on line for emergency operations. As is recommended elsewhere in this report, once the RDC is ready to accept additional municipalities, it is strongly recommended that the participants come on board incrementally, adding each additional town in no less than 60-day intervals.

APPENDIX A



**Municipal
Resources
Inc.**



Staffing and Retention in Public Safety Communication Centers: A National Study

August, 2005

Research Report

NOTE: Entire report is over 100 pages long. It will be provided in its entirety with the final report.



**APCO Project RETAINS
Responsive Efforts to Assure
Integral Needs in Staffing**

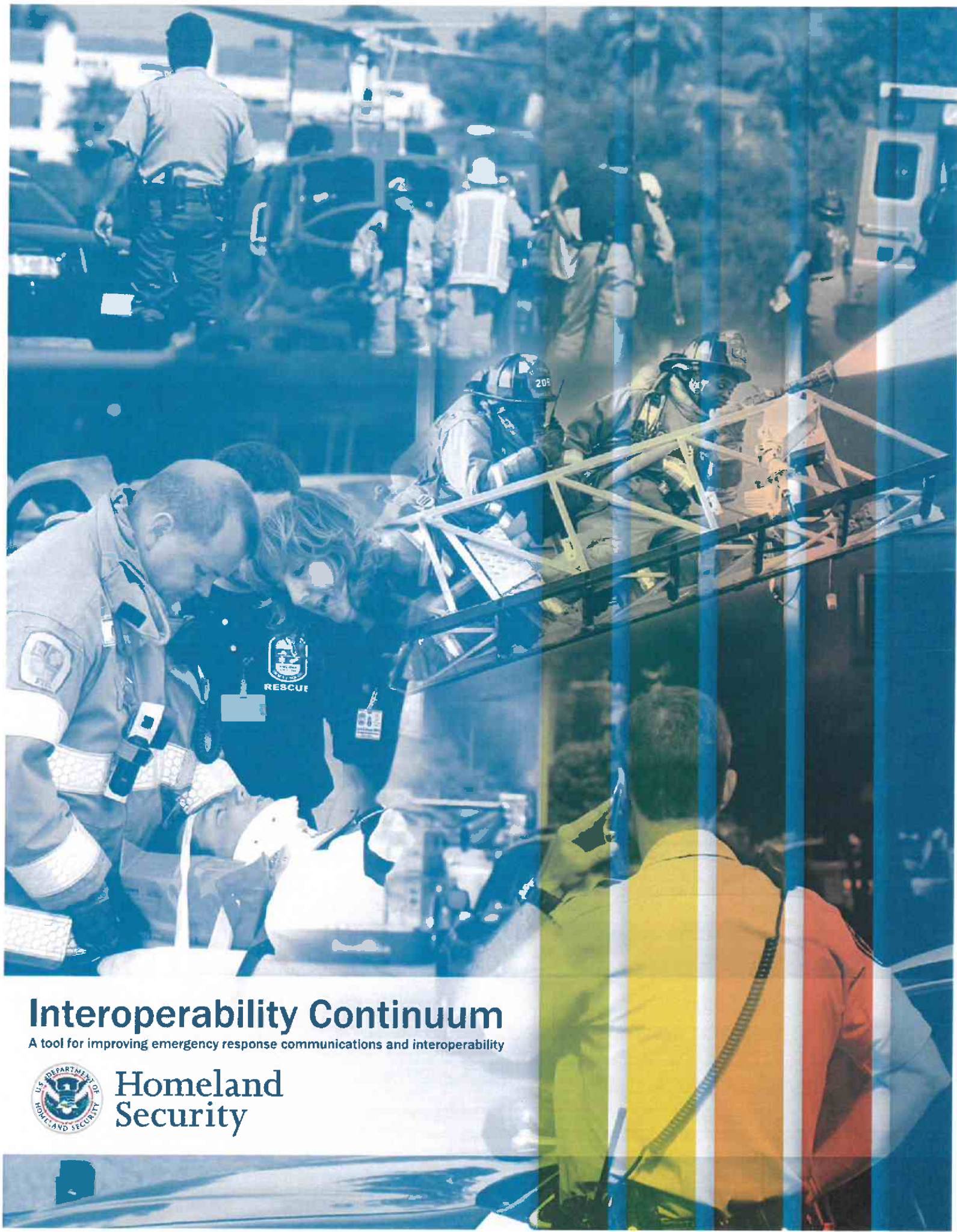


University of Denver
Research Institute



APPENDIX B





Interoperability Continuum

A tool for improving emergency response communications and interoperability



**Homeland
Security**

Interoperability Overview

Emergency responders—emergency medical services (EMS), fire-rescue personnel, and law enforcement officers—need to share vital data or voice information across disciplines and jurisdictions to successfully respond to day-to-day incidents and large-scale emergencies. Many people assume that emergency response agencies across the Nation are already interoperable. In actuality, emergency responders often cannot talk to some parts of their own agencies—let alone communicate with agencies in neighboring cities, counties, or states.

Developed with practitioner input by the Department of Homeland Security's SAFECOM program, the Interoperability Continuum is designed to assist emergency response agencies and policy makers to plan and implement interoperability solutions for data and voice communications. This tool identifies five critical success elements that must be addressed to achieve a sophisticated interoperability solution: governance, standard operating procedures (SOPs), technology, training and exercises, and usage of interoperable communications. Jurisdictions across the Nation can use the Interoperability Continuum to track progress in strengthening interoperable communications.

To drive progress along the five elements of the Continuum and improve interoperability, emergency responders should observe the following principles:

- Gain leadership commitment from all disciplines (e.g., EMS, fire-rescue response, and law enforcement).
- Foster collaboration across disciplines through leadership support.
- Interface with policy makers to gain leadership commitment and resource support.
- Use interoperability solutions regularly.
- Plan and budget for ongoing updates to systems, procedures, and documentation.
- Ensure collaboration and coordination across all Interoperability Continuum elements.

Interoperability Continuum Elements

Interoperability is a multi-dimensional challenge. To gain a true picture of a region's interoperability, progress in each of the five inter-dependent elements must be considered. For example, when a region procures new equipment, that region should plan and conduct training and exercises to make the best use of that equipment.

