Analysis of Fire Station Location Alternatives

Town of Andover, Massachusetts

December 2013

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I. EXECUTIVE SUMMARY

The Town of Andover retained Criterion Associates, LLC to assist the Ballardvale Fire Station Relocation Committee (the Committee) in their work assessing the need for, and the location of a firehouse to replace the existing facility located at the intersection of Andover Street and Clark Road in the Ballardvale village area of Andover. The Committee has been working for several years and had derived, with the assistance of a prior consulting firm, a suitable location near the South Elementary School at the corner of Andover and Woburn Streets. The focus of this assignment was to address three primary questions:

1. Using the latest methodologies possible, where should the fire station be placed for Andover Fire Rescue resources to the southern portion of the Town of Andover?

2. If the Town were to also replace the West Andover Fire Station in the future, where should that facility be located – and does that decision impact the placement of the southern (Ballardvale) station?

3. How do other expected projects impact the placement of the fire stations in the Town? What happens when a fourth station is considered? Do these change the potential placement of a Ballardvale fire station?

The results of this analysis are shown, in detail, in the body of this final report.

However, the following are the key conclusions from the study:

1. The utilization of five years of call for service data resulted in the model placing the 'optimal' location for the Ballardvale station at the location derived by the prior study at South School. **The best locations remain within a half-mile of the Andover Street / Woburn Street location recommended in the prior study**. In this case, 'optimal' is defined as that location which maximizes the number of emergency incidents reached by at least one engine company in four minutes or less, and which minimizes the number of emergency incidents which are reached by zero stations in that time limit.

2. The model derived locations for both Station 2 (Ballardvale) and Station 3 (West Andover) under a variety of scenarios. In every scenario, the project team "locked" the location of Fire Headquarters at the Public Safety Building located at 32 North Main Street.

In successive scenarios, the project team allowed the model to re-locate Station 2 alone, Station 3 alone, and then to re-locate both, Stations 2 and 3 concurrently. Under each scenario, the model resulted in placing the stations at approximately the same new locations, regardless of the order in which they are moved. **In other words, a new Station 2 (Ballardvale) can be located successfully within a half-mile of South School and provide service to that area of town. Placing it does not change the eventual preferred location for the Station 3 replacement for West Andover.**

3. Major new projects in the Town will result in challenges for the fire rescue system as it is currently deployed. When the model is limited to three stations, it does not move the alternative locations for Stations 2 or 3 very far to the West. When the model is allowed to consider a fourth station it identifies locations proximate to Interstate 93 (I-93) due to the ability of the fire rescue system to deliver emergency units North and South rapidly from a starting point near the Route 133 intersection with I-93 while maintaining its recommended location for Station 2.

While the GIS models used by the project team are able to derive 'optimal' locations, it must be acknowledged that the availability of suitable land (size, location, neighboring uses etc.) is a critical driver in the Town's decision making process as well. Our findings show that the movement of the current Ballardvale station to the East side of the railroad tracks is supported by current trends in workload. Again – these results are dependent, in large measure, on the location of the workload in the Town and on the assumptions regarding response capabilities utilized by the Committee.

The following chapter provides the body of our analysis, including a discussion about key assumptions, detailed maps and a summary of the response time impacts under various scenarios.

II. ANALYSIS OF STATION LOCATIONS

The project team from Criterion Associates evaluated a number of fire station location alternatives based on the direction provided by the Andover Fire Rescue Department staff and from the members of the Ballardvale Fire Station Relocation Committee. This Committee, comprised of town residents, has been charged with assessing the need for, and the potential location of, a new fire station in the southern end of Andover.

A. CONCLUSION: A new Station 2 (Ballardvale) should be located at or near South School (i.e., on the east side of the railroad tracks). This movement can be done without impacting the logical future location for any new facility in West Andover.

B. METHODOLOGY AND ANALYSIS

Criterion Associates, LLC utilizes a geographic information system (GIS) to analyze fire station locations, fire suppression / EMS response capabilities and other spatially-related questions. For the Town of Andover, we were asked to evaluate the placement of alternative locations for a new Ballardvale Fire Station. Concurrently, we were asked to evaluate locations for a potential new site for West Andover (Station 3) and to ensure that the relocation of the Ballardvale (Station 2) would not impact the placement of the other.

The project team from Criterion Associates, LLC combines data provided by the client, utilizing GIS data analytical and mapping tools and other non-GIS analytical tools to derive the answers to our clients' questions. This approach allows for the utilization of actual experience, captured in the CAD / RMS systems, to analyze current capabilities and potential alternative locations. The following sections provide a

summary of current operations, a description of the methods by which we evaluated the locations, and the analytical data and maps generated in our analysis.

1. Andover Fire Rescue Currently Operates from Three Fire Stations Located in Historic Areas of Call Demand and Development.

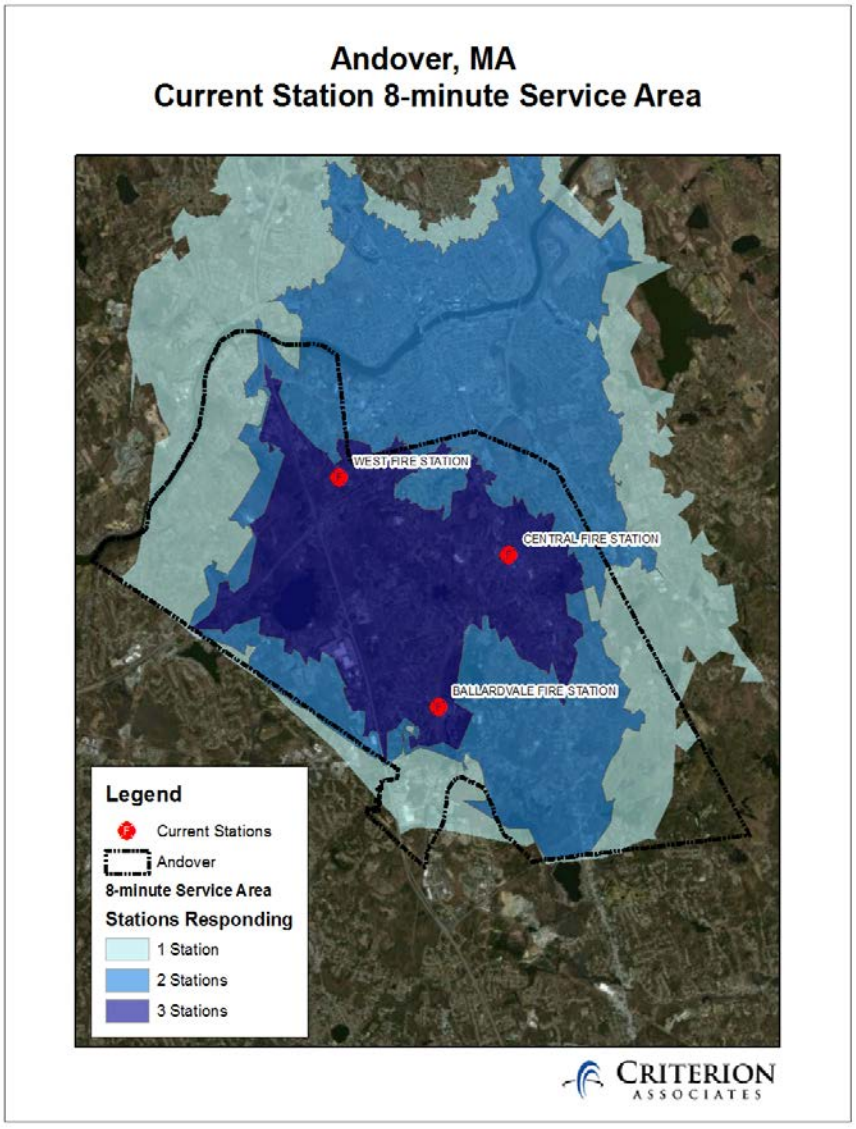
Andover Fire Rescue currently operates from three fire stations with a minimum daily staffing of 15 personnel, working on a four-platoon schedule. The minimum current on-duty deployment is as follows:

- **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:

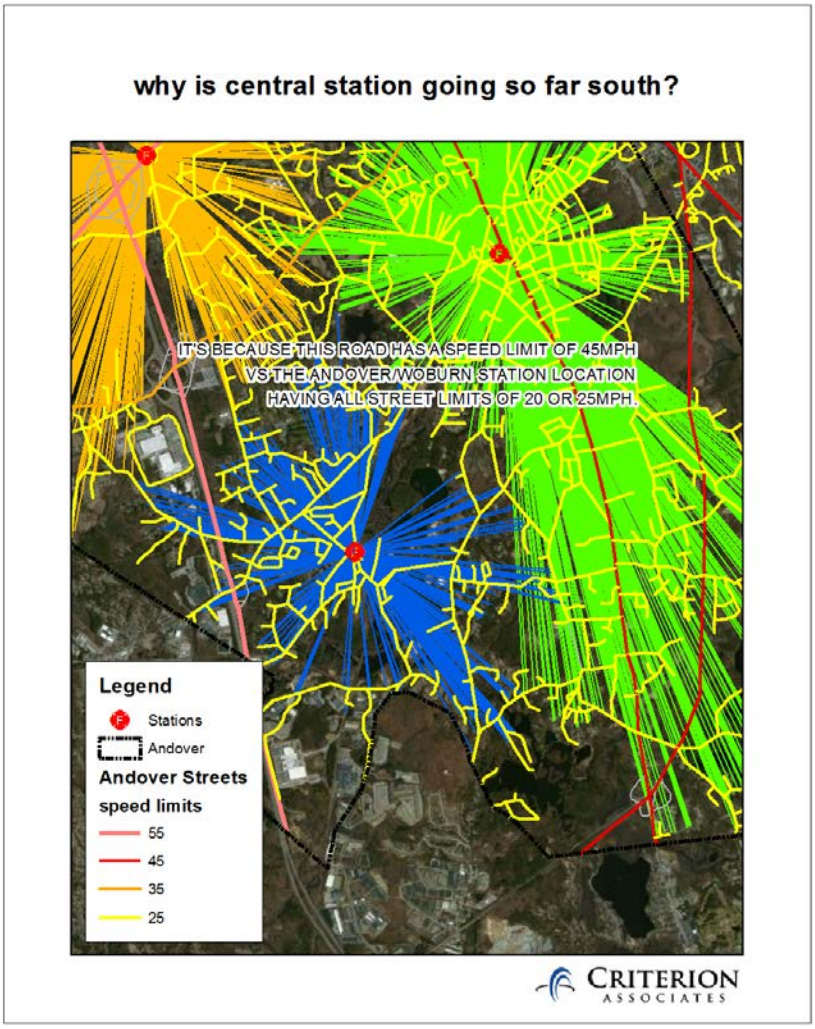
- Headquarters (Station 1): 32 North Main Street
- Ballardvale (Station 2): 1 Clark Road
- West Andover (Station 3): 200 Greenwood Road

The map, that follows, provides a graphical summary of the locations of the current fire stations and the capability of Andover Fire Rescue to cover the community in eight minutes or less of drive time:



Note, that the current system provides extensive coverage with at least one station being able to reach almost every street in Andover within eight minutes. The resulting maps for the current and potential alternative locations are provided in the chapter of the report that follows. One of the interesting questions that can be posed through this analysis, is why the headquarters (or central) station is operating so far south along Main Street and into the neighborhoods to the east of Main Street. The

map, that follows, depicts the "demand lines" that show which station can reach calls for service most quickly (assuming a unit is available):



The road on the right-hand side (eastern) of the map is Main Street – a 45 mph speed limit (south of Phillips Academy), straight road. Fire and EMS units can operate more effectively and with greater response speeds along this road than they can along the road network surrounding the current Ballardvale station. This is an important consideration as the analysis of station locations are considered in the body of the report.

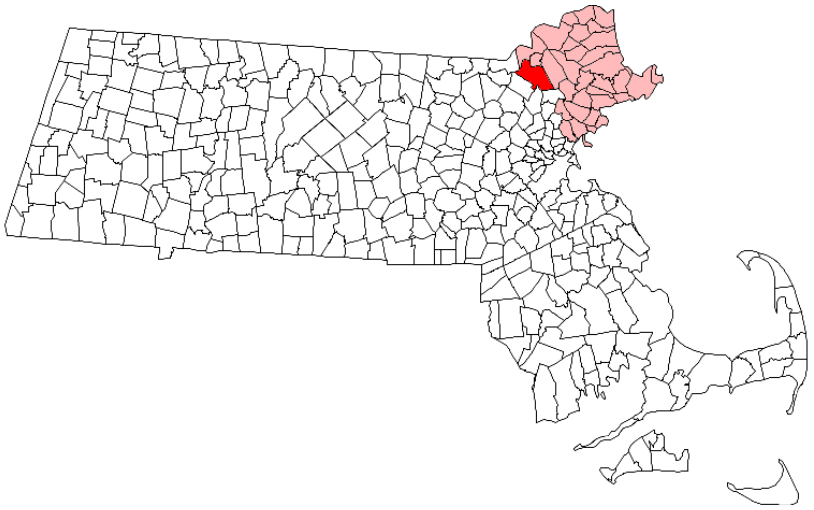
2. Standards Discussion – It is Important to Identify the Standards Against Which the Fire Rescue System Is To Be Evaluated. These Choices Can Have Major Impacts on Station Location.

In order to evaluate station locations, the project team from Criterion Associates, LLC needed a standard against which to evaluate them. Since the Town of Andover does not have formally adopted service levels (there is no Standard of Cover document in place), the project team referred to national consensus service level objectives and provided a range of analyses based on these recommendations.

One of the most important decisions that can be made by the Town's policymakers relating to the delivery of fire and EMS services is to determine what the appropriate service level standards are for the community. This has been a topic of intense national debate in recent years, with efforts focused on providing a consensus standard and developed methodologies for setting appropriate response time targets locally.

The project team from Criterion Associates, LLC recognizes that each community differs, even potentially from their immediate neighbors. A combination of standards to ensure the highest degree of emergency services is provided for the residents while being budget conscious to the taxpayer. This approach allows a custom fit for local government. Local demographics additionally guide what level of service a community should choose as their standard. Unique features of the Town of Andover to be considered:

- The Town is geographically large, with more than 32 square miles within its borders. The Town is located along the I-93 and I-495 corridors, on the western side of Essex County. Its neighboring communities range from urban (Lawrence and Methuen) to suburban to rural (North Andover, North Reading, Methuen, Tewksbury, Wilmington). The Town is shown, in red, in the map below:



- The Town has a population, according to the 2010 Census, of 33,201 resulting in a population density of approximately 1,000 persons per square mile (although the density can vary widely in different parts of Town).

- Given its size and density, there are challenges to the Town in terms of providing needed urban levels of coverage (in some parts of Town) and the suburban to rural levels of coverage required in other areas of Town.

- Andover Fire Rescue has an on-duty staff of 15 personnel at minimum staffing, including two Basic Life Support (BLS) level ambulances.

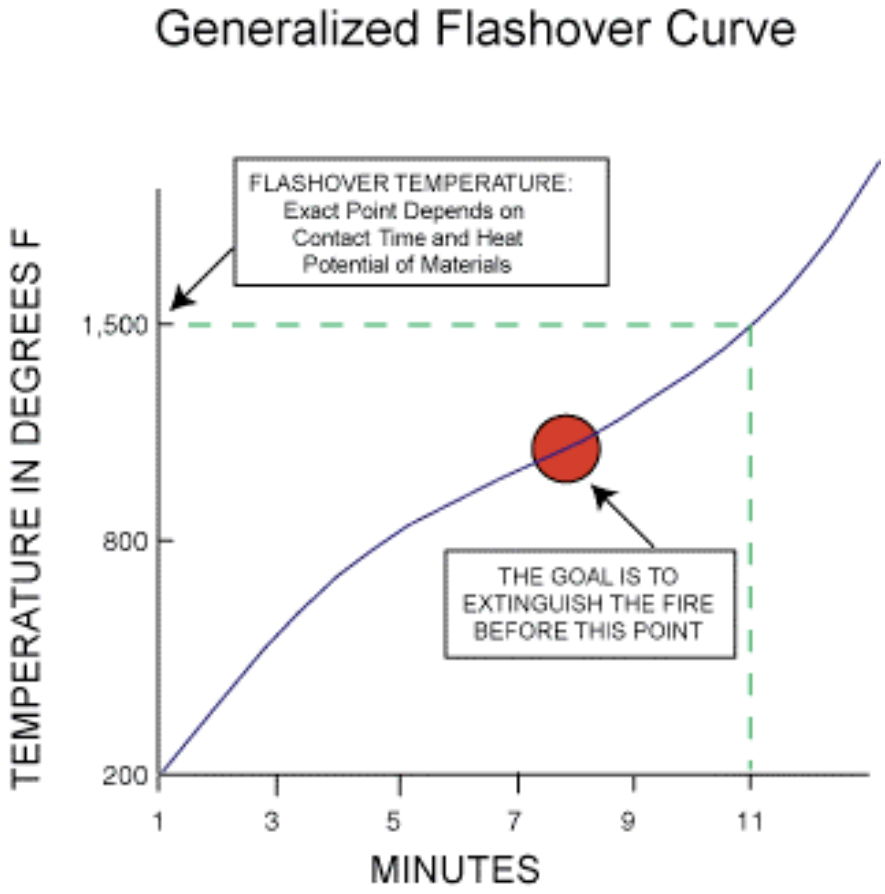
- Advanced Life Support (ALS) service is provided through a contract via an "intercept vehicle" staffed with two Paramedics who will meet the ambulance and provide ALS drugs and other life saving interventions as necessitated by the status of the patient.

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, as stated previously, 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 and categorized 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 a 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 violently involved in the fire. This is also the point at which a fire typically shifts from “room and contents” to a “structure” fire involving larger areas of the building and posing a potential risk to the structures surrounding the original location of the fire.



Note that this exhibit 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 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 the fire is reached; portable extinguishers can no longer have a successful impact on controlling the blaze. Only larger diameter hand-lines will have enough water supply delivery capacity to affect fire extinguishment 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 the collapse danger for the structure. Structural collapse begins to become a major risk to fire suppression personnel 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 a portable extinguisher or other "fast attack" methodology.

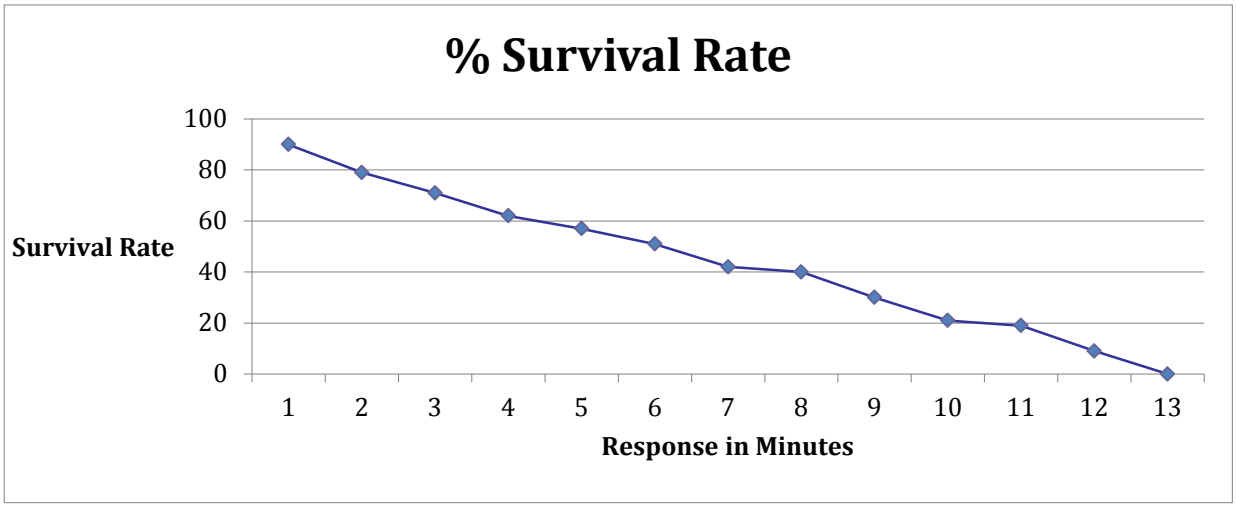
- Venting the room to allow hot gases to escape before they can cause ignition of other materials in the room.

- Not venting a room – under some circumstances this will actually stifle or "smother" 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 be limited by a safety requirement related to staffing levels. OSHA and related industry standards require the presence of at least two (2) firefighters (2 in 2 out rule) 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-firefighters 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 exhibit below demonstrates the survivability of cardiac patients as related to time from onset:



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 cardiac 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 doesn't). This research results in the recommended objective of the provision of basic life support within four (4) minutes

of notification and the provision of advanced life support within eight (8) minutes of notification. The goal is to provide BLS within six (6) minutes of the onset of the incident (including detection, dispatch and travel time) and ALS within ten (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 or fly-car units and personnel.

Additional recent research is beginning to show the impact and efficacy of rapid deployment of automatic external defibrillators (AED's) to cardiac arrests. This research conducted in King County (WA), Houston (TX), and as part of the OPALS study in Ontario, Canada, demonstrates that the AED can be the largest single contributor to the successful outcome of a cardiac arrest, particularly when accompanied by early delivery of Cardiopulmonary Resuscitation (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 intervention on these events.

Communities and first responders, often on their own with no single reference, develop local response time and other performance objectives, and have utilized the results of these research efforts. 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 was initially published in 2001 and underwent revisions generated a great deal of dialogue and debate which is still on-going.

- The Center for Public Safety Excellence (CPSE) 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.

Utilizing the above standards in the protection of life and property in addition to addressing the uniqueness of the Town of Andover, the following Level of Service Standard is recommended:

- One minute (60 seconds) or less for dispatch processing time – from call answer to dispatch of initial units. This is evaluated at a 90% fractile.

- Two (2) minutes or less for reflex time – from dispatch notification to the units going enroute. This is also evaluated at a 90% fractile.

