Evaluation and Strategic Plan for the Fire Department

SOMERVILLE, MASSACHUSETTS

matrix consulting group

July 2010

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1. INTRODUCTION AND EXECUTIVE SUMMARY

The Matrix Consulting Group was retained by the City of Somerville to develop an Evaluation and Strategic Plan for the Fire Department, which included an extensive review of organization, operations, and management. In reaching the concluding point of the study, the project team has assembled this report, which summarizes our findings, conclusions and recommendations, where appropriate. This study was conducted with cooperation and assistance of City of Somerville – SomerStat – personnel in conjunction with an external consultant from the Matrix Consulting Group. The Matrix Consulting Group is a national management consulting firm dedicated to assessing public safety service delivery in cities and other jurisdictions.

In this study of the Somerville Fire Department (SFD), the project team utilized a wide variety of data collection and analytical techniques. The project team conducted the following data collection and analytical activities:

*   The project team began an intensive process of interviewing personnel in every Fire Department Division and collecting a wide variety of data designed to document workloads and service levels.

*   Staff at every rank and in every function were interviewed either one on one or in small groups. This included personnel in operations, support and fire alarm functions.

*   Additionally, the project team from SomerStat and the Matrix Consulting Group interviewed representatives of the bargaining unit's executive board as part of this process.

*   The project team also compared organizational structure, staffing levels, as well as certain operational and service delivery areas against other comparable fire / rescue departments.

*   The Fire Department was compared to a series of best management practices developed by the Matrix Consulting Group. This process was used to identify

issues on a wide range of topics in the Fire Department, as well as a process by which positive aspects of the Fire Department could be identified. These are included in each chapter.

• The project team collected detailed workload statistics for the primary functional areas, including calls for service from the computer aided dispatch / records management system, budget documents and monthly statistical reports.

Throughout the performance audit process, the project team reviewed interim deliverables, including the findings and issues, with the project steering committee, consisting of both SFD and City management.

2.   EXECUTIVE SUMMARY

The project team has prepared a summary of the key findings, conclusions and recommendations to be found in this final report. The primary findings and recommendations identified in the Final Report are summarized in the exhibit which follows:

Report Section / Page	Finding	Recommendation	Fiscal Impact	Responsible Parties	Recommended Priority
Page 23	The organizational structure of the Fire Department only provides for the Chief to be out of the bargaining unit. The project team explored a number of options.	The Fire Department and the Mayor's Office should work to convert a single Deputy Chief position to that of a non-union Assistant Chief.	$14,500	Chief, Mayor's Office	Medium
Page 27	The Fire Department is operating without many key management documents in place, including: no long range planning, no performance measures, no annual work plan, little review time dedicated to assessing basic performance, etc.	The Fire Chief must take actions, in conjunction with the command staff, to improve the overall management systems of the Fire Department. Without these critical documents, the Department will continue to react to situations rather than proactively address them.	None	Chief, Command Staff	High
Page 27	There are no regular meetings of the management team of the Fire Department.	The Fire Department command staff should hold regular, at least monthly, meetings to review issues, discuss assignments, etc.	$10,000	Chief	High
Page 37	The Fire Department needs to have up to date policies and procedures in order to be effective.	Policies and procedures need to be comprehensive and to be modern in their scope and content.	None (Staff)	Chief, Command Staff	Highest

Report Section / Page	Finding	Recommendation	Fiscal Impact	Responsible Parties	Recommended Priority
Page 42	Training in the Fire Department is not well organized and suffers from lack of involvement by company officers.	Target development of training by company officers, distributed by the Training office. Focus on on-duty training at the company level, at least two hours daily. Additional focus on performance based training. Provide some overtime funding for multi-company drills.	$50,000 for training overtime	Chief, Mayor's Office, Command Staff, Company Officers	Medium Medium
Page 46	The Fire Department does not have an analytical position dedicated to supporting the Chief and the command staff in identifying data sources or to provide day to day analytical support.	Add a management analyst position to the Fire Department. The training for such a person should be similar to that which is typically found in a crime analyst in the police department.	$80,000	Chief, Mayor's Office, Human Resources	Medium
Page 50 / Page 55	Staffing in Fire Alarm, at two personnel is necessary to handle major incidents. However, it is also a very inefficient level of staffing given total workloads. Changing the work schedule to a 4/2 plan would allow for a reduction of one position (3 per shift).	Serious consideration should be given to consolidating dispatch within the City of Somerville or between the City and neighboring communities. The City should work to bargain a 4/2 schedule and reduce the one position.	($500,000) ($100,000)	Chief, Mayor's Office	High
Page 58	As with general Fire operations, there are no performance measures in place for the Fire Alarm unit.	Develop specific performance measures for Fire Alarm. Monitor those measures on a daily / weekly / monthly basis.	None	Chief, Command Staff, Chief Operator in Fire Alarm	High

Report Section / Page	Finding	Recommendation	Fiscal Impact	Responsible Parties	Recommended Priority
Page 71	The Fire Department does not have performance measures in place for Fire Suppression.	Develop specific performance measures for Fire Suppression. Monitor those measures on a daily / weekly / monthly basis.	None	Chief, Command Staff	High
Page 73	Fire Stations are well situated to provide excellent coverage of the City of Somerville.	Consider pursuing a new Fire Station in the Assembly Square development area. This would provide for enhanced multi-unit response into that area.	Unknown	Chief, Mayor's Office, Planning	Medium
Page 74	Visual inspection of the City's fire stations by the project team indicate that there are a number of potentially significant issues.	The City should retain a consulting engineer in order to obtain an evaluation of structural and systems issues in the Fire Stations.	$50,000	Chief, Mayor's Office	Medium
Page 75	Currently, Fire Department vehicle / apparatus maintenance is performed by a single Mechanic in a very small maintenance area.	Move Fire Maintenance to a facility where there are other City heavy equipment maintenance personnel assigned. Continue to maintain a dedicated Fire Mechanic, with assistance from other heavy vehicle mechanics. In the interim, authorize use of some Firefighter or temporary mechanic time to support the Mechanic during heavy maintenance tasks.	Unknown	Chief, Mayor's Office	High

Report Section / Page	Finding	Recommendation	Fiscal Impact	Responsible Parties	Recommended Priority
Page 80	Fire Prevention is located in office space that is inadequate for most of its needs.	Seek alternative office space for Fire Prevention. This space should provide for private offices, storage space, space for reviewing plans, etc.	None (City owned space)	Chief, Mayor's Office	Medium

At the conclusion of this study, the Fire Department, under the direction of the Office of the Mayor, should assess which recommendations should be implemented. This process should include the following:

• Internal assessment of each recommendation.

• Determine if funding is available to implement the recommendation.

• Develop an internal mechanisms for tracking the recommendations to ensure that they are completed within targeted time frames.

The overall benefits from implementing the recommendations encapsulated in this report should include the following:

• Improved operational management and service delivery.

• Improved risk management for the City, the Fire Department and its employees.

• Enhanced professionalism and management of the Fire Department.

The next chapter of this report focuses on management and organizational issues that span the scope of the Department's operations.

2.   ORGANIZATIONAL STRUCTURE AND MANAGEMENT SYSTEMS

This first analytical chapter of the report focuses on key organizational structure and management systems issues facing the Fire Department. As is the case with each chapter, the first section provides a comparison of the Fire Department to a series of best management practices.

1.   THE FIRE DEPARTMENT FACES A NUMBER OF ISSUES AND OPPORTUNITIES RELATED TO ORGANIZATIONAL STRUCTURE AND MANAGEMENT SYSTEMS.

The Matrix Consulting Group applied a series of "best management practices" to each area of the Fire Department. These are provided, below, summarizing those issues that impact the management and organizational structure of the Somerville Fire Department. Others are presented in later sections of the report.

Performance Target	Strengths	Potential Improvements
ORGANIZATION AND MANAGEMENT		
The Department has a defined chain of command with clear lines of authority. The organization chart is available to all members of the Department.	√	
The Department has a written vision and mission statement. The statement is available to all members of the Department.	√	
The Department has a written long range plan. The long-range plan is available to all members of the Department.		√
The management team holds regular meetings with written agendas and minutes.		√

Performance Target	Strengths	Potential Improvements
The Department has a management accountability system that identifies group performance goals.		√
The Department is Accredited or is seeking Accreditation.		√
The Department has written policies and procedures that are reviewed and updated regularly.	√	
The Department has an automated system for managing and distributing its policies and procedures.		√
Critical policies meet national standards and recognize national and local legal requirements.	√	
Staff inspections are conducted based on need and a defined schedule that ensures all components are inspected annually.		√
The organization has grouped like functions together to support the organization's mission and goals.	√	
The organizational structure supports equivalent spans of control for similar levels of management.	√	
Personnel of like rank have similar levels of responsibility.	√	
The organizational structure supports goals of one manager per function and ensures that staff report to a single manager.	√	
The Department has a public information program.	√	
ANALYSIS AND PLANNING		
The Department has a planning and analysis function.		√

Performance Target	Strengths	Potential Improvements
The Department produces an annual improvement and associated project plan.		√
The Department produces an annual report.		√
The Department maintains a web site to distribute information to its members and to the general public.	√	
Planners have access to automated tools to abstract and analyze data from the Department's automated records system.	√	
The Department has a computer aided dispatch (CAD) system that supports Fire and EMS operations.	√	
The Department has an automated records management system (RMS) that supports fire suppression, emergency medical and fire prevention reporting requirements.	√	
The Department routinely monitors and analyzes CAD and RMS data to ensure that the data is accurate.	√	
The Department routinely analyzes and monitors emergency vehicle reflex and travel times to identify problems.		√
PERSONNEL MANAGEMENT		
The Department has a personnel manager.	√	
The Department has a written personnel manual.	√	
The Department has an automated personnel management system.		√

Performance Target	Strengths	Potential Improvements
The Department conducts annual evaluations of all personnel.		√
The Department's hiring process is compliant with state and federal guidelines.	√	
The Department has a health and safety program for its employees	√	
Background testing of new hires conducted before a job offer is made.	√	
STATIONS, APPARATUS AND EQUIPMENT		
The Department has a written long range plan for the replacement and repair of its facilities.		√
The Department's facilities meet all local, state and federal health and safety standards.		√
The Department's facilities are inspected annually to ensure that they meet all building maintenance, health and safety standards.	√	
All facilities are equipped with automatic sprinkler and fire/smoke detection systems.		√
All facilities housing vehicles are equipped with automatic exhaust ejection systems.	√	
The Department's facility replacement and renovation plan has been budgeted in the jurisdiction's long-range capital plan.		√
The Department has a written long-range fleet replacement plan that specifies the life cycle for apparatus (i.e., Engines, Ladders, Rescues, Ambulances).	√	

Performance Target	Strengths	Potential Improvements
The Department's vehicle replacement plan is based on the following criteria: Cars – 120,000 miles Ambulances -120,000 miles Command vehicles- 120,000 miles Engines, ladders and heavy rescues - 12 - 15 years.	√	
The Department's fleet replacement plan has been funded in the jurisdiction's long-range capital plan.		√
The Department has an automated fleet management system to monitor equipment utilization and repair histories, labor distribution, downtime and costs.		√
The Department's fleet management program schedules preventive maintenance and inspections for all vehicles.		√
The Department's apparatus repair facility has the proper equipment to handle large and specialized apparatus.		√
The Department's emergency vehicle mechanics are emergency vehicle technician (EVT) certified.	√	
The Department conducts annual pump and ladder tests and all of the in-service apparatus is certified.	√	
The Department has sufficient equipped reserve apparatus. 1 reserve engine per 4 engines 1 reserve ladder per 4 ladders 1 reserve ambulance per 4 ambulances	√	
The Department routinely disposes of surplus apparatus.	√	

Performance Target	Strengths	Potential Improvements
The Department's turnout gear and SCBA's meet national standards.	√	
The Department has a written long-range replacement plan for turnout gear and SCBA's.		√
The Department has an automated system to monitor its turnout gear and SCBA's		√
TRAINING		
The Department has a training budget to provide both in-house and outside training for its fire and EMS personnel.	√	
The training officer creates monthly and weekly training schedules for both fire and EMS instruction.		√
The fire and EMS training programs are designed to meet state re-certification requirements.	√	
The Department has an automated system to track training attendance and certifications.		√
Training instructors meet NFPA and EMS training certification requirements.		√
Training instructors are required to prepare and submit lesson plans to the Department's training officer for review and approval.		√
The Department has adopted NFPA Firefighter I, II and III requirements for Firefighters.	√	
Fire training evolutions are based on NFPA 1410.		√
Department conducts monthly multi-company drills on both the day and night shifts.		√

Performance Target	Strengths	Potential Improvements
Company officers conduct training activities on both the day and the night shift.		√
Company officers and senior EMS personnel are required to document the completion of all scheduled training and to update the records of individuals who attended the training.		√
Chief officers and company officers and senior EMS personnel are expected to provide training classes.		√
The Department conducts a periodic training needs assessment to determine what training to offer.		√
The Department closely monitors EMS recertification requirements.		√

The following paragraphs offer a summary of the key issues identified, in the preceding exhibit:

• There are no long range plans in place within the Fire Department.

• The Fire Department does not operate under a set of performance measures against which management or operations can be assessed.

• There is no routine monitoring of basic performance measures such as unit reflex time (the time it takes to react to a newly dispatch alarm until the vehicle is moving) or vehicle drive times (from the time a unit leaves the station until it arrives at the scene).

• The Fire Department is not accredited nor have any steps been taken towards achieving accreditation at some point in the future.

• The management team, for a number of reasons, does not meet with any regularity (it is reported that it has been "years" since the entire command staff was together).

• There are no annual reports, annual work plans or other documents that can be used to proactively guide the Department.

• Visual observation of the City's fire stations indicate that a number of deficiencies exist and should be addressed. There is, at this time, no long term plan for facility replacement or renovation included in the City's capital improvement plan.

• Likewise, there is no formal plan for replacing fire apparatus (vehicles) in a routine scheduled manner.

• The Department's vehicle maintenance operations are challenged by its physical space, single mechanic, lack of scheduled maintenance, etc.

