

Analysis of Fire Department Operations

Town of Westwood, Massachusetts



August, 2023

EXECUTIVE SUMMARY

The Town of Westwood, through the Fire Department, retained Criterion Associates to conduct a study focused on assessing several specific questions relating to the operations of the Department.

Specifically, the questions Criterion Associates was asked to address include the following:

- How should personnel and apparatus be distributed across the Department's two stations, and does that impact staffing?
- What is an appropriate command / oversight structure in the Fire Department for line operations?
- Should the Town consider shifting personnel from staffing paramedic ambulances to staffing an additional fire apparatus, or should the Town continue with the level of service currently provided?

Our recommendations with respect to each of these questions is summarized, below:

- While there are NFPA standards for volunteer agencies (NFPA 1720 – which does not, of course, recommend staffing levels) and for career agencies (NFPA 1710 – which does recommend crew sizes and total staffing) these standards were originally (NFPA 1710 in particular) intended to apply to the “metro” departments. There is, as of now, a standard for fire-rescue agencies serving smaller municipalities – who often rely on shared responses with their neighboring communities for major incidents. The prevailing staffing model for career agencies in Massachusetts suburban communities inside and adjacent to 495 is an officer and two firefighters on engines / quints / aerials and two firefighters in ambulances. **Westwood should continue to staff their fire and medical units according to current practice. This means an officer and two firefighters on engine / quint and two firefighters on the ALS ambulances.**
- Given that the Town and Fire Department are working to develop a replacement for Station 1, consideration as to how best to deploy resources in the Town is appropriate. It is best practice to provide for effective first response to the most common kinds of incidents from each station. **We recommended that each station have a staffed engine / quint (at minimum) and that each station have a staffed ALS ambulance. The current workload does not justify adding a third staffed fire apparatus at this time.**
- In suburban communities it is our recommendation that the public policy be focused on addressing the following question: “what work should we be able to handle, as a community and as a department, on our own before we start asking for help from our neighbors, or before we consider adding additional staff?” It is not unreasonable, given the workload in the Town, to expect to handle routine events concurrently (car accident, medical call, etc.) and to expect that major incidents (structure fires, mass casualty incidents) would require that the Town work in conjunction with its neighboring communities. **Maintain the current deployment model, augmented and deployed as recommended.**
- Modern concepts of command, control, and oversight within the fire-rescue-EMS service delivery environment follow common best practices as it relates to span of

control, training, oversight, and incident command suggest that every fire apparatus (and associated medical transport unit) should have a line-level supervisor. In Westwood this role is fulfilled by shift Lieutenants. **Each engine / quint / aerial company should have an assigned supervisor responsible for on-scene and in-station activities including: service delivery, training, shift chores, etc. These personnel should also supervise the firefighters assigned to the ALS ambulances.**

- Similarly, in order to provide consistency of oversight and to ensure consistency across the shift (at both stations) there should continue to be an overall shift commander, in Westwood this role is fulfilled by a Captain. **The Westwood Fire Department should continue to have a shift command Captain assigned to each shift.**
- Our overall recommendation for operational staffing, at minimum, on all four shifts is as following:
 - Captain (1)
 - Lieutenant (2) – one per piece of staffed apparatus
 - Firefighter (8) – two on the engine / quint and two on each of the ALS ambulances
 - **This is a total of 11 personnel, at minimum, on each shift. This recommendation does not account for administrative and support roles performed by other uniformed and non-sworn personnel in the Fire Department.**
- The Town of Westwood currently provides emergency medical services (EMS) at the advanced life support (ALS) level using Fire Department firefighter-paramedics. The desirability of this is that the personnel, trained as both EMTs or Paramedics, are also fully trained firefighters – who can augment the response if and when a major emergency occurs. Elimination of this service would result in the Town facing the following consequences or decisions:
 - The Town’s compensation for EMS services, based on federal law, is associated with the provision of emergency medical transport services. The loss of this revenue would be approximately \$1.6 million per year. This helps offset current staffing and capital expenditures associated with the delivery of EMS.
 - The Town would need to identify, and contract with, a third-party transport provider. In most Massachusetts communities, this is at little to no cost.
 - Given current workloads, and the Town’s geography and road network, there is no justification for adding a third piece of fire apparatus (engine, quint, aerial) at this time.
 - **The Town should maintain its current service delivery model, providing advanced life support EMS services using Fire Department based transport units.**

How Will Changes in Town Demographics Impact Westwood Fire?

