Analysis of Fire Station Location Alternatives

Town of Andover, Massachusetts

October 2018

The Town of Andover, through the Andover Fire Rescue Department, retained Criterion Associates to conduct a study focused on determining the suitability of several locations for the potential replacement of the sub-station located in the Ballardvale neighborhood. This study was conducted in anticipation of a special town meeting focused on obtaining town meeting approval for replacement and financing of this sub-station.

1. Conclusion

The current location for the fire rescue sub-station, at 1 Clark Road, remains the best location for a sub-station given: the distribution of calls for service, the Town's road network, and the locations of the other stations in the Andover Fire Rescue Department's response network. Other potential locations were assessed to be less effective or efficient in providing the foundation for fire / EMS / rescue response in the Town of Andover.

2. Current Situation

The Town of Andover is currently served by a full-hazards fire rescue agency, Andover Fire Rescue. The Town of Andover's Fire Rescue Department current operates from three fire stations with a minimum daily staffing of 15 personnel, working on a four-platoon schedule. The minimum current on-duty deployment is as follows:

- Station 1
  - Engine 1: 3
  - Ambulance 1: 2
  - Ladder 1: 1
  - Car 2 (Deputy Chief): 1
- Station 2
  - Engine 2: 3
- Station 3
  - Engine 3: 3
  - Ambulance 2: 2

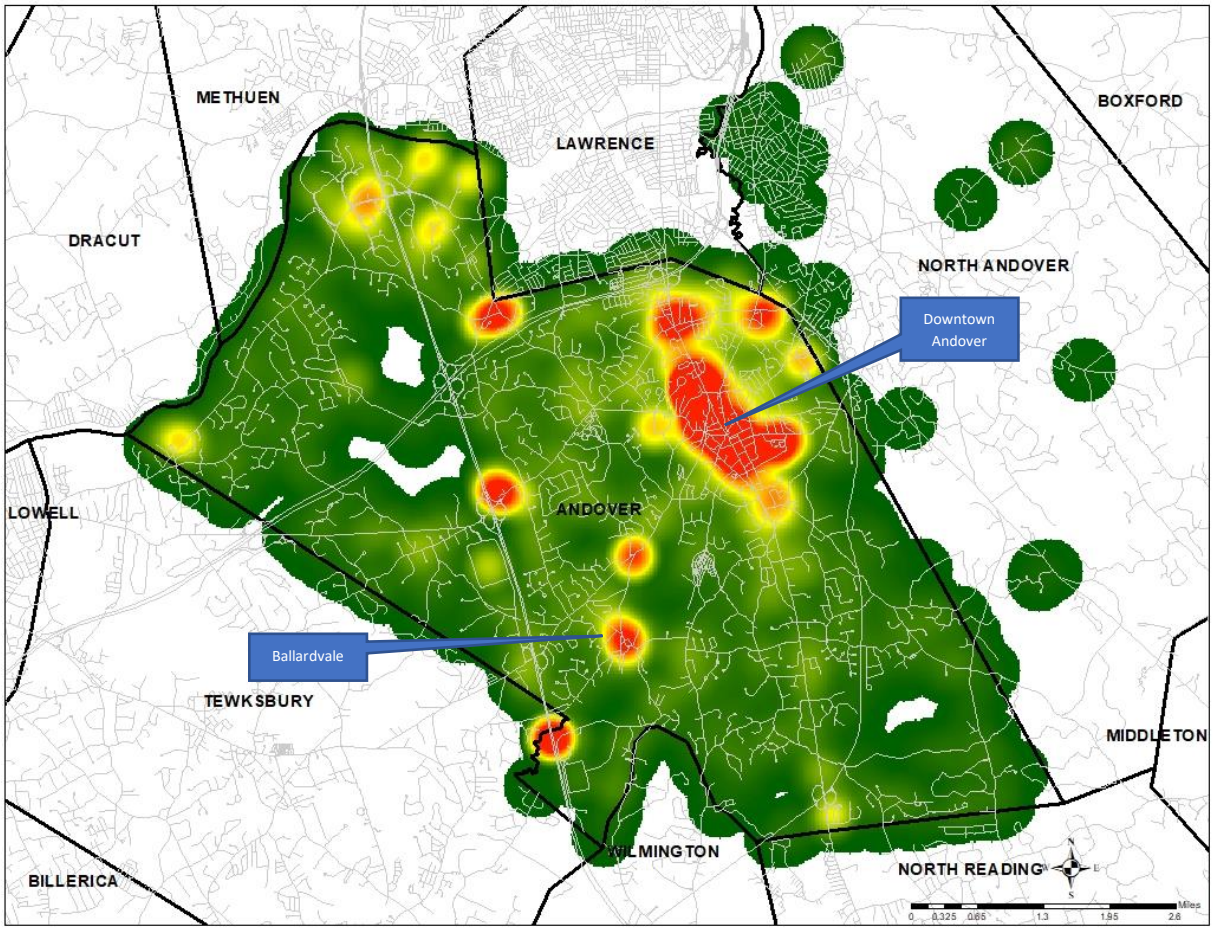
The three current station locations are as follows:

- Headquarters (Station 1): 32 North Main Street
- Ballardvale (Station 2): 1 Clark Road
- West Andover (Station 3): 200 Greenwood Road

The focus of this project was on addressing a single question: should the Ballardvale station remain in its current location, or should it be relocated to an alternate location? Discussions about the need to renovate or rebuild or relocate the Ballardvale fire station have been on-going for more than a decade, and the current administration has identified methods and funding by which to potentially move forward with a project.

The level of service being provided by the Town of Andover is also an area of focus. Currently, the Fire Rescue Department provides "all hazards" response, with staff within the Department functioning at the level of EMT-Basic. Advanced life support (i.e., paramedic) is provided by third party units which are dispatched to calls as an additional resource. Furthermore, one of the challenges posed by the current Ballardvale station is that is has insufficient apparatus bay area in which to park an ambulance.

The project team from Criterion Associates first solicited data from the Fire Rescue Department that documented calls for service over the past several years. This resulted in a sample of more than 25,450 calls over the course of a 33 month period – representing workload of approximately 25 calls per day. The map, below, provides a graphical summary of the location of those calls as they are distributed across the Town of Andover.



This map shows a significant concentration of calls in the area immediately adjacent to the headquarters fire station in "downtown" Andover. It also shows small pockets of concentrated workload in Ballardvale

and at the I-93 ramps for Dascomb Road and for Route 133. It is also interesting to note the growing pockets of workload north of 495 along the River Road corridor. This area will be important to track as time and development occur.

It is also important to note that the focus for larger scale future development in the Town of Andover has shifted from a major focus on the area between the Dascomb Road and Route 125 exits (the State is no longer focused developing a new I-93 off-ramp at this location) and has moved to parcels that are proximate to the Dascomb Road exit from Route 133 and to the River Road area on the north side of the Town of Andover.

3. Methodology and Analyses

The Town of Andover, as documented in our earlier report from 2014, does not have any adopted "standards" for the delivery of fire / rescue / EMS services. Given the lack of locally adopted standards, the project team from Criterion Associates utilizes commonly used standards of four and eight minutes of drive time. These assume additional time in the dispatch center to process the incoming call, and some time in the station for crews to transition from other activities to call-response.

The project team took the over 25,000 calls for service and entered them into a geographic information system (GIS) which is capable of performing highly complex geo-spatial analyses. With this software, we are table to ask two basic sets of questions when conducting projects such as this one:

- How will the fire rescue system perform from a pre-determined set of starting locations (for example, the current three fire stations)? In this case, we tested both the current system, as well as testing the system moving station 2 to a location near South School (a previously considered location).
- If I want to maximize the effectiveness of a fire rescue system, given a known distribution of workload, where should I locate those stations? In this case, we "locked down" the current headquarters and west Andover locations.

These analyses are able to tell us what calls can be reached within certain time standards, and from that we can calculate two key measures:

- The percentage of total calls that can be reached in pre-set time limits. This is known as the "fractile" performance of the system.
- The average expected response time from the system. This is calculated by taking a stack-ranked sample of the highest frequency call locations and calculate the expected average response time (this takes into account the likelihood of call concurrency as well – where the physically closest station might not respond because they are already committed to another call).

The results of these analyses are summarized, below:

Scenario	Stations in Scenario	Fractile Performance – Drive Time % Calls Reached in 4 / 6 / 8 Minutes	Addresses for Stations **Bold = Current** / *Italic = New Location*	Expected Average Response Time [1]
1	Current 1 Current 2 Current 3	72% / 88% / 93%	**32 N. Main St** **1Clark Rd** **200 Greenwood Rd**	2:23 M:S
2	Current 1 New 2 Current 3	70% / 89% / 93%	**32 N. Main St** *55 Woburn St* **200 Greenwood Rd**	2:49 M:S