• Similarly, there are no plans in place for long term replacement cycles for SCBA, turnout gear, etc.

• The Training function does little to provide daily / weekly guidance to company officers regarding on-shift training.

• Record keeping in many areas of the Department are manual. This includes all training files for Fire Department personnel.

• Personnel providing training in the Department (including company officers) are not required to meet NFPA training officer certification (Fire Officer 1 or 2 for example). Nor are personnel providing training (including company officers) required to provide lessons plans to the Training Chief for approval (to ensure consistency, to allow lessons to be shared among staff, etc.). Nor are senior personnel including the chief officers expected to provide training as part of their responsibilities.

• The Department does not routinely conduct training drills using multiple companies (to simulate real fire-ground operating conditions). There are also no expectations that training will be conducted at night, nor typically that training will be conducted on weekends.

• There are no periodic training needs assessments conducted. Training is provided based on opportunities that arise – not based on an evaluation of where training may be required. Neither are EMS certifications tracked by the Department.

The points, above, represent significant management and organizational issues

for the Somerville Fire Department. The following sections in the report address these

issues.

2.   **KEY TO EVALUATING ANY ORGANIZATIONAL STRUCTURE IS THE NEED TO IDENTIFY CRITERIA FOR ASSESSMENT.**

In order to evaluate the organizational structure of the Somerville Fire Department, the project team first had to identify the criteria by which the organizational structure would be judged. The paragraphs, that follow, describe those criteria as well as describe what is meant by each of them:

•   **Accountability and Responsibility is clearly identified:** The organization must be consistent with the concept that clear lines of authority and decision making are essential for any organization to achieve excellence. Areas of responsibility are clearly delineated and points of accountability are readily identifiable.

•   **Span of Control or Communication is Optimal:** Effective organizations are structured so that lines of communication are identifiable and where there are multiple reporting relationships, responsibility for communication and control are clearly identified and understood.

•   **There are essential checks and balances in place where necessary:** As it relates to this project, checks and balances are necessary in the area of clinical performance review as opposed to operational performance review. For example, effective EMS organizations are able to maintain a constructive and remedial focus on clinical issues while maintaining formal organizational discipline in the operational arena.

•   **Structure is based on task requirements and work flow as opposed to specialized skills of individual members:** There is a tendency in some organizations to organize work patterns around the specific passions or skills of individual members. This results in high friction levels of most work processes and the relationships between group members and groups them.

•   **Similar titled positions have similar responsibilities and levels of accountability:** The organization should be structured such that decision making authority and the ability of decisions to impact the organization in a strategic way are all found at similar levels of the hierarchy.

•   **Support functions are logically grouped and do not, through this grouping, create additional layers of oversight:** Organizational structures should group support functions together, separated from operations, only when the scale and scope of the operation requires it.

The section, that follows, provides our analysis of the current organizational structure and opportunities for improvement.

3. THE CURRENT ORGANIZATIONAL STRUCTURE LARGELY MEETS THE CRITERIA FOR AN EFFECTIVE ORGANIZATION.

The current organization of the Fire Department is along fairly typical lines, as shown, below:
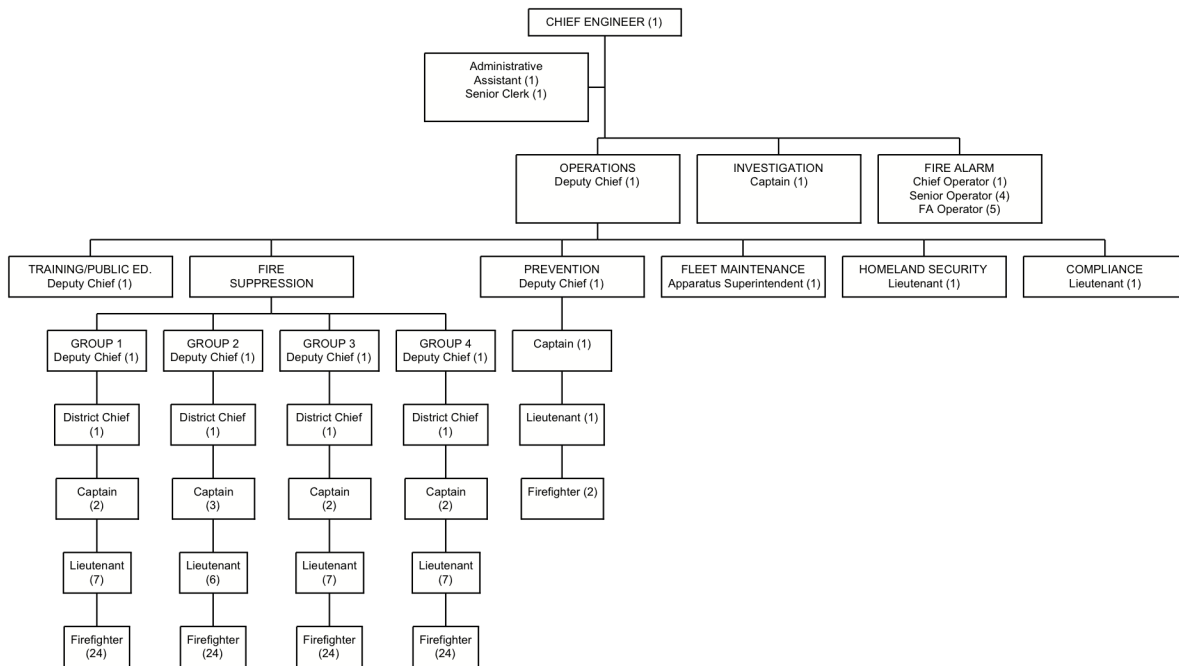
The exhibit, that follows, provides a graphical assessment of the current organizational structure. Note the "√" marks in a box indicate that the organizational unit meets that criteria described in the preceding section of the report.

Organizational Unit	Authority	Span of Control	Checks and Balances	Based on Work Flow	Similar Titles / Similar Duties	Support Integrated into Ops
Office of the Fire Chief	√		√	√	√	√
Shift Operations	√	√	√	√		√
Training	√	√	√	√		√

Organizational Unit	Authority	Span of Control	Checks and Balances	Based on Work Flow	Similar Titles / Similar Duties	Support Integrated into Ops
Special Operations	√	√	√	√		√
Fire Alarm	√	√	√	√	√	√
Fire Prevention	√	√	√	√		√

The paragraphs that follow provide a summary of the project team's findings and conclusions regarding the current organizational structure of the Fire Department:

• The overall organizational structure of the Fire Department effectively represents the primary mission and the administrative necessities of the Department.

• There are no operational functions assigned within the Office of the Chief – an appropriate organizational approach in an agency of this size.

• Functions are logically grouped in the Department.

• The use of Chief level officers to oversee small functions (such as training and prevention) with little or no subordinate staff is unusual in agencies of this size.

• Similarly, the number of chiefs on shift should be evaluated (there are currently two – for eight or nine fire companies).

The following section considers the organizational options available to the Fire Department.

4. SEVERAL ORGANIZATIONAL ALTERNATIVES WERE ASSESSED IN AN EFFORT TO IDENTIFY AN ASSISTANT CHIEF POSITION.

In order to evaluate the true effectiveness and efficiency of the current organizational structure, it is important to consider other alternatives and to compare the relative merits or issues with each relative to the current approach. Our review identified the most serious issues to be the lack of a second senior command staff member outside the bargaining unit – at this time, only the Fire Chief is a non-

bargaining unit member. This presents several challenges to the City and the
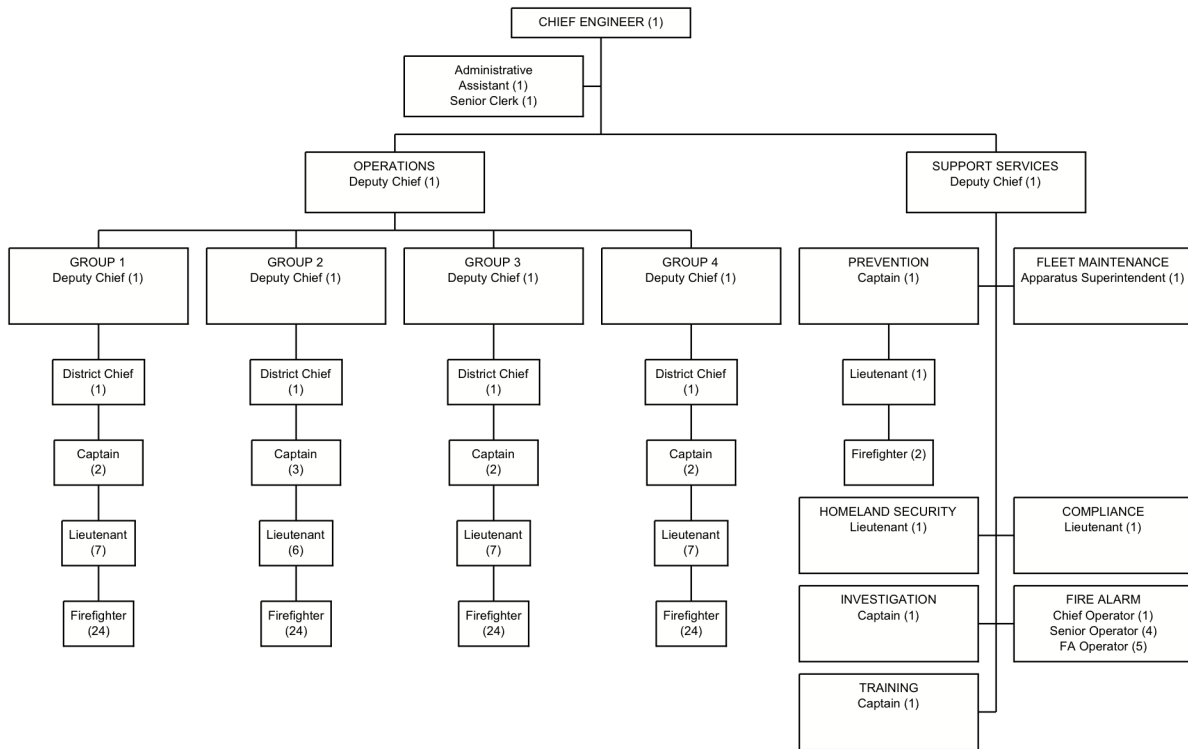
Department:

- The Chief does not have a command officer with whom to confer on employee or other significant management issues that might impact bargaining unit employees.

- There is no other person, beyond the Chief, who can participate in the disciplinary process who is not part of the same bargaining unit.

- When the Chief is away from the Department, there is no other employee who can be left in charge that is not a member of the bargaining unit – raising concerns regarding discipline and management.

The dot points, which follow, provide a brief description of the alternatives

considered by the project team:

- **Option 1** – Eliminate the Deputy Chief in the Operations Chief role and convert that position to Assistant Chief. Replace them with Captains reporting to one Deputy Chief for Support Services. Create a Training Captain position to coordinate training functions.

- **Option 2** – Eliminate the Deputy Chief classification entirely. Create two Assistant Chiefs, who are not part of the union, with Captains handling staff assignments and District Chiefs providing shift management (1 per shift). Create a Training Captain position to coordinate training functions.

- **Option 3** – Maintain the Deputy Chief positions on the shifts. Add the position of Assistant Chief, not in the Union, supervising all five Deputy Chiefs and reporting to the Chief.

Organization charts for these options are presented in the following exhibits:

Option 1: Eliminate One Deputy Chief Position
Create a Training Captain

```
                                    CHIEF ENGINEER (1)

                        Administrative
                        Assistant (1)
                        Senior Clerk (1)

        OPERATIONS                                      SUPPORT SERVICES
        Deputy Chief (1)                                Deputy Chief (1)

  GROUP 1        GROUP 2        GROUP 3        GROUP 4        PREVENTION        FLEET MAINTENANCE
  Deputy Chief(1) Deputy Chief(1) Deputy Chief(1) Deputy Chief(1) Captain (1)      Apparatus Superintendent (1)

  District Chief  District Chief  District Chief  District Chief   Lieutenant (1)
  (1)             (1)             (1)             (1)

  Captain         Captain         Captain         Captain          Firefighter (2)
  (2)             (3)             (2)             (2)

  Lieutenant      Lieutenant      Lieutenant      Lieutenant      HOMELAND SECURITY   COMPLIANCE
  (7)             (6)             (7)             (7)              Lieutenant (1)      Lieutenant (1)

  Firefighter     Firefighter     Firefighter     Firefighter     INVESTIGATION       FIRE ALARM
  (24)            (24)            (24)            (24)             Captain (1)         Chief Operator (1)
                                                                                      Senior Operator (4)
                                                                                      FA Operator (5)

                                                                  TRAINING
                                                                  Captain (1)
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Option 2: Eliminate All Deputy Chief Positions
Create Assistant Chiefs and a Training Captain Position

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                              CHIEF ENGINEER (1)

                          Administrative
                          Assistant (1)
                          Senior Clerk (1)

        OPERATIONS                                    SUPPORT SERVICES
        Assistant Chief (1)                           Assistant Chief (1)


  GROUP 1      GROUP 2      GROUP 3      GROUP 4     PREVENTION        FLEET MAINTENANCE
  District     District     District     District    Captain (1)      Apparatus Superintendent (1)
  Chief (1)    Chief (1)    Chief (1)    Chief (1)

  Captain      Captain      Captain      Captain     Lieutenant (1)
  (2)          (3)          (2)          (2)

  Lieutenant   Lieutenant   Lieutenant   Lieutenant  Firefighter (2)
  (7)          (6)          (7)          (7)

  Firefighter  Firefighter  Firefighter  Firefighter
  (24)         (24)         (24)         (24)

                                    HOMELAND SECURITY        COMPLIANCE
                                    Lieutenant (1)           Lieutenant (1)

                                    INVESTIGATION            FIRE ALARM
                                    Captain (1)              Chief Operator (1)
                                                             Senior Operator (4)
                                                             FA Operator (5)

                                    TRAINING
                                    Captain (1)
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Option 3: Create an Assistant Chief Position / Eliminate One Deputy Chief Position
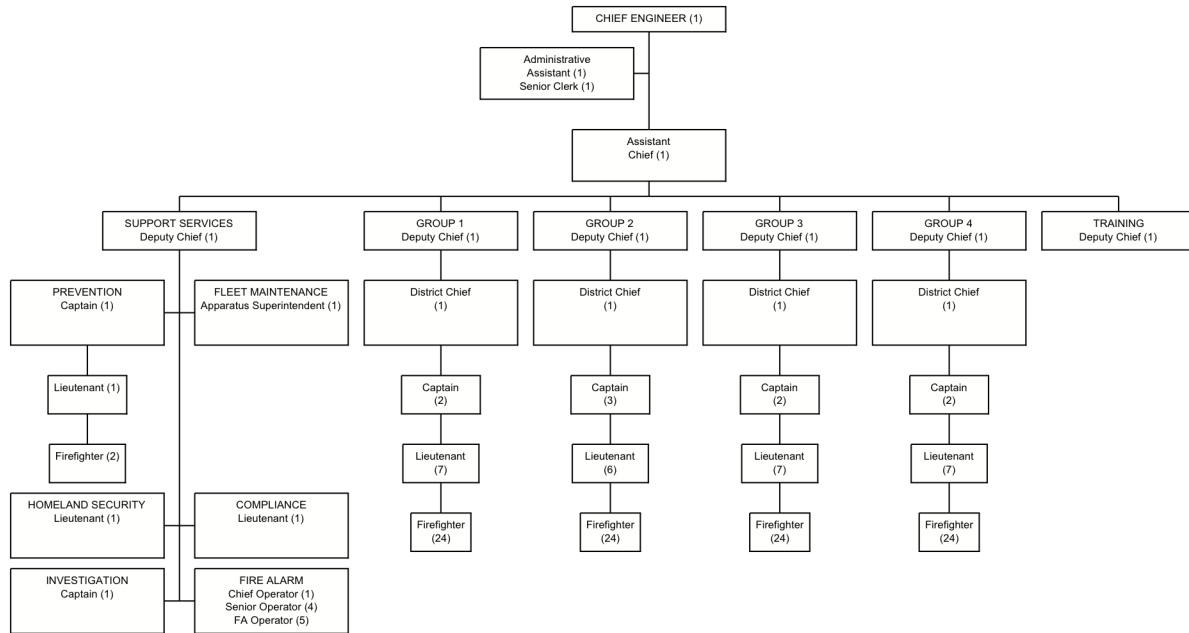
Each of these alternatives represents a significant departure from the current approach to managing the Somerville Fire Department. Each would be accompanied by changes in either the number of positions or the classifications in the Fire Department. The City could, for example, increase the headcount in the Department by one position and simply insert an Assistant Chief into the table of organization. The alternatives, above, show that there are options which can partially offset the cost of this improvement as well as resulting in enhanced management and control of the Department.

The approach utilized for implementing this change will be key to its success – particularly for any of the options that result in demotion of existing positions. The project team recommends the following:

• Conversion should wait until one of the existing Deputy Chiefs retires or resigns.

- When this takes place, the Assistant Chief position should be created and a process utilized to fill it from existing Deputy Chiefs.

- Once that has been completed, Deputy Chief or newly created Captain positions should be filled and the reorganization completed.

Unless the City chooses to simply create a new Assistant Chief position (i.e.,

increase headcount) the project team recommends waiting until there has been some

form of attrition before making these changes.

5. THERE ARE POSITIVE IMPACTS AND CHALLENGES TO ANY ORGANIZATIONAL ALTERNATIVE

The exhibit, below, provides a summary of the benefits and challenges posed by

the three options described graphically in the previous section.

Option	Benefits	Challenges
Option 1: Eliminate one Deputy Chief position / consolidating Support Services under 1 Deputy Chief.	• Fiscal savings associated with elimination of the position (reduced through the creation of another position). • Improved intra-departmental focus on Support Services. • Improved departmental focus, through one commander, on the range of non-suppression services.	• Does not get an Assistant Chief position out of the bargaining unit. • Elimination of a Deputy Chief position. • Creation of a Captain position handling training coordination. • Pressure from union on changing work conditions due to position reduction.
Option 2: Eliminate all Deputy Chiefs, create two Assistant Chief positions.	• Significant cost savings through the elimination of 7 Deputy Chief positions. • Would create two positions that are not in the union, in addition to the Chief. This would provide for additional management capacity outside the union.	• Elimination of all Deputy Chief positions. • Creation of a Captain position handling training coordination. • Pressure from union on changing work conditions due to position reduction. • Reduced supervision on the shift. Reduced supervision of major incidents through the elimination of one shift chief officer.

Option	Benefits	Challenges
Option 3: Create one Assistant Chief position, consolidating Support Services under a single Deputy Chief.	• Results in the creation of an Assistant Chief position. • The organizational structure focus is improved somewhat with a single Deputy Chief responsible for support services.	• No fiscal savings due to the net creation of positions. • Elimination of a Deputy Chief position (current Operations Chief). • Pressure from union on changing work conditions due to position reduction.

The options, above, are certainly not the only options for changing the organizational structure of the Fire Department. However, these options each are intended to either address an issue identified by the project team, or are intended to represent an option (creation of at least one Assistant Chief) that was identified within the Department. The table, that follows, shows the cost implications of each of the alternatives:

Option	Position Changes	Salary / Position	Benefits / Position	Total Impact
	One			
-1	Deputy Chief	$96,672	$48,336	-$145,008
1	Captain	$75,708	$37,854	$113,562
One - Total				**-$31,446**
	Two			
-7	Deputy Chief	$96,672	$48,336	-$1,015,056
2	Assistant Chief	$106,339	$53,170	$319,017
1	Captain	$75,708	$37,854	$113,562
Two - Total				**-$582,477**
	Three			
-1	Deputy Chief	$96,672	$48,336	-$145,008
1	Assistant Chief	$106,339	$53,170	$159,509
Three - Total				**$14,501**

The exhibit shows that there is a wide range of operating cost impacts from the three alternatives – from moderate savings (Option 1) to significant savings (Option 2) to significant increased annual cost (Option 3).

Recommendation: The City of Somerville should convert the Operations Deputy Chief to an Assistant Chief position. This will cost an estimated $14,500 per year.

6. MANAGEMENT SYSTEMS IN THE FIRE DEPARTMENT ARE VARIED WITH MANY NOT BASED ON DATA FOR DECISION MAKING AND ACCOUNTABILITY.

The Somerville Fire Department represents a multi-million dollar investment on the part of the community. For the investment, the community expects to receive effective and efficient fire, rescue and EMS services. In order to assure the community that these funds are well-spent and that operations are being managed effectively, the Fire Department must have data-driven management systems in place. In general, management systems should be able to provide managers with insight into the following critical areas:

• Performance responding to emergencies.

• Training for both fire and EMS skills.

- Use of leave (sick, vacation, etc.).

- Budgetary performance.

- Overtime utilization by cause.

- Fire / EMS "run" reports and billing documentation.

The Matrix Consulting Group found that the Department's key management systems vary in their utility and in the level of utilization by the command staff. Our findings are summarized, below:

- Systems that provide for financial reporting are present and are under the control of the City. Systems are in place which enable the Department to monitor budgetary performance. These are linked to the City's financial management systems. The project team found that the Department reconciles its own performance against the budget in an on-going manner, enabling potential budgetary issues to be identified quickly.

- Systems are also in place which enable detailed tracking of the use of overtime, the use of leave, etc. – all key indicators on the utilization of personnel. The project team found that the Department maintains detailed accounting of all overtime utilized by reason. This enables overtime to be billed, for example, to the ambulance account – rather than the general fund – when appropriate.

- There are no performance measures established for the Fire Department (nor for any other department in the City apparently). The result of this is that there is no objective measure against which to evaluate the Department's operations, performance, etc. The lack of these targets can impact planning decisions related to staffing, training, equipment purchases, etc.

- The Department does not utilize available data to assess its own performance internally. The project team found that key data elements were not being captured by the dispatch process. These data would enable the Department to assess its own "reaction" time to calls for service – this can not be reliably done given the issues, found by the project team, with the data in the various reporting systems in the Fire and Police Departments.

- There are no internally developed performance objectives for response, on-scene activities, etc. which are actively measured. Personnel are not held directly accountable for their individual performance.

The Fire Department command staff has focused on the oversight of key financial indicators. This is not surprising given the high level of scrutiny under which the Department has come, particularly on financial issues in the past. There has been relatively little focus by the City on the establishment of performance objectives for any of the City's departments – the Fire Department included – that are not outcome related. Few performance measures are focused on service delivery – and therefore few are useful in terms of measuring performance contemporaneously. This focus has changed in the City recently as SomerStat continues to improve its focus, as well as that within the operating departments, on these issues.

Performance measures should be easily understood and easily calculated. Suggested performance measures for the Fire Department should include the following:

- 911 call processing time (call answered to call dispatched): 1 minute or less 90% of the time.

- Emergency call reaction time (call dispatched to unit en-route): 1 minute or less 90% of the time.

- First unit drive time to emergency calls (unit en-route to unit on-scene): 5 minutes or less, 90% of the time (should include calls in the City of Somerville only).

- Quality assurance score of 85% of better on 90% of emergency medical calls for service.

Other communities will also identify on-scene performance indicators, or measures which must be met in training. These may include:

- On-scene to charged line at the front door of a structure fire: three minutes or less 90% of the time.

- Water from hydrant to supply engine: two minutes or less 90% of the time.

The point of the performance measures is to identify the community's expectations in a quantifiable way, and to use the measurement of the Department's

performance against these objectives to identify areas which may need improvement or

additional resources.

Recommendation: **The Fire Department, in conjunction with the City's administration and policy makers, should work to develop specific performance indicators for the SFD. The Department's financial management systems are adequate for ensuring that budgetary and overtime issues can be identified quickly. Once these are in place, simple management systems focused on tracking these indicators should be developed by the Department.**

7.   POLICIES AND PROCEDURES IN THE FIRE DEPARTMENT, THOUGH RECENTLY UPDATED, ARE NOT COMPREHENSIVE AND LEAVE MANY ISSUES UNADDRESSED.

The Fire Department operates under the direction provided by its Rules and

Regulations for the Governance of the Fire Department of the City of Somerville. This

document has been issued by the Fire Chief under the authority granted to him by the

MGL Chapter 48 / Section 42. This document, in conjunction with the contract between

the City of Somerville and the bargaining unit, represent the two locally derived

documents that provide structure to the administration and operation of the Fire

Department.

The current "Rules and Regulations" are limited in their scope and do not cover

the comprehensive requirements of a modern fire / rescue department. The "Articles"

included in the current document include the following:

• Officers General	• Deputy Chief	• Lieutenant
• Mechanic	• Drivers	• Dispatcher
• General Rules	• Fire Alarm	• EMS Coordinator
• Uniforms	• Training	• Call Firefighters
• Radio Procedures	• Attack Procedures	• House Cleaning
• Accountability and Discipline		

There are no dates on the specific "Articles" contained in the document as to when they were reviewed and / or updated. The clear tracking of review and revision is instrumental to ensuring that all staff are able to identify the most up to date version of each policy or procedure. In addition, the project team found that the document is updated solely by the Chief with little direct input from the Deputy Chiefs or other staff in the Department.

The project team also found the following:

- The document does not cover a number of topics which are critical for the fire / rescue service delivery environment.

- The current "Rules and Regulations" is focused on a mixture of administrative and operational items with significant gaps in the document regarding topics such as emergency medical response, infection control, risk management, etc. A detailed list, developed by the US Fire Administration, is provided later in this section of the report.

- The document has a number of intensely detailed passages followed by very general guidelines.

- The document, though organized in the table of contents, is difficult to follow given the way is has been laid out and the way in which the page numbering can change mid-page.

Policy creation is a rigorous and demanding process, especially if it is based entirely on local development efforts. Fortunately, a number of fire departments nationwide have developed policies that could form the basis for the comprehensive development of policies for the SFD. In addition, the Commission on Fire Accreditation International has developed materials that could support the Department's policy initiative. We are not suggesting that documents from other sources be copied into a SFD format but that existing materials be used to help the Department structure its efforts. The Matrix Consulting Group project team recommends that the Department

adopt the following process for completing this, as recommended by the US Fire

Administration:

• Conduct a complete needs assessment of the policies and procedures of the Fire Department. The current policies are so out date and incomplete, it would likely be more practical to obtain an up-to-date policy from a neighboring community (or a model policy from the Commonwealth, if it is available). This needs assessment should take the following form:

  - Form a committee made up of Fire Officers and Firefighters to develop a needs assessment. Coordinated committees might be established on each shift.

  - Identify any unique or unusual characteristics of the community. What are the major sources of risk? Are there unique demands for service placed on the Department? Who does it interact with frequently (police, water, other fire departments)? Are there response impediments that need to be considered? Are there seasonal issues that need to be considered?

  - Consider the current policies as well as any potential models from which the policies could be developed.

  - Do the policies that exist address the needs of the community and the Department? Are there major gaps in them or are they too specific?

  - Develop a list of policies and procedures that should be in place. Do the model policies address the issues relevant to the SFD? Are there major gaps in the policies?

  - Do post-incident reviews suggest major gaps that need to be addressed? Have there been changes in the law? Have any issues been identified during training? Has equipment been changed? Are there new apparatus that need to be considered?

  - Are there guidelines from professional and trade organizations that suggest policy or procedure approaches?

• Once the needs assessment has been done, the Fire Department can turn to the process of developing new policies or modifying existing ones. This process can be accomplished as follows:

  - Establish one or more teams for each section of the policy manual to handle specific editing and writing tasks.

- Develop specific procedures for writing, sharing and editing proposed policies.

- Develop a specific format for all policies and procedures.

- Gather information and potential alternatives for each policy. Do not reinvent policies that already exist elsewhere.

- Analyze the various alternatives and select the one which most closely matches the SFD approach to conducting fire and EMS operations.

- Write the draft of the policy.

- Review and test (if applicable) the proposed policy or procedure.

- Ratify and approve the final version. Seek legal sign-off from the City's attorney if this is recommended internally.

• The next step is to implement the policies and procedures. This is also a complicated process and involves the following:

- Assessment of what is being implemented. Is this a total replacement or an annual update?

- Provide notice to, and discuss policy changes with, personnel.

- Assess training needs and develop training materials to ensure that all personnel are properly briefed and prepared to consistently implement the policies.

- Track who has received new policies and who has been trained. Many agencies require employees to sign an acknowledgement receipt.

• The Department should have a process by which performance can be monitored to ensure that:

- All policies are being followed.

- All policies match the actual practices and that they meet the needs of the agency and community.

- All policies are reviewed annually to ensure that they continue to be relevant. A process similar to the one described above should be used to review polices.

The preceding dot points describe a process by which policies can be developed, reviewed and implemented. The following points provide a list of standard operating guidelines the SFD should consider developing.

- Management and Administration

    - General Administration

        •• Organizations
        •• Facilities
        •• Emergency Vehicles and Special Apparatus
        •• Equipment and Supplies
        •• Finance
        •• Training, Education and Exercises
        •• Information Management

    - Member Health and Assistance Programs

        •• Medical Screening / Health Assessment
        •• Health and Wellness Promotion
        •• Performance Evaluation Process
        •• Post-Injury Rehabilitation
        •• Employee Assistance
        •• Facility Safety
        •• Hazard Communication

    - Organizational Planning and Preparedness

        •• Strategic / Master Plan
        •• SOP Development
        •• Risk Management
        •• Emergency Operations Planning
        •• Mutual / Automatic Aid

- Prevention and Special Programs

    - Public Information and Education

        •• Working with the Public
        •• Working with the Media
        •• Emergency Public Information
        •• Public Education
        •• Public Relations

- Building Inspections and Code Enforcement

    •• Authorities and Codes
    •• Design and Plans Review
    •• Residential Inspections
    •• Commercial Inspections
    •• Industrial Inspections
    •• Code Enforcement
    •• Record Keeping

- Special Programs

    •• Fire Cause and Arson Investigation
    •• Hydrant Maintenance
    •• Other Special Programs

- General Emergency Operations

    - Operating Emergency Vehicles

        •• Driving Emergency Vehicles
        •• Riding Emergency Vehicles
        •• Operating Special Apparatus
        •• Vehicle Accident Reporting and Investigation
        •• Use of Personal Vehicles

    - Safety at Emergency Incidents

        •• Applicable Standards
        •• Risk Management Guidelines
        •• Safety Officer
        •• Protective Clothing and Equipment
        •• Personnel Accountability System
        •• Responder Exposure Control
        •• Hearing Conservation
        •• Operating in a Hostile Environment
        •• Operating on Roadways
        •• Incident Scene Rehabilitation
        •• Medical Support
        •• Incident Termination

    - Communications

        •• System Access
        •• Definition of Alarms / Dispatch Protocols
        •• General Procedures

- •• Emergency Signals
- •• Alternate Radio Frequencies
- •• Mobile Data Terminals
- •• Departmental Cell Phones and Pagers
- •• Mutual Aid Companies
- •• Situation / Status Reports
- •• Use of Personal Cell Phones and Pagers

- Command and Control

  - •• Incident Command / Incident Management System
  - •• Mutual / Automatic Aid
  - •• Incident Scene Management
  - •• Staging
  - •• Transferring Command
  - •• Public Information
  - •• Record Keeping

- Special Operations

  - •• Aircraft Operations
  - •• Boat and Watercraft Operations
  - •• Special Unit Operations
  - •• Bomb / Hazardous Device Threats or Confirmed Incidents
  - •• Terrorism Incidents
  - •• Civil Disturbances

- Post-Incident Operations

  - •• Post-Incident Analysis
  - •• Post-Incident Recovery
  - •• Incident Record Keeping and Reporting
  - •• Injury / Exposure Reporting and Investigations
  - •• Critical Incident Stress Debriefing / Defusing

- Fire Suppression

  - Fire Suppression Risk Management

    - •• Required Use of Personal Protective Equipment
    - •• Rapid Intervention Team
    - •• Evacuation (Firefighters)
    - •• Air Monitoring

  - Company Operations

- ••   Incident Staffing
- ••   Water Supply
- ••   Tanker / Tender Operations
- ••   First-In Engine Operations
- ••   Second-In Engine Operations
- ••   Truck Company Operations
- ••   Rescue / Squad Company Operations
- ••   Special Units

-    Tactical / Strategic Guidelines

  - ••   Incident Size-Up
  - ••   Automatic Alarms
  - ••   Offensive and Defensive Operations
  - ••   Apparatus Placement
  - ••   Forcible Entry / Gaining Access
  - ••   Foam Operations
  - ••   Ventilations
  - ••   Hot / Cold Weather Conditions
  - ••   Sprinkler / Standpipe Operations
  - ••   Apartment / Condominium Operations
  - ••   Commercial Building Operations
  - ••   Salvage
  - ••   Overhaul
  - ••   Exposures

-    Special Facilities / Target Hazards

  - ••   High-Rise Operations
  - ••   Clandestine Drug Labs
  - ••   Correction Facility Operations
  - ••   Industrial Facilities
  - ••   Other Special Structures

-    Special Fire Suppression Operations

  - ••   Aircraft Firefighting Operations
  - ••   Special Unit Operations
  - ••   Wildfire Operations

- Emergency Medical Response

  -    Emergency Medical Response Risk Management

    - ••   Incident Infection Control
    - ••   Protective Clothing and Equipment

- •• Lifting / Moving Patients
- •• Hostile Situations

- Pre-Hospital EMS First Response

  - •• Delivery Model
  - •• Patient Care
  - •• Treatment Protocols
  - •• Medical Devices and Equipment
  - •• Biohazard and General Waste Disposal
  - •• Clothing / Equipment Decontamination

- Patient Disposition and Transportation

  - •• Destination Guidelines
  - •• Method / Mode of Transport
  - •• Ambulance Operations
  - •• Helicopter Operations

- Management of EMS Operations

  - •• Re-Supply / Procurement of Supplies
  - •• System Inventory
  - •• Designation of Treatment Facilities
  - •• Data Collection and Reporting
  - •• Quality Improvement System
  - •• Research and Reporting
  - •• Standard of Care
  - •• Patient Care Reporting
  - •• Patient Documentation and Billing

- Special EMS Operations

  - •• Mass Gatherings
  - •• Hazardous Materials Team Medical Monitoring
  - •• EMS Operations at Hazmat Incidents
  - •• EMS Operations at Technical Rescue Incidents
  - •• EMS Operations During Disasters
  - •• EMS Operations in the Rehabilitation Area / Sector

• Hazardous Materials Response

- Hazardous Materials Response Risk Management

  - •• Personal Protective Equipment
  - •• Hazardous Materials Personal Safety

- ••   Air Monitoring

- -   First Responder Operations

  - ••   Roles and Actions
  - ••   General Response Procedures / Emergency Response Plan
  - ••   Recognition and Identification
  - ••   Notification
  - ••   Site Management and Scene Setup
  - ••   Emergency Decontamination
  - ••   Defensive Actions

- -   Special Hazmat Operations

  - ••   Operating with Hazmat Teams
  - ••   Public Protection Options
  - ••   Environmental Restoration

- •   Technical Rescue

  - -   Technical Rescue Risk Management

    - ••   Personal Protective Equipment
    - ••   Lock Out / Tag Out
    - ••   Air Monitoring

  - -   Rescue Operations

    - ••   Scene Stabilization
    - ••   Rescue Equipment
    - ••   General Rescue Operations
    - ••   Rescue Teams

  - -   Special Rescue Operations

    - ••   Ice Rescue
    - ••   Water Rescue
    - ••   Confined Space Rescue
    - ••   Structural Collapse Rescue
    - ••   Rope Rescue
    - ••   Trench and Excavation Collapse
    - ••   Aircraft Extrication

- •   Disaster Operations

  - -   Organizing for Disaster Situations

- •• Disaster Management
- •• EOC Organization
- •• ICS / EOC Interface (NIMS)
- •• Activation Levels
- •• Personnel Assignments and Responsibilities
- •• Personnel Notification Procedures / Call-In Procedures
- •• Disaster Training
- •• Disaster Preparation

- Disaster Operations Risk Management

  - •• Personal Protective Equipment
  - •• Disaster Operations Personal Safety
  - •• Protection of Facilities and Equipment
  - •• Accountability of Personnel
  - •• Suspending Operations
  - •• Member Injuries and Fatalities

- Disaster Operations

  - •• Disaster Operations Center
  - •• Adjusted Levels of Response
  - •• Disaster Communications
  - •• Response Unit Routing and Placement
  - •• Damage Assessment
  - •• Specialized Equipment
  - •• Building Safety Evaluations
  - •• Community Emergency Response Teams
  - •• Mitigation Activities
  - •• Curtailing Disaster Operations

Successful and safe operations, as well as broader risk management strategies, are grounded in an agency's policies and procedures. The current "Rules and Regulations" does not provide a comprehensive basis from which the SFD can be effectively and efficiently operated.

Recommendation: The Fire Department should develop a new, comprehensive, policy and procedures manual. The Department should first take steps to identify model examples from Massachusetts to simplify their development. Second, a committee of staff from all ranks should be formed to ensure that the adaptation of policies and procedures to the Fire Department is done with appropriate focus on the needs of the community and the SFD.

8. ASSESSMENT OF THE TRAINING PROVIDED TO PERSONNEL SHOWS THAT A NUMBER OF IMPROVEMENT OPPORTUNITIES ARE AVAILABLE.

A review of the training program shows that there are several major issues

regarding the way in which training is provided by the Fire Department:

• The unpredictability and turnover in the Training Chief position is viewed as a major concern by line staff and managers.

• There are no performance measures or standards for performance for training or for basic skills.

• There are no "minimum standards" set for new employees to meet and to be continually maintained by current employees.

• The company officers do not receive coordinated support for in-station training.

• There are few opportunities for multiple companies to train together in either scenario based exercises or on technical issues.

• There is little or no formal training provided for supervisors, managers or executive staff.

The current program is dependent on the creativity, motivation and preparation of

the company officers who work on the daily training. The project team recommends

that the Fire Department take a number of steps to address these issues. These steps

should include the following:

• Maintain a Deputy Chief in Training. This is discussed in the organizational and management chapter. Consider a 3-year appointment to this position to maintain continuity in this critical function.

• The Fire Department should adopt a series of minimum standards for new and incumbent employees. These minimum standards should be made part of the process by which new employees either pass or fail their probationary period. These standards should continue to serve as the nucleus for in-station and multi-company training. Recommended standards include the following:

    - Area familiarization.

    - Vehicle familiarization.

- Use of SCBA system.

- Incident command and safety.

- Use of ropes.

- Use of ladders.

- Use of hoses and streams.

- Medical equipment.

- Use of other tools and equipment.

- Ventilation.

- Emergency vehicle driver training.

These standards require the company officer assigned to the new employee to mentor the person to ensure their understanding of the minimum requirements. In addition, each minimum standard has a test which is administered to ensure their knowledge. This provides a formal methodology for assessing employee performance and enables the Fire Department and the City to make more informed decisions.

- Develop a calendar-based system to support the company officers in their delivery of the training program. This would consist of the development of a series of key topics with supporting materials, pictures, reference guides, tests, suggested activities that would be provided to each fire station or on the internet for the Department when the citywide WAN is in place. The key elements of the program are described, below:

  - The program would work by assigning a topic to a number (1-30).

  - A notebook (hardcopy or virtual) would be provided to each station.

  - Each topic would be covered when the date corresponds to its topic number.

  - This would ensure consistency (each topic would be taught from the same set of materials – the "Somerville way").

  - The list of topics can be as narrow or broad as the Department desires. It can remain the same or can be changed quarterly or annually. Example topics include the following:

••	Ventilation	••	Overhaul	••	SCBA
••	Construction	••	Salvage	••	Entry
••	Hoses	••	Ground Ladders	••	Pumping
••	Fire Streams	••	Incident Command	••	Safety
••	Communications	••	Sprinklers	••	Streets
••	EMS	••	Hydrants	••	Policies

- The training program should be developed in accordance with NFPA 1410 – "Standard for Training for Initial Emergency Scene Operations." This is a standard which focuses less on topical skills training (as above) but also provides for scenario based minimum standards for a fire agency. This approach can easily be adopted to encompass both training as well as performance assessment for the line crews. A number of specific minimum skills are defined in the document. One example of the types of minimum standards set forth in NFPA 1410 follows:

  - Forward-lay a hose 300 feet from a hydrant using a single supply line.

  - Advance a pair of attack lines 150 feet each from the engine.

  - Charge the lines so that the primary attack line can pump and maintain 100 gpm. The secondary (backup) line should be able to pump and maintain a flow of 200 gpm.