The Town of Westwood is considered, by the Metropolitan Area Planning Commission ¹ (MAPC) as a “maturing suburb.” Communities included in this definition are, like Westwood, relatively stable in size and lacking in significant opportunities to expand residential population through means of new development – unless that development takes the place of a pre-existing use. The MAPC provides community specific published forecasts for population and demographic changes.

The following table shows that the MAPC forecasts that the Town of Westwood will not grow substantially between now and 2030 (and will in fact be marginally lower from 2010 to 2030):

Population Summary, 1990-2030					
	1990	2000	2010	2020	2030
Total Population	12,557	14,117	14,618	14,325	14,507
Population under 15	2,181	3,388	3,478	2,576	2,445
Population over 65	2,004	2,701	2,656	3,209	4,186

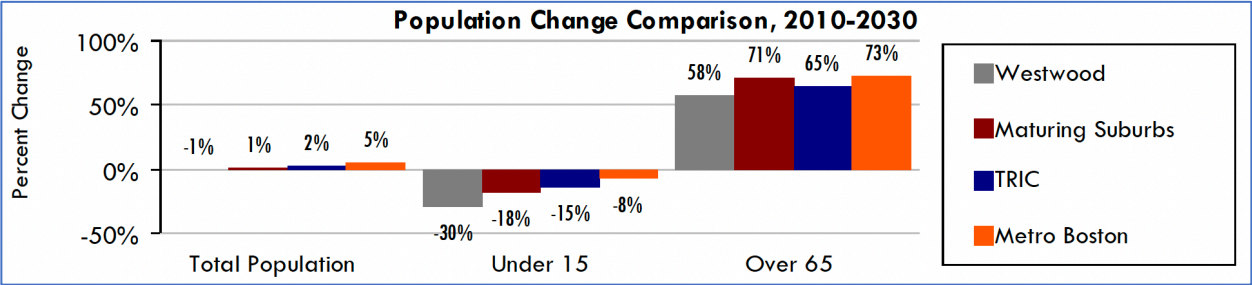
A key takeaway from the table is that the population over 65 years old will be growing while the population 15 and under will continue to decline in the Town of Westwood. This is a key indicator for the Fire Department, because the use of the EMS system rises significantly for persons >60 years of age. The table, below, provides a breakdown on use the the EMS system / Emergency Rooms by age cohort ²:

Age Range	EMS / ER Use per 100 Population
<1	60 / 100
1-17	22 / 100
17-44	41 / 100
44-64	39 / 100
65 +	62 / 100

¹ The MAPC is the regional planning agency, equivalent to a council of governments, (COG) which is responsible for regional growth analysis, transportation planning, and other state and federally recognized activities.


² US Centers for Disease Control Data, CY 2020

The following table shows that Westwood is expected to experience a similar trend in conjunction with other “maturing suburbs” when compared with other, similar, communities within the 101 communities in the MAPC’s metro-Boston region. Note that while regional population is expected to grow only slightly (less than 5%) the change in population over the age of 65 is expected to grow significantly.



The unknown factor is what impact adding any additional multi-family housing units may have on workload for the Fire Department. While the MAPC appears to have taken those considerations into account for their overall population forecast, it must be remembered that dramatic changes in the housing stock in Westwood could have additional workload implications for the WFD.