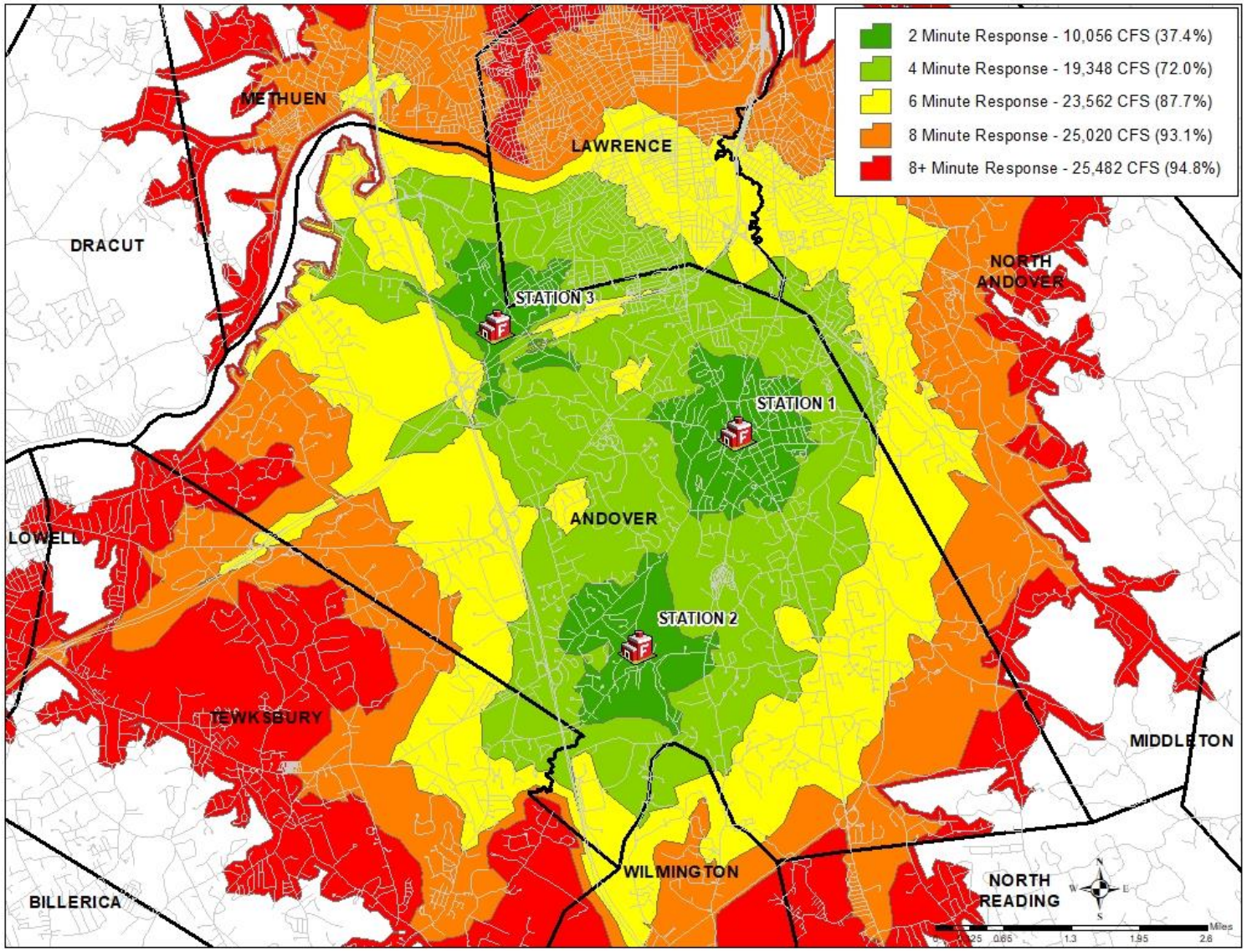
The table, above, provides a comparison between the current system and locations and one in which the Ballardvale station is shifted to the east to the corner of Woburn and Andover Streets. The resulting analysis favors the current location for the following reasons:

- The average response time to the most frequent call locations in the Town of Andover is better by almost 30 seconds (per call) from the current site.
- The current site enables the department to deliver a first unit on scene in four minutes or less at a slightly better performance than does the alternative.
- It should be noted, that when these two sites were excluded from the range of options, that the next site selected by the GIS model performed worse than did the site near the South Elementary School.

Continued development in the Town should cause the Town to continue to monitor shifts in calls for service and the potential impacts that these changes might have on future decision making about development and the like. It should be noted that these same models can be used to predict response performance at particular locations / developments and can be used by the Town to negotiate with the developer(s) for enhanced safety precautions.

[1] Uses top 20 call locations to determine "expected response time." This is a 19.7% of the total calls for service, an excellent measure of system performance. This takes into account concurrent calls, and the likelihood that the closest (or next closest) station will respond.

Scenario 1: Current Station Locations Remain the Same



Scenario 2: Station 2 @ 55 Woburn Street