Memorandum

From: Fire Station Study Team
Date: May 2016
Re: Future Station Locations

Executive Summary

Due to the planned development of Union Square, maintaining the Somerville Fire Department's Engine 3 fire station in its current location is not an acceptable long-term solution from either a public safety or urban planning perspective. At one point, the City considered purchasing land at 515 Somerville Avenue (hereafter "515") for a new station to replace the Union Square and Lowell Street stations. The vision was to not only provide coverage out of 515 for the Union and Lowell responder areas, but also to establish a new centralized headquarters to meet citywide training, equipment, and storage (truck bays) needs. After careful analysis, we have developed a decentralized solution that will provide quicker and more future-proof response times to the full Lowell-Union area and will provide space for necessary equipment and reserve apparatus storage. (Note: we were unable to accommodate the training needs in any scenario.) The preferable solution would provide coverage meeting or exceeding national standards to both the Lowell area as well as points east of Union Square, including Brickbottom and Inner Belt, where significant development is slated to happen.

Instead of 515, we recommend building a new station east of Union Square, from which to deploy Engine 3, and finding space for the remaining fire apparatus elsewhere in the City – most likely at a renovated Lowell Street station. We carefully modeled response times using cutting-edge analytical techniques, and feel confident predicting that future response times in this scenario will meet or exceed national standards. The Somerville Fire Department will be able to maintain its above-average service standards.

Methodology

In order to make predictions about response times, we took a random sample of 3,000 critical calls and geocoded them using the Google Maps API. This was critical to delivering accurate longitude/latitude coordinates because the Google geocoding database is well maintained with new addresses (e.g., Assembly Square Drive), and is robust to aberrations in the address data.

We then used the Google Maps Distance API to build a matrix with the driving distance between each unique address and a list of 7 locations: the current 5 fire stations, 515, and a hypothetical station east of Union Square. We then compared the predicted drive times to actual response times and wrote a function to scale the predictions appropriately.

This work allowed us to model response times under four main scenarios:

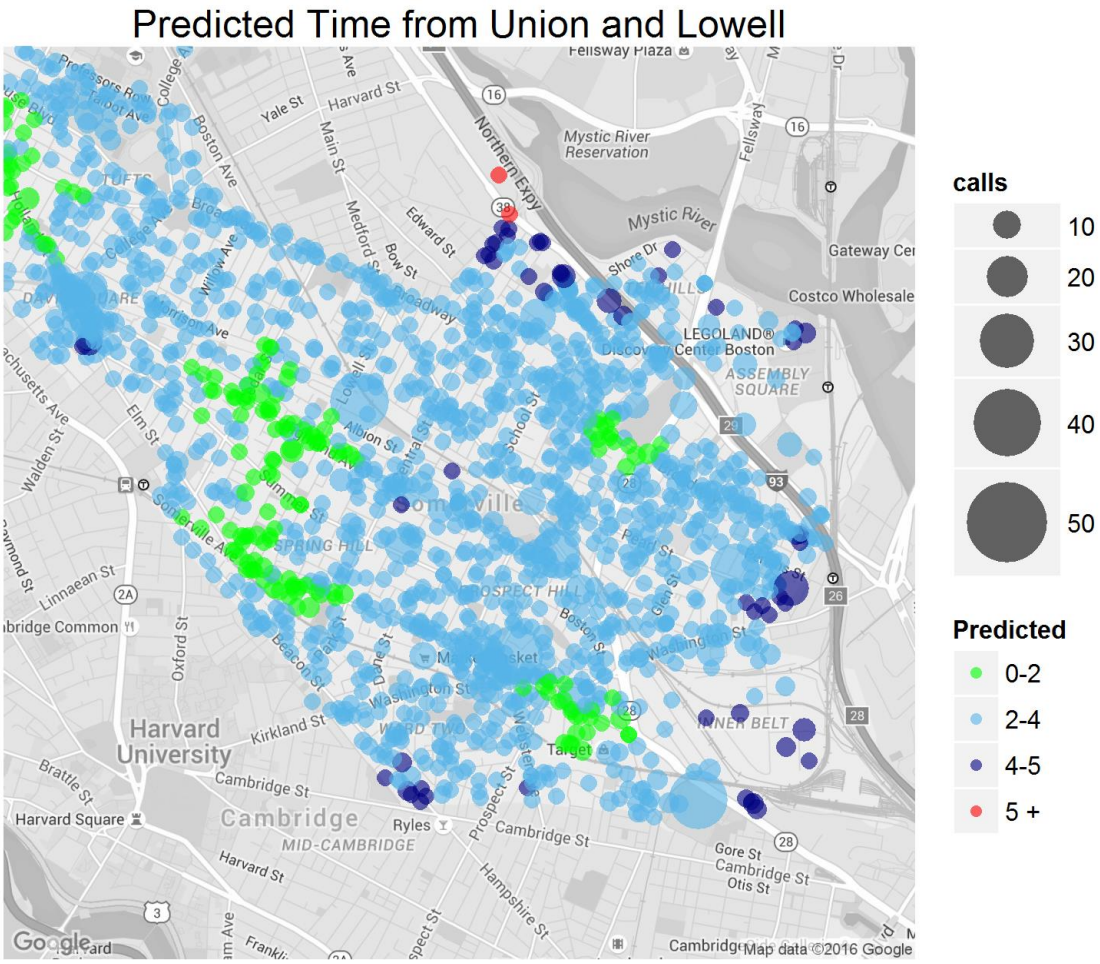
Scenario 1: The current scenario (Engine 3 (E3) in Union Square and Engine 1 (E1) at Lowell Street)
Scenario 2: Move E3 and E1 to 515
Scenario 3: Move E3 to a new station east of Union Square
Scenario 4: Move E3 east, as above, but also move E1 from Lowell Street to 515