  - This task should be completed by a 3-person engine company in less than three (3) minutes.

- Crews should be tested annually (or more often) on their ability to meet these minimum qualifications. Those units that cannot meet these standards should be immediately scheduled for training supervised by the Training Chief.

- The Training Chief should also utilize the recommended standards from NFPA 1410 to develop and oversee multi-company training. This training should be done on at least a quarterly basis for all units. The Deputy Chief on-duty should be involved in the exercises and full incident command practices should be utilized in all exercises involving any fire or rescue and all events with three or more units on-scene.

- All personnel from the rank of Lieutenant and above should be provided with specific training to enable them to better oversee operations. The project team

recommends that the Fire Department adopt an approach recommended NFPA 1021 "Standard for Fire Officer Professional Qualifications."   This standard sets forth requirements to achieve various classifications of Fire Officer 1 through Fire Officer 4. These are summarized, in the exhibit which follows:

Fire Officer I	Fire Officer II
• Firefighter II • Minimum standard for department. • Familiar with budget process. • Departmental operating procedures. • Fire prevention and education. • Cultural diversity. • Methods of supervision. • Group dynamics. • Rights of management and bargaining unit. • Contractual language. • Ethics. • Fire related ordinances. • Basic writing and organizational skills.	• All from FO1 • Ability to evaluate member performance. • Human resource policies of the city. • Communicate orally an in writing. • Preparing a project or divisional budget. • Purchasing laws and regulations. • Working with the press. • Incident command, health and safety.
Fire Officer III	**Fire Officer IV**
• All from FO 1 and FO 2. • Ability to research and analyze data. • Working with the public outside the agency. • Develop and oversee large budgets. • Ability to evaluate construction for issues.	• All from FO 1, FO 2 and FO 3. • Advanced training in personnel, administration, legal and other issues. • Advanced training in analysis and information management. • Training in long range planning and evaluation. • Major incident oversight. • Major incident planning.

This exhibit does not exhaustively cover the text of the 25-page standard. However, it does show the sense of progression that is encouraged by this program. The Fire Department could either adopt the standard formally (by linking, for example, promotions to these various levels) or could design a program for new and existing officers. Many of the elements of these programs can be provided by the City's Human Resources, Finance, Information Technology, Purchasing and other support departments. The City should budget an additional $50,000 in training funds to provide for outside training to management personnel.

The training program of the Fire Department should be enhanced to improve the

consistency of training and to enhance the support of company officers. In addition,

particular focus should be given to enhancing the training given to new employees and

to management personnel. Specific steps that should be taken to enhance the delivery

of management training include the following:

- Provide "grade appropriate" training to personnel in the Fire Department. Identify the training needs that are relevant to officers and provide this to them. Do not require officers who do not actively participate in line activities to spend time on line training.

- Access the programs made available at Bunker Hill Community College (BHCC) that focus on training mid-managers and senior managers to be more effective trainers. These classes focus on methods of instruction and identify the various ways in which people learn and retain information.

- Consider joint training exercises for managers in the Fire, Police and other City departments. The focus should be on sharing training opportunities which have broad applicability. City departments should focus on cross-cutting training issues such as personnel, budget management, capital planning, etc. and provide these to personnel in all public safety agencies in the City.

Recommendation: The Fire Department needs to make several major changes in its training program. These include improving the continuity in the position of Training Deputy Chief, development of a standards-based training program, annual testing against these minimum standards, development of new hire training, and provision of management training. The City should budget an additional $50,000 to cover the cost of the management and supervisory training - much of which can be provided in-house for no additional cost.

9.   **THE FIRE DEPARTMENT HAS NOT ADOPTED THE INFORMATION TECHNOLOGY SOLUTIONS COMMONLY FOUND IN HIGH-PERFORMANCE FIRE/RESCUE AGENCIES.   THE FIRE DEPARTMENT SHOULD BE AUTHORIZED TO CREATE A MANAGEMENT ANALYST POSITION TO SUPPORT MANAGEMENT AND ANALYSIS SIMILAR TO THE CRIME ANALYST POSITIONS FOUND IN POLICE DEPARTMENTS.**

This section addresses the key management and information systems that

should be in place within a modern fire-rescue agency such as the Somerville Fire

Department. The project team examined key management systems relating in the

Department. These systems are critical to ensuring that the Department operates both

effectively and efficiently. The key elements of a successful management system for a

Fire agency include the following:

- **Formal Interaction** – Does the management team interact in formal meetings (set times, regular schedule, with agendas, etc.)? Are different groups of managers brought together to focus on key issues, to communicate general issues, to work on budget information, etc.?

- **Utilization of Data in Decision Making** – Does the Department make use of the data collected from calls, quality assurance reviews, inspections, etc. to make informed decisions? Are analytical methods regularly employed to make decisions regarding deployment, budgetary expenditures, etc.? Is there a culture of making decisions using analysis rather than anecdotal information? Are there sufficient staff resources to support analytical decision-making?

- **Accountability Mechanisms** – Is there a mechanism in place by which staff can be held accountable for assignments made? Do these systems provide for accountability the same way throughout the organization?

- **Formal Policies, Procedures and Protocols** – Are key policies, procedures and protocols formally documented? Are they regularly reviewed and updated? Does the review of these key documents involve a broadly based group? Are policies and procedures widely available to all staff? Are staff held accountable for compliance? Is there a formal "professional standards" function within the Department?

- **Management Training** – Does the City and the Department provide formal training to officers as they are promoted and as part of their continuing education? Do officers receive advanced tactical training, risk management training, personnel policy updates, etc.?

- **Utilization of Technology** – Does the Fire Department make maximum use of technology to enhance effectiveness and efficiency? Are current investments being used effectively? Has the Department planned to adopt technology in the future that will enhance services or management of services?

The project team has the following observations and findings regarding the management of the Fire-Rescue Department:

- The SFD also makes use of ad hoc groups to address special projects.

- The project team found that the use of data by the Fire Department occurs sporadically if at all. Examples include the following:

  - Operations data is not tracked by unit, station, battalion, etc. to monitor performance of individual units or officers.

- Response time data are not regularly analyzed or evaluated at any level of the organization.

- Training data cannot, at present, be tracked by individual.

- District Chiefs and others are rarely expected to utilize formal methods for evaluating issues assigned outside of operations – for example, the decision to adopt a new piece of equipment or a new tactic is only undertaken following a formal research process.

- There are no analysts to support the operations of the Fire Department. This means that senior staff are left to perform their own research, rely on less senior sworn staff to perform various analytical tasks, etc.

- Extensive data are collected in various operational areas through the CAD / RMS system, training records, etc. However, many of these data cannot be easily accessed under current information systems.

- There is not a particular culture of "analysis" within the Fire Department. The awareness that data can provide powerful – critical – information for fire-rescue managers is growing nationally. Senior staff will need to be able to make a case for additional resources predicated on proof derived from analysis – rather than on anecdotal approaches that have historically been acceptable. This change will need to be developed and fostered by the command staff.

- The Fire Department does not have a systematic method for ensuring accountability for staff assignments or other routine tasks. The current approaches rely upon the institutional memory of the command staff as a group to ensure compliance by individuals. Given the complexity of the SFD, this approach can no longer be viewed as appropriate. The City should obtain a software driven solution that allows assignments to be made and tracked and to allow progress on assignments to be followed. It is equally important that such a solution does not add excessively to the workload of the command staff.

- The Fire Department does not currently maintain a "command college" for its Chiefs. Additional support for new chief-level officers would be appropriate – particularly focused on personnel, risk management and other key management skills not typically covered as part of company officer training.

- The Fire Department should begin to engage in a number of projects focused on enhancing the utilization of technology in the field and in the administration of the Department. The project team found the following examples:

  - There are no computers in the fire response vehicles – an increasingly common tool found in progressive fire / rescue agencies.

- Personnel are not able to access critical records on-line from their vehicles, leaving personnel using hard-copy books for limited pre-incident plans.

- There are no GPS or mapping solutions being utilized by the Fire Department. This represents a lost opportunity in terms of improving response time management.

The project team recommends that the Fire Department undertake the following actions to make improvements in management and oversight:

- The Fire Department should develop an accountability system to ensure that all assignments are followed-up appropriately. A simple in-house system can be developed using common office programs until a more sophisticated system can be obtained. An electronic system is useful since issues can be sorted by due date, individual, status, etc. The tracking system should have (at minimum):

  - Assignment

  - Data assigned

  - Due date

  - Responsible Individual

- Key measures should be identified by the senior staff and tracked regularly. Examples might include:

  - Reflex time (overall, by station, by unit, by major call type)

  - Dispatch processing time

  - Drive time

  - Call concurrency

  - Response times by time of day, etc.

  - Number of inspections per inspector

- Begin a process of information systems enhancement in the Department – including consideration of contracting for a full needs assessment.

• Create a new analyst position, assigned to the Office of the Chief. This position, similar in training and background to crime analysts typically found in police agencies, should be a civilian who is trained as an analyst – familiar with spreadsheets, statistics, use of analytical tools including GIS. The time of this new position should be dedicated to both routine tasks (providing management reports focused on response performance, leave utilization, etc.) and to provide support to special projects undertaken by the command staff of the Department. This will be critical in supporting the Department if it is to move towards a culture which utilizes data for decision making.

Recommendation: The Fire Department should undertake several steps to enhance the utilization of information and analysis in support of decision making. Included in these steps should be the creation of a new Fire Analyst position for a total cost of $80,000 annually. The Department should also take steps to improve staff accountability, improve new-chief officer management training and the adoption of key performance measures to be regularly tracked.

3. ASSESSMENT OF FIRE ALARM

This chapter focuses on staffing and performance measurement within the Fire Alarm Office of the Fire Department. The City of Somerville operates a separate Fire Alarm Office (call taking and dispatching for the Fire Department) from the 911 PSAP / dispatch center managed by the Police Department.

1.   METHODS FOR ANALYZING STAFFING

The Matrix Consulting Group takes the general approach that staffing, wherever possible, should be related to two key factors: the workload to be handled by the staff in question and the public policy decisions made with regard to service levels for each facet of the operations. Assessing the number of personnel required to provide call-taking and dispatching services in a large center such as Fire Alarm requires analysis of several factors as well as several public policy decisions.

(1)   How Long a Dispatcher Should Be Occupied with Workload Is a Function of Several Factors.

The calculation for net availability noted in the previous chapter essentially results in the amount of time each Dispatcher is available to perform work. In any profession, however, no position is occupied 100% of the time. By example, many labor intensive professions, such as fleet mechanics, are ideally occupied 80% of the time performing direct work on vehicles. This helps ensure productivity and, in the private sector, profitability. More relevant to the public safety field, urban and suburban law enforcement agencies would typically strive for patrol staff to have from 45%-50% un-committed patrol time thereby allowing them to selectively work, in this "free time," particular community-oriented problems. This proportion of un-obligated time also

allows for patrol units to generally be available for relatively rapid response to community generated calls for service.

How much time is dedicated to actual work in the public safety dispatch field is a function of several inter-related variables. An allowance needs to be made regarding the proportion of time desirable to have a dispatcher actually involved in call handling, radio transmissions, keyboard entry, records research, etc. There are several reasons why direct task allocation should not be nearly 100%, including the following:

• Dispatch centers which have excessively high utilization levels tend to "burn-out" staff and consequently have high levels of employee turnover.

• Professions that require extreme concentration during work activities, such as dispatch, air traffic control, or other professions in which failure brings unacceptable risk, should have lower work utilization rates.

• Dispatch centers which have high utilization levels experience "queuing" problems in which responses to incoming telephone calls and radio transmissions are delayed because the dispatcher is pre-occupied with other concurrent workload.

• In dispatch centers with high utilization quality begins to suffer because dispatchers must cut calls and radio exchanges short, thereby impacting dispatcher effectiveness, perceived customer service, and potentially safety in the field for law enforcement, fire, and emergency medical response professionals.

Based on these variables the project team typically uses a utilization rate of **25-30%** for dispatchers. This implies that dispatchers will be busy performing work an average of 20 minutes per hour or one second every two seconds of net available time. It should be noted that this utilization or "occupancy rate" is one of the primary drivers in staffing requirements, particularly for larger dispatch centers. Modifying this variable by relatively small increments can have an important impact on staffing requirements. This will be noted throughout this chapter.