Optimal interoperability is contingent on an agency's and jurisdiction's needs. The Continuum is designed as a guide for jurisdictions that are pursuing a new interoperability solution, based on changing needs or additional resources.

Governance

Establishing a common governing structure for solving interoperability issues will improve the policies, processes, and procedures of any major project by enhancing communication, coordination, and cooperation; establishing guidelines and principles; and reducing any internal jurisdictional conflicts. Governance structures provide the framework in which stakeholders can collaborate and make decisions that represent a common objective. It has become increasingly clear to the emergency response community that communications interoperability cannot be solved by any one entity; achieving interoperability requires a partnership among emergency response organizations across all levels of government. As such, a governing body should consist of local, tribal, state, and Federal entities as well as representatives from all pertinent emergency response disciplines within an identified region.

Individual Agencies Working Independently—A lack of coordination among responding organizations.

Informal Coordination Between Agencies—Loose line level or agency level agreements that provide minimal incident interoperability.

Key Multi-Discipline Staff Collaboration on a Regular Basis—A number of agencies and disciplines working together in a local area to promote interoperability.

Regional Committee Working within a Statewide Communications Interoperability Plan Framework—Multi-disciplinary jurisdictions working together across a region pursuant to formal written agreements as defined within the larger scope of a state plan—promoting optimal interoperability.

Standard Operating Procedures

Standard operating procedures—formal written guidelines or instructions for incident response—typically have both operational and technical components. Established SOPs enable emergency responders to successfully coordinate an incident response across disciplines and jurisdictions. Clear and effective SOPs are essential in the development and deployment of any interoperable communications solution.

Individual Agency SOPs—SOPs exist only within individual agencies and are not shared, resulting in uncoordinated procedures and/or incompatible data systems among agencies that can hinder effective multi-agency/multi-discipline response.

Joint SOPs for Planned Events—The development of SOPs for planned events—this typically represents the first phase as agencies begin to work together to develop interoperability.

Joint SOPs for Emergencies—SOPs for emergency level response that are developed as agencies continue to promote interoperability.

Regional Set of Communications SOPs—Region-wide communications SOPs for multi-agency/multi-discipline/multi-hazard responses serve as an integral step towards optimal interoperability.

National Incident Management System Integrated SOPs—Regional SOPs are modeled to conform to the elements of the National Incident Management System.