Metro Boston 2030 Population and Housing Demand Projections
Municipal Report
Status Quo Scenario: Housing
WESTWOOD



		Households and Housing Demand, 2000-2030			
		2000	2010	2020	2030
MAPC projected the number of households using age-specific headship rates and municipal-specific housing occupancy patterns and vacancy rates. Total household change and housing unit demand are shown in the table on the right.	Households	5,122	5,249	5,571	5,972
	Housing Units	5,251	5,431	5,788	6,199

Taking the available data and forecasts into account, the project team was able to develop a workload forecast for 2030. This analysis takes into account the relative aging of the population in Westwood, and the impacts that can be understood to have on demands for EMS services (the largest driver of call volume for the WFD). The table, below, presents these results:

Year	2020	2030
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Total Pop	14,325	14,507
Runs / Day (2020)	11.55	
Total Runs (2020)	4,216	
Pop >65	3,209	4,186
% Pop >65	22%	29%
Runs >65	2,614	2,782
Net Change	-	169
Total Runs(2030)		4,384
Runs / Day (2030)		12.01

This analysis shows that, given the currently available growth forecasts, and our understanding of how various age cohorts make demands on the EMS system, Westwood should expect to experience a small growth in daily demand, growing from 11.55 runs per day, to 12.01 runs per day (on average). Keep in mind, a “call for service” can be comprised of one or more “runs” when measured in any fire department. A “run” is a vehicle or unit responding, while a call is the incident to which one or more vehicles may respond.

How Should Units Be Deployed in Westwood?

The Town of Westwood Fire Department Operates from two fire stations, which are currently located at:

- Headquarters: 637 High Street
- Station 2: 300 Washington Street

Current staffing in the Fire Department calls for the following:

- (1) Captain
- (1) Lieutenant
- (8) Firefighters (EMT’s and Paramedics)
- Total: 9 personnel at minimum from 8AM – 6PM, and 8 personnel minimum from 6PM – 8AM.

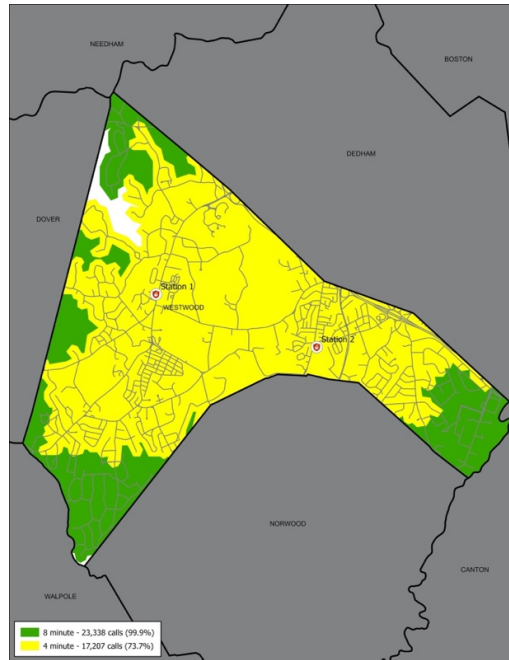
- The Fire Department will, as able, also do some peak level deployment of personnel using overtime, during the week.
- Current deployment is as follows:

Station 1	Station 2
<p>(1) Captain (in the car if 9 or more personnel³) (2) Firefighter / medics staffing 1st ambulance (2-3) Firefighters (1 must be medic) will cross staff Engine 5 and Ladder 1 depending on need</p> <p>Second medical call will pull (2) Firefighters from the fire apparatus to cross-staff an ambulance.</p>	<p>(1) Lieutenant (2) Firefighters (1 must be a medic)</p> <p>Personnel will cross staff either Engine 2 or Ladder 2 depending on need</p>

The Town and Fire Department are currently engaged in a study process examining the needs and feasibility of replacing the aging fire headquarters (Station 1) currently located at 637 High Street. This follows the development of a modern fire rescue facility in Islington, completed approximately five years prior to this project. The current system provides for highly effective first response capability across the Town, and certainly in the areas of the highest call density. This is shown in the map, below:

³ If the staffing drops below nine (9) the Captain will move to the fire apparatus to provide staffing. Note that the current collective bargaining agreement sets the daily minimum at six (6) total personnel.

Current Response Capability Town of Westwood Fire Department ⁴



This map shows the current capability for response time in the Town of Westwood, using current station locations. This was assessed using data from January 2017 – December 2022 – six (6) years of call for service data.