We discussed these results extensively in a group that included staff from the Fire, Planning, SomerStat, Capital Projects, and Finance departments. Finally, we examined the potential costs associated with purchasing land and building a station at 515.

Results

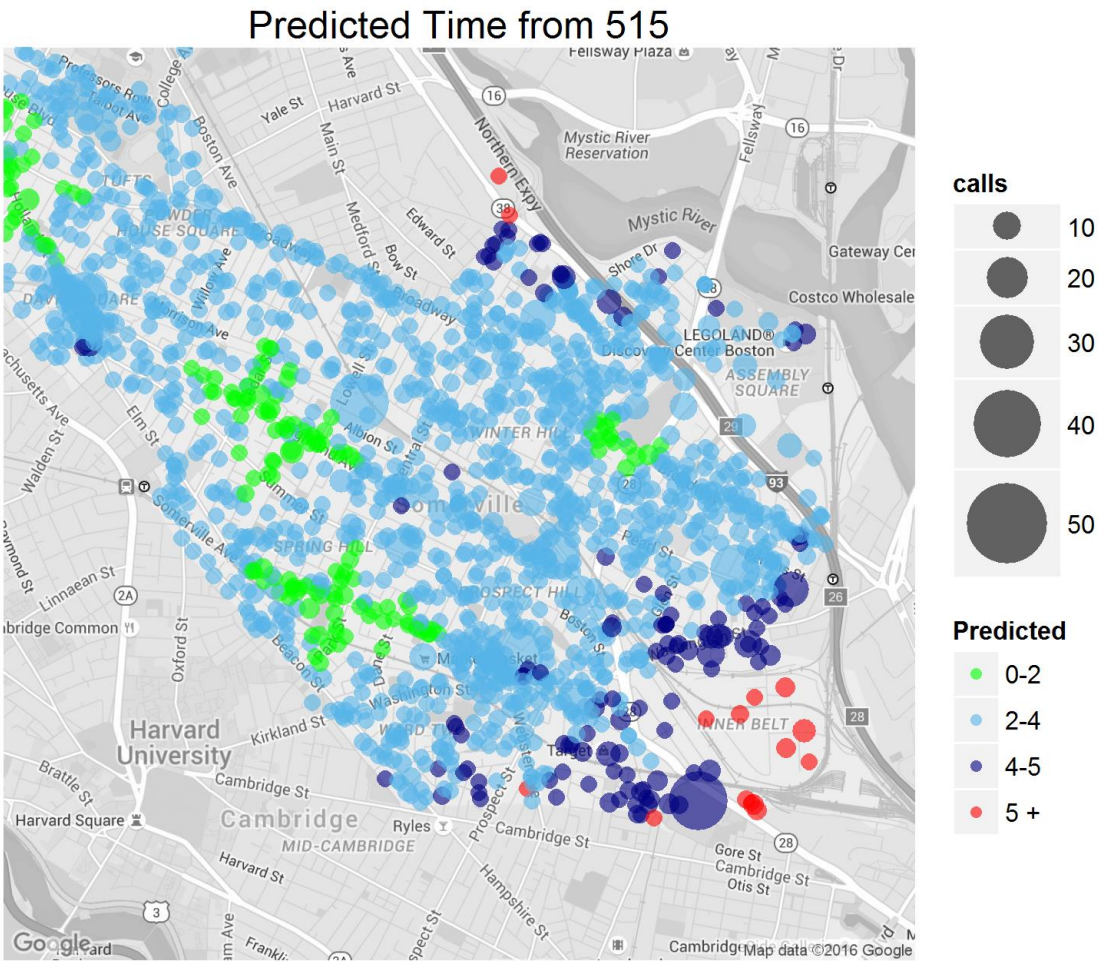
Figure 1 shows the modeled response times with our current configuration (Scenario 1) – that is, stations in Union Square and on Lowell Street. The modeled response times align with actual average response times in this area. The current situation provides excellent coverage, but is not compatible with future development.