Technology

Technology is a critical tool for improving interoperability, but it is not the sole driver of an optimal solution. Successful implementation of data and voice communications technology is supported by strong governance and is highly dependent on effective collaboration and training among participating agencies and jurisdictions. Technologies should meet the needs of practitioners on the frontlines and should address regional needs, existing infrastructure, cost vs. benefit, and sustainability. The technologies described within the Continuum must be scalable in order to effectively support day-to-day incidents as well as large-scale disasters. Many times, a combination of technologies is necessary to provide effective communications among emergency responders. Security and authentication challenges are present in each technology and must be considered in all implementation decisions.

Data Elements

Swap Files—Swapping files involves the exchange of stand-alone data/application files or documents through physical or electronic media (e.g., universal serial bus devices, network drives, emails, faxes). This process effectively creates a static “snapshot” of information in a given time period. Though swapping files requires manual planning and training, it can become difficult to manage beyond one-to-one sharing. With data frequently changing, there may be issues concerning the age and synchronization of information, timing of exchanges, and version control of documents. Each of these issues can hinder real-time collaborative efforts. In addition, the method of sharing files across unprotected networks raises security concerns.

Common Applications—The use of common proprietary applications requires agencies to purchase and use the same or compatible applications and a common vocabulary (e.g., time stamps) to share data. Common proprietary applications can increase access to information, improve user functionality, and permit real-time information sharing between agencies. However, the use of common proprietary applications requires strong governance to coordinate operations and maintenance among multiple independent agencies and users; these coordinated efforts are further compounded as the region expands and additional agencies use applications. Common proprietary applications also limit functionality choices as all participating agencies must use compatible applications.

Custom-Interfaced Applications—Custom-interfaced applications allow multiple agencies to link disparate proprietary applications using single, custom “one-off” links or a proprietary middleware application. As with common applications, this system can increase access to information, improve user functionality, and permit real-time information sharing among agencies. Improving upon common applications, this system allows agencies to choose

their own application and control the functionality choices. However, if using one-to-one interfaces, the use of multiple applications requires custom-interfaces for each linked system. As the region grows and additional agencies participate, the required number of one-to-one links will grow significantly. Proprietary middleware applications allow for a more simplified regional expansion; however, all participants must invest in a single “one-off” link to the middleware, including any state or federal partners. Additionally, custom-interfaced applications typically require more expensive maintenance and upgrade costs. Changes to the functionality of linked systems often require changes to the interfaces as well.

One-Way Standards-Based Sharing—One-way standards-based sharing enables applications to “broadcast/push” or “receive/pull” information from disparate applications and data sources. This system enhances the real-time common operating picture and is established without direct access to the source data; this system can

also support one-to-many relationships through standards-based middleware. However, because one-way standards-based sharing is not interactive, it does not support real-time collaboration between agencies.

Two-Way Standards-Based Sharing—Two-way standards-based sharing is the ideal solution for data interoperability. Using standards, this approach permits applications to share information from disparate applications and data sources and to process the information seamlessly. As with other solutions, a two-way approach can increase access to information, improve user functionality, and permit real-time collaborative information sharing between agencies. This form of sharing allows participating agencies to choose their own applications. Two-way standards-based sharing does not face the same problems as other solutions because it can support many-to-many relationships through standards-based middleware.