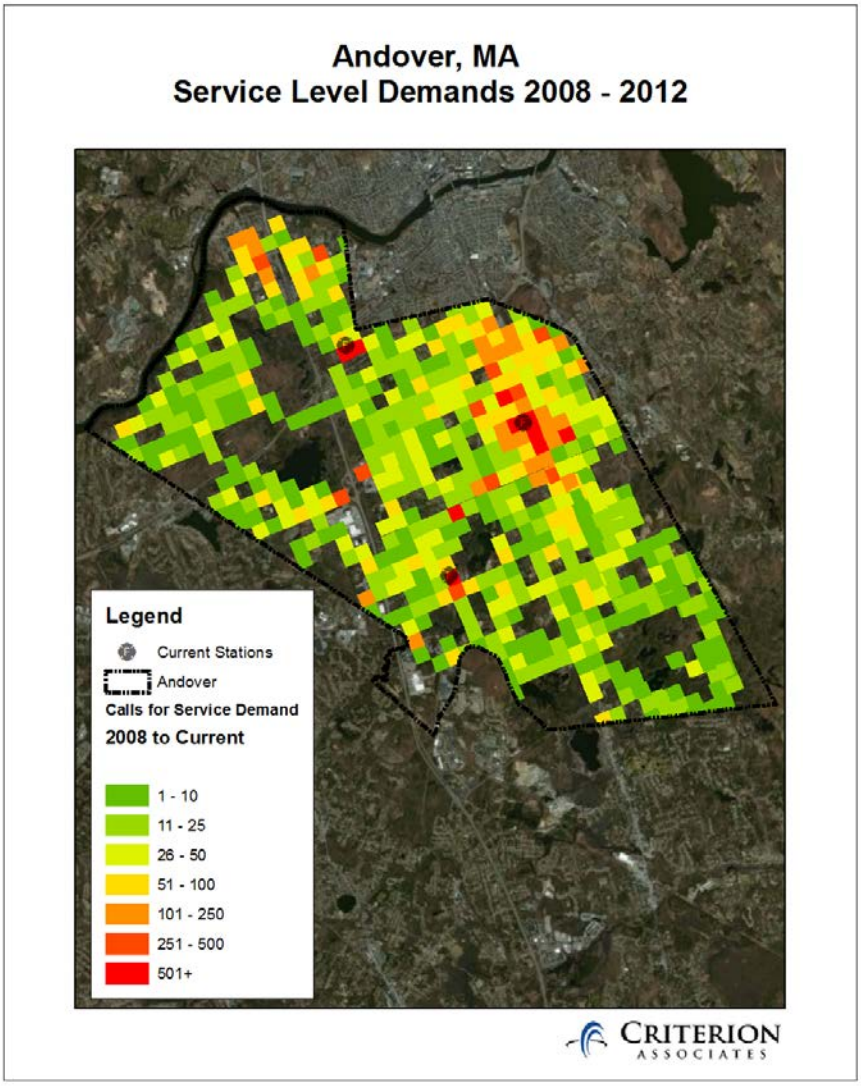
- Eight minutes (480 seconds) or less for drive time – from enroute time to arrival of the first unit on scene. The project team examined the capability of the Department to achieve the four minute response time capability and found that given current resources and current deployment (three stations) this is difficult to accomplish Town-wide.

In the evaluation of the various locations, the project team from Criterion Associates, LLC reports on the drive-time performance from each location at the four (4) minute and eight (8) minute standard. These analyses are shown in a later section of our report, along with maps that graphically depict the results. The Town of Andover and Andover Fire Rescue should focus on maximizing the number of incidents to which they can respond to under the four (4) minute target.

3. Criterion Associates, LLC Utilizes Several Analytical Models and Tools for Analyzing Station Locations.

The Criterion Associates, LLC project team makes use of a number of analytical tools and methods for assessing fire / rescue station locations. These are described below:

- The project team uses several pieces of GIS software to do the following:
  - Calls for service are added to a database and plotted on a map of the town.
  - Current and proposed stations are added to a second database and plotted on a map of the town as well.
- The GIS model is used to calculate the drive time from each station location to each call for service. In this project, the project team utilized five years' worth of call for service data spanning 2008-2012 (Summer). The image on the following page shows the distribution of calls graphically.
- Multiple-call locations are counted more heavily within the model than those where only a single call occurred. This has a notable result in the analyses shown in the subsequent section of the report.
- The GIS Model is then used to determine the proportion of calls that can be reached within pre-determined time periods. In this case, and as noted above, the project team utilized eight (8) minute drive times. Given the varying deployment models, the project team did not include a factor for dispatch or reflex time in our analyses.



This map shows, not surprisingly, a concentration of workload for Andover Fire Rescue along the Route 28 corridor, with other concentrations along I-93 and I-495.

The following section provides the project team's analyses of the current and alternative fire station locations.

4. The GIS Model Was Used to Evaluate the Current Locations as well as the Alternative Locations in Terms of Response Time Capability.

The next step in the analysis is to determine the sites to be evaluated. This process can be done in one of two ways (and in fact, both were used in this analysis):

1. The client provides the project team with pre-determined sites. Often these sites include parcels that are already owned by the community, are of sufficient size, and meet other pre-established criteria.

2. The project team is asked to select sites, regardless of ownership, that will best meet the community's pre-determined response time targets.

As mentioned above, the project team utilized both methods for identifying potential sites in the analyses conducted for the Town of Andover. This is summarized, below:

- The project team utilized the three existing fire station locations as potential sites.

- In certain scenarios, current fire station location sites were 'locked' into place. For example, we always assumed that there would be a fire station at the current public safety facility. In other successive scenarios, the project team 'locked' Station 3 (West Andover) or Station 2 (Ballardvale) in an effort to test various questions about the impact of moving one or more stations in the system and the potential timing impact of those moves.

- In some scenarios, we tested the previously determined site at Andover and Woburn Streets.

- The project team also took a grid and laid it down across the entire community, with locations every 1,000 feet on the road network. This approach allows the project team to test a multitude of locations with no specific guidance or bias for any particular location. The model will not place a grid-point in open space, only on a road network location.

The project team tested a number of alternatives, including the following:

1. Test the previously identified location at Andover Street and Woburn Street (South School).

2. Evaluate the best (other than South School) location for Station 2 if Station's 1 and 3 remain in their current location.

3. Evaluate the best location for Station 3 is Station's 1 and 2 remain in their current location.

4. Evaluate the best locations for Stations 2 (other than South School) and 3 if Station 1 remains in its current location.

5. Evaluated the impact of potential growth in the southwest corner of the Town if the State constructs a new exit off the I-93 highway.

First, it is important to understand how the model determines what is 'optimal' for these types of analyses. In essence, the modeler has two choices to consider:

1. Maximize the number of call locations that are arrived at within a pre-set period of time.
2. Minimize the average drive time to each location.

Given the land area and mixtures of population density within the Town of Andover, the project team chose to focus on the first option – to maximize the number of addresses which could be reached within a pre-set period of time – in this case, within four minutes of drive time. It should be noted that the model still attempts to locate stations in or near areas of call concentration. In this case, making use of the existing Public Safety facility on North Main Street and then striving to capture as many calls as possible within the pre-set limits. In addition, the model also attempts to provide for overlapping coverage in high-density call areas. This is shown by the number or percentage of call locations that have one, two, three, etc. units able to respond within a targeted time frame.

The following table shows the potential response time impacts from any of these alternatives, as compared to the current system and station locations. This first table shows the expected response time performance of each alternative system against a range of fractile performance targets (i.e., the response time to the fastest 10% of calls, etc.).

Fractile	Station 2 at Ballardvale & South Main	Optimal Station 3	Station 2 at Ballardvale and South Main & Optimal Station 3	Station2 @ South School
10th	0.02	0.02	0.02	0.02
20th	0.41	0.41	0.41	0.41
25th	0.56	0.47	0.56	0.56
30th	0.58	0.65	0.74	0.58
40th	0.92	0.89	1.18	0.92
50th	1.64	1.40	1.64	1.62
Avg	2.04	1.79	1.95	1.94
60th	2.24	2.03	2.11	2.09
65th	2.66	2.24	2.45	2.45
70th	3.03	2.51	2.75	2.90
75th	3.33	2.88	3.10	3.12
80th	3.79	3.16	3.45	3.52
90th	4.62	3.93	4.20	4.37

The table, below, shows the 4-minute station coverage results for calls for service from existing Station 1 (Public Safety), existing Station 3 and a newly located station at South School (as previously proposed). Note that the result is that more than 500 calls for service fall outside the 4-minute response time threshold that is currently within it.

Station 2 at South School: 4-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	4,422	505
1 station	25,750	(952)
2 stations	2,265	447

The next exhibit shows the distribution of calls for service under that same scenario as above (existing Station 1 – Public Safety, existing Station 3 and a newly located station at South School) under an eight (8)-minute drive time standard. Note that there is an improvement in that all calls can now be covered within the eight minute

target, with a shift of 900 call from single station coverage (215) and three station coverage (750) representing a net reduction in concurrent call coverage in the Town.

Station 2 at South School: 8-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	253	-
1 station	1,970	(215)
2 stations	6,711	965
3 stations	23,503	(750)

The next table shows the same four (4) minute analysis for Station 2 located at South Main Street and Ballardvale Road. Note that 13,950 calls shift from being covered by 1 station to 2 stations. Approximately 1,970 calls over the time period researched would not have been reached within four (4) minutes by a unit that were reached in that time standard under the current system.

Station 2 @ Ballardvale and South Main: 4-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	5,887	1,970
1 station	10,782	(15,920)
2 stations	15,768	13,950

The exhibit that follows provides a summary of the results derived from shifting the Ballardvale Station to a South Main Street location measured against the 8-minute standard. As the table shows, this results in a slight improvement.

Station 2 @ Ballardvale and South Main: 8-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	99	(154)
1 station	2,236	51
2 stations	5,829	83
3 stations	24,273	20

The next exhibit shows the impact of shifting Station 3 (West Station) to this location (while leaving Station 2 and HQ in place) shows an improvement in multiple station coverage of calls for services and a reduction of 1,029 incidents in the number of stations that receive no coverage in the four (4) minute time standard.

Alternative Station 3: 4-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	2,888	(1,029)
1 station	26,043	(659)
2 stations	3,506	1,688

The shifting of Station 3 to this location, against the eight (8) minute standard, shows that this move improves multi-station coverage marginally. This is shown in the exhibit, below by the shift of 99 non-covered calls into one or more stations, and a shift of calls from two stations into three station coverage.

Optimal Station 3: 8-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	154	(99)
1 station	2,251	66
2 stations	5,246	(500)
3 stations	24,786	533

Identifying the best locations for both Stations 2 (excluding South School) and Station 3 concurrently results in very similar station placement and also in results that look very similar for the Ballardvale Road / South Main Street location for Station 2 analysis discussed previously, with a significant improvement in multiple station coverage at the four (4) minute time standard.

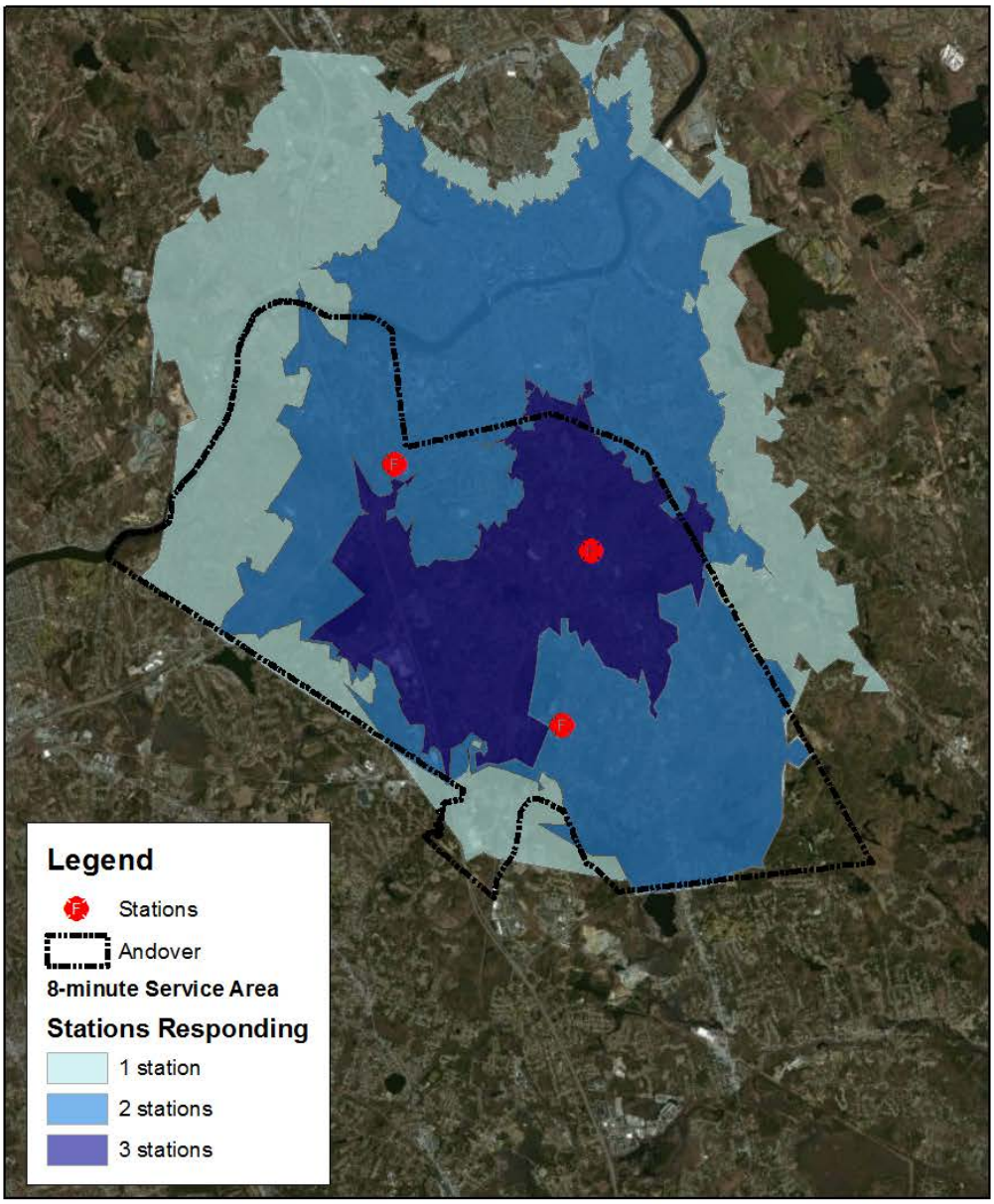
Station 2 at Ballardvale and South Main and Optimized Station 3: 4-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	6,021	2,104
1 station	7,638	(19,064)
2 stations	18,751	16,933
3 stations	27	27

Interestingly, at the EIGHT (8) minute standard, there are very few changes with a modest improvement on multi-station coverage (reduction of non-covered calls) with a slight reduction in 2-station covered calls within eight (8) minutes, and the vast majority receiving 3-station response coverage at the eight (8)minute threshold:

Station 2 at Ballardvale and South Main and Optimized Station 3: 8-minute Service Area		
Station Coverage	**Number of CFS**	**Scenario Compared to Current**
Total CFS	32,437	-
0 stations	9	(244)
1 station	2,898	713
2 stations	5,218	(528)
3 stations	24,312	59

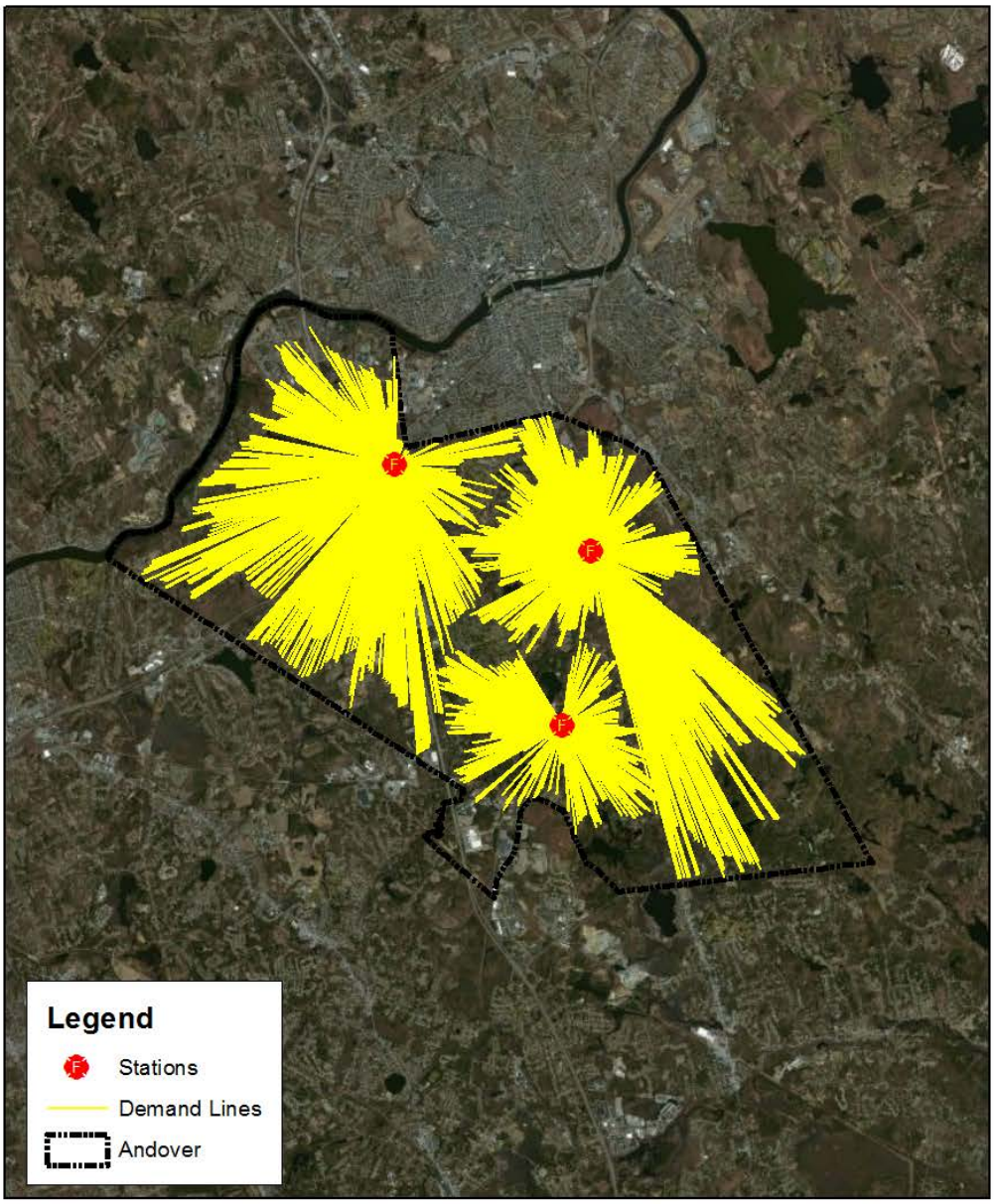
The following pages provide maps depicting the issues discussed in the body of the report.

Andover, MA
Ballardvale Station Located at Andover and Woburn
8-minute Service Area

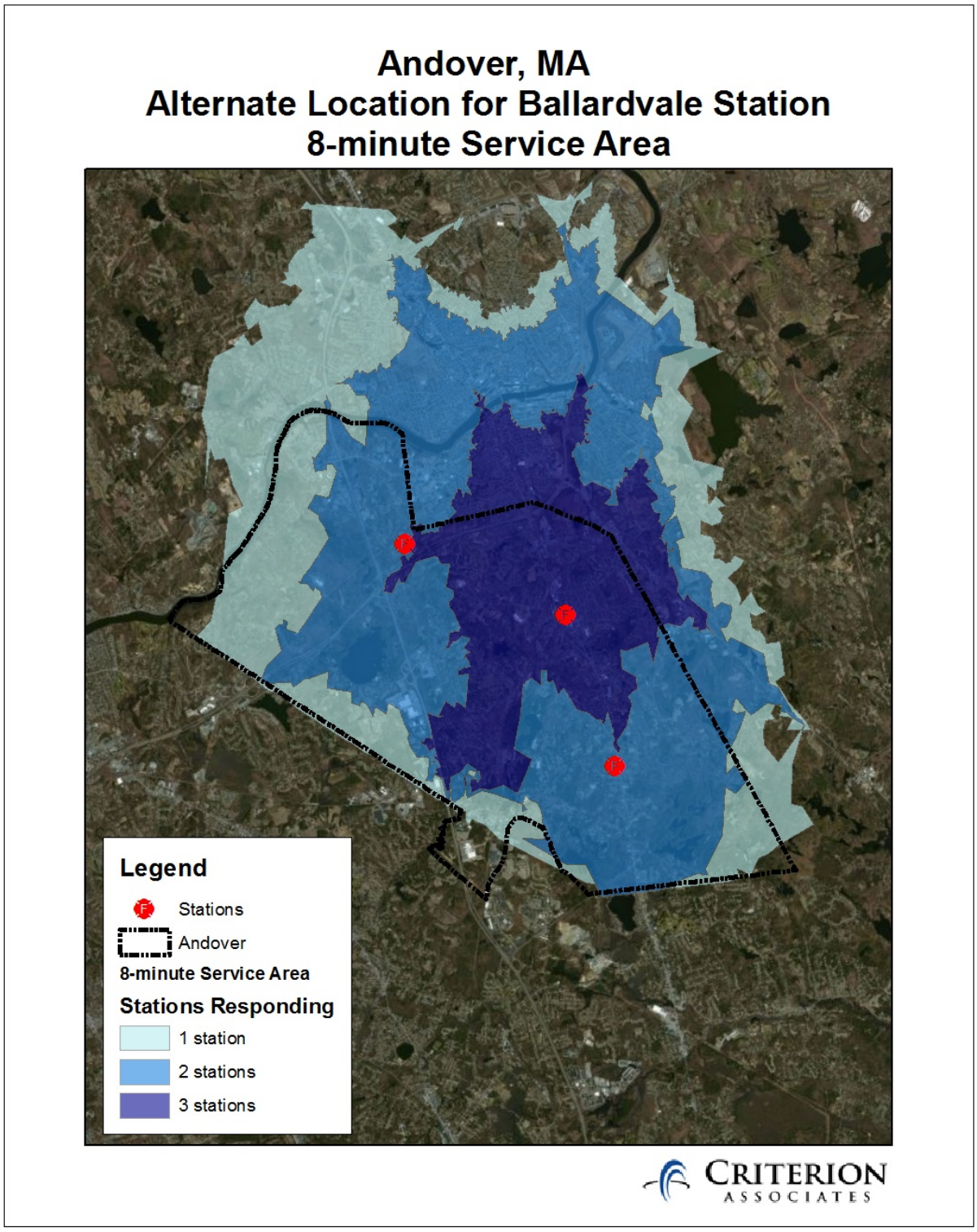


CRITERION ASSOCIATES

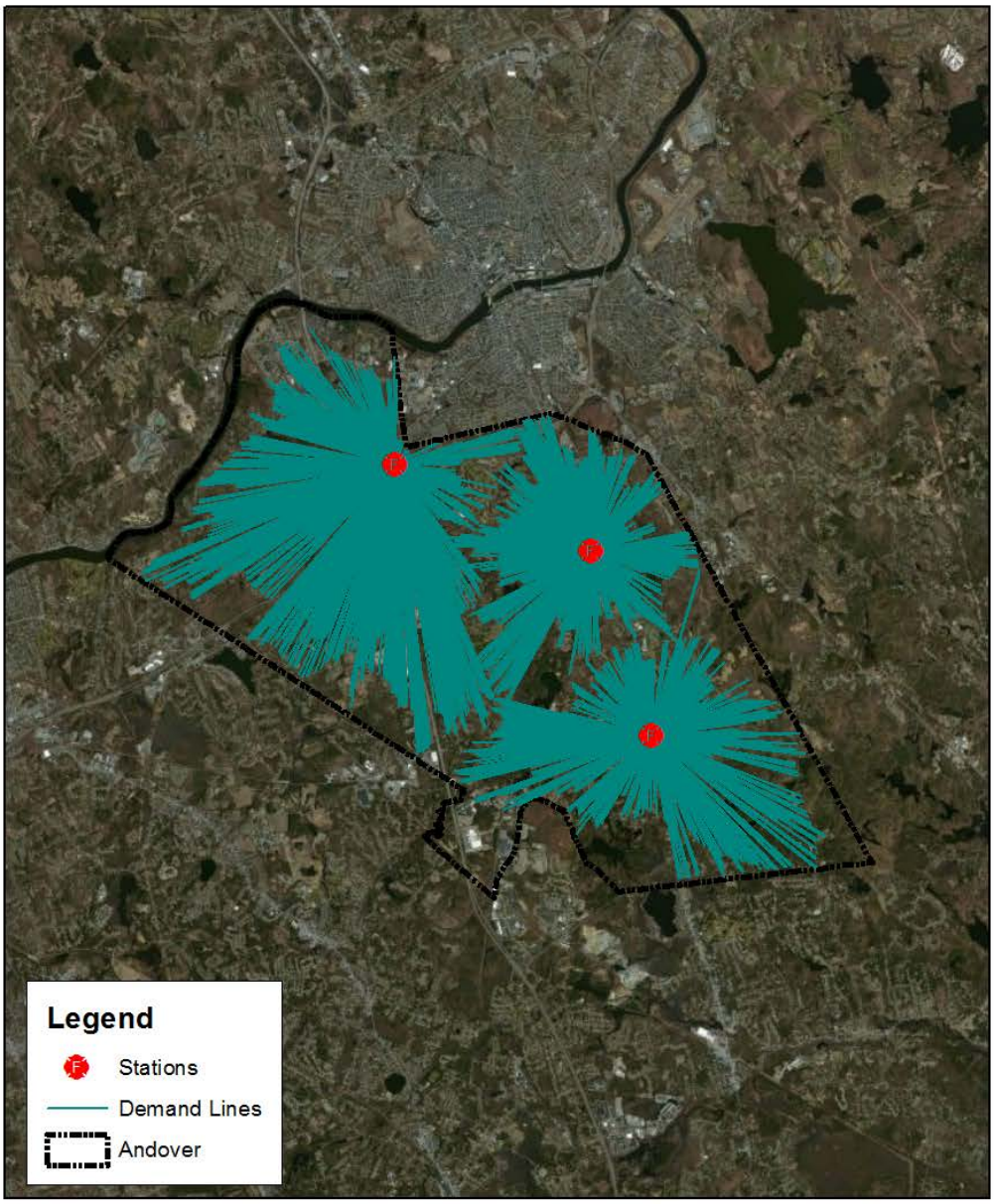
Andover, MA
Ballardvale Station Located at Andover and Woburn