2. ANALYSIS OF STAFFING USING CURRENT DEPLOYMENT

The first approach that the project team utilizes is to assess the staffing required to meet the current deployment in Fire Alarm. In effect, we are asking the question: what level of staffing is required to efficiently staff operations in the Department? The questions that need to be addressed are the following:

• What is the availability of Dispatchers to meet staffing needs?

• What level of staffing is Fire Alarm deploying to meet expectations for service delivery?

The following exhibit shows the current level of net availability in Fire Alarm. Net availability is, simply explained, the total time left over after all leaves and other absences are subtracted from the hours that each Dispatcher is scheduled to work in a given year:

Based on 2007 - 2009 Personnel Data / Estimates

Position	Dispatchers	Notes / Description
A	16,430.00	Total hours for all full time employees
B	1,568.00	Total vacation and holiday leave (total hours)
C	1,021.00	Total sick leave (total hours)
D	216.00	Total personal leave (total hours)
E	-	Total training leave (total hours)
F	-	Total military, FMLA leave, etc. (total hours)
G	-	Total lunch and break (total hours)
H	100.00	Total other (meetings, light duty, special assignments, etc.)
I	2,905.00	Total <u>un</u>available time = Total B through H
J	13,525.00	Net Available Work Hours (NAWH) = A – I
K	1,352.50	Net Available Work Hours per employee (NAWH from J above)
L	65.02%	Net Available Divided by Total Hours Scheduled / Employee

This table shows that the Fire Alarm Operators, based on average usage in the calendar years 2007 through 2009, were available an estimated average of 1,352 hours out of the 1,643 hours they were scheduled to work on average (this does not include overtime). This is equivalent to a net availability of 65% - or conversely, that personnel are not available to work 35% of the time. This is a critical figure that goes directly to

the number of total fulltime equivalents required to staff a given 24-hour position in Fire

Alarm for the Fire Department, as shown, below:

Factor	Impact
Hours / Year for One Post	8,760.00
Net Availability	1,352.50
Positions Required to Cover	6.48

The next consideration is the level of deployment targeted in Fire Alarm itself. In

this analysis the project team has not challenged this level of staffing – this only

indicates how many personnel would be required to staff the various positions targeting

minimal levels of overtime utilization:

Element	Factor
Targeted Staffing (Line)	2.00
Staffing Required / Shift	6.5
Total Staffing Required	13.00
Current Line Staffing	10.00
Variance	(3.00)

This analysis shows several key points, each of which are summarized, below:

•	The staffing levels in Fire Alarm remain consistent with a target of two Dispatchers on duty on the floor during all shifts. The current program requires the use of some overtime.

•	Using the factors described, above, indicates that the Fire Department is staffed appropriately – given current targeted deployment.

•	The current shift schedule is very inefficient. The levels of available time in Fire Alarm, coupled with the very low levels of scheduled work hours, make this one of the least efficient 24-hour operations in the project team's experience.

Recommendation: Under current conditions and given public policy decisions, the Fire Alarm unit is appropriately staffed to maintain two personnel on duty at all times with minimal overtime.

3.   **SEVERAL MODELS EXIST FOR ASSESSING STAFFING REQUIREMENTS IN FIRE ALARM.   STAFFING IN FIRE ALARM SIGNIFICANTLY EXCEEDS CURRENT WORKLOAD, PRESENTING AN OPPORTUNITY FOR INCREASED EFFICIENCY AND COST SAVINGS.**

The Matrix Consulting Group continually researches various methods for determining staffing requirements for functions such as emergency communications. There are several models currently worth consideration.

(1)   **APCO Project RETAINS Combines Workload and "Post" Positions in Determining Total Staffing Required.**

In the last few years APCO has published a staffing model as part of their Project RETAINS efforts, developed by the University of Denver Research Institute.   In effect, the APCO Project RETAINS model requires several discrete data elements based on actual workloads to be effective. These include:

•   Net annual staffing availability as discussed earlier in this chapter.

•   Average telephone busy time (call duration in seconds), from phone records. This should ideally distinguish between, where appropriate, law and fire E-9-1-1 calls and administrative calls for service.

•   Average call completion time (in minutes, this includes time for keyboard data entry, radio transmission, address verification, etc.).   Average call completion time is often not accurately available. While some agencies are capable of collecting accurate radio transmission time, other dispatcher-related workload, such as records checks or keyboard data entry by staff, is most often not available.

•   Average Processing Time, or APT— which is the sum of the two above bullets. What the APCO model fails to account for is the workload directly related to other activities unrelated to telephone call's workload; that is, by example, officer initiated activities and the variety of tasks associated thereto.

•   Agent Occupancy Rate (AO) which reflects the proportion of time that the agency desires a dispatcher to be occupied with workload. This is, in effect the opposite of the prior model's Utilization Rate which calculates the proportion of time a dispatcher should be free of workload as opposed to busy with workload. Nevertheless, the concept is the same although the mathematics differs.

- The model also provides for positions which are staffed based on workload and positions staffed as "coverage" – i.e., positions that are staffed for public policy reasons other than workload.

In brief, the APCO project RETAINS staffing model is a generally good methodology with a few notable exceptions, but it is data intensive to the extent that many agencies do not possess the level of detail required to properly complete the model. The Matrix Consulting Group, using the APCO model as a baseline, has made some slight revisions using major work activities captured as well as some assumptions regarding other types of work.

(2)   Erlang C Models Were Developed for Telephone Queuing Applications and Have Some Utility When Examining Dispatch Operations.

Another model that can be used to estimate staffing needs is based on the work of Danish engineer Agner Erlang. Unlike the prior two models which estimates staffing based upon community generated calls for service workload standards or actual work outputs for major tasks, the Erlang model uses workload variables but the primary driver is related to developing staffing levels based on desired performance or "response time." In effect, the Erlang Model is a predicted performance model that calculates the probability of a certain average wait time that a caller would experience. One of the primary criticisms of the Erlang model is that it assumes an acceptable "on-hold" time for the caller. While initially this may seem to make the Erlang model impractical for use in an E-9-1-1 PSAP environment, using national or local policy-driven standards for call answering times eliminates the shortcoming of an assumed hold time. The Erlang model uses calculations to find the amount of time it takes to answer a call based on a certain level of staffing; these times can then be compared to standards to assure

performance minimums are achieved. Although the Erlang model has been traditionally used to estimate staffing needs and performance predictions for non-emergency call center operations, the input values can be manipulated such that the model is well adaptable to a PSAP.

As it relates to standards, according to the National Emergency Number Association (NENA), PSAPs should meet or exceed the minimum standard of 90% of E9-1-1 calls answered within ten (10) seconds and 95% of E9-1-1 calls answered within twenty (20) seconds. Local and state standards may be different but these standards should be considered reasonable operating protocols.   The Erlang model uses sophisticated formulae based on probability theory, which will not be replicated in this report. The Matrix Consulting Group uses the Erlang model to determine the number of call takers required in a call taking center.

4.   ANALYSIS OF STAFFING USING WORKLOAD AS THE SOLE DETERMINING FACTOR MAY NOT BE A REASONABLE APPROACH IN FIRE ALARM.

The second analysis conducted by the project team focuses on determining the number of personnel required to handle call-taking and dispatching functions in Fire Alarm – based entirely on workload. In other words, this model does not protect current assumptions about staffing positions with essentially equivalent staffing for a major part of each day. Nor does the model make any other assumptions about how personnel would be specifically deployed across the day or into which functions – other than broadly for call-taking and dispatching. The results of this model are provided, below:

Element	Value
CALL TAKING	
911 Call On-Phone Time	1.80
Other Calls On-Phone Time	1.10
911 Calls (2009 Estimated - Fire / EMS Related)	7,500.00
Non-911 Calls (2009 Estimated)	5,000.00
Sub-Total: 911 Call Processing Time (Minutes)	13,500.00
Sub-Total Non-911 Call Processing Time (Minutes)	5,483.33
Total Phone Time (Minutes)	18,983.33
Utilization (Erlang-C)	30%
Total Time for Call Takers (Minutes)	63,277.78
Total Time for Call Takers (Hours)	1,054.63
Net Availability	1,670.85
Call Taking Staff Required	**0.63**
DISPATCHING	
Fire / EMS Radio Time (est.)	2.50
Fire / EMS Incidents (2008 projected)	7,500.00
Sub-Total: Fire / EMS Radio Time	18,750.00
Total Radio Time	18,750.00
Utilization Target	30%
Total Time Required for Radio (Minutes)	62,500.00
Total Time Required for Radio (Hours)	1,041.67
Net Availability	1,670.85
Dispatcher Staff Required	**0.62**
SUMMARY	
Call Taking Staff Required	0.63
Dispatcher Staff Required	0.62
Total Staff Required (Volume)	1.25
Current Line Staffing	10.00
Variance	8.75

Note that this analysis shows that Fire Alarm is significantly overstaffed *given the workload handled by the unit* – by almost nine of the ten positions assigned. This model, based entirely on workload suggests that Fire Alarm would require a total 1.2 personnel – significantly less than the number that are currently authorized for Fire Alarm operations. However, a closer examination also shows the following:

• The total number of call taking and dispatching personnel required is equal – and in both cases is less than a single total FTE of workload.

• The total number of positions required is 1.2 FTE's – significantly less than the 10 FTE's currently authorized for Fire Alarm.

The most significant impact of this would be that the model suggests that the Fire

Alarm Office could operate with many fewer positions than are currently authorized.

However, this would present major issues for the Office and the Fire Department.

These are summarized, below:

• The analysis, based on workload, does not do an effective job of taking into consideration the impact of concurrent events – particularly on the dispatching side of the operation.

• The analysis is also unable to properly account for the need to provide multiple functions at the same time – dispatching and responding to fire units while contacting power companies and other agencies.

• This analysis makes a compelling case for consideration of some kind of merger or consolidation of dispatch within the City or with neighboring communities – to make the operations more efficient while at the same time maintaining the ability to provide support for operations. The consideration of regionalization of dispatch will be the focus of a study being overseen by the MAPC and the City. Regardless of the outcome of this study, the City should consider consolidation of Fire Alarm and police 911 / dispatch intra-City. This would almost certainly enable the City to reduce staffing. As an example, the reduction of five positions would result in savings of hundreds of thousands of dollars.

• A shift to another schedule that focused on a full 40-hour work week for all personnel would not allow the City to reduce staffing significantly *if the intent continues to maintain two personnel in a stand alone Fire Alarm operation.* It would be possible to reduce staffing to nine personnel if the entire unit moved to a straight 4-on / 2-off schedule, as shown, below (this table shows on shift):

Day / Staff Person	1	2	3	4	5	6	7	8	9	10
A	1	1	1	1	0	0	1	1	1	1
B	0	0	1	1	1	1	0	0	1	1
C	1	1	0	0	1	1	1	1	0	0
Total Scheduled	2	2	2	2	2	2	2	2	2	2

• Civilian staff cannot work more than 40 hours per week without being paid overtime. This would make it complicated to assign them to a firefighter's work schedule that exceeds 40 hours / week

Recommendation: The City should maintain current staffing while Fire Alarm is a stand alone entity. However, serious consideration should be given to merging Fire Alarm with Police Dispatch or with neighboring communities. Savings from doing so, assuming reduction of one fixed position, could exceed $500,000

annually. Shifting to a 4/2 scheduled (8-hour work day) would allow for the reduction of one position, for savings of approximately $100,000.

4. PERFORMANCE INDICATORS SHOULD BE MATCHED TO SERVICE EXPECTATIONS AND OBJECTIVES.

It should be noted that dispatch centers like the Fire Alarm Office are not atypical compared to many government entities in regard to its sophistication in measuring performance, linking production to not only outputs but also to outcomes. Similar to many jurisdictions, "performance reports" are generated, distributed, reviewed, and filed, but little more is done with the contents. The City of Somerville has an increasing focus on statistical management as overseen and typified by the SomerStat Office. The most advanced performance measurement systems are generally found in the private sector. Yet the value of performance measurement cannot be underestimated, particularly since performance measurement is a core business practice and fundamental to many successful companies. An oft-repeated phrase is, "You can manage what you can measure." The belief in this sentiment is the cornerstone of the performance measurement philosophy.

We reviewed information made available from the Fire Alarm Office and framed our review utilizing what is known as the "SMART" approach to performance measurement and performance goals and objectives development. SMART is an acronym for (S)pecific, (M)easureable, (A)chievable, (R)elevant, and (T)ime-bound. Specifically:

Specific	Objectives must express the action and results required so that the reviewer of the objective can see clearly whether or not the objective has been achieved.
Measurable	When setting objectives, there must be some way of measuring and validating whether the objective has or has not been achieved and to what level of success or failure.

Achievable	Although objectives should be challenging and encourage continuous improvement, they must be reasonable and achievable.
Relevant	The objectives must be pertinent to the organization's core business practices and measure performance that reflects critical operations fundamental to the success of the work unit's mission.
Time bound	Objectives need to have clear time frames attached to them such that success or failure can be analyzed within an established period.

While the Fire Alarm Office does not have a formal performance management system or directives, typical elements tracked by dispatch operations include the following examples:

• Case Entry Protocol Compliance (95%)

• Chief Complaint Selection Accuracy (95%)

• Key Questions Compliance (90%)

• Post-Dispatch Instructions Compliance (90%)

• Pre-Arrival Instructions Compliance (95%)

• Final Coding Accuracy (90%)

• Total Compliance Score (90%)

• "Customer Service" (95%)

Other examples that are tracked (but which are not driven by the Priority Dispatch System) include the following:

• 911 – Average Ring Time (9 Seconds)

• % 911 Answered in Less Than 20 Seconds (90%)

While these performance measures are excellent ones for managing the operations of a dispatch center, some of them are not applicable to all functions in the Fire Alarm Office. Many of the compliance measures are focused on emergency