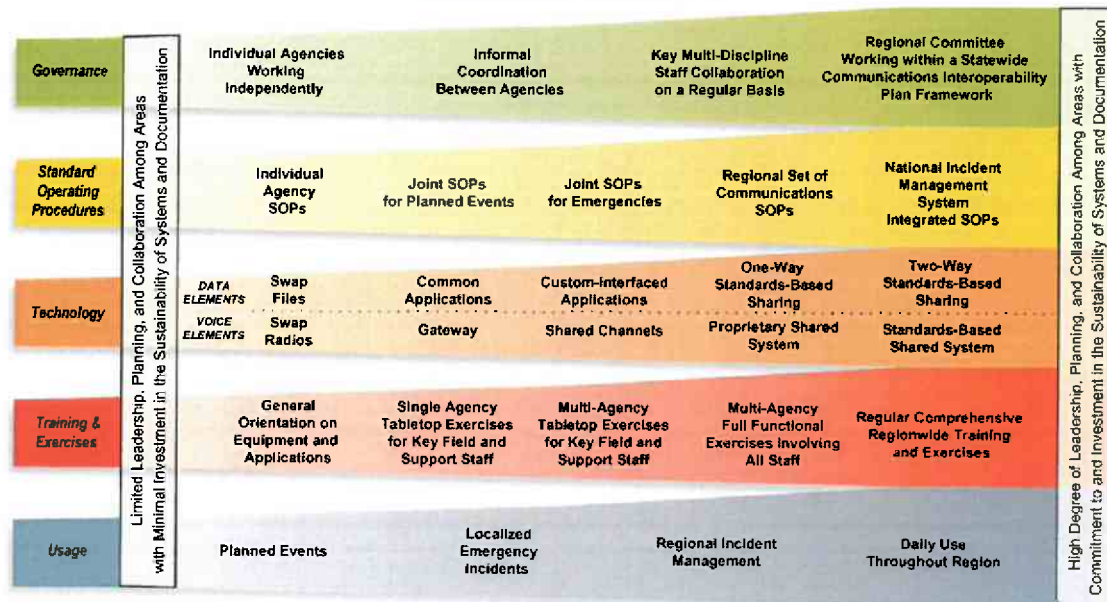
Building on the attributes of other solutions, this system is most effective in establishing interoperability.

Voice Elements

Swap Radios—Swapping radios or maintaining a cache of standby radios, is an age-old solution that is time-consuming, managerial-intensive, and likely to provide limited results due to channel availability.

Gateway—Gateways retransmit across multiple frequency bands, providing an interim interoperability solution as agencies move toward shared systems. However, gateways are inefficient in that they require twice as much spectrum because each participating agency must use at least one channel in each band per common talk path and because they are tailored for communications within the geographic coverage area common to all participating systems.

Interoperability Continuum



Shared Channels—Interoperability is promoted when agencies share a common frequency band or air interface (analog or digital), and are able to agree on common channels. However, the general frequency congestion that exists nationwide can place severe restrictions on the number of independent interoperability talk paths available in some bands.

Proprietary Shared Systems and Standards-Based Shared Systems—Regional shared systems are the optimal solution for interoperability. While proprietary systems limit the user's choice of product with regard to manufacturer and competitive procurement, standards-based shared systems promote competitive procurement and a wide selection of products to meet specific user needs. With proper planning of the talk group architecture, interoperability is provided as a byproduct of system design thereby creating an optimal technology solution.

Training & Exercises

Implementing effective training and exercise programs to practice communications interoperability is essential for ensuring that the technology works and responders are able to effectively communicate during emergencies.

General Orientation on Equipment and Applications—Agencies provide initial orientation to their users with regard to their particular equipment and applications. Multi-agency/multi-jurisdictional operations are often an afterthought to this training, if provided at all.

Single Agency Tabletop Exercises for Key Field and Support Staff—Structured tabletop exercises promote planning and identify response gaps. However, single agency activities do not promote interoperability across disciplines and jurisdictions. Additionally, management and supervisory training is critical to promoting routine use of interoperability mechanisms.

Multi-Agency Tabletop Exercises for Key Field and Support Staff—As agencies and disciplines begin working together to develop exercises and provide field training, workable interoperability solutions emerge. Tabletops should address data and/or voice communications interoperability and focus on effective information flow.

Multi-Agency Full Functional Exercises Involving All Staff—Once multi-agency/multi-discipline plans are developed and practiced at the management and supervisory level, it is critical that all staff who would be involved in actual implementation receive training and participate in exercises.

Regular Comprehensive Regionwide Training and Exercises—Optimal interoperability involves equipment familiarization and an introduction to regional/state interoperability at time of hire (or in an academy setting). Success will be assured by regular, comprehensive, and realistic exercises that address potential problems in the region and involve the participation of all personnel.

Despite the best planning and technology preparations, there is always the risk of the unexpected—those critical and unprecedented incidents that require an expert at the helm who can immediately adapt to the situation. Within the Incident Command System, these specialists are called Communications Unit Leaders. The

role of the Communications Unit Leader is a critical function that requires adequate training and cannot be delegated to an individual simply because that person “knows about communications systems.” Rather, the proper training of these individuals is of significant importance to a region's ability to respond to unexpected events, and it should prepare them to manage the communications component of larger interoperability incidents by applying the available technical solutions to the specific operational environment of the event.