CRITERION ASSOCIATES

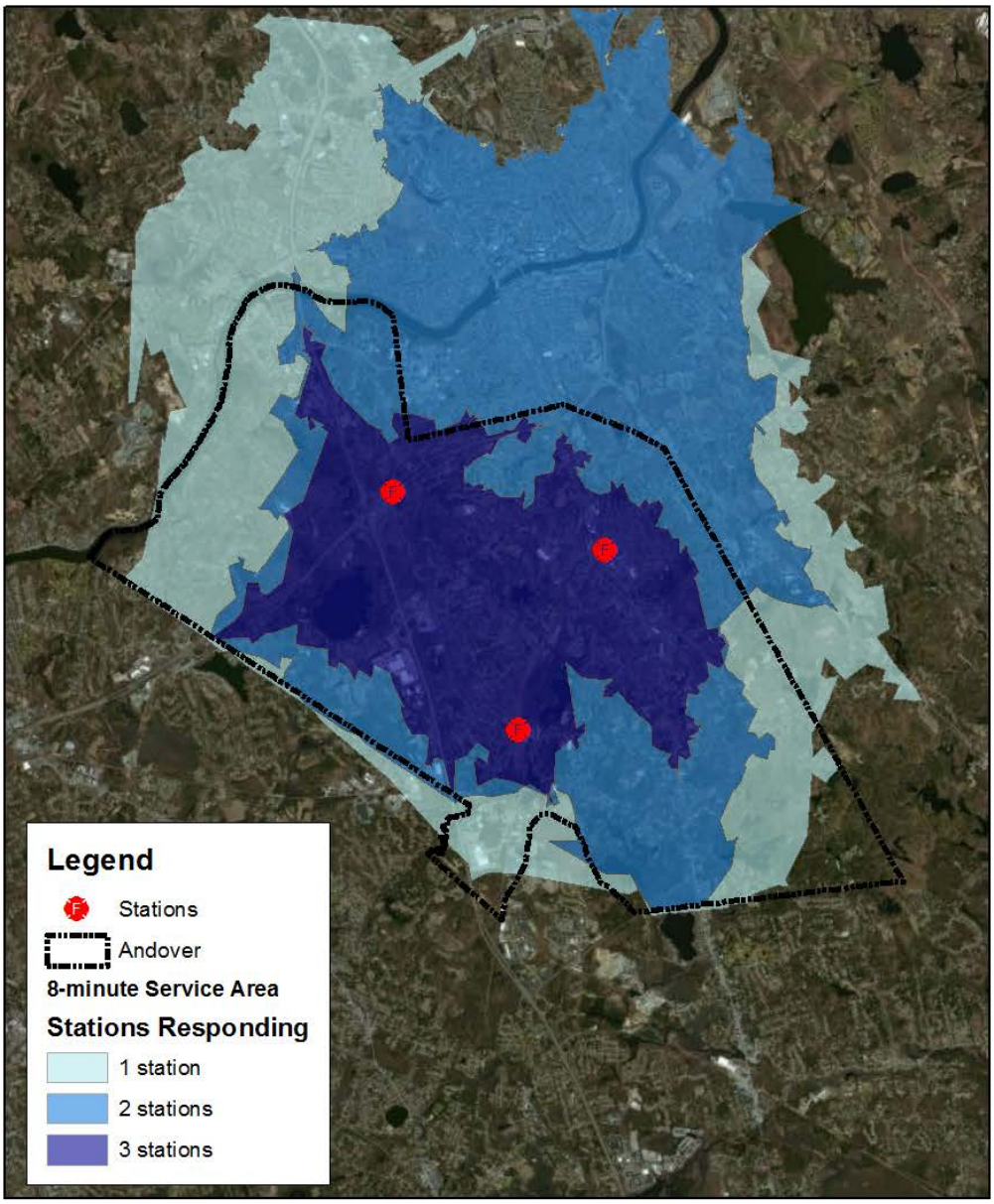

Andover, MA
Alternate Location for Ballardvale Station
8-minute Service Area
Legend
Stations
Andover
8-minute Service Area
Stations Responding
1 station
2 stations
3 stations
CRITERION
ASSOCIATES

Andover, MA
Alternate Location for Ballardvale Station
Demand Lines: CFS Serviced by Stations within 8-minutes



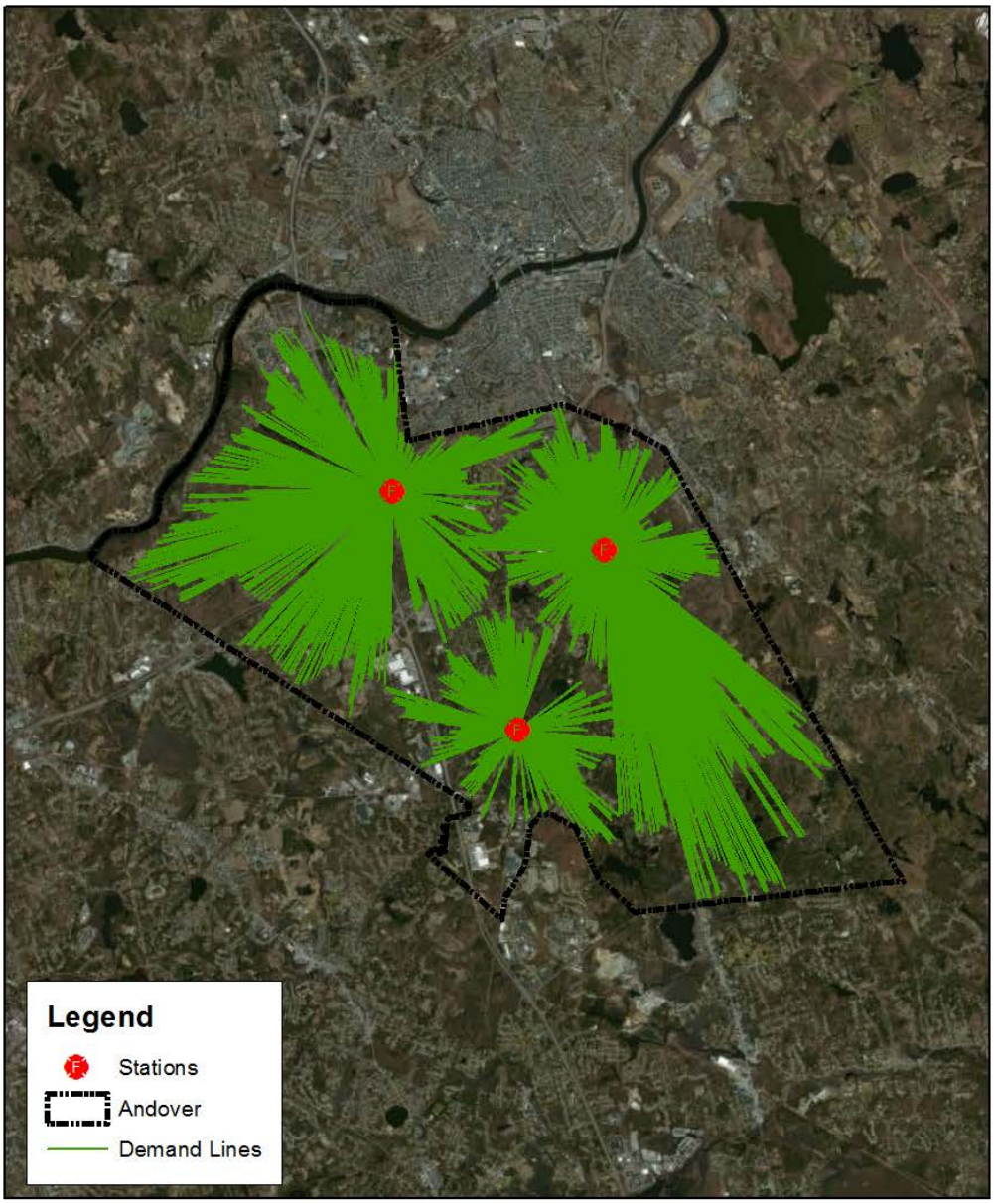
CRITERION ASSOCIATES

Andover, MA
Central Station, Ballardvale Station and Alternative Location
8-minute Service Area

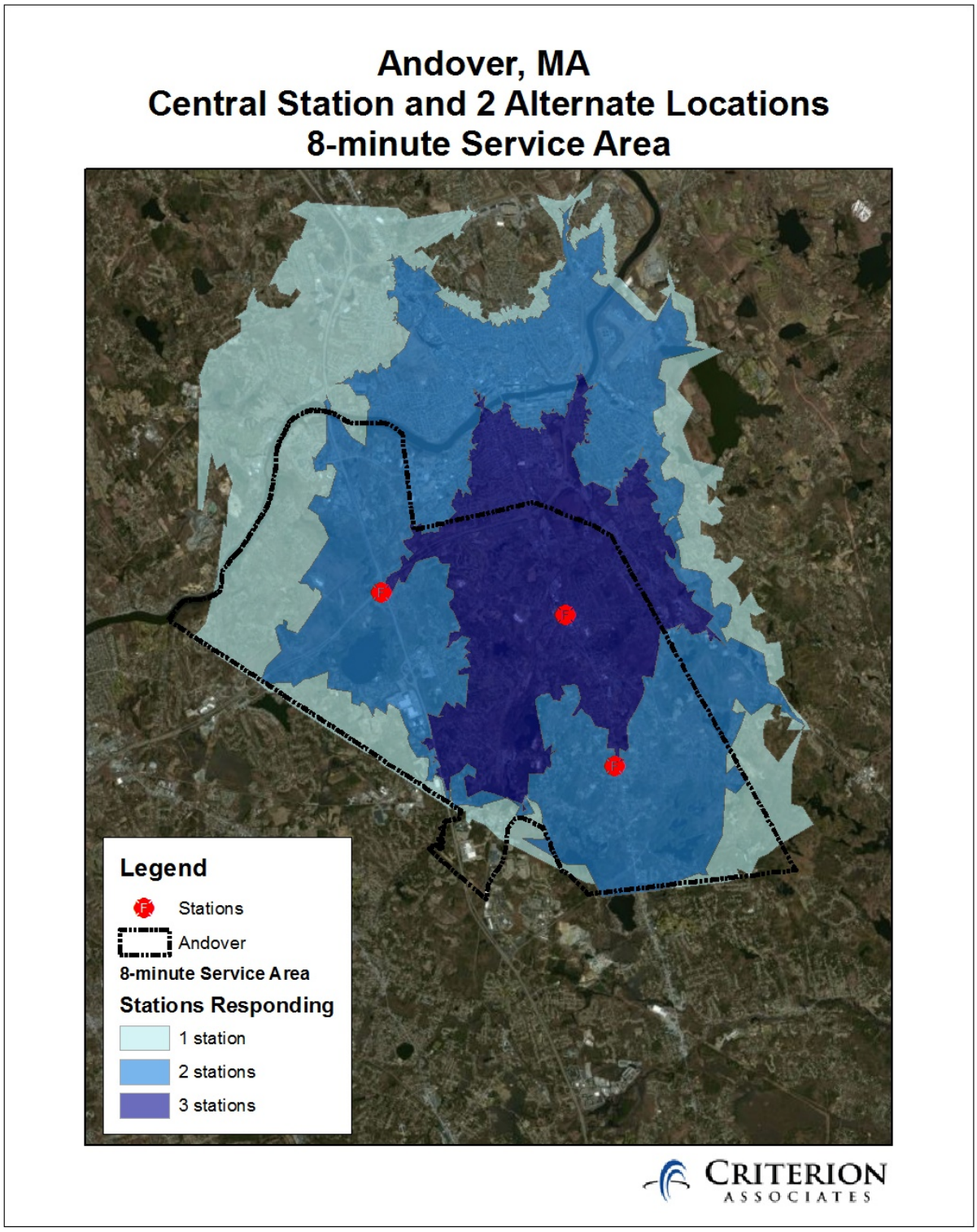


CRITERION ASSOCIATES

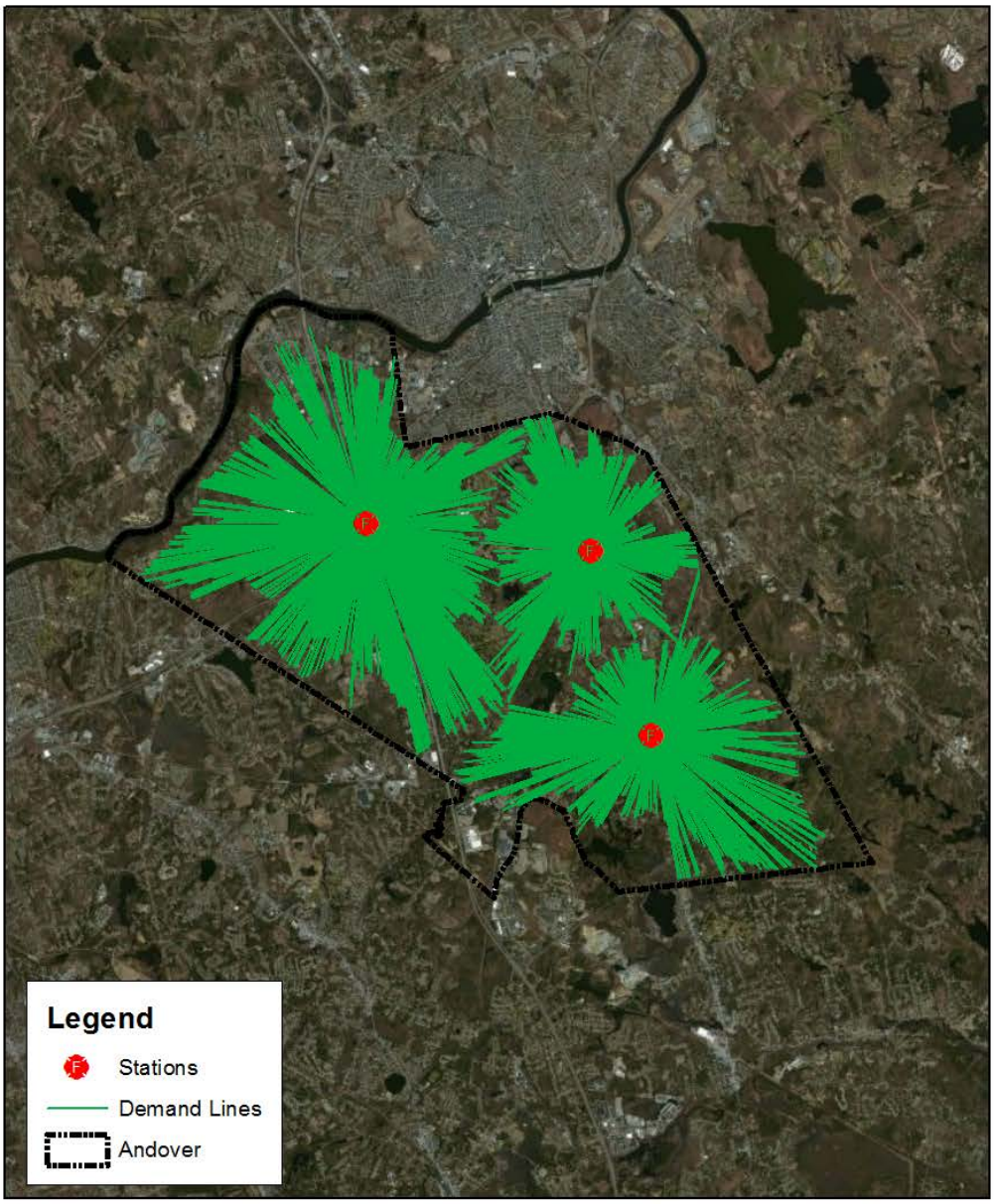
Andover, MA
Central Station, Ballardvale Station and Alternative Location



CRITERION ASSOCIATES

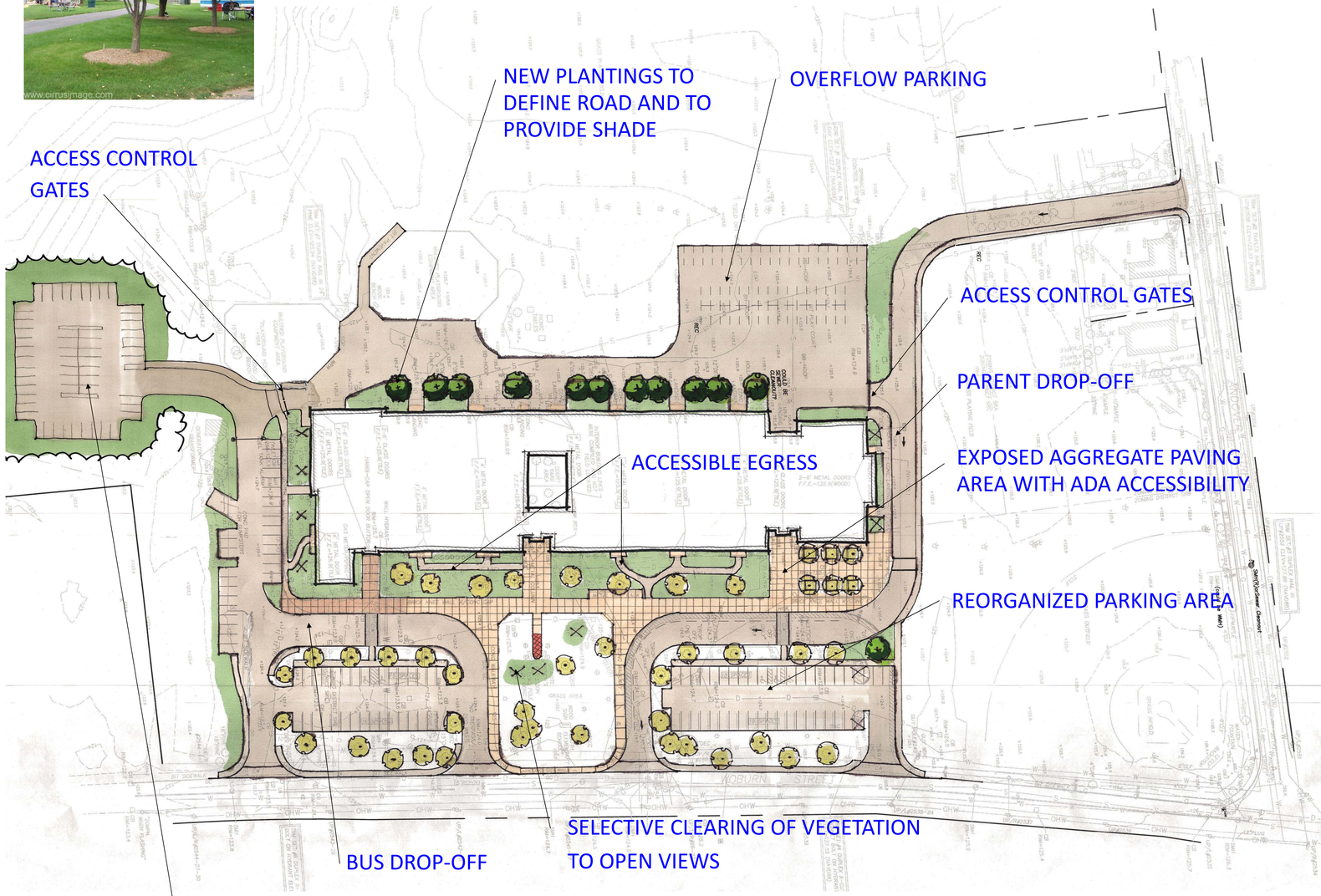

Andover, MA
Central Station and 2 Alternate Locations
8-minute Service Area
Legend
Stations
Andover
8-minute Service Area
Stations Responding
1 station
2 stations
3 stations
CRITERION
ASSOCIATES

Andover, MA
Central Station and 2 Alternate Locations
Demand Lines: CFS Serviced by Station Within 8-minutes



CRITERION ASSOCIATES

South Elementary School



PARE CORPORATION

BIRCHWOOD DESIGN GROUP

46 Dike Street • Providence, RI • 02909

PROPOSED TREELINE
BIO-RETENTION AREA
WATER QUALITY SWALE (TYP)
SNOW STORAGE AREA
GRANITE CURB (TYP)
BITUMINOUS WALK (TYP)
GATE
BITUMINOUS PAVEMENT (TYP)
RELOCATE STORAGE CONTAINER AND SHED
CONCRETE PAD FOR RELOCATED SHED
CONCRETE DUMPSTER PAD
WATER QUALITY SWALE
BIO-RETENTION AREA
BITUMINOUS WALK (TYP)
CROSSWALK (TYP)
SNOW STORAGE AREA
LAYOUT FOR OVERFLOW PARKING
BITUMINOUS PAVEMENT (TYP)
CONCRETE WALK
BITUMINOUS WALK (TYP)
CONCRETE WALK (TYP)
PROPOSED TREELINE
BITUMINOUS PAVEMENT (TYP)
WATER QUALITY SWALE (TYP)
GRANITE CURB (TYP)
BITUMINOUS WALK (TYP)
BIO-RETENTION AREA
GATE
CONNECT ROOF DRAIN TO CLOSED DRAINAGE
SNOW STORAGE AREA
BITUMINOUS WALK (TYP)
SNOW STORAGE AREA

NOTES:

1. ADA CURB CUTS AND SITE SIGNS ARE NOT SHOWN FOR MASTER PLAN LEVEL.
2. ALL SIGNS, ADA PARKING SPACES AND PROPOSED WALKWAYS SHALL BE COMPLIANT WITH ADA AND MAAB REGULATIONS.
3. BRICKS IN STRUCTURES SHOULD BE EVALUATED AND ADDED WHEN ADJUSTING STRUCTURES TO GRADE.
4. APPROXIMATE LIMIT OF DISTURBANCE WILL BE 5' FROM PROPOSED WORK. AREAS DISTURBED WILL REQUIRE LOAM AND SEED.
5. EROSION CONTROL WILL BE REQUIRED AT PERIMETER OF WORK.
6. DRAINAGE INDICATED IS CONCEPTUAL.
7. CLOSED DRAINAGE AND GRADING IMPROVEMENTS ARE NOT DEPICTED.