Current best practice in the fire rescue service is to provide for the ability to respond to both emergency and non-emergency calls for service with an effective response force. Best practice, nationwide, is that this should include either a fire or EMS unit – or both in the case of serious emergency calls. The Westwood Fire Department currently operates from five (5) front line pieces of fire / EMS apparatus⁵:

- (1) Engine

⁴ This map is taken from a separate report conducted by Criterion Associates, provided under separate cover. Given that fire station location studies can often include sensitive information regarding private property, it may be released by the Town in accordance with the laws of the Commonwealth of Massachusetts.

⁵ The Westwood Fire Department also maintains, and uses as needed, a wide variety of vehicles including brush fire trucks, rescue trucks for more technical rescues and extrications, and a variety of boats and trailers dedicated to low frequency events. Some of these are used in combination with other vehicles distributed across multiple agencies – this is particularly true in Massachusetts of Hazardous Materials response (HazMat) and technical rescue, which are largely provided regionally.

- (1) Quint⁶
- (2) ALS Ambulances
- (1) Shift Command Car

As the Fire Department and the Town of Westwood continue to plan for the new fire headquarters building, and given that both the new fire headquarters and the newly constructed Station 2 have the capability to house personnel to staff dedicated front line fire / rescue and EMS units, steps should be taken to deploy the engine and an ambulance from one of the stations, and the quint and an ambulance from the others. The shift commander can be located as deemed most suitable by the Fire Department, given the breadth of responsibility for this position daily.

Another important consideration is whether the Westwood Fire Department has the appropriate number of units for both fire and EMS responsibilities under normal circumstances⁷. Assessing the number of units required in a community can be derived from a number of sources and considerations. These include the following:

⁶ A “quint” is a combination piece of fire apparatus that combines the capabilities of a traditional pumper or engine, carries water, full complement of ground ladders, and has an aerial ladder or platform. These can be very effective pieces to operate, particularly in suburban departments where EMS represents close to 2/3 of all calls handled by the Fire Department and the incidence of fire is low.

⁷ Fire-rescue systems, particularly those in suburban environments where there are many such providers (as in the case in Westwood with neighboring systems in Norwood, Dedham, etc.), will staff and deploy resources to handle routine daily events. This may include car accidents, medical emergencies, and small fire or rescue events. Larger events are handled using both local resources and those from neighboring communities in a mutual aid system. This allows each agency to benefit from the help of its neighbors when unusual or staff-intensive events occur. This may also be used under practical considerations (i.e., when one community can get on to a highway faster based on the location of its station, even though the emergency may be in another jurisdiction).

Issue	Method	Impact in Westwood
Number of transport units	<p>Industry standard examines unit-hour-utilization. This is calculated using the following formulae: Calls / Hours Available</p> <p>Also consider the road network and geography of the community.</p>	<p>The UHU for Westwood Fire Department is calculated at 0.21 (see the table following this exhibit). When staffing using a 24-hour shift, a UHU between 0.2 and 0.4 is appropriate depending on distance to the hospital, etc. Higher levels lead to more frequent gaps in coverage, and can cause burnout of assigned staff.</p> <p>Response time analysis for the Town of Westwood clearly demonstrates the need for two stations. Best practice would call for distributing ambulances across both stations to provide for effective town wide coverage. Average unit demand is for 5.1 medic units / day on average over the sample period 2017-2022.</p>
Number of fire apparatus	<p>Consider the road network and geography of the community.</p> <p>Consider if workload is exceeding 8-10 calls / day per any unit.</p>	<p>Response time analysis for the Town of Westwood clearly demonstrates the need for two stations. Best practice would call for distributing ambulances across both stations to provide for effective town wide coverage.</p> <p>No unit in Westwood reaches this level of demand, on average, on a daily basis. Average daily demand for fire apparatus is approaching 5.9 runs / day over the sample period 2017-2022.</p>

Unit Hour Utilization Calculation for Westwood Fire

EMS Runs	10,963
Days in Sample	2,165
Hours in Sample	51,960
UHU (Actual)	0.21

In terms of staffing the units themselves, it is common and best practice in most suburban communities, particularly those that provide fire-based EMS (rather than third party of a separate agency) to staff fire and EMS units, as follows:

- Engine / Quint: (1) Officer and (2) Firefighters
- Ambulance: (2) Firefighters
- Shift Command: (1) Officer

The Town of Westwood currently functions almost in accordance with this, however there is one piece of fire apparatus that does not have a dedicated company officer. This is addressed in the following section of this report.