Usage

Usage refers to how often interoperable communications technologies are used. Success in this element is contingent upon progress and interplay among the other four elements on the Interoperability Continuum.

Planned Events—Events for which the date and time are known (e.g., athletic events and large conferences/conventions that involve multiple responding agencies).

Localized Emergency Incidents—Emergency events that involve multiple intra-jurisdictional responding agencies (e.g., a vehicle collision on an interstate highway).

Regional Incident Management—Routine coordination of responses across a region that include automatic aid fire response as well as response to natural and man-made disasters.

Daily Use Throughout Region—Interoperability systems are used every day for managing routine as well as emergency incidents. In this optimal solution, users are familiar with the operation of the system(s) and routinely work in concert with one another.

Leadership, Planning, and Collaboration

In addition to progression along the five elements of the Interoperability Continuum, regions should focus on planning, conducting education and outreach programs, and maintaining an awareness of the specific issues and barriers that affect a particular region's movement towards increased interoperability. For example, many regions face difficulties related to political issues and the relationships within and across emergency response disciplines (e.g., EMS, fire-rescue response, and law enforcement) and jurisdictions. Leaders of all agencies and political sub-divisions should help to work through these challenging internal and jurisdictional conflicts as well as set the stage for a region's commitment to the interoperability effort. Additionally, leaders must be willing to commit the time and resources necessary to ensure the sustained success of any interoperability effort. For example, ongoing maintenance and support of the system must be planned and incorporated into the budget.

In addition, collaboration should involve other agencies and organizations that may be critical in supporting the mission of emergency responders. Examples include emergency management agencies, the National Guard, public works, educational institutions/schools, transportation, medical facilities, and large private facilities.

Sustainability

Communications interoperability is an ongoing process, not a one-time investment. Once a governing body is set up, it must be prepared to meet on a regular basis, drawing on operational and technical expertise to plan and budget for continual updates to systems, procedures, and training and exercise programs. If regions expect emergency responders to use interoperable equipment on a daily basis, supporting documentation and the installed technology must be well-maintained with a long-term commitment to upgrades and the eventual replacement of equipment.

Lastly, an interoperability program should include both short- and long-term solutions. Early successes can help motivate regions to tackle more time-consuming and difficult challenges. It is critical, however, that short-term solutions do not inappropriately drive the planning process, but function in support of a long-term plan.

National Frameworks

As an evolving tool, the Interoperability Continuum supports the *National Preparedness Strategy* and aligns with national frameworks including, but not limited to, the National Response Framework, the National Incident Management System, the National Emergency Communications Plan, and the National Communications Baseline Assessment. To maximize the Interoperability Continuum's value to the emergency response community, SAFECOM will regularly update the tool through a consensus process involving practitioners, technical experts, and representatives from local, tribal, state, and Federal agencies.

SAFECOM is a communications program of the Department of Homeland Security. SAFECOM provides research, development, testing and evaluation, guidance, tools, and templates on interoperable communications-related issues to local, tribal, state, and Federal emergency response agencies. The Office of Emergency Communications (OEC) supports SAFECOM's development of grant guidance, policy, tools, and templates, and provides direct assistance to local, tribal, state, and Federal practitioners. The Office for Interoperability and Compatibility (OIC) supports SAFECOM's research, development, testing and evaluation, standards, and tools such as reports and guidelines. OEC is an office within the Directorate for National Protection and Programs. OIC is an office within the Science and Technology Directorate.



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Visit www.safecomprogram.gov or call 1-866-969-SAFE