PARKING SUMMARY	
EXISTING	68 SPACES
PROPOSED	152 SPACES
TEMPORARY	35 SPACES

* = MUSTER AREA

Graphic Scale 1"=40'

40' 20' 0 40' 80' 160'

PARE
PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
10 LINCOLN ROAD, SUITE 103
FOXBORO, MA 02035
508-543-1755

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING.

SOUTH ELEMENTARY SCHOOL

55 WOBURN STREET
ANDOVER, MASSACHUSETTS

REVISIONS:

PROJECT NO.:	11147.00
DATE:	APRIL 27, 2012
SCALE:	1"=40'
DESIGNED BY:	CPO
CHECKED BY:	AJC
DRAWN BY:	AWB/LMC
APPROVED BY:	AJC

SITE PLAN

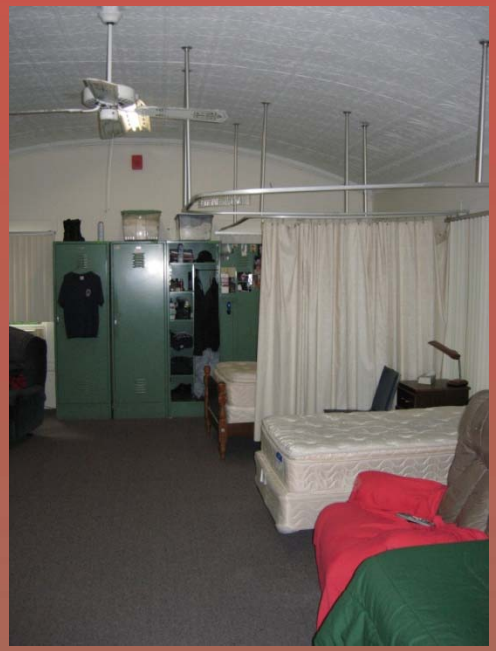
SHEET NO.:
C 5.0

Ballardvale Fire Station Building Committee Presentation to Citizens of Andover

Ballardvale Fire Sub-Station Relocation Proposal

April 13, 2011

Ballardvale Fire Station

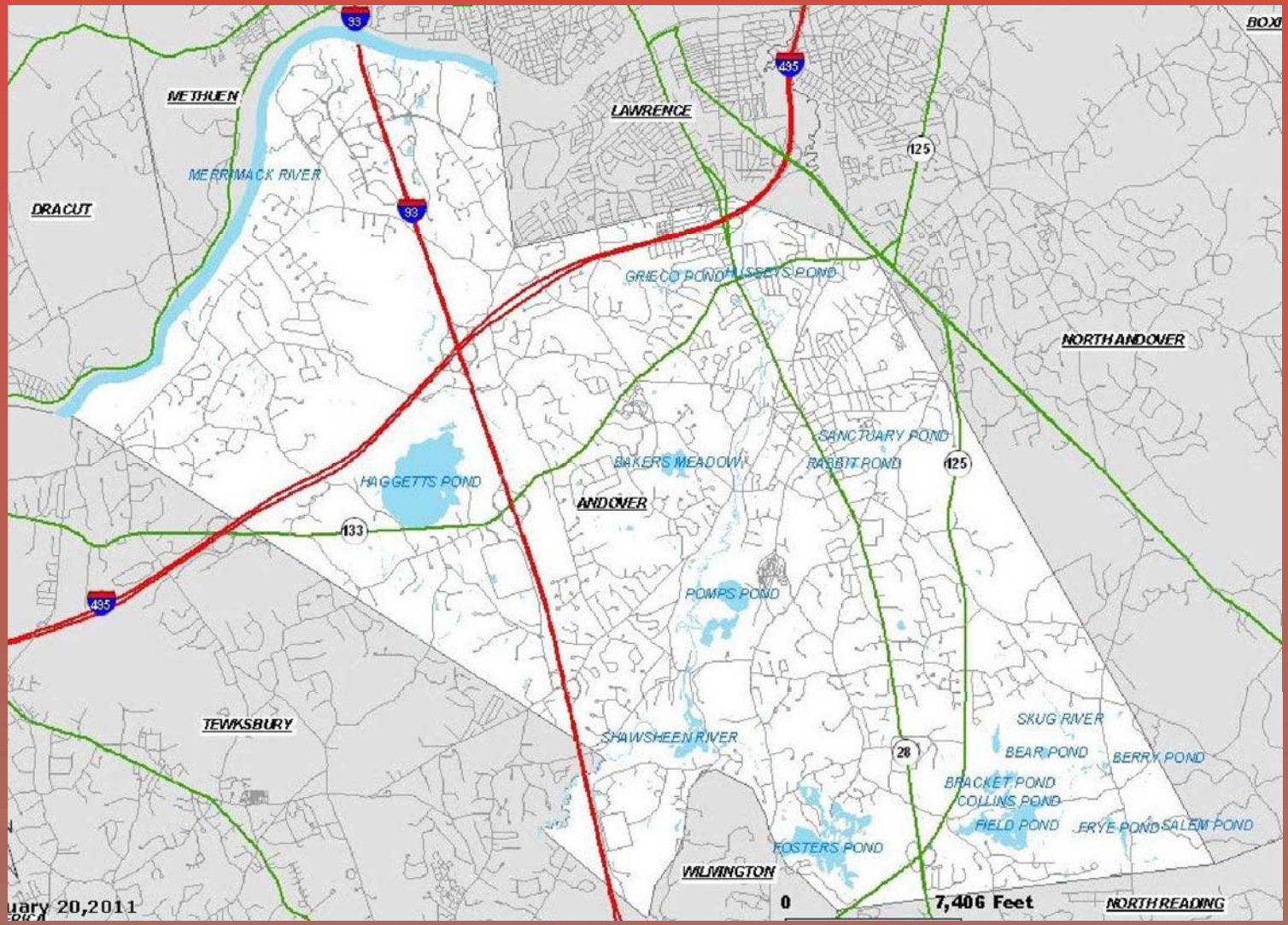


Ballardvale Fire Station Building Committee Presentation

Ballardvale Fire Station

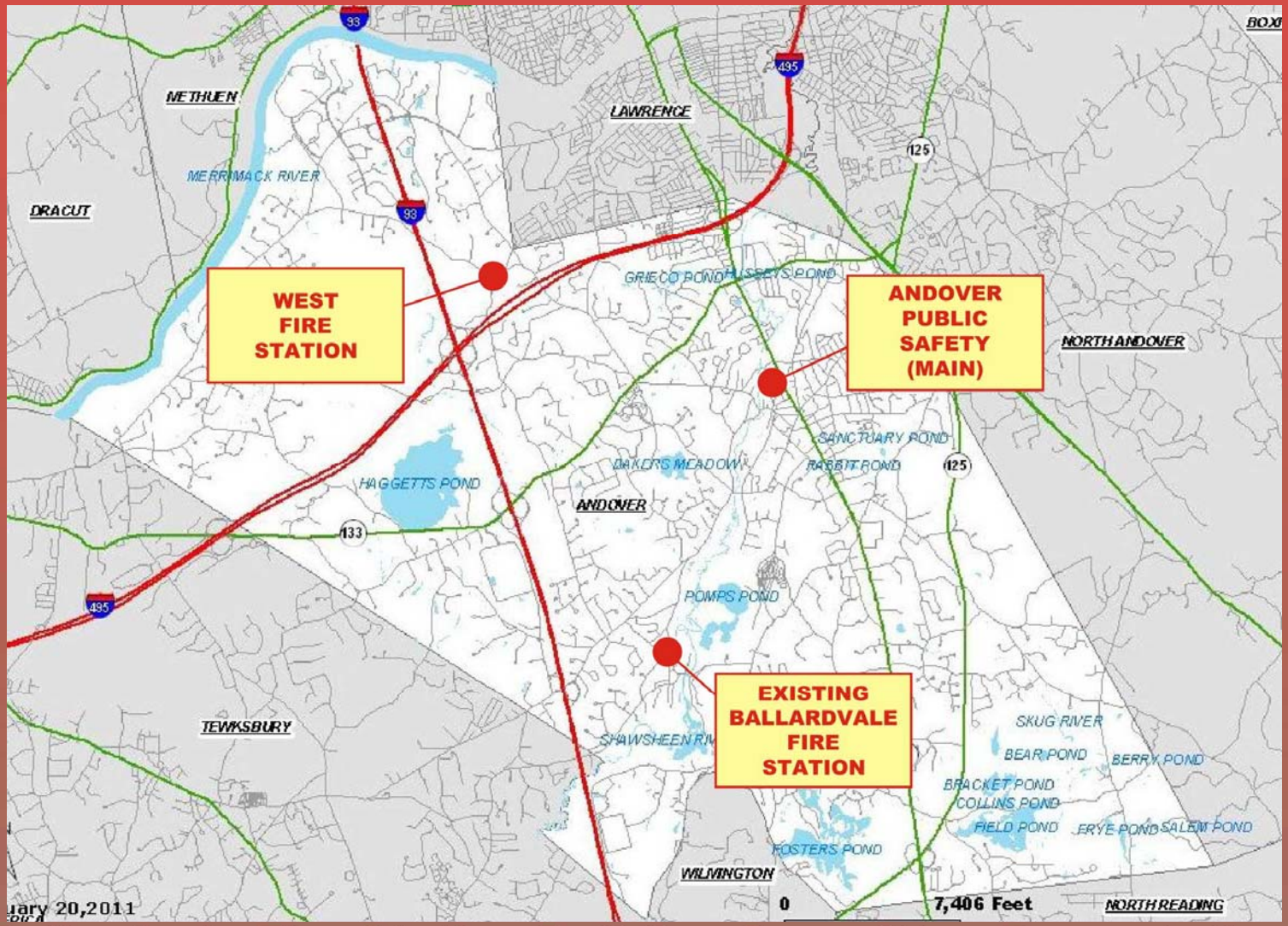
Ballardvale Fire Station Building Committee Presentation