Figure 1, Scenario 1:



Of the scenarios listed above, the only one for which response times are likely to fall below national standards on a consistent basis is Scenario 2, moving E3 and E1 to 515 without moving a company east of Union Square. Figure 2 shows how calls in East Somerville and near Twin City Plaza would see response times mostly in the 4-5 minute range – still within national standards. More concerning, however, is the fact that all calls within Inner Belt are predicted to exceed 5 minutes under this scenario.

Figure 2, Scenario 2:

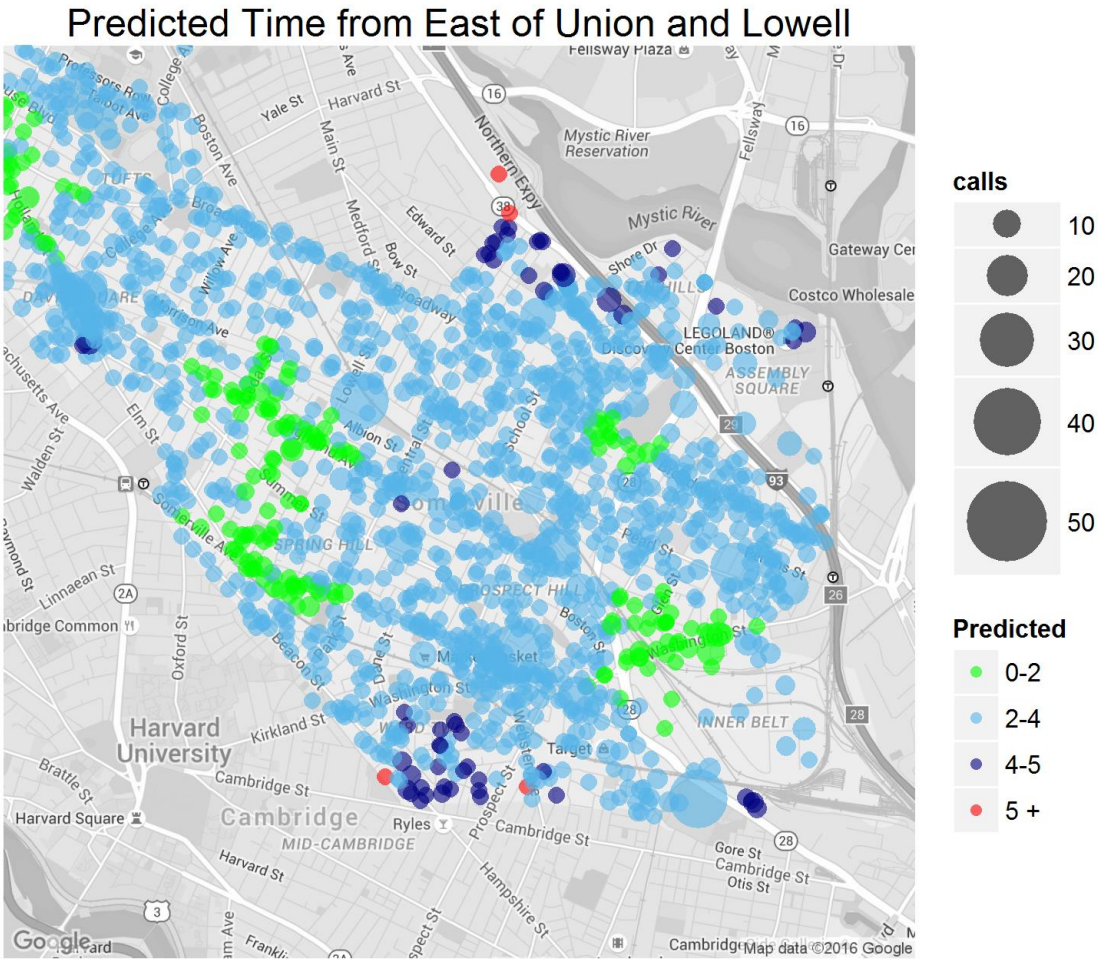


In the remaining scenarios, the SFD is predicted to reach almost all calls within 5 minutes. Figure 3 shows the