medical call taking and dispatching and are driven by Priority Dispatch developed by the

National Academies of Emergency Dispatch.

The project team recommends that the City of Somerville adopt the following

performance / effectiveness measures for Fire Alarm:

Performance Standard	Data Source	Audience	Frequency

911 Call Pick-Up
    80% / 7 seconds
    90%10 Seconds
    98% 15 Seconds
	Phone System	Management staff, all oversight boards, staff, public (website).	Daily monitoring with monthly reporting.

Call creation in CAD High: 85% / 90 secs Medium: 85% in 180 secs	CAD	Management staff, all oversight boards, staff, public (website).	Daily monitoring with monthly reporting.

Dispatch Serious Calls
    85% events / 30 secs
    95% events / 60 secs
	CAD	Management staff, all oversight boards, staff, public (website).	Daily monitoring with monthly reporting.

911 Callback Failure < 0.10%	Quality Assurance program / data collection.	Management staff, all oversight boards, staff, public (website).	Daily monitoring with monthly reporting.
Community Perception (95% positive)	User Survey – every 200th call taken. Limit questions to postcard sized return mailer.	Management staff, all oversight boards, staff, public (website).	Monthly reporting.
Responder Perception (95% positive)	Responder Survey – every 200th call taken – sent to primary unit. Limit questions to postcard sized return mailer.	Management staff, all oversight boards, staff, public (website).	Monthly reporting.
Staff Retention (Annual turnover rate of <15%).	Human Resources	Management staff, all oversight boards, staff, public (website).	Monthly reporting.

These performance measures can be adopted by the Fire Alarm Office almost

immediately (with the exception of the two surveys) with data currently captured in the

Fire Department.

Recommendation: The City and the Fire Alarm Office should adopt a more detailed and formal performance measurement and management plan. The project team recommends the standards provided in preceding exhibit. Additional standards may also be desirable, depending on policy objectives.

4. ASSESSMENT OF FIRE DEPARTMENT SUPPRESSION OPERATIONS

The primary focus of the Fire Department is on the provision of EMS and Fire response. This function involves the majority of the resources of the Department.

1. ISSUES IDENTIFIED RELATING TO THE OPERATIONS OF THE FIRE DEPARTMENT

The following exhibit compares the Somerville Fire Department to a series of best practices:

Potential Improvements	Strengths	Potential Improvements
EMERGENCY RESPONSE GOALS		
Response time targets are directly related to designing a fire protection system that can attack structure fires prior to "flashover" Flashover normally occurs between 6 to 10 minutes after ignition. Response time targets can be modified based on built-in protection		√
Stations are located to yield response time targets of four minutes for the first responding unit for emergency fire and medical calls with a fractile target of 90%.	√	
The Department has a 1-minute "Reflex" time goal. Reflex time is the time between the receipt of the dispatch and the time that the unit(s) is moving to respond or is en-route.		√
The Department monitors reflex times for each fire and EMS company monthly.	√	

The Department is able to deliver a minimum of 14 personnel (three engines, a rescue and a truck) with a travel time for all responding units of 8-minutes on a 90% fractile basis.	√	
Cross-jurisdictional automatic and mutual aid agreements are in place to ensure that sufficient resources are available to handle major incidents.	√	
Apparatus response areas are clearly defined to ensure that the closest unit will be dispatched to each call.	√	√
Response protocols clearly define the types and number of responders dispatched to various types of calls.	√	
Response protocols (number of apparatus and response speeds) are designed to minimize community risk by differentiating between emergency and non-emergency calls.	√	
SUPPRESSION OPERATIONS		
Command staff and company officers are trained in an Incident Command System (ICS), National Incident Management System (NIMS) or comparable approach.	√	
The Department conducts periodic training exercises that include ICS incident simulation.	√	
The Department has a 3-person minimum staffing requirement for both engine and aerial operations.	√	
Suppression crews are actively involved in community smoke detector and CO detector awareness and inspection programs.		√

The Department has developed a comprehensive risk assessment and inventory information system that quantifies fire risk or hazards for planning purposes.		√
Fire company in-service inspections are conducted to identify life-safety problems and fire hazards and to prepare pre-plans.		√
Officers and Firefighters conduct after action discussions and produce after action reports on all major emergencies		√
EMERGENCY MEDICAL SERVICES		
The Department has a board certified emergency medical physician as its Medical Director.	√	
The Medical Director prepares and periodically updates written medical protocols for the Department.		√
The protocols are electronically available to all members of the Department		√
The Department provides in-service EMS training programs for its members as specified by the Medical Director and by state directives.	√	
The Department has an automated system to track the training and certification records of its EMS personnel.		√
The Department expedites the delivery of cardiac response and advanced EMS care by deploying ALS personnel on engine companies.		√

The Department monitors and analyzes response times for EMS calls as follows: (1) BLS (basic life support) response within 4-minutes for 90% of calls; and (2) ALS (advanced life support) response within 8-minutes for 90% of calls (as measured by travel time).	√	
The Department has an automated EMS incident reporting system.		√
EMS providers have portable computers that enable them to complete reports on-scene and automatically upload reports to hospital and agency records systems.		√
The Department has a quality assurance and improvement program to provide timely feedback to employees and to identify protocol and training needs.		√
The Department's Medical Director is actively involved in the agency's quality assurance program.		√
The Department has established a goal of reviewing a percentage of its run reports and discussing the report with the responders.		√
Emergency Medical Dispatch (EMD) procedures are used to provide callers with pre-arrival care instructions.		√
The Department supports citizen "self-help" programs by locating defibrillators in high-risk areas and by providing AED and CPR training.	√	
HAZARDOUS MATERIALS		

Hazardous materials plans are required to be submitted by businesses with defined hazardous materials on their premises.	√	
Sites with hazardous materials are required to place a placard on the exterior of their business.		√
Types of materials utilized and typical quantities on-site are noted as part of the pre-incident planning process and these data are included in those plans.	√	
Pre-designated hazardous materials routes are established for large quantity transport through the City.	√	
All response staff are trained to the Hazardous Materials Responder Level 1,	√	
Hazardous materials planning and response is regionalized.	√	

2.   THE CITY OF SOMERVILLE HAS NOT YET ADOPTED SERVICE LEVEL STANDARDS

The adoption of performance standards for fire and EMS response is a critical first step in the evaluation of fire, rescue, and EMS service levels and staffing alternatives. While there are national standards that can be used to evaluate fire and EMS service delivery, each community must identify the key risks and necessary level of protection it needs based on its own unique circumstances. Once these performance standards are established a community can assess its performance and determine if current resources support the desired level of service.

(1)   Efforts to "Standardize" Service Level Objectives Are Based on Fire Growth Behavior and Research on Cardiac Arrest.

Nationwide, a great deal of effort and research has been put into developing performance objectives for the delivery of fire and EMS services. This effort is critical for agencies making decisions about deployment and location of emergency resources. The objectives promoted for fire/rescue and EMS have their basis in research that has been conducted into two critical issues:

- What is the critical point in a fire's "life" for gaining control of the blaze while minimizing the impact on the structure of origin and on those structures around it?

- What is the impact of the passage of time on survivability for victims of cardiac arrest?

The chart, that follows, shows a typical "flashover" curve for interior structure fires. The point in time represented by the occurrence of "flashover" is critical because it defines when all of the contents of a room become involved in the fire. This is also the point at which a fire typically shifts from "room and contents" to a "structure" fire – involving a wider area of the building and posing a potential risk to the structures surrounding the original location of the fire.

Generalized Flashover Curve
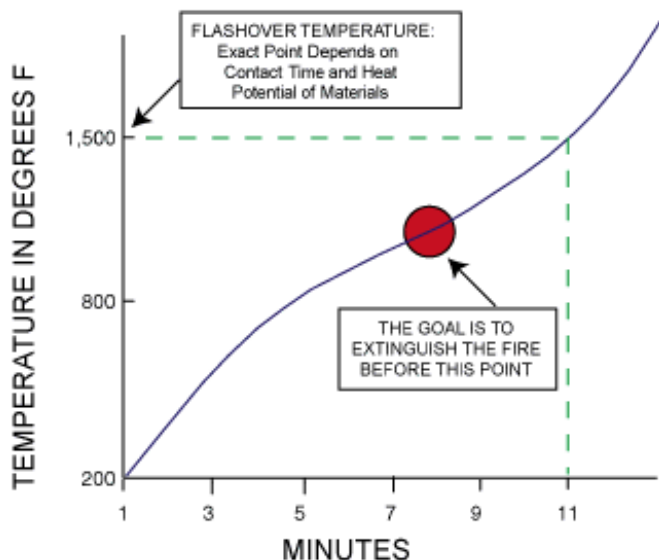
Note that this chart depicts a fire from the moment of inception – not from the moment that a fire is detected or reported. This demonstrates the criticality of early detection and fast reporting as well as rapid dispatch of responding units. This also shows the critical need for a rapid (and sufficiently staffed) initial response – by quickly initiating the attack on a fire, "flashover" can be averted. The points, below, describe the major changes that occur at a fire when "flashover" occurs:

- It is the end of time for effective search and rescue in a room involved in the fire. It means that likely death of any person trapped in the room – either civilian or firefighter.

- After this point in a fire is reached, potable extinguishers can no longer have a successful impact on controlling the blaze. Only larger hand-lines will have enough water supply to affect a fire after this point.

- The fire has reached the end of the "growth" phase and has entered the fully developed phase. During this phase, every combustible object is subject to the full impact of the fire.

- This also signals the changeover from "contents" to "structure" fire. This is also the beginning of collapse danger for the structure. Structural collapse begins to

become a major risk at this point and reaches the highest point during the decay stage of the fire (after the fire has been extinguished).

It should be noted that not every fire will reach flashover – and that not every fire will "wait" for the 8-minute mark to reach flashover. A quickly responding fire crew can do things to prevent or delay the occurrence of flashover. These options include:

•   Application of portable extinguisher or other "fast attack" methodology.

•   Venting the room to allow hot gases to escape before they can cause the ignition of other materials in the room.

•   Not venting a room – under some circumstances this will actually stifle a fire and prevent flashover from occurring.

Each of these techniques requires the rapid response of appropriately trained fire suppression resources that can safely initiate these actions. In the absence of automatic fire suppression systems, access to interior fires can again be limited by a safety requirement related to staffing levels. OSHA and related industry standards require the presence of at least 2-firefighters on the exterior of a building before entry can be made to a structure in which the environment has been contaminated by a fire. In the absence of a threat to life demanding immediate rescue, interior fire suppression operations are limited to the extent a fire service delivery system can staff to assure a minimum of 4-people actively involved in firefighting operations. The second issue to consider is the delivery of emergency medical services.   One of the primary factors in the design of emergency medical systems is the ability to deliver basic CPR and defibrillation to the victims of cardiac arrest. The chart, that follows, demonstrates the survivability of cardiac patients as related to time from onset:
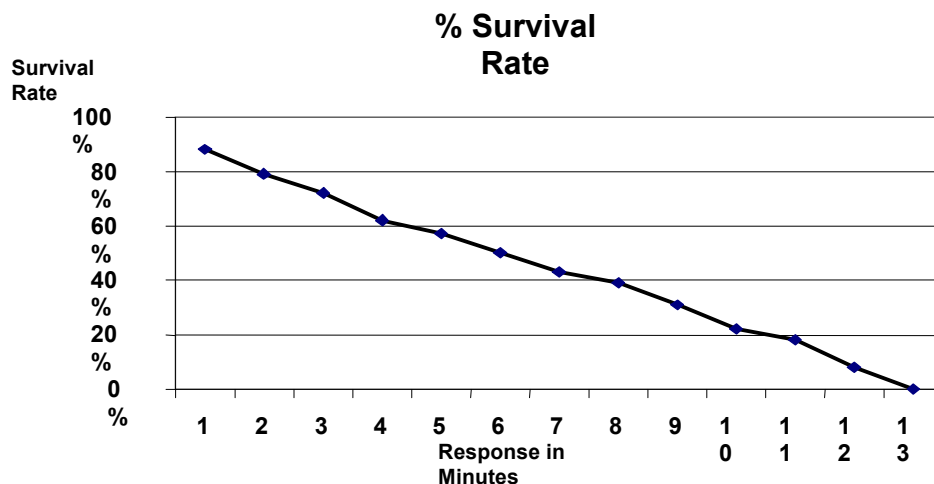
% Survival Rate

This graph illustrates that the chances of survival of cardiac arrest diminish approximately 10% for each minute that passes before the initiation of CPR and/or defibrillation. These dynamics are the result of extensive studies of the survivability of patients suffering from cardiac arrest. While the demand for services in EMS is wide ranging, the survival rates for full-arrests are often utilized as benchmarks for response time standards as they are more readily evaluated because of the ease in defining patient outcomes (a patient either survives or does not). This research results in the recommended objective of provision of basic life support within 4-minutes of notification and the provision of advanced life support within 8 minutes of notification. The goal is to provide BLS within 6 minutes of the onset of the incident (including detection, dispatch and travel time) and ALS within 10 minutes. This is often used as the foundation for a two-tier system where fire resources function as first responders with additional (ALS) assistance provided by responding ambulance units and personnel.

Additional recent research is beginning to show the impact and efficacy of rapid deployment of automatic defibrillators to cardiac arrests. This research – conducted in King County (WA), Houston (TX) and as part of the OPALS study in Ontario, Canada –

shows that the AED can be the largest single contributor to the successful outcome of a

cardiac arrest – particularly when accompanied by early delivery of CPR.   It is also

important to note that these medical research efforts have been focused on a small

fraction of the emergency responses handled by typical EMS systems – non-cardiac

events make up the large majority of EMS and total system responses and this research

does not attempt to address the need for such rapid (and expensive) intervention on

these events.

The results of these research efforts have been utilized by communities and first

responders, often on their own with no single reference, to develop local response time

and other performance objectives.   However, there are now three major sources of

information to which responders and local policy makers can refer when determining the

most appropriate response objectives for their community:

- The Insurance Services Office (ISO) provides basic information regarding distances between fire stations. However, this "objective" does little to recognize the unique nature of every community's road network, population, calls for service, call density, etc.

- The National Fire Protection Association (NFPA) promulgated a documented entitled: "NFPA 1710: Objective for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments." This document (NFPA 1710) was published in 2001 and generated a great deal of dialogue and debate – which is still on-going.

- The Commission on Fire Accreditation International (CFAI) in its "Objectives of Coverage" manual places the responsibility for identifying "appropriate" response objectives on the locality. These objectives should be developed following a comprehensive exercise in which the risks and hazards in the community are compared to the likelihood of their occurrence.

While each of these efforts provides a reference point for communities to follow,

only NFPA 1710 offers any specificity.   It is important to note that the performance

objectives (in terms of response times) provided in the NFPA 1710 document are

derived from the basic research previously described. These include the following (all

are taken from section 4.1.2.1.1 of NFPA 1710):

- One minute (60 seconds) for the processing of an incoming emergency phone call, including the completion of the dispatching of fire response units.

- "One minute (60 seconds) for turnout time." This is also called reflex time, reaction time, "out-the-chute" time, etc. This is the time that elapses between dispatch and when the units are actively responding.

- "Four minutes (240 seconds) or less for the arrival of the first arriving engine company at a fire suppression incident and / or 8 minutes (480 seconds) or less for the deployment of a full first-alarm assignment at a fire suppression incident."