Site Selection Process

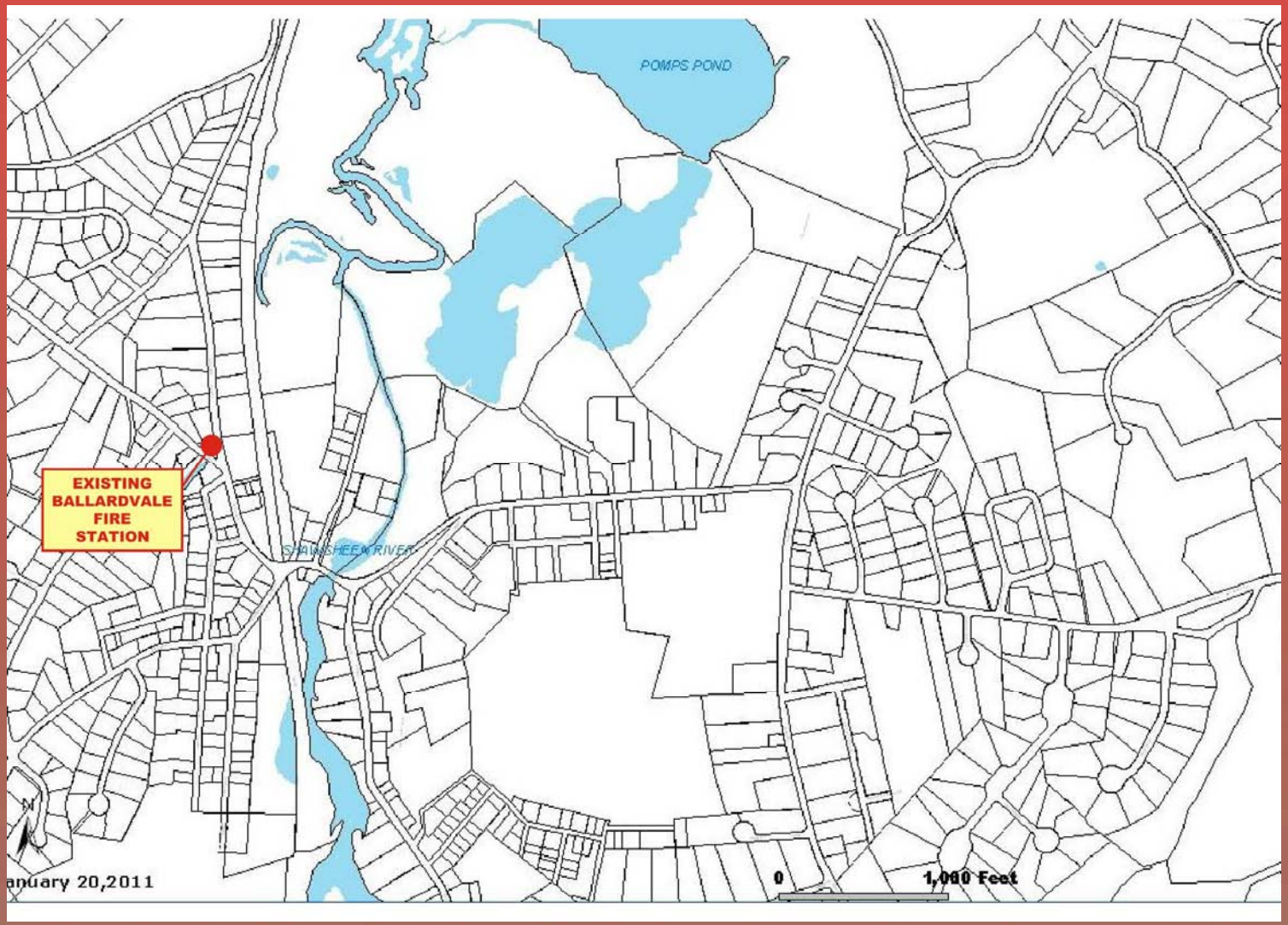


Ballardvale Fire Station Building Committee Presentation

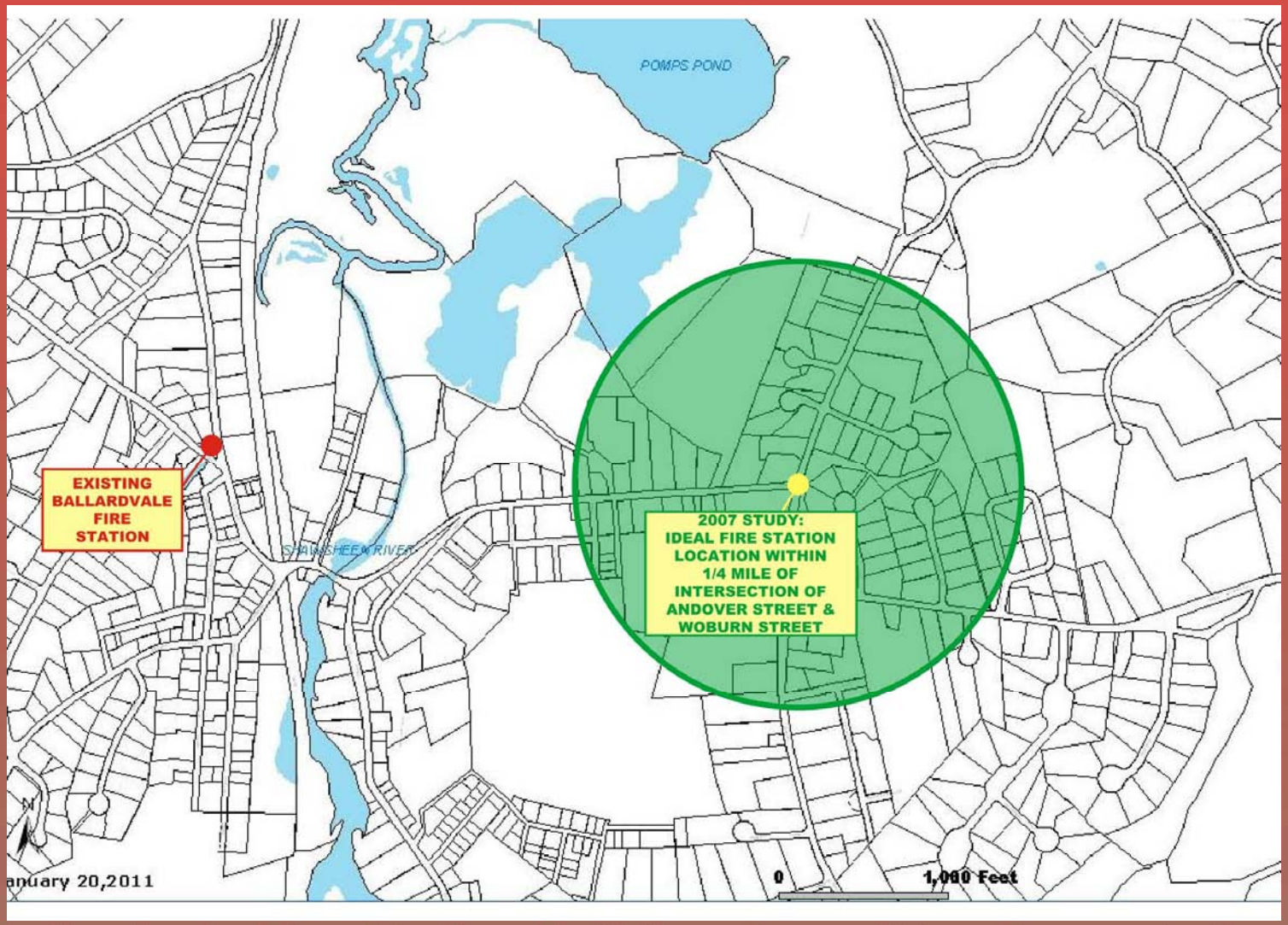
Site Selection Process



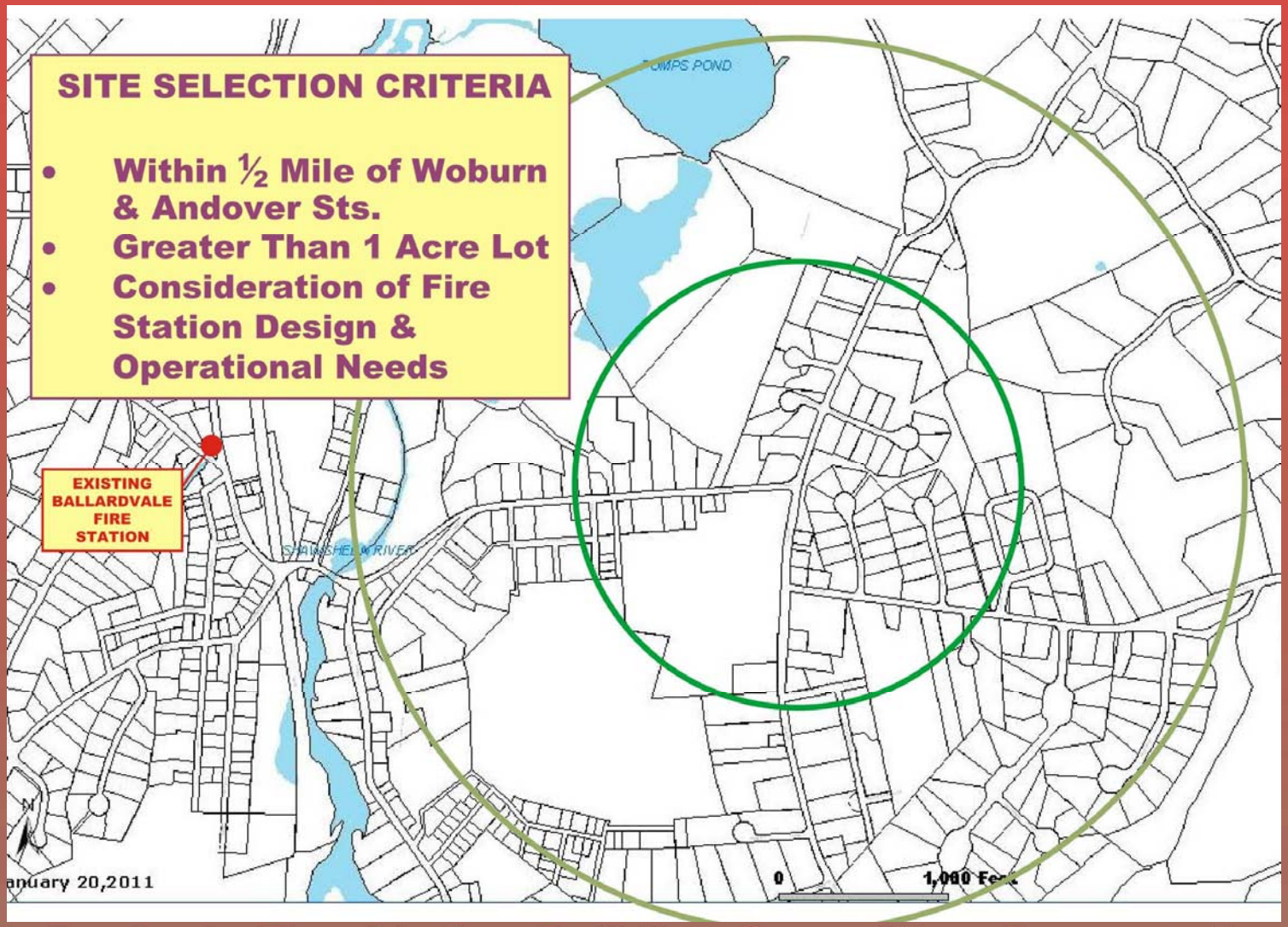
Site Selection Process



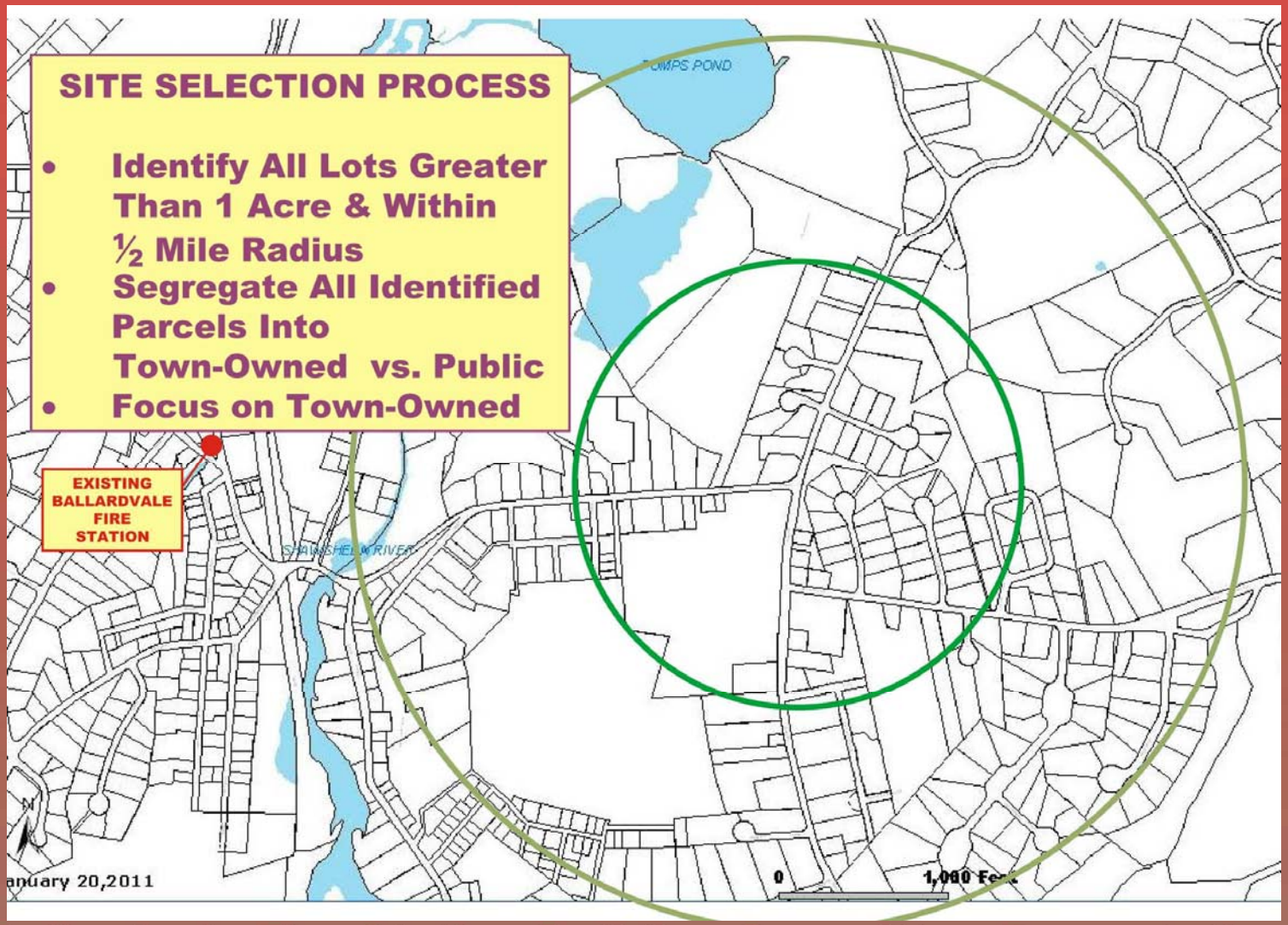
Site Selection Process



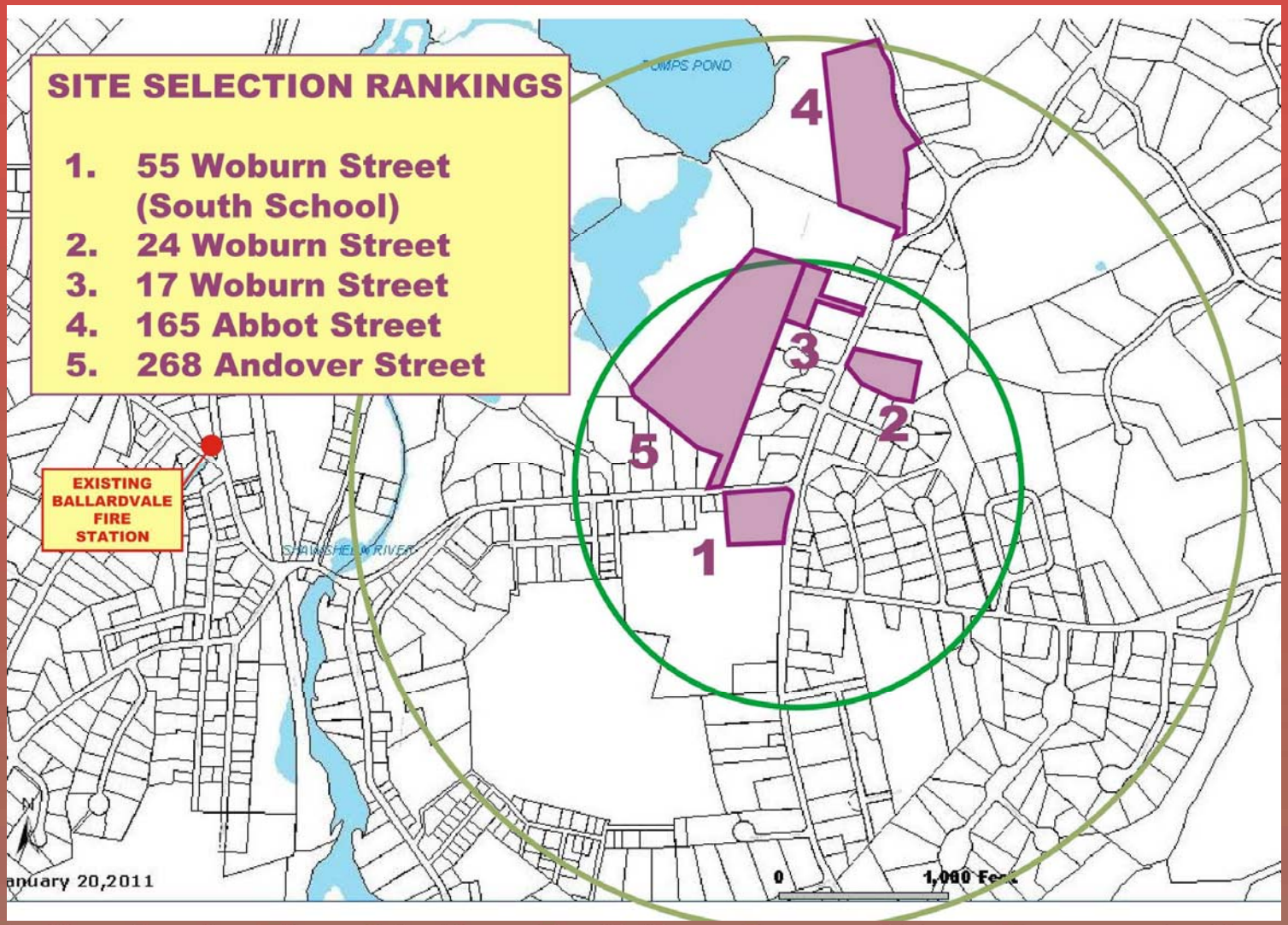
Site Selection Process



Site Selection Process



Site Selection Process



Site Selection Process

Direct Residential Abutters to Each Site:

1. 55 Woburn Street (South School)
   3 Residential Abutters
2. 24 Woburn Street
   7 Residential Abutters
3. 17 Woburn Street
   5 Residential Abutters
4. 165 Abbot Street
   7 Residential Abutters
5. 268 Andover Street
   10 Residential Abutters

Site Selection Process

Apply Site Selection Criteria to 5 Town-Owned Sites Passing Initial Screen to Calculate Scores (below):

Site #	Site Address	Minimum 1 Acre Lot Size	Lot Shape	Close to Manitou Target	Access to Primary Roads & Sight Lines	Site Work Needed	TOTAL SCORE
1	South School Baseball Field (corner of Andover & Woburn Sts.)	5	5	5	5	5	25
2	24 Woburn Street **	5	5	5	5	5	25
3	17 Woburn Street	5	4	4	3	5	21
4	183 Abbott Street	5	3	4	2	2	16
5	268 Andover Street	5	2	5	2	1	15

Discard 3 Lowest Scoring Sites to Directly Compare the 2 Sites Tied for Highest Score (below):

Site #	Site Address	Minimum 1 Acre Lot Size	Lot Shape	Close to Manitou Target	Access to Primary Roads & Sight Lines	Site Work Needed
1	South School Baseball Field (corner of Andover & Woburn Sts.)	X	X	X	X	X
2	24 Woburn Street **	X	X			

**Conservation Restriction Exists at 24 Woburn Street

Relocation & Site Improvement Proposal

The Ballardvale Fire Station Building Committee:

- Presents our Preliminary Site Plan Proposal
- Highlights the Benefits

Relocation & Site Improvement Proposal

HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

Relocation & Site Improvement Proposal

HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

Ballardvale Fire Station Building Committee Presentation

Relocation & Site Improvement Proposal

HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

Relocation & Site Improvement Proposal

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Relocation & Site Improvement Proposal

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Landscape Architecture & Land Planning

Ballardvale Fire Station Building Committee Presentation

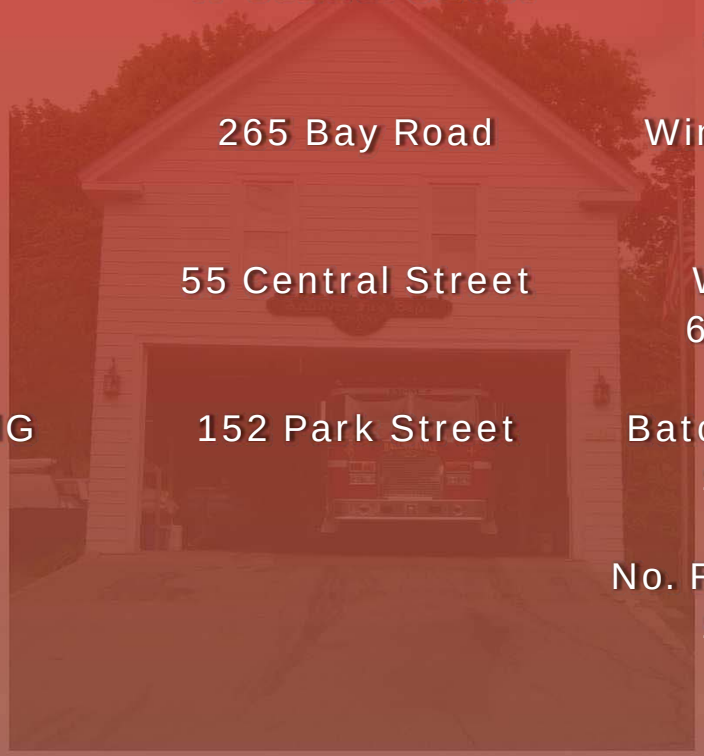
Relocation & Site Improvement Proposal

HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

Ballardvale Fire Station Building Committee Presentation

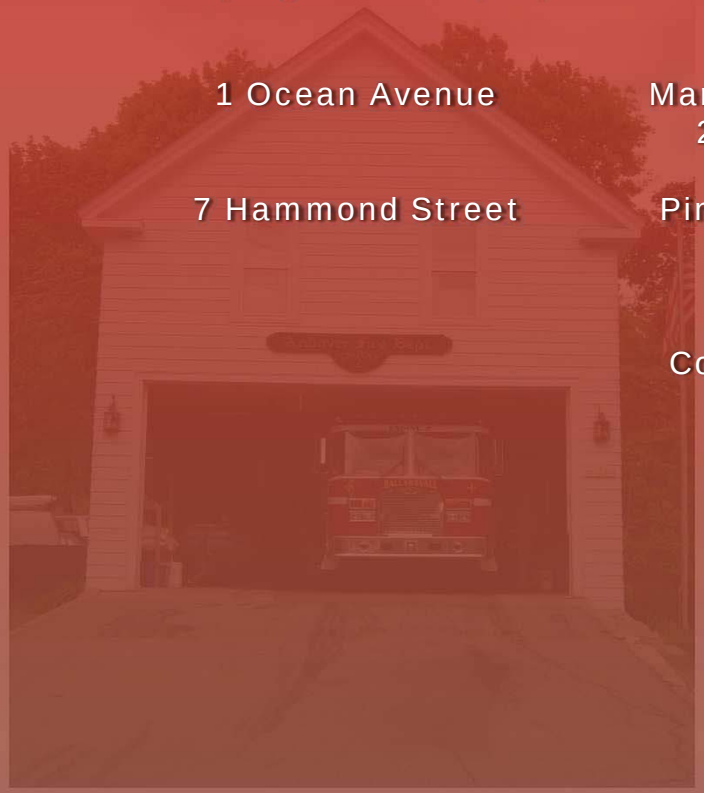
Fire Stations Near Schools

Community	Fire Stations	Schools
GEORGETOWN	47 Central Street	Perley School 51 North Street
HAMILTON	265 Bay Road	Winthrop Elementary 325 Bay Road
IPSWICH	55 Central Street	Winthrop School 65 Central Street
NORTH READING	152 Park Street	Batchelder Elementary 175 Park Street No. Reading High School 195 Park Street



Fire Stations Near Schools

Community	Fire Stations	Schools
MALDEN	1 Sprague Street (HQ)	Malden High School 77 Salem Street
MARBLEHEAD	1 Ocean Avenue	Marblehead High School 2 Humphrey Street
ROWLEY	7 Hammond Street	Pine Grove Elementary 191 Main Street Parker River Community Preschool 181 Main Street



Ballardvale Fire Station Building Committee Presentation

Fire Stations Near Schools

CHICOPEE, MA

Ballardvale Fire Station Building Committee Presentation

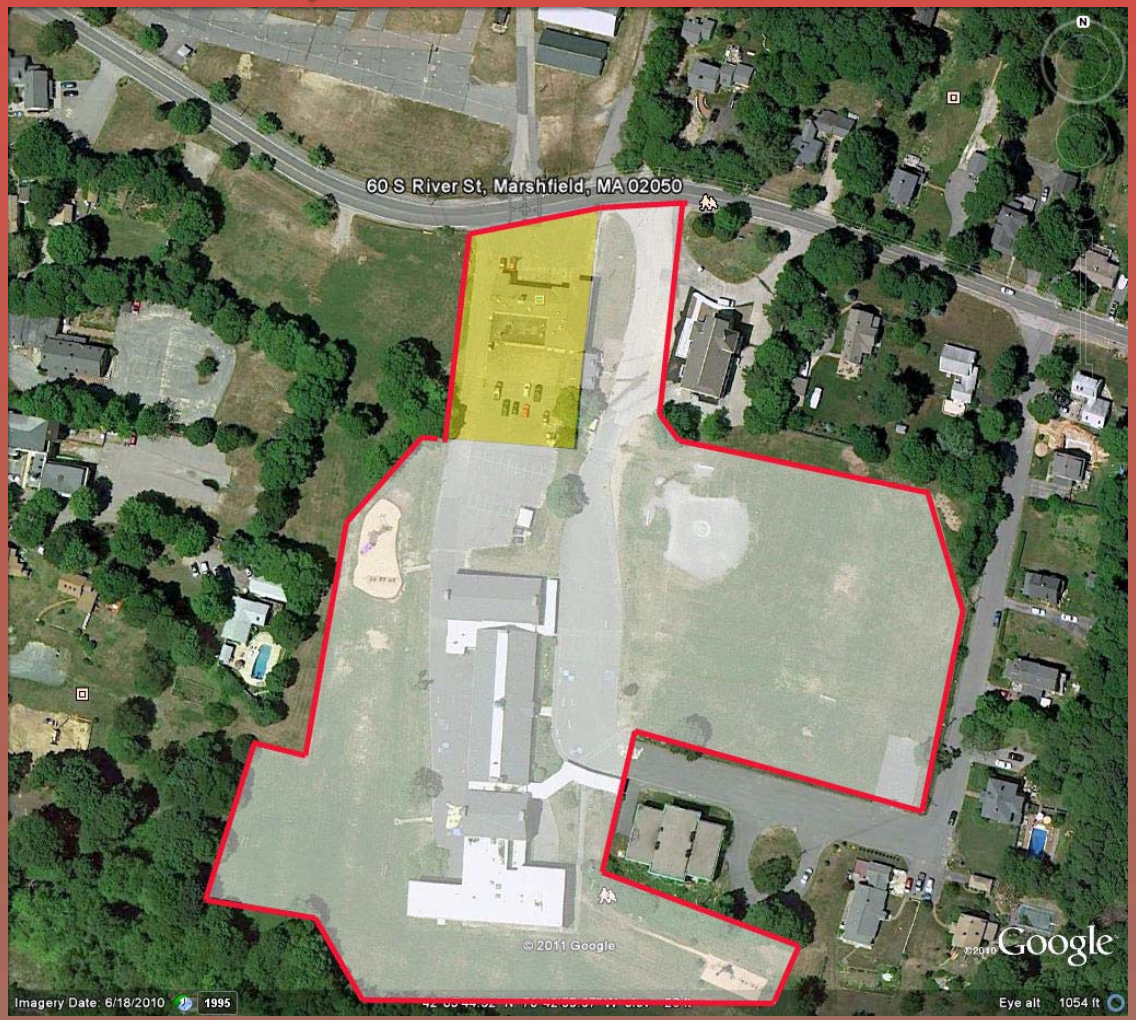
Fire Stations Near Schools

IPSWICH, MA

Ballardvale Fire Station Building Committee Presentation

Fire Stations Near Schools

MARSHFIELD, MA



Ballardvale Fire Station Building Committee Presentation

Fire Stations Near Schools

HAMILTON, MA

Ballardvale Fire Station Building Committee Presentation

New Station Benefits

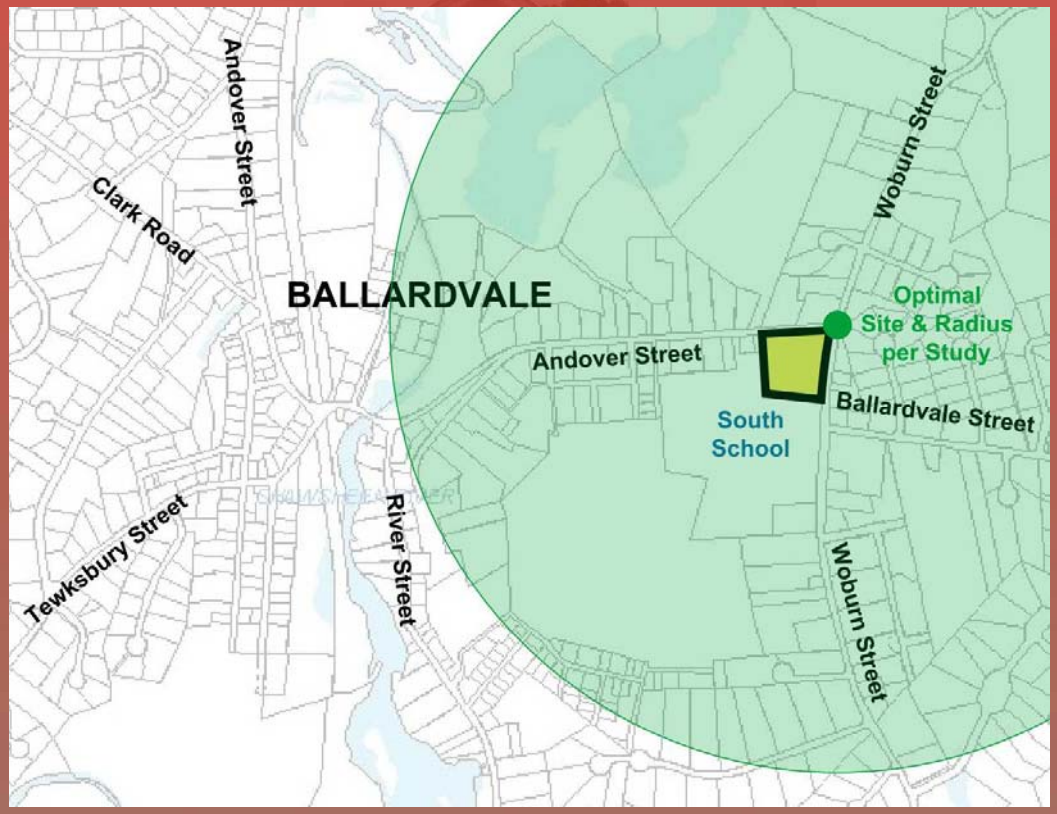
"Win-Win-Win" Opportunity between Fire & School Departments and Ballardvale / So. Andover Community

- Fire Department Gets Modern Station to Replace 120-Year Old Building (WIN)
- Community Gets Increased Emergency Response Protection and Protection of Substantial Commercial Tax Base (WIN)
- School Department Gets Improved Site Plan at South School with No School Budget Impact (WIN)