predicted response times under our recommended scenario (Scenario 3), where the City builds a station east of Union Square, to which it moves E3, but continues to occupy its other stations, including the Lowell Street station. But there are some critical geostatistical trends to note:

- A station east of Union Square would better serve East Somerville, where even engines dispatched from headquarters occasionally have had difficulty arriving in less than 5 minutes.

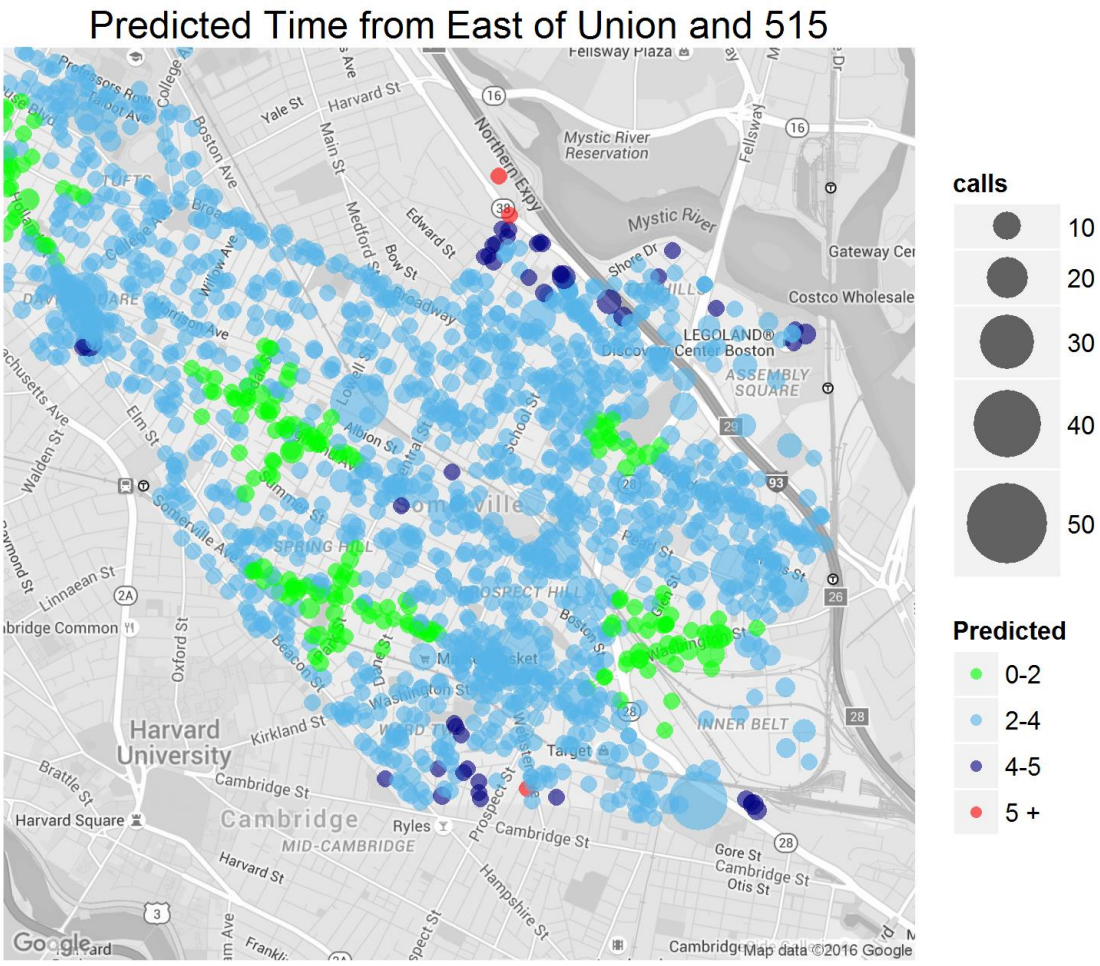
- The recommended configuration would likely mean slightly slower response times to parts of Duck Village, but faster responses to Inner Belt and Brickbotttom, where significant development is planned.