APPENDIX C



**Municipal
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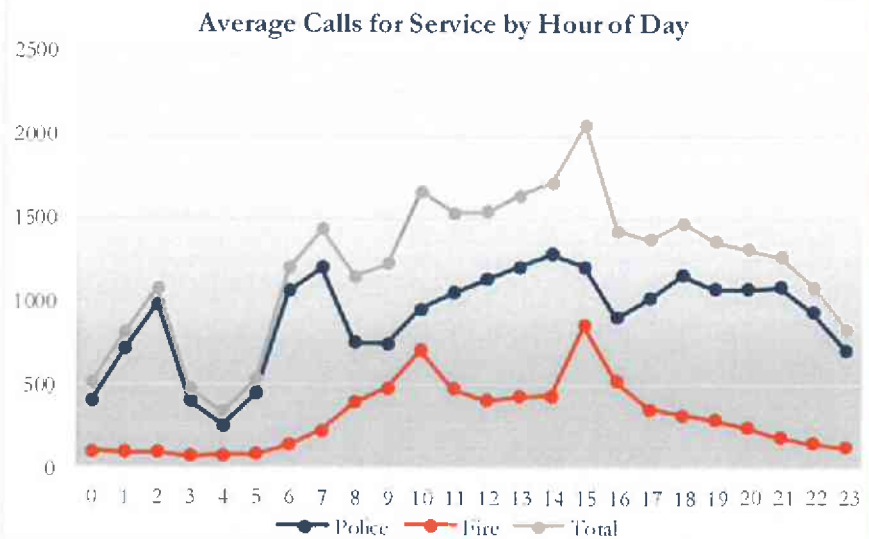
Danvers Police Department

Police and Fire Calls for Service: 2014 - 2016

Office of Public Safety Analysis
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The chart to the right displays the three-year average of calls for service by hour received by the Danvers Police Department and Danvers Fire Department between 2014 and 2016. The table below details the frequencies of calls by agency, hour of day and year.



Hour of Day	2014		2015		2016		Total	
	Police	Fire	Police	Fire	Police	Fire	Police	Fire
0	448	92	401	100	381	112	1,230	304
1	947	108	642	83	566	90	2,155	281
2	1,212	70	967	112	792	106	2,971	288
3	513	69	395	73	313	76	1,221	218
4	290	69	279	78	213	81	782	228
5	496	63	504	97	354	94	1,354	254
6	1,075	130	1,195	166	925	131	3,195	427
7	1,307	217	1,192	248	1,121	224	3,620	689
8	798	407	814	403	657	383	2,269	1,193
9	721	454	790	513	732	478	2,243	1,445
10	972	667	991	743	903	723	2,866	2,133
11	1,111	434	1,042	506	1,021	488	3,174	1,428
12	1,119	402	1,156	463	1,136	357	3,411	1,222
13	1,224	428	1,239	434	1,172	429	3,635	1,291
14	1,254	432	1,274	425	1,328	461	3,856	1,318
15	1,203	835	1,277	850	1,163	886	3,643	2,571
16	871	521	951	576	893	482	2,715	1,579
17	1,051	370	995	357	1,021	344	3,067	1,071
18	1,165	360	1,203	334	1,105	274	3,473	968
19	1,093	294	1,103	313	1,040	269	3,236	876
20	1,110	258	1,072	239	1,050	237	3,232	734
21	1,103	202	1,042	185	1,122	173	3,267	560
22	906	141	960	153	962	166	2,828	460
23	715	125	733	140	688	129	2,136	394
Total	22,704	7,148	22,217	7,591	20,658	7,193	65,579	21,932