- "Four minutes (240 seconds) or less for the arrival of a unit with first responder or higher level capability at an emergency medical incident."

- "Eight minutes (480 seconds) or less for the arrival of an advanced life support unit at an emergency medical incident, where this service is provided by the fire department."

- In section 4.1.2.1.2, NFPA 1710 goes on to state: "The fire department shall establish a performance objective of not less than 90 percent for the achievement of each response time objective specified in 4.1.2.1.1"

It is important to note the "and / or" found in the initial response objective

statement. This indicates that a system would meet the intent of the standard if it can

reasonably plan to deliver either the single unit, 4-minute travel time standard, the first

alarm, 8-minute travel time standard, or both. It should also be noted that it is implied

that the total time allotted is additive with each successive event. For example, a

system which arrived on-scene in 6-minutes or less 90% of the time (from time of

dispatch) would be in compliance – even if the turnout time was longer than a minute

(though that should clearly be improved).

It is also critical to note that these time objectives apply to emergency calls for service – there is nothing in NFPA 1710 (nor in any other objective) that suggests that communities cannot establish a differential response to calls for service determined to be non-emergency in nature.   A second element of the NFPA 1710 performance objectives addresses unit and total response staffing. These objectives are described in NFPA 1710 as follows:

- Engine and truck companies should be staffed with a minimum of four personnel (sections 5.2.2.1.1 and 5.2.2.2).

- Section A.3.3.8 defines a company as either a single unit or multiple units, which operate together once they arrive on the fire ground.

- A total initial response is defined (in section 5.2.3.2.2) as having a total of 15 people (if an aerial is utilized) for 90% of calls. This is broken down as follows:

    One (1) incident commander.

    One (1) on the primary supply line and hydrant.

    Four (4) to handle the primary and backup attack lines.

    Two (2) operating in support of the attack lines, performing forcible entry.

    Two (2) assigned to victim search and rescue.

    Two (2) assigned to ventilation.

    One (1) assigned to operate the aerial device.

    Two (2) to establish an initial rapid intervention team.

- If an incident is determined to require additional resources, the fire department should have as an objective the ability to respond with:
-
    Additional units as needed (through its own resources or via automatic and mutual aid).

    Assignment of two (2) additional personnel to the rapid intervention team.

    Assignment of one (1) as an incident safety officer.

It is interesting to note that the four person companies discussed in some areas of NFPA 1710 are not maintained in the description of primary tasks to be accomplished on the fire ground – recognition that the requirements of the response in the field are dynamic and do not fit neatly into size and shape of any particular response configuration. These objectives apply to the initial and follow-up response for reported structure fires. The document does not suggest that this response be mounted for all incidents.

(2)   The City of Somerville Should Formally Adopt Locally Defined Service Level Objectives.

The Somerville Fire Department includes a number of performance measures in its annual budget, including average response times to emergency calls for service. However, the City and the Fire Department have not identified or formally adopted service level targets for initial response to emergency medical calls or fire incidents. While the project team believes the standards utilized in the following sections are appropriate for the City, service level targets should be adopted only after careful consideration of local risks and the financial implications of maintaining those levels.

Recommendation: The City should formally adopt service level objectives. While targets should be locally determined, the project team believes the City should adopt a one-minute dispatch processing time and one-minute reflex time for 90% of emergency calls.

(3)   The Current Fire Station Network Provides Excellent Coverage of the City

The next step for the project team was to assess the current fire station network utilizing our GIS capabilities. The map showing station coverage is provided, below:

Somerville, Massachusetts
Potential Responders Within 4 Minutes of Drive Time
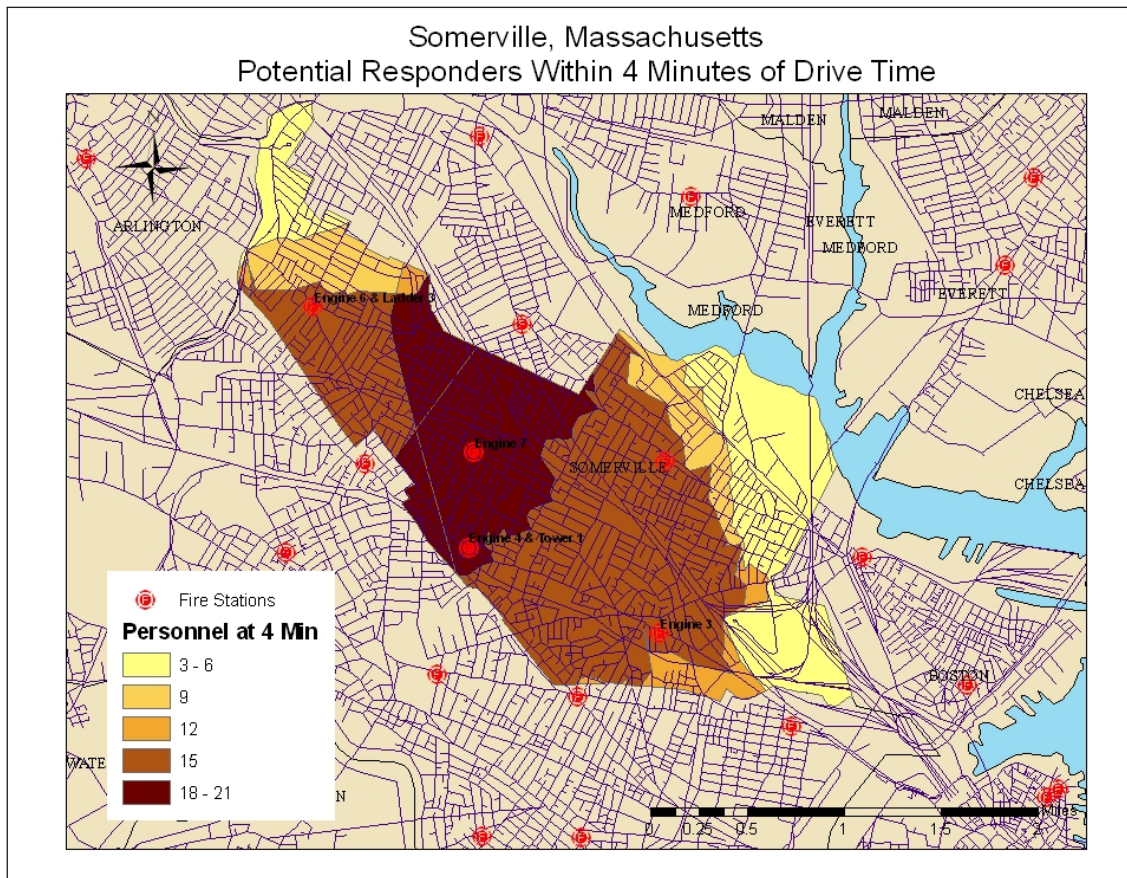
The project team assessed the capability of the Fire Department in terms of their ability to cover the City. The map, and the statistics below, reflect only the ability of the Somerville Fire Department. The other station locations are provided for reference only The table, that follows, provides a summary of the coverage capabilities of the Fire Department as measured by their ability to reach road miles within a period of time (four minutes) with varying levels of personnel:

Number of Road Miles Within 4 Minutes of Emergency Response Personnel

Personnel	Street Miles	%
3 or more personnel	110	100%
9 or more personnel	94	85%
12 or more personnel	84	76%
18 or more personnel	26	24%

The map and table show that the Somerville Fire Department can cover a large area of the City within the initial response time target of 4 minutes. Response capabilities are greatest in the central areas of the City, with more limited response coverage at the far east and north area. It also indicates that the Department can provide an initial response of 3 personnel to multiple, simultaneous calls for service. In conclusion, these data also indicate that the Department can assemble an initial structure fire response rapidly – in fact, almost the entire City can be reached by a full structure fire response within eight (8) minutes or less. Of course, this capability can vary widely depending on the level of traffic volume in the City.

Recommendation: Maintain the current fire station network in the City. Consider a new location, built with developer assistance, in the Assembly Square development area. Move an existing company to that station.

3. **THE CITY'S FIRE STATIONS FACE MAJOR CHALLENGES IN TERMS OF THEIR CONDITION. THE CITY SHOULD RETAIN AN ENGINEERING FIRM TO CONDUCT A CONDITION ASSESSMENT.**

The Matrix Consulting Group and SomerStat personnel toured the City's fire stations. Our tour of the facilities revealed the following examples:

• Exterior walls with major visible cracks in brickwork and mortar, missing bricks, etc.

• Water penetration through roofs and walls.

• Aging windows and doors which do little to prevent the penetration of water and cold air.

• Aging mechanical and electrical systems.

• Personnel who are living in a "temporary" trailer that has been in place for a decade. This was necessitated by air quality and other conditions in the station it replaced.

• Limited storage space.

- Limited office spaces, etc.

- There is not an adequate facility for conducting fire training of any kind. The single classroom that the Department has, at headquarters, is inadequate for training. There is no facility in which the Department can provide for training with hands-on skills without having to utilize space in a fire station or borrowed space.

- The City should consider the adequacy of its emergency operations center (EOC) as part of its overall facilities assessment.

Recommendation: The City should seek to have a professional condition assessment performed by a competent engineering firm which can assess structural, roofing, mechanical / electrical systems. The purpose of this assessment should be to develop a formal plan for renovation or replacement of fire facilities.

4.   **OPPORTUNITIES SHOULD BE CONSIDERED FOR CONSOLIDATING FLEET MAINTENANCE LOCATIONS AND / OR OPERATIONS.**

The Fire Department provides for its own fleet maintenance within the

Headquarters station. The following paragraphs summarize the current situation:

- The Department has a single mechanic who performs the full range of necessary repairs and maintenance alone. This presents a major safety concern for the Mechanic and a major risk management issue for the City and Fire Department.

- The maintenance bay also doubles as storage area for large parts and tires, presenting a major challenge for the Mechanic and necessitating the movement of parts / tires to even extend the outriggers on the ladder trucks.

- The pace of repairs can also be impacted by solo work – necessitating a number of work arounds, movement of equipment, etc.

    The City should consider the following solutions to these issues:

- Move the mechanic from the headquarters facility to a joint facility with other heavy equipment mechanics.

- Maintain the current dedicated fire mechanic staffing of one position.

- Support the work of the Fire Mechanic with other heavy equipment mechanics from other departments. This will improve the safety of performing major repairs, changing of tires, etc.

- The Department has had a second Fire Mechanic position that was eliminated in 2003. This position would improve the efficiency, effectiveness and safety of the operation.

- The second position would allow for the improvement of preventive maintenance of Fire Department equipment and apparatus – this currently suffers due to the demands on the sole Mechanic to address more urgent repairs.

Recommendation: The Fire Department should maintain its dedicated mechanic. However, steps should be taken to shift the work location of the Mechanic to a site shared with other heavy equipment repair mechanics. This will improve the safety of the Fire Mechanic's operations. In the interim, the Fire Department could consider assigning a Firefighter to work as an assistant to the Mechanic. Alternatively, a temporary mechanic could be hired to work with the Mechanic part-time, allowing heavy repairs to be done when two personnel were available.

5. ASSESSMENT OF FIRE PREVENTION AND PUBLIC EDUCATION

This chapter focuses on the fire prevention and public education efforts of the Fire Department. The first section summarizes the findings of the project team as they relate to these functions.

1. ISSUES IDENTIFIED RELATING TO THE OPERATIONS OF THE FIRE DEPARTMENT

The following exhibit summarizes the project team's assessment of the prevention and education functions in the Fire Department:

Performance Target	Strengths	Potential Improvements
FIRE PREVENTION		
The Fire Marshal is a direct report to the Fire Chief and holds equivalent rank with other senior command staff members.	√	
The jurisdiction has adopted a certified fire code.	√	
The jurisdiction has ordinances requiring built-in protection for high-risk occupancies.		√
The Department routinely seeks alarm and sprinkler upgrades when developers request zoning variances.	√	
The Department has a dedicated staff of plan reviewers and inspectors.	√	
Fire Prevention personnel plan check site plans, fire protection system plans and specifications, and building permit plans for compliance with the Uniform Fire Code or NFPA Code.	√	

Plan checks in the Fire Department are conducted concurrently with those performed by other participants in the plan check process.	√	
Jurisdiction-wide plan check software (such as Permits Plus) enables the Fire Department to review and share comments with other participants in the process, and enables applicants to view in process plan reviews.		√
Complicated plans including fire suppression systems, fire pumps, etc. are reviewed either by a contract PE or are accepted with an approved PE's stamp on them.	√	
The Department conducts inspections in accord with state and local ordinances.	√	
The frequency of State mandated fire prevention inspections by the Division are in accordance with the ordinances and codes	√	
The Department has certified fire investigators or works with certified fire investigators from the local law enforcement agency.	√	
The Department has an automated fire plan review, inspection, permit and investigation system.		√
Inspectors have laptops or other field electronics devices that enable them to directly input inspection records, reducing repetitious data entry.		√
The automated system is used to produce an annual fire prevention report.		√
The automated system supports the creation and updating of pre-fire plans by suppression personnel.		√

Fire prevention identifies high-risk facilities and supports suppression personnel in conducting in-service inspections and pre-fire plans.	√	
The automated system supports in-service inspections by suppression personnel.		√
The Department has established in-service inspection and pre-fire plan goals each of its suppression companies.		√
Fire Prevention staff work closely with operations staff to identify the cause of frequent calls for service at specific addresses.	√	
The Department has a public education program to improve fire safety knowledge and awareness.	√	
The Department uses Fire Prevention Week and the two annual time changes as focal points for public education.	√	
The public education program focuses on fire detector installation, maintenance and battery maintenance.	√	
The public education program also addresses other threats to life and property including: drowning prevention, stroke, cardiac care.	√	
The public education program focuses on issues such as child seat and bike safety.	√	
Public education program works in conjunction with law enforcement to address gun safety and other in-home issues.	√	
A citizens fire academy is available to the community.		√

CPR and other first aid programs provided by the Fire Department to the community at low or no cost.	√	
Engine companies, rescue crews, etc. are directly involved in prevention activities in their first due area.		√
Prevention and public education outreach is conducted with area schools, assisted living facilities, etc. to target at risk groups.	√	
Specific programs are in place to deal with juvenile fire setters	√	
Company officers are trained to handle basic cause and origin determinations, including skills to determine when an arson investigator should be called on.	√	
Arson investigators are State certified and have also received basic law enforcement training in areas such as interrogation, evidence collection, etc.	√	
Fire and Police Departments have specific individuals assigned to serve as liaisons for handling arson cases when there is a criminal component.	√	

Several of these major issues are addressed in the following sections.

2. FIRE PREVENTION STAFF FACE MAJOR CHALLENGES IN THEIR CURRENT WORK SPACE

The Fire Prevention and related staff are not currently housed in Fire

Headquarters (where there is not sufficient space) but rather share a trailer home with a

fire station crew. The following paragraphs document our key findings:

• The space is very cramped – with desks, file cabinets, plan storage and other assets all housed in one open space.

• There is no space upon which plans can be fully laid out flat to be reviewed.

- There is no meeting space that can be used by the Fire Department to meet with other City Departments, contractors or others.

- The storage spaces for plans, exacerbated by the lack of an electronic plans system, is almost non-existent in the current office spaces. Plans are permanently stored in tube racks, stacked on top of one another, etc.

- Property files showing inspections, changes of use, permits, etc. are maintained in file cabinets within the trailer – taking up the majority of the office space.

- There is limited space for movement in the office, making it difficult for personnel to interact, search for plans, etc.

Recommendation: The Fire Department, in conjunction with the City, should seek to identify an alternative space for Fire Prevention more appropriate to their needs. This would include, at minimum, space for individual work stations (large enough to review plans), storage space separate from the office areas, and a conference room space.

3.   THE CITY MUST EXAMINE THE INTERRELATIONSHIP BETWEEN THE FIRE DEPARTMENT AND OTHER CITY DEPARTMENTS INVOLVED IN DEVELOPMENT AND INSPECTIONAL SERVICES.

The City is currently seeking a consultant to evaluate the overall delivery of

inspections – including those performed by the Fire Department. A key focus for that

project will be to evaluate opportunities for enhancing the sharing of information and

overall coordination between the Fire Department, Inspectional Services and others.