New Station Benefits

Overall Community Benefits

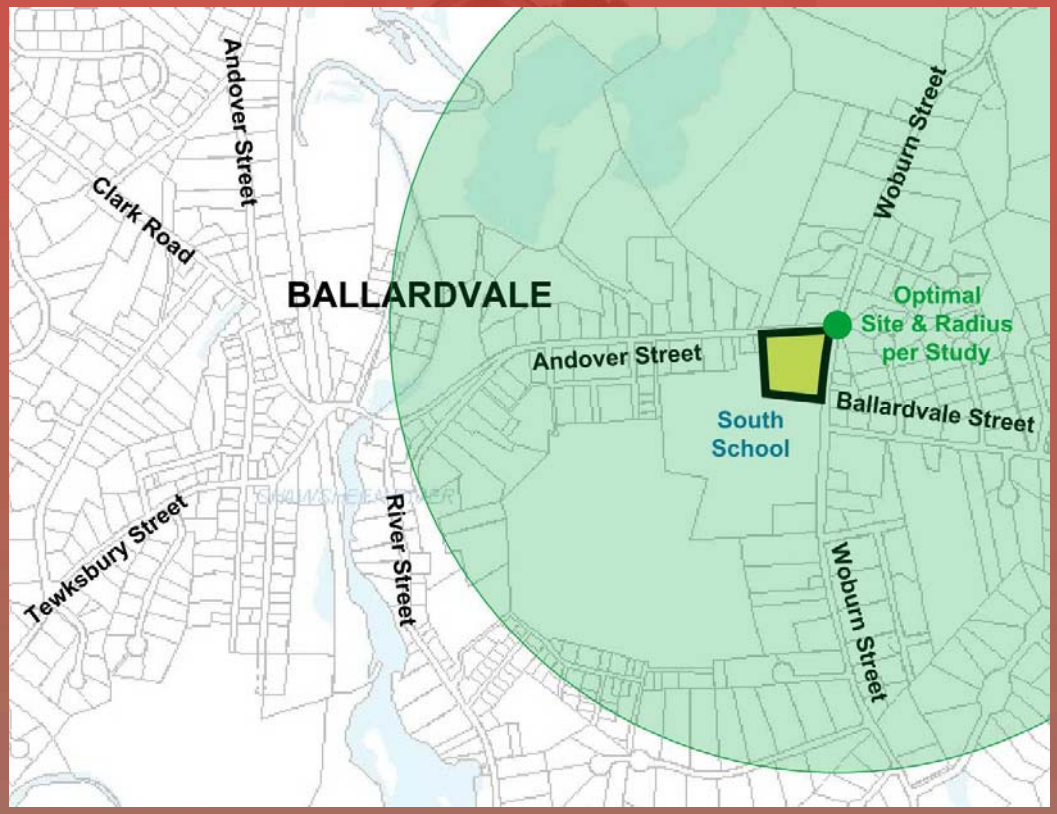
- Fire Protection Facilities are Modern and Station is Fully Operational



New Station Benefits

Overall Community Benefits

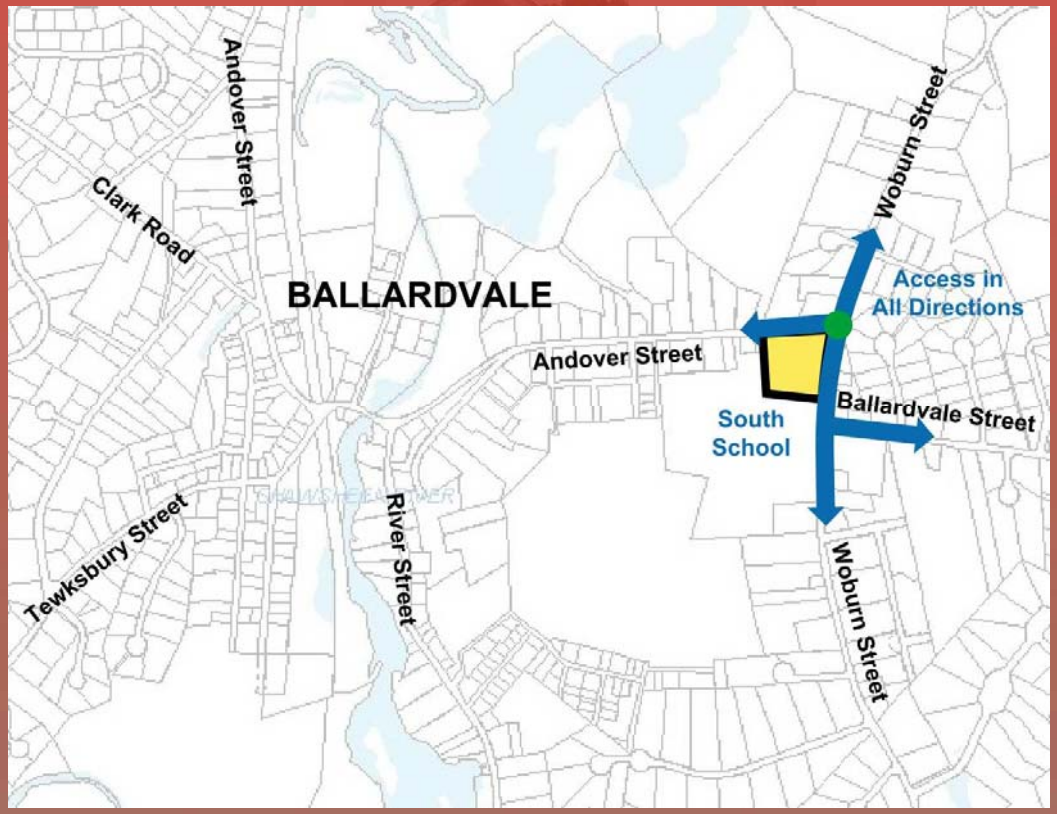
- Significant Savings by Selecting a Town-Owned Property



New Station Benefits

Overall Community Benefits

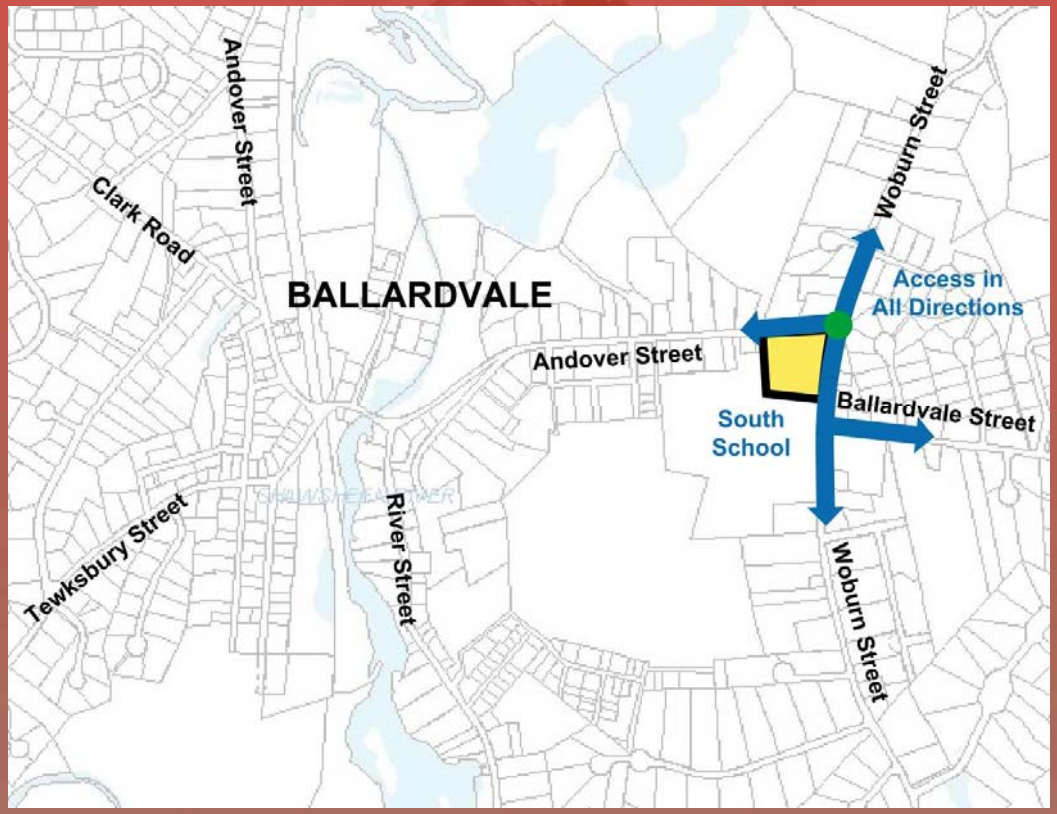
- Station in a Centralized Location Providing Access in All Directions for Faster Response



New Station Benefits

Overall Community Benefits

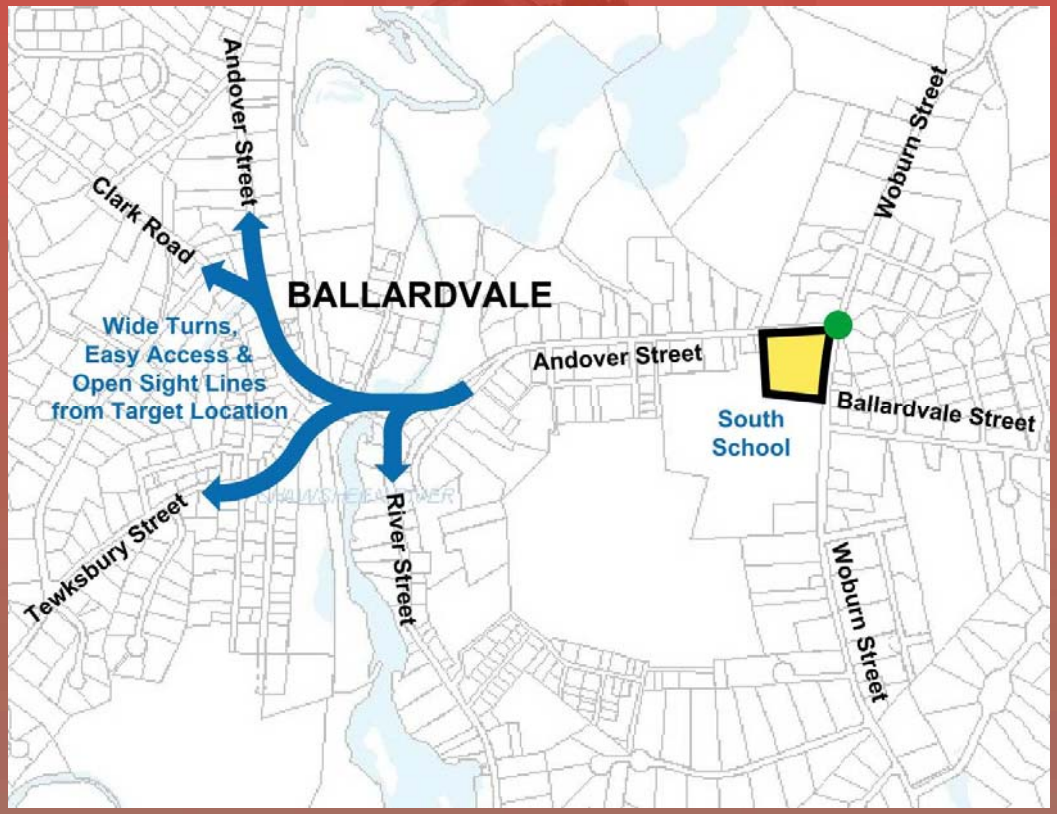
- Open Corner Lot with Clear Lines-of-Sight and Direct Access to Primary Roads



New Station Benefits

Overall Community Benefits

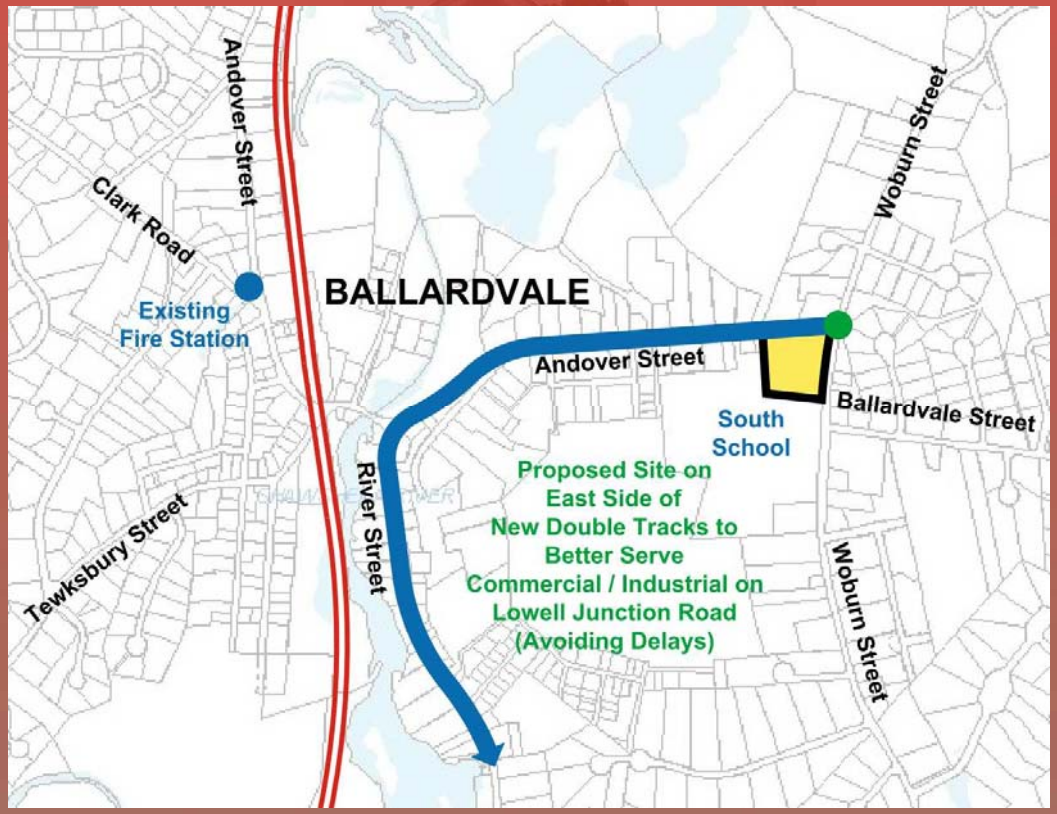
- Wide Turns, Easy Access, & Clear Lines-of-Sight (No Multiple Point Turns)



New Station Benefits

Overall Community Benefits

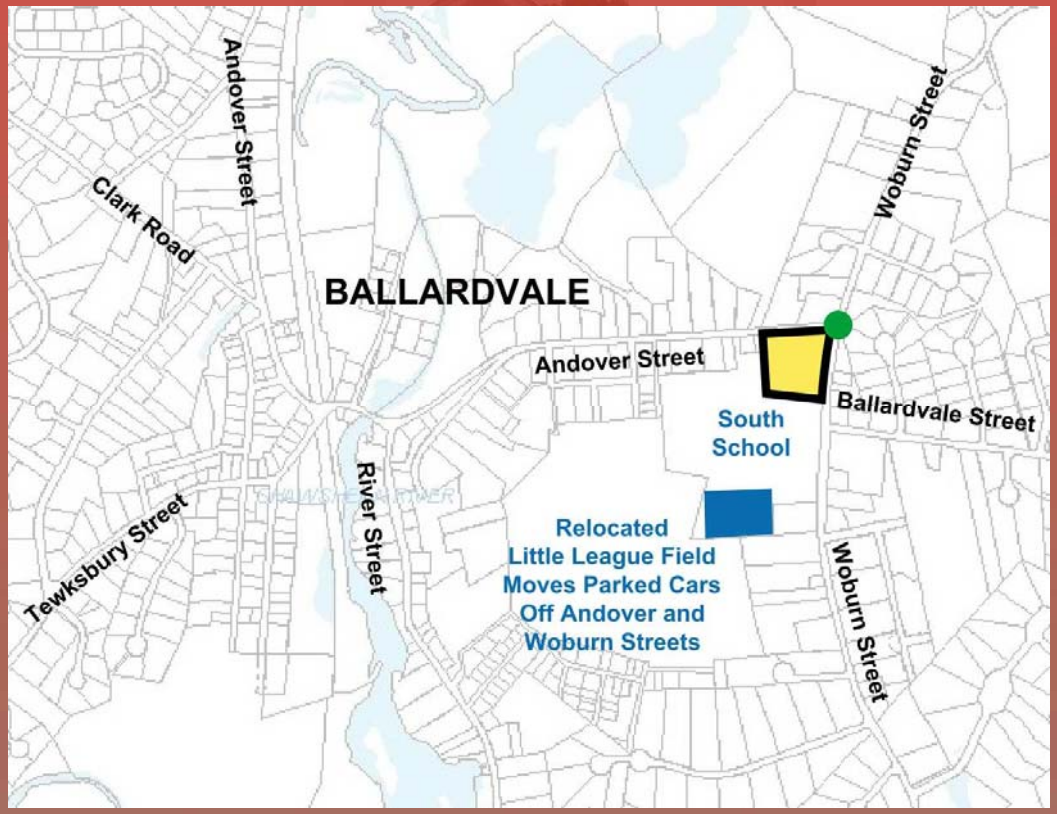
- Better Service for Commercial and Industrial Properties on Lowell Junction Road



New Station Benefits

Overall Community Benefits

- Relocated Little League Field Eliminates Parked Cars from Andover and Woburn Streets



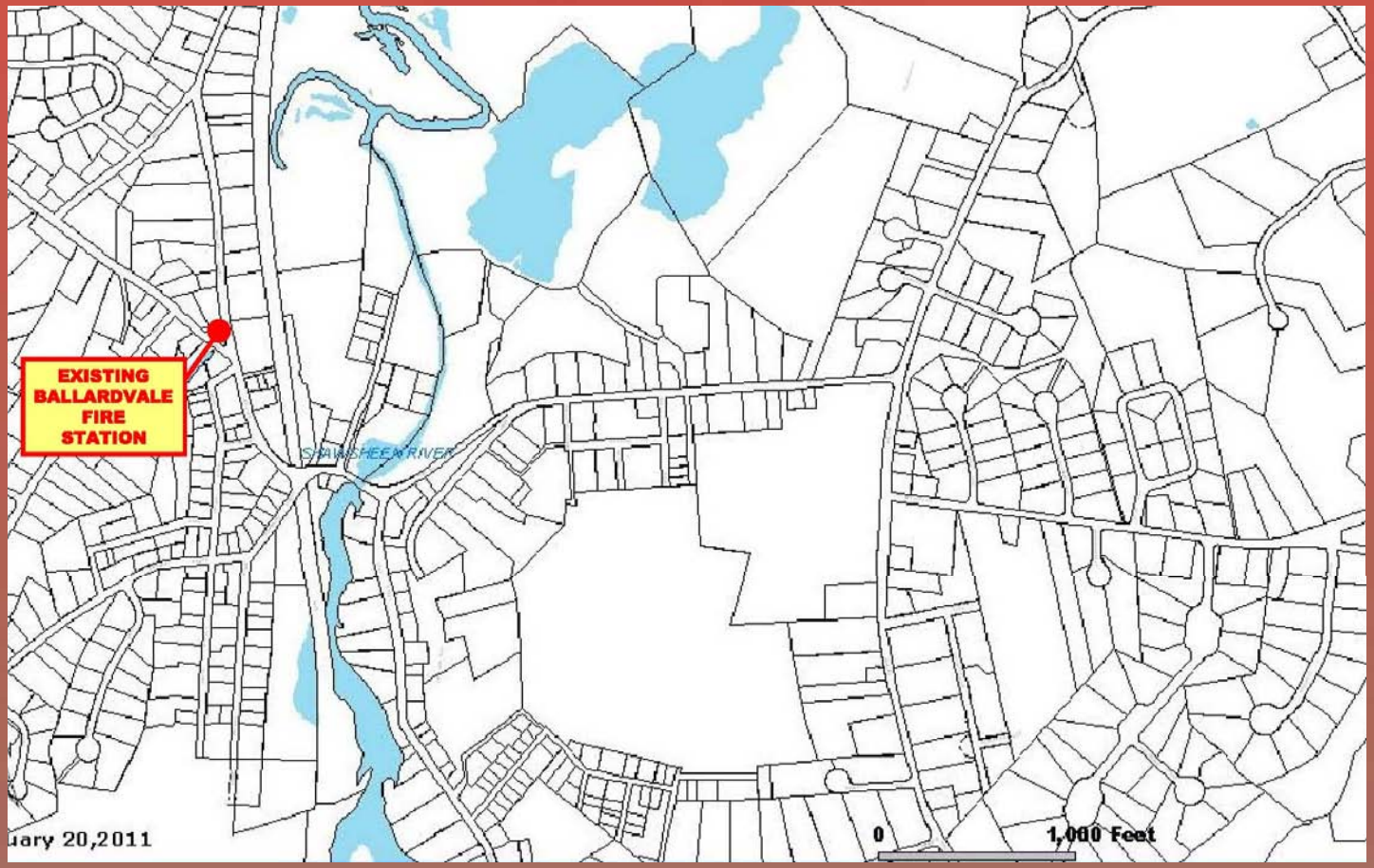
New Station Benefits

Overall Community Benefits

- Traffic Alleviation at South School
  - Reduced Queuing at Drop Offs
  - Decreased Traffic on Woburn Street
  - Improved Bus Routing and Flow
  - Increased Parking for Faculty and Staff
  - Overflow Parking for Special Events

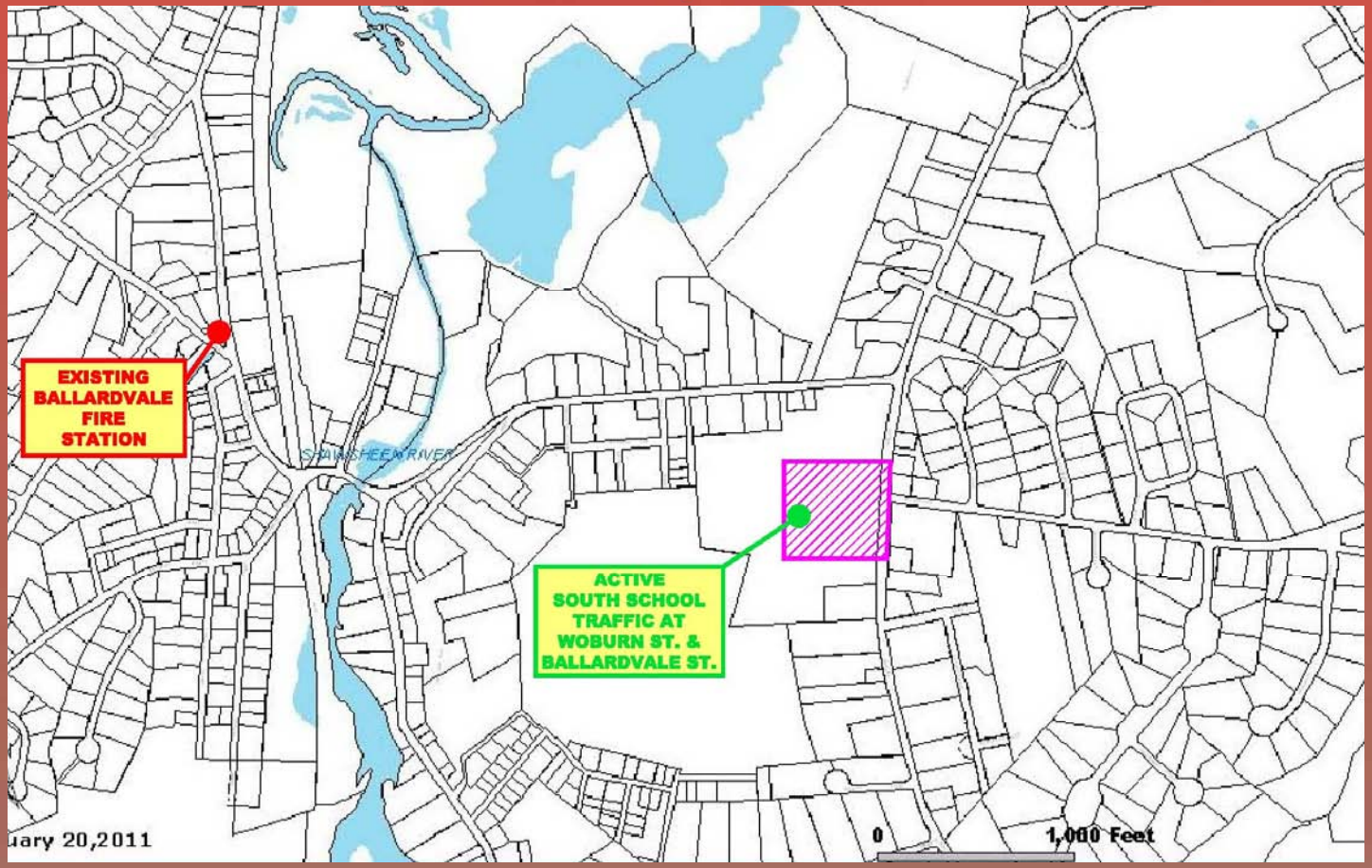
No Impact to South School Traffic

Existing Fire Station Location



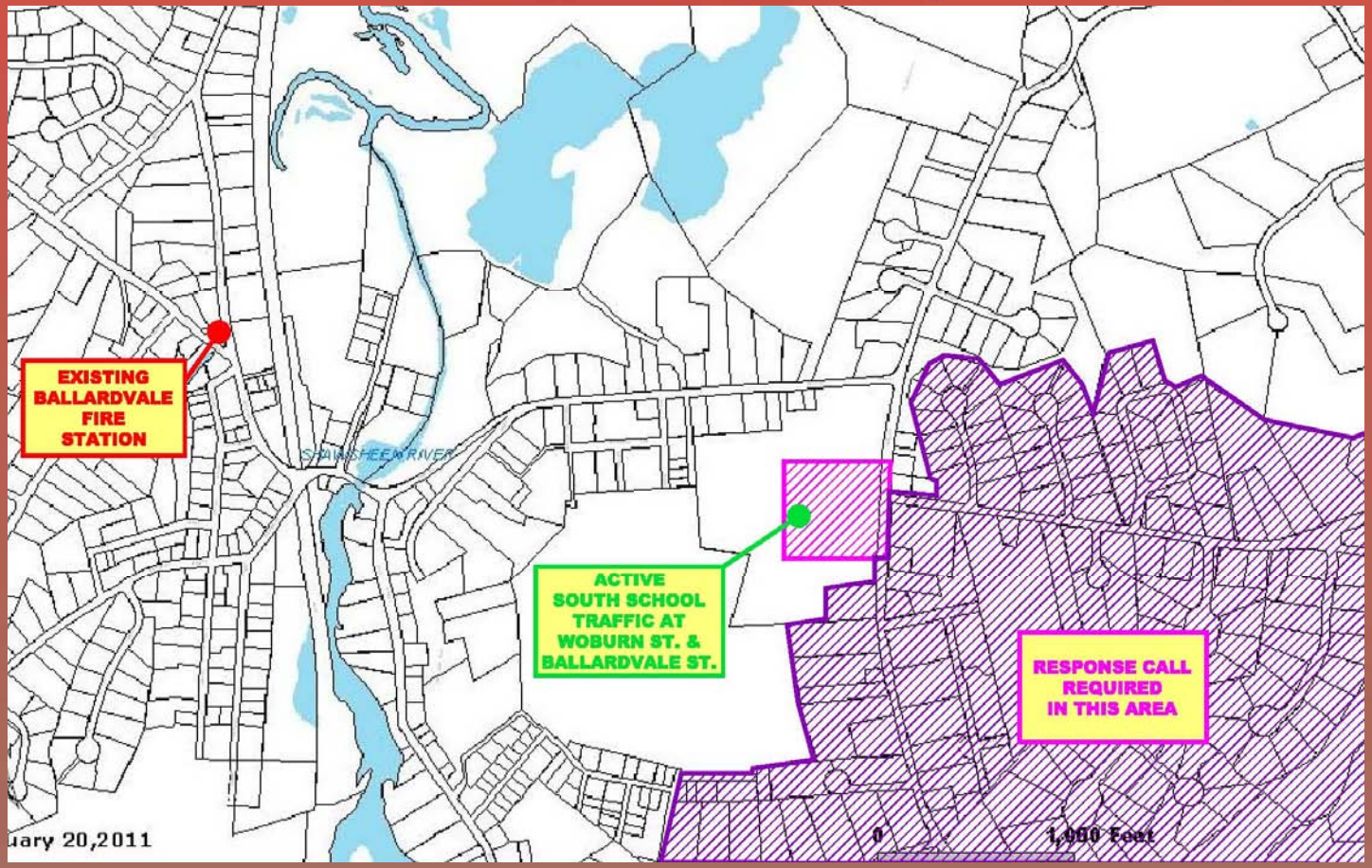
No Impact to South School Traffic

Active South School Traffic Zone at Entrance (Woburn & Ballardvale St.) for Bus & Car Dropoff



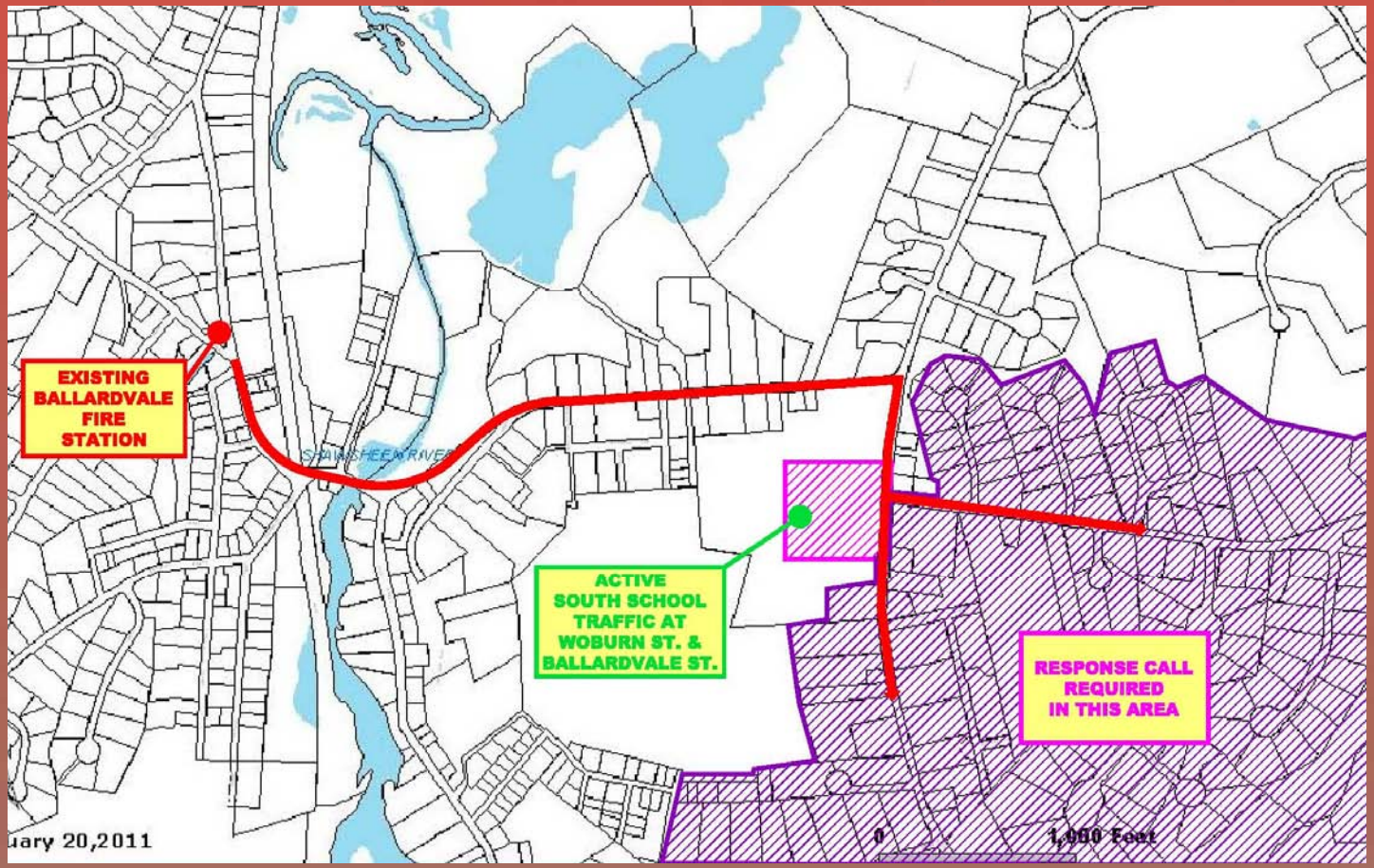
No Impact to South School Traffic

Response Calls that Require Fire Truck to Pass
In Front of South School Entrance (Southeast)



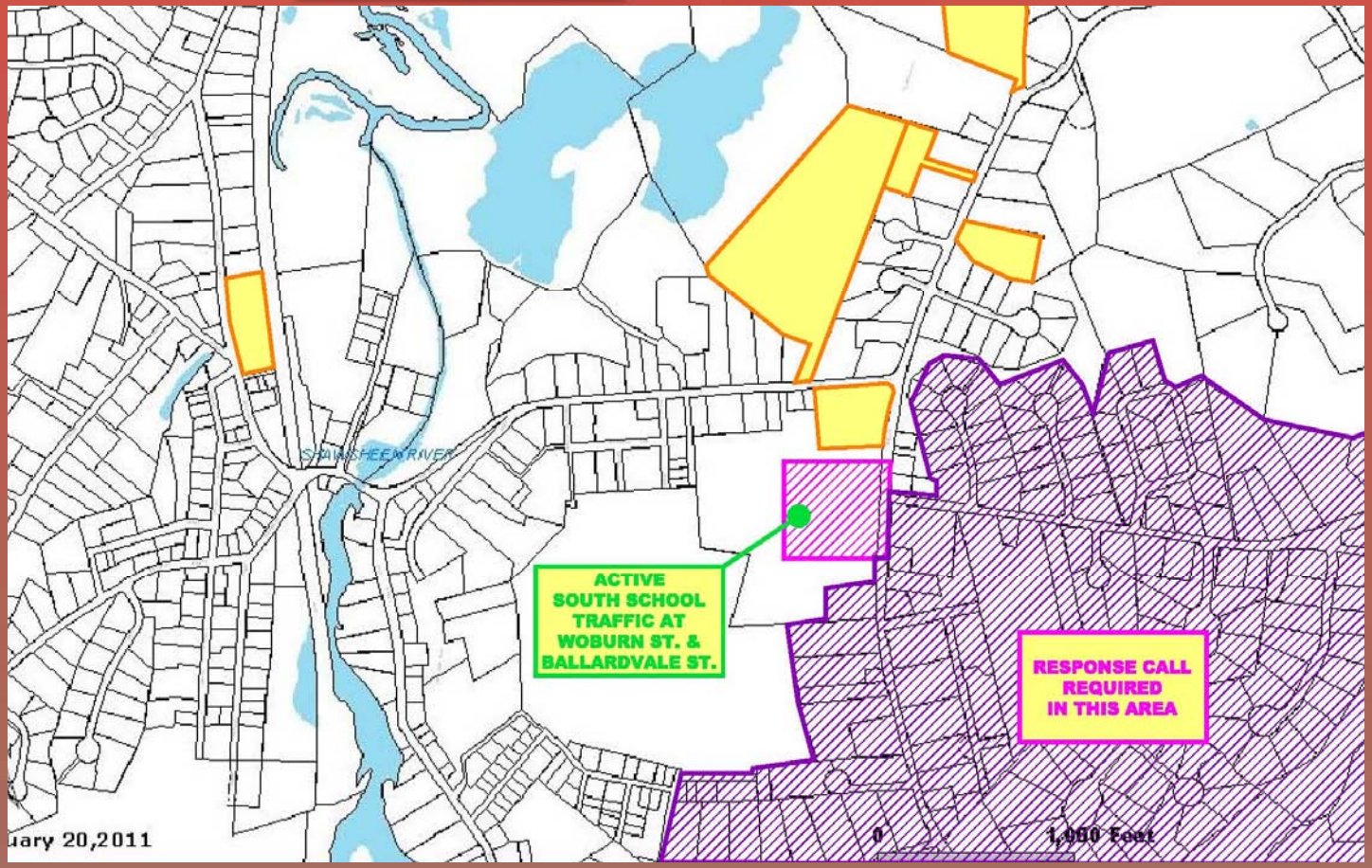
No Impact to South School Traffic

Response Calls that Require Fire Truck to Pass
In Front of South School Entrance (Southeast)



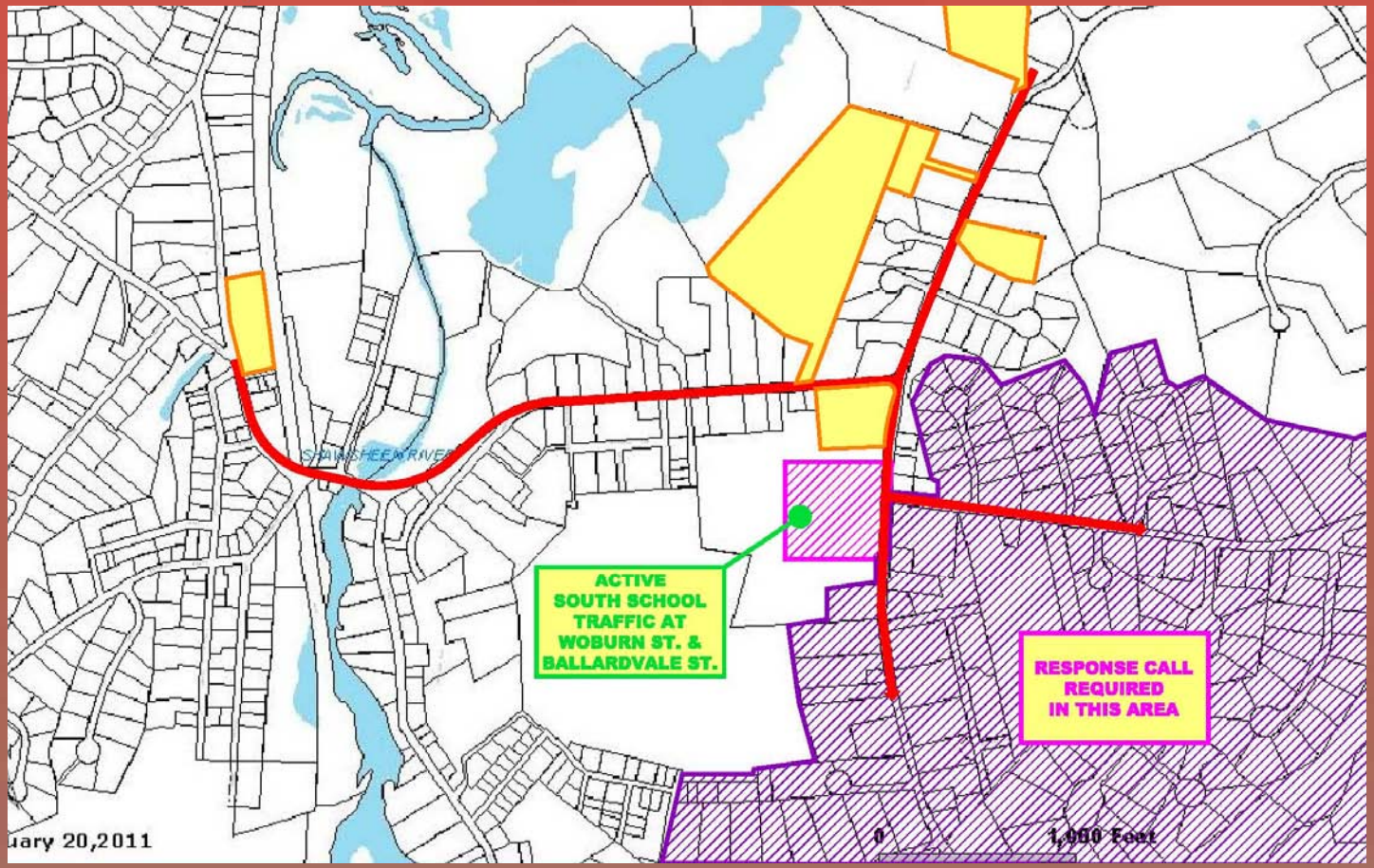
No Impact to South School Traffic

If New Fire Station is Located at Any Site Studied, Trucks Will STILL ONLY Pass School in this Area

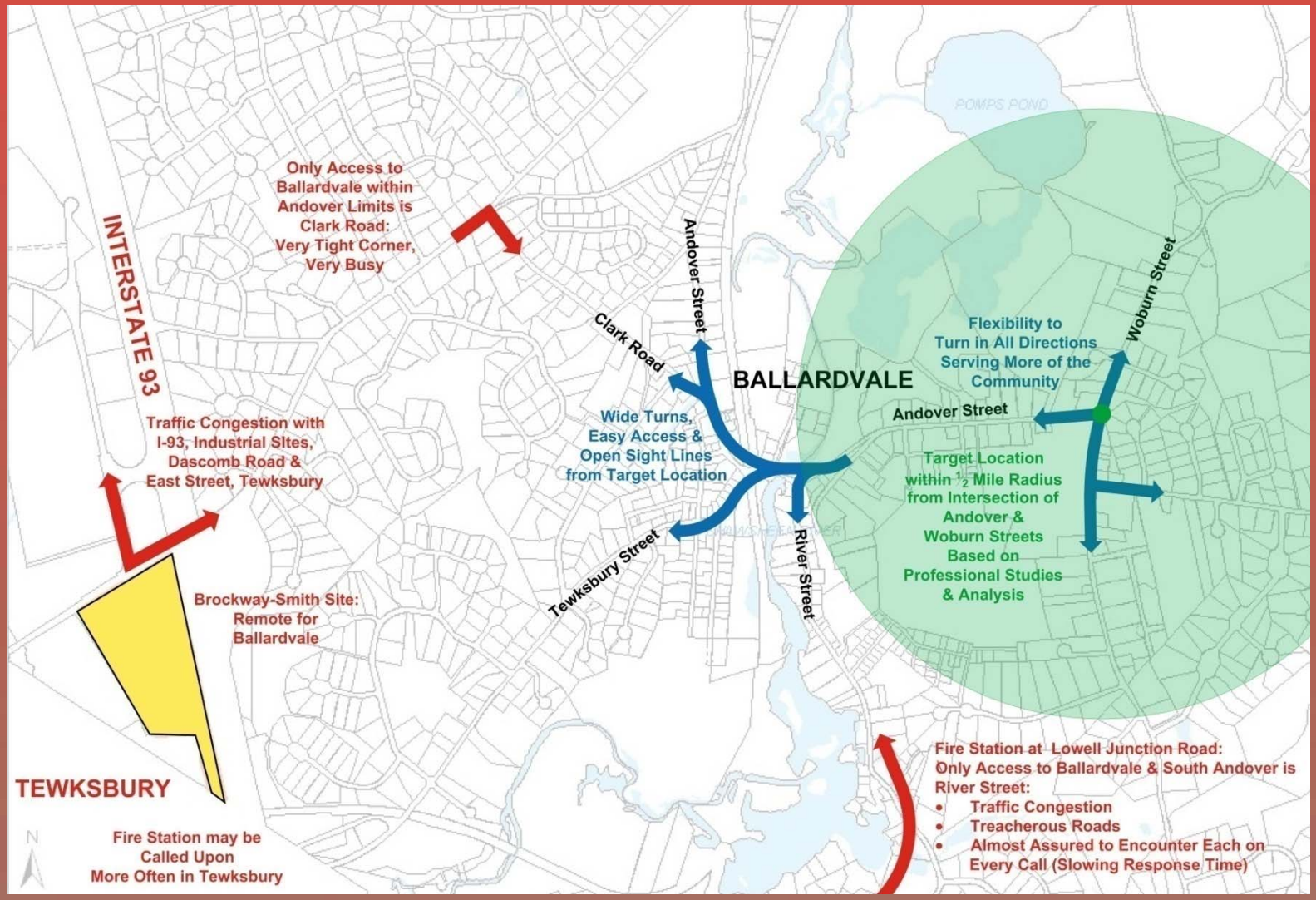


No Impact to South School Traffic

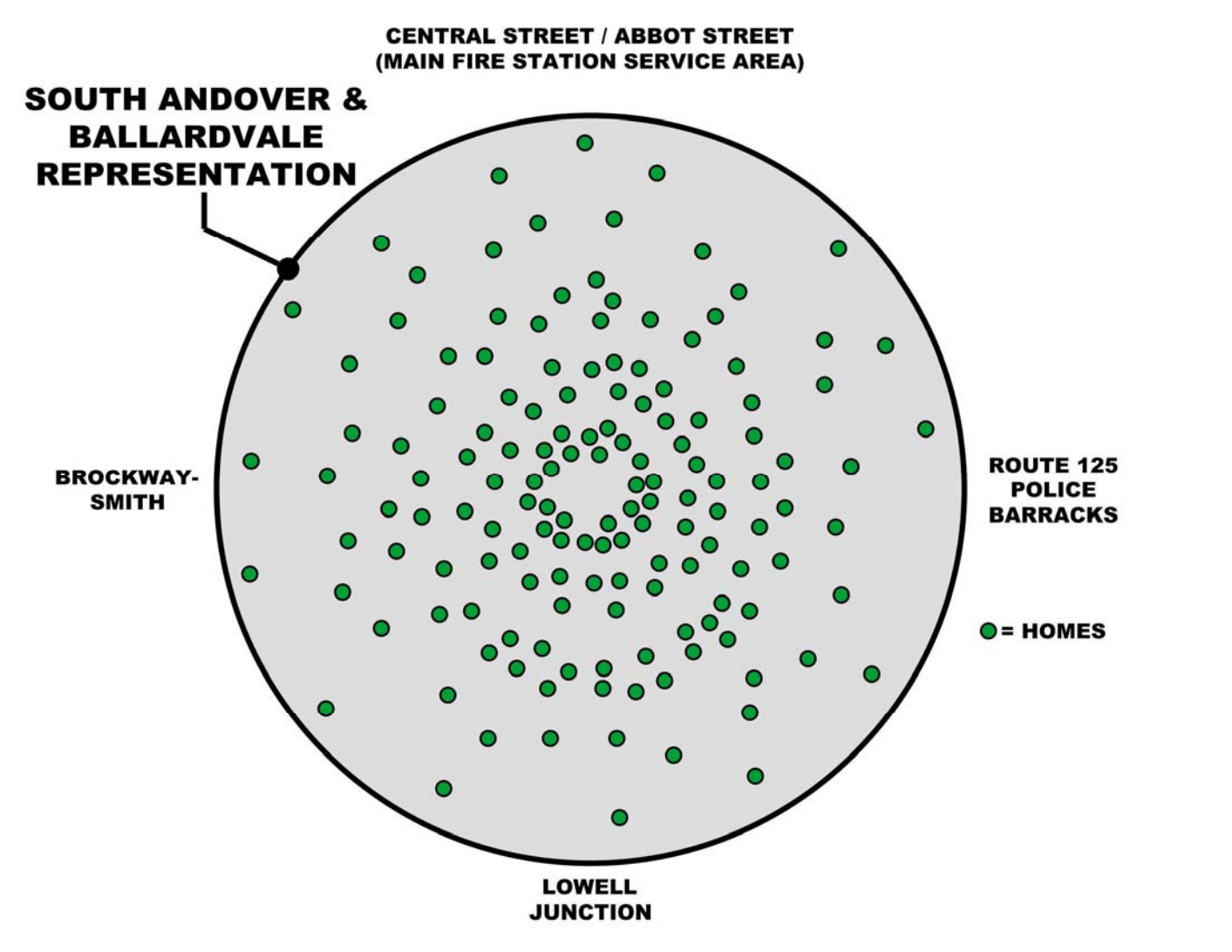
of Calls are Independent of Fire Station Location: Therefore, No Net Impact on South School Traffic



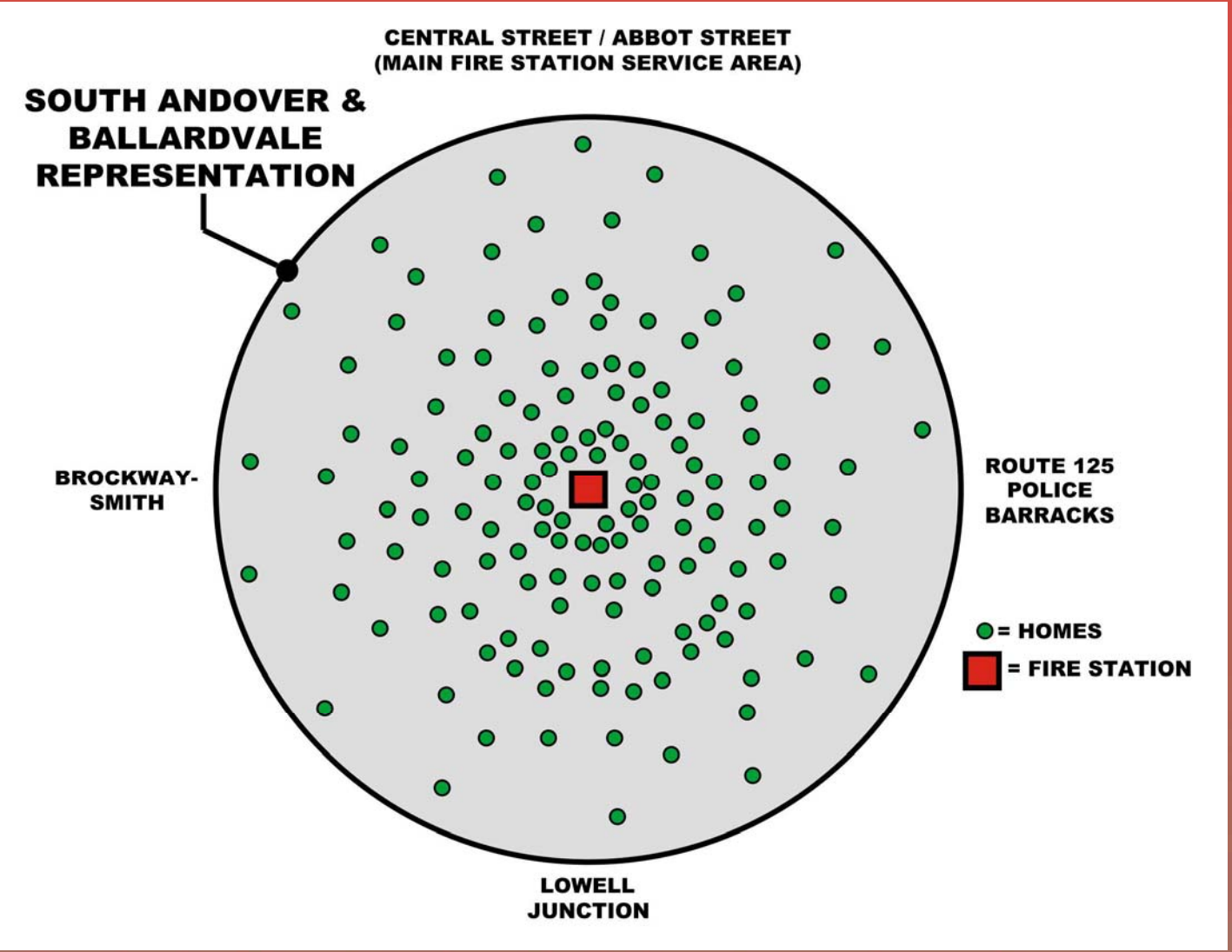
Alternative: Edge of Town



Alternative: Edge of Town



Alternative: Edge of Town



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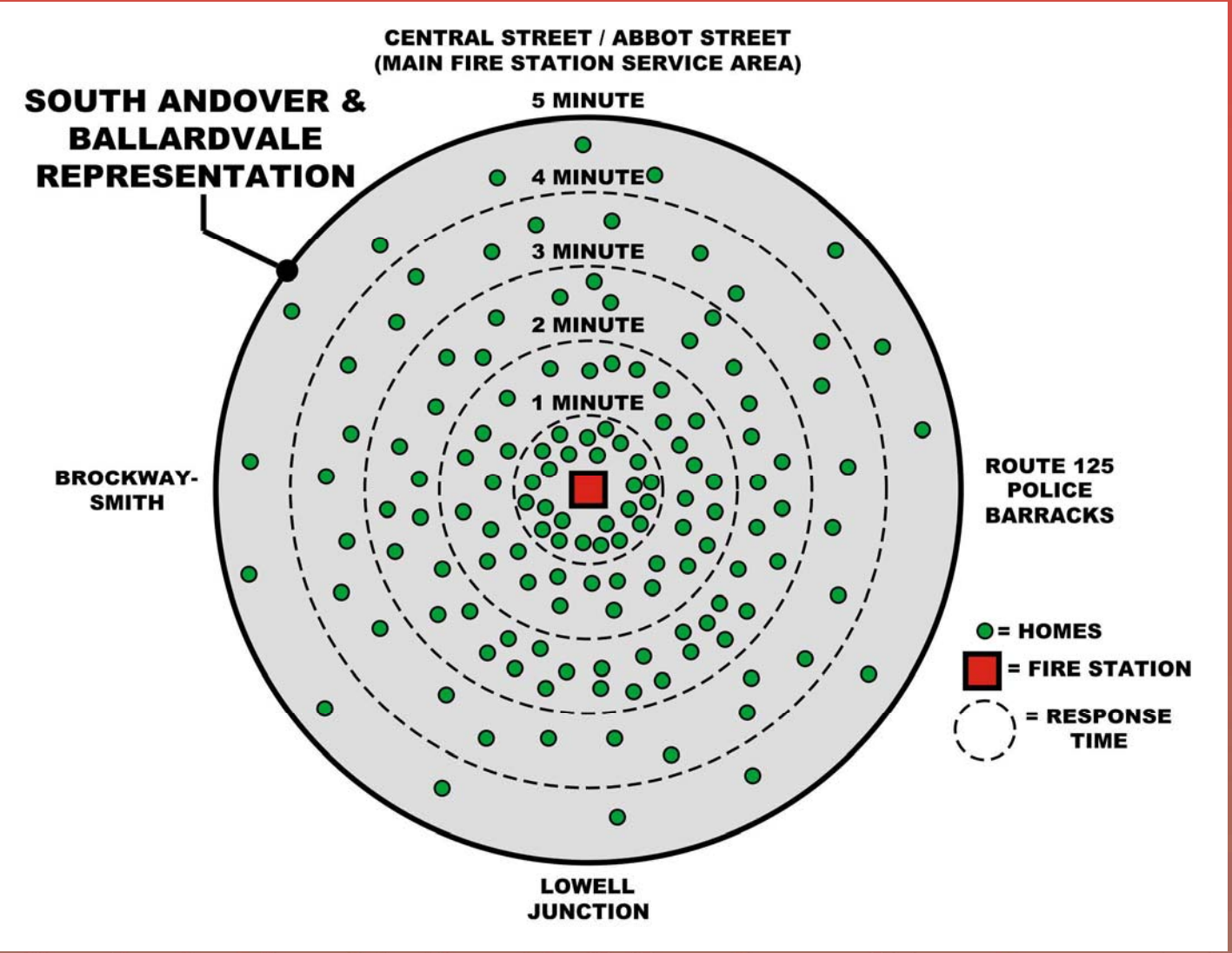

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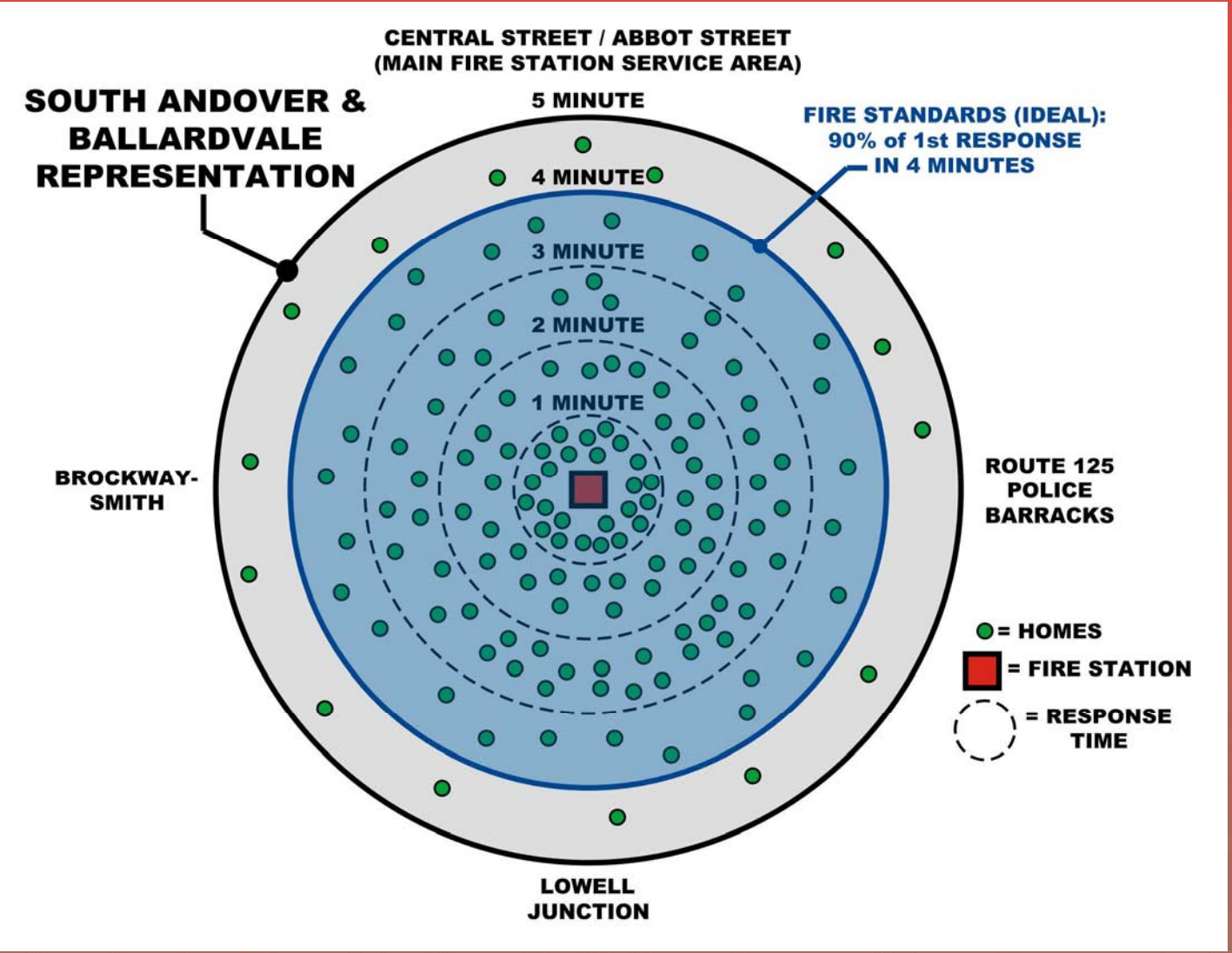
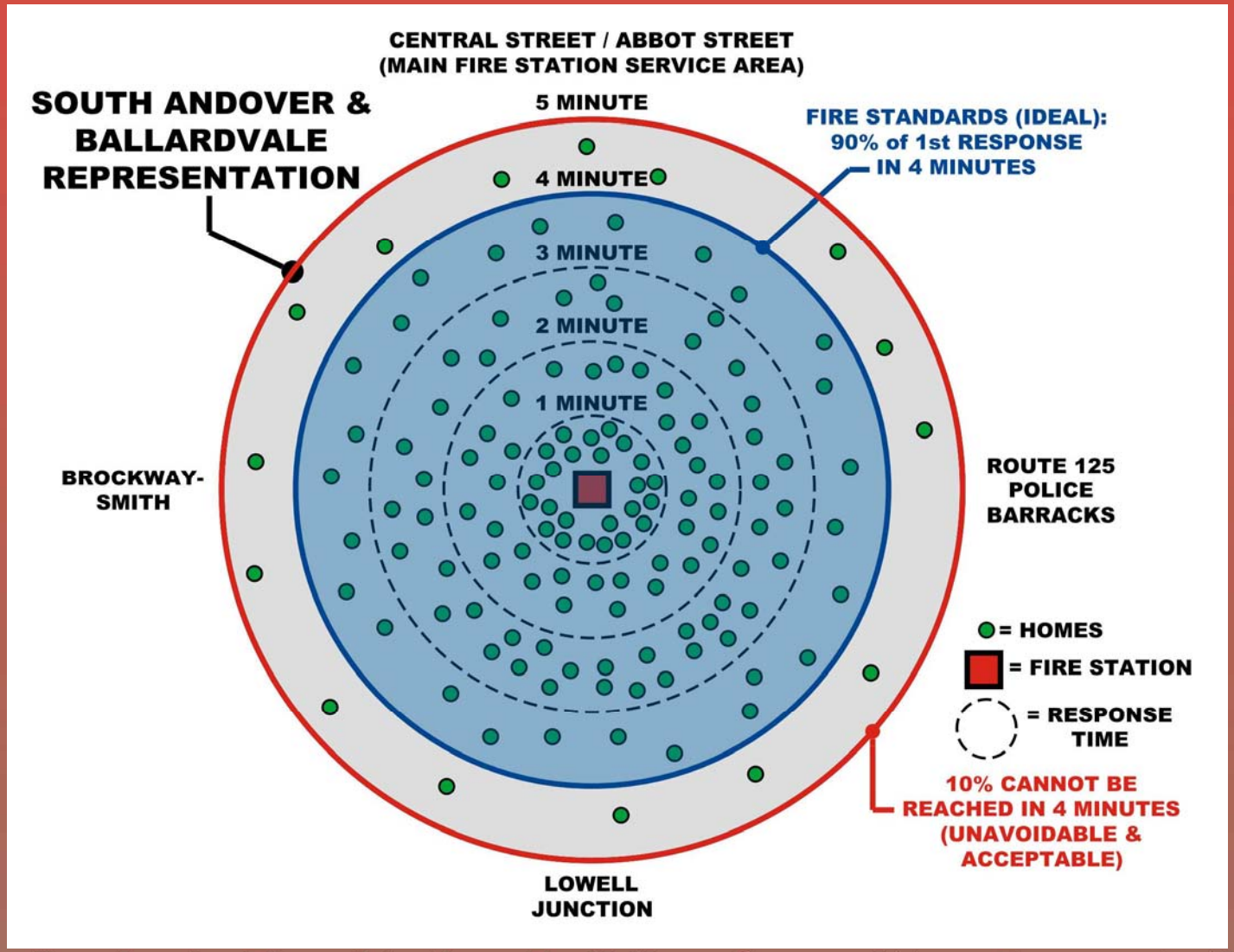
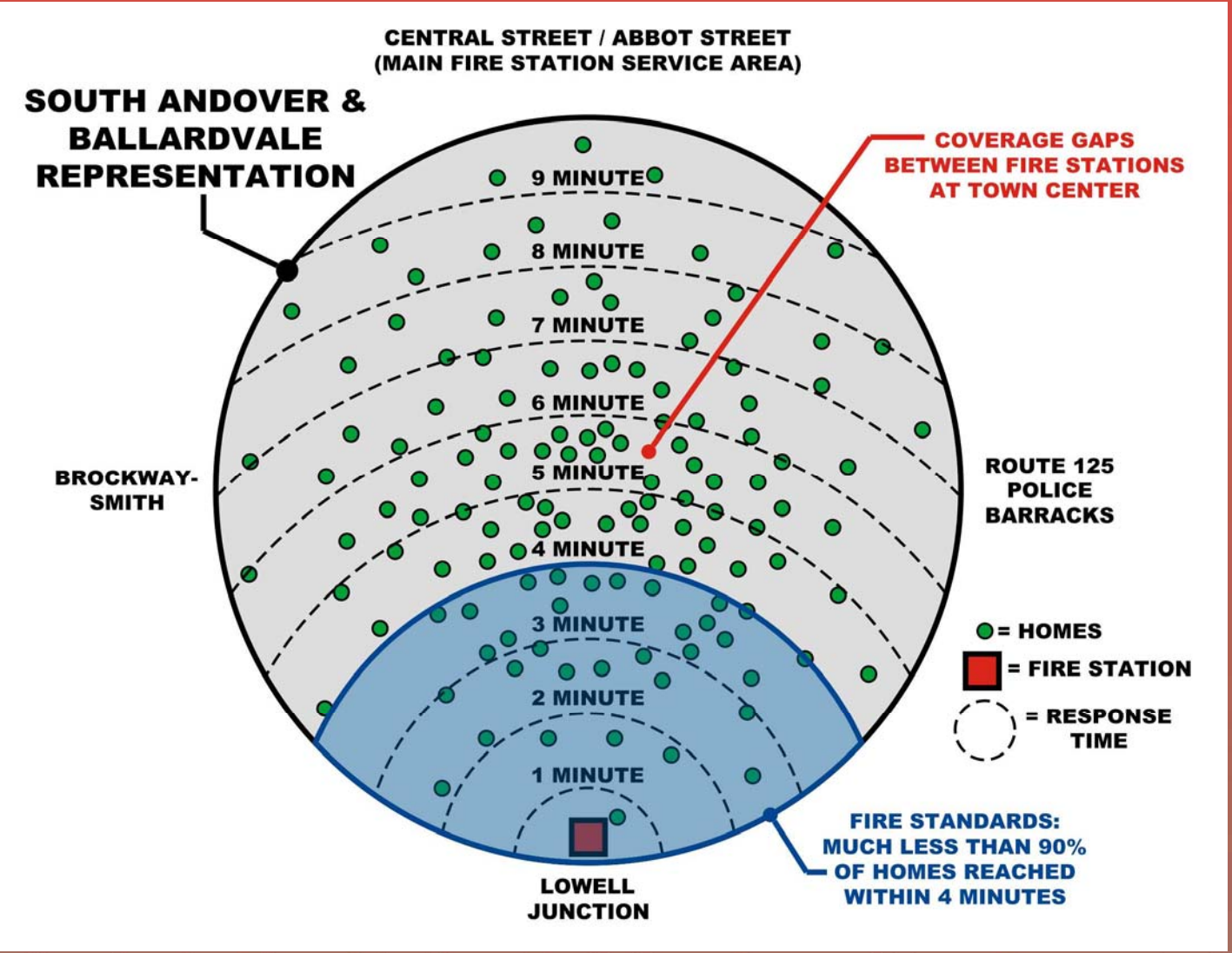


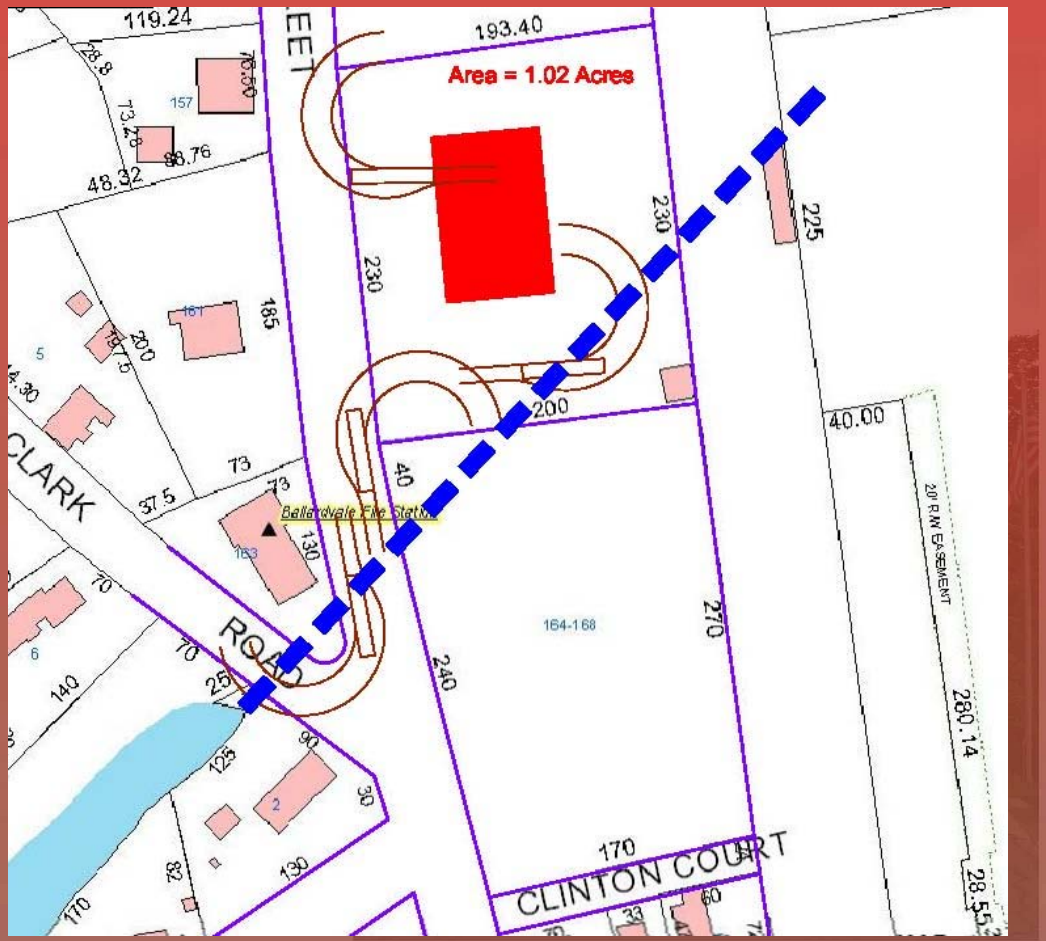
Alternative: Edge of Town



Alternative: Edge of Town