APPENDIX D



**Municipal
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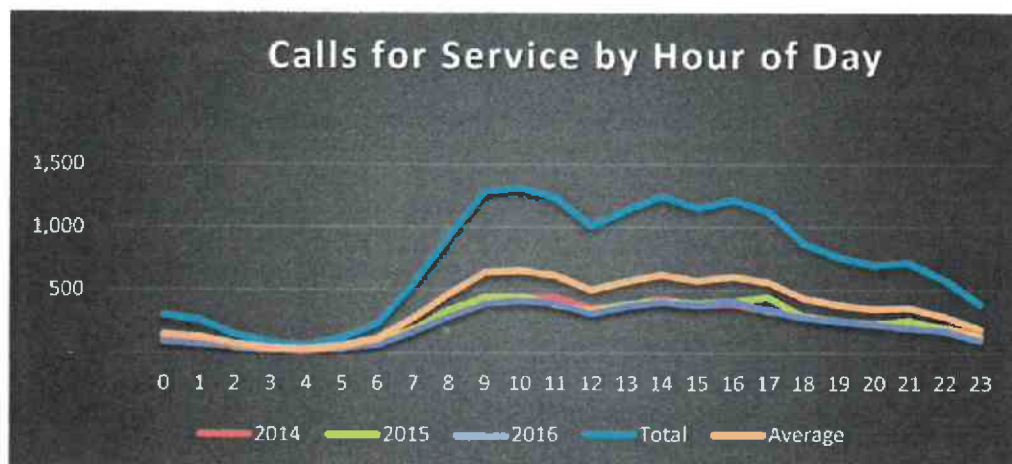


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TOWN OF MANCHESTER-BY-THE-SEA POLICE DEPARTMENT

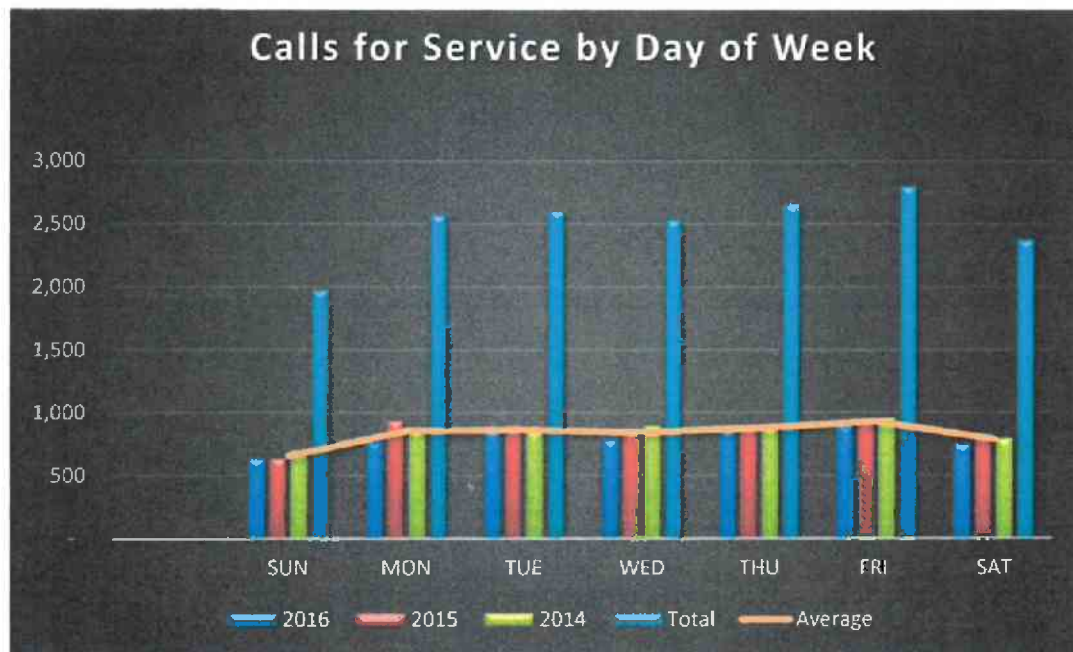
10 CENTRAL STREET, P.O. BOX 306, MANCHESTER-BY-THE-SEA, MA 01944



Hours of Day	2014	2015	2016	Total	Average	Most Active	Least Active
0	114	91	96	301	151	659	10:00 AM
1	105	76	81	262	131	31	4:00 AM
2	46	49	55	150	75		
3	30	23	31	84	42		
4	14	24	24	62	31		
5	44	34	42	120	60		
6	69	99	64	232	116		
7	196	185	168	549	275		
8	300	347	290	937	469		
9	454	441	392	1,287	644		
10	449	452	416	1,317	659		
11	449	387	399	1,235	618		
12	360	335	313	1,008	504		
13	380	389	372	1,141	571		
14	433	412	406	1,251	626		
15	379	397	379	1,155	578		
16	396	412	413	1,221	611		
17	335	447	344	1,126	563		
18	296	295	285	876	438		
19	255	257	256	768	384		
20	238	236	230	704	352		
21	255	263	204	722	361		
22	208	194	182	584	292		
23	154	132	104	390	195		
Total	5,959	5,977	5,546	17,482			

A listing and description of datasets used is located on the final page of this report.

Only one incident per UCR/System code was used, therefore, each call for service is counted once despite the number of UCR codes used in a particular incident.



	SUN	MON	TUE	WED	THU	FRI	SAT	TOTALS
2016	633	767	846	785	867	897	751	5,546
2015	635	937	901	852	890	940	822	5,977
2014	703	866	846	895	891	960	798	5,959
Total	1,971	2,570	2,593	2,532	2,648	2,797	2,371	17,482
Average	657	857	864	844	883	932	790	