Figure 3, Scenario 3:



As noted above, we also analyzed a scenario (Scenario 4) in which the City builds two new stations: one east of Union Square (for E3) and one at 515 (for E1). Figure 4 shows that under this scenario, response times east of 515, including parts of Duck Village and Union Square would be reduced (essentially by the drive-time difference between 515 and the current Lowell Street station); while locations west of Lowell street would see increased response times.

Figure 4, Scenario 4:



This scenario has pros and cons. The average predicted response time is slightly lower – but the costs are significantly higher. It would require the City to take all or part of 515 through eminent domain. The acquisition and construction costs (see detailed discussion below) outweigh the benefits, in our opinion, especially considering the fact that the Lowell Street station is currently and is predicted to continue meeting national standards on a consistent basis as the City continues to develop.

Financial Analysis: 515 Somerville Ave Station vs Renovated Lowell St Station

As a part of the decision-making process, the City's Finance Department developed a cost/benefit analysis to compare two options outlined in this report: renovating the existing Lowell Street Station versus acquiring and building a new station at 515 Somerville Ave. Given that both scenarios lead to appropriate response times as guided by national standards, it is critical that the City consider the costs associated with both options. Included in this analysis are land acquisition and building construction costs, as well as tax revenue generated on land unused by the City. The two options as reviewed were based on the following assumptions:

Lowell St Renovation Scenario	Acquire & Build at 515 Somerville Ave
• Renovate & construct 4-bay station at Lowell St • Private developer builds on 515 Somerville Ave	• Acquire 515 in entirety • Construct 4-bay station at 515 • Subdivide and sell portion of land (est. 17.5k sqft) to developer for new development • Sell Lowell St site for development

Based on these assumptions, the City determined that over a 25-year bonding period, the Lowell Street renovation scenario costs approximately 75% of the cost of the 515 scenario. In net present value terms, the Lowell St renovation is estimated at -$11,614,963 while the 515 scenario is estimated at -$16,610,742. In summary, the financial analysis points to the renovation of Lowell Street as a more cost effective way to continue to ensure appropriate fire response times in the area west of Union Square.

Conclusion and Next Steps

Based on our financial and statistical analysis, we recommend the following next steps:

1. The Fire Study Group should begin searching for potential station locations east of Union Square. Ideally, the final location would have access to Brick Bottom and Inner Belt, as well as parts of East Somerville and Union Square.
2. Capital Planning should continue analyzing the full range of space needs, and refining repair and renovation costs of the Lowell Street station.
3. The Fire Study Group should continue to monitor data on response times and make changes accordingly. More specifically, the SFD should consider redrawing first-due areas soon after stations are moved.