Recommendation: Westwood Fire, and the Town of Westwood, should deploy an ambulance and a fire apparatus from each of the two fire stations. Our analysis of call / run growth in the Town shows that this recommendation should remain true for the foreseeable future.

Recommendation: The Fire Department and the Town should work to ensure that these units are all fully staffed. “Jump” or “cross” staffing of fire apparatus should be limited to those pieces that are not on the front line of operations (i.e., brush trucks, heavy rescues, boats, etc.) or to ensuring that a full crew responds on the most appropriate piece. Staffing of a third ambulance by downing a fire apparatus should be a rare occurrence.

What Is the Appropriate Command / Supervisory Structure for Line Operations in the Fire Department?

The Westwood Fire Department currently operates from two stations, and has the following supervisory and command staff on duty:

- (1) Captain (shift command) assigned to Station 1
- (1) Lieutenant (company officer) assigned to Station 2.

Best practice for fire-rescue agencies is to have appropriate oversight and span of control to ensure for safe operations, effective incident command, oversight of training and equipment checks and other key personnel functions. The federal Incident Command System (ICS) which is used to manage local and multi-jurisdictional events requires that span of control range between two (2) and seven (7) people. It is also best practice to ensure that operational companies have effective supervision and oversight and

that the functions of shift command, which are distinct from company supervision, be clearly delineated and housed appropriately. As described, above, the shift Captains assigned to station one splits the duty of being both the shift supervisor, as well as company officer for between four and six Firefighters.

Recommendation: The Westwood Fire Department should be authorized and funded to add four (4) additional Lieutenants to provide for company officers at both stations. This approach would result in shift staffing of (1) Captain, (2) Lieutenants, and (8) Firefighters per shift.

Recommendation: The Department should also be authorized to maintain a minimum staffing of 11 per shift. This would enable the Department to maintain an engine / quint at each station, an ambulance at each station, and a shift commander.

Should the Town Continue to Provide EMS Transport Services in the Westwood Fire Department?

The Town of Westwood currently provides what is called, in the industry, fire-based advanced life support (ALS) emergency medical services (EMS) using firefighters who are a mix of paramedics and emergency medical technicians (EMTs). As has been previously described, the Fire Department currently staffs a primary ALS ambulance (with two paramedics) from Station 1, and then will cross staff a second ALS ambulance (with one medic and possibly one EMT) also from Station 1. The project team has recommended, in a previous section of this report, that the Fire Department be authorized to increase staffing by an additional Lieutenant and that minimum staffing be increased to maintain 11 personnel on duty at all times. It must also be recalled that the personnel assigned to provide EMS transport can also augment other operations when needed – and are subsidized by the collection of EMS revenues.

In order for EMS agencies to be reimbursed for the delivery of 911-drive emergency (and non-emergency) responses, they must provide the transport of the patient. The Town of Westwood currently collects \$1.6 million annually from reimbursements from insurance and other sources for provision of medical transport. If the Town were to pursue a third-party transport provider that revenue would be lost.

One possible argument would be to shift the personnel as justify signed to staff a third piece of fire apparatus. However, our earlier analyses have shown that the Town's current workload does not justify the staffing of a third unit at this time. If, despite this analysis, the Town decided to pursue staffing of a third unit (and kept the EMS transport function) the cost to add those personnel would be roughly equivalent to the revenue that would be lost if transport were given up.

Recommendation: The Town of Westwood enjoys a high level of service from a Fire Department based EMS-ALS transport service. These personnel also augment the Fire Department's ability to respond to a wide range of issues. The revenue collected by the Fire Department for EMS services (\$1.6 million) is collected based on the delivery of transport services. If this service were turned over to a third party, this revenue would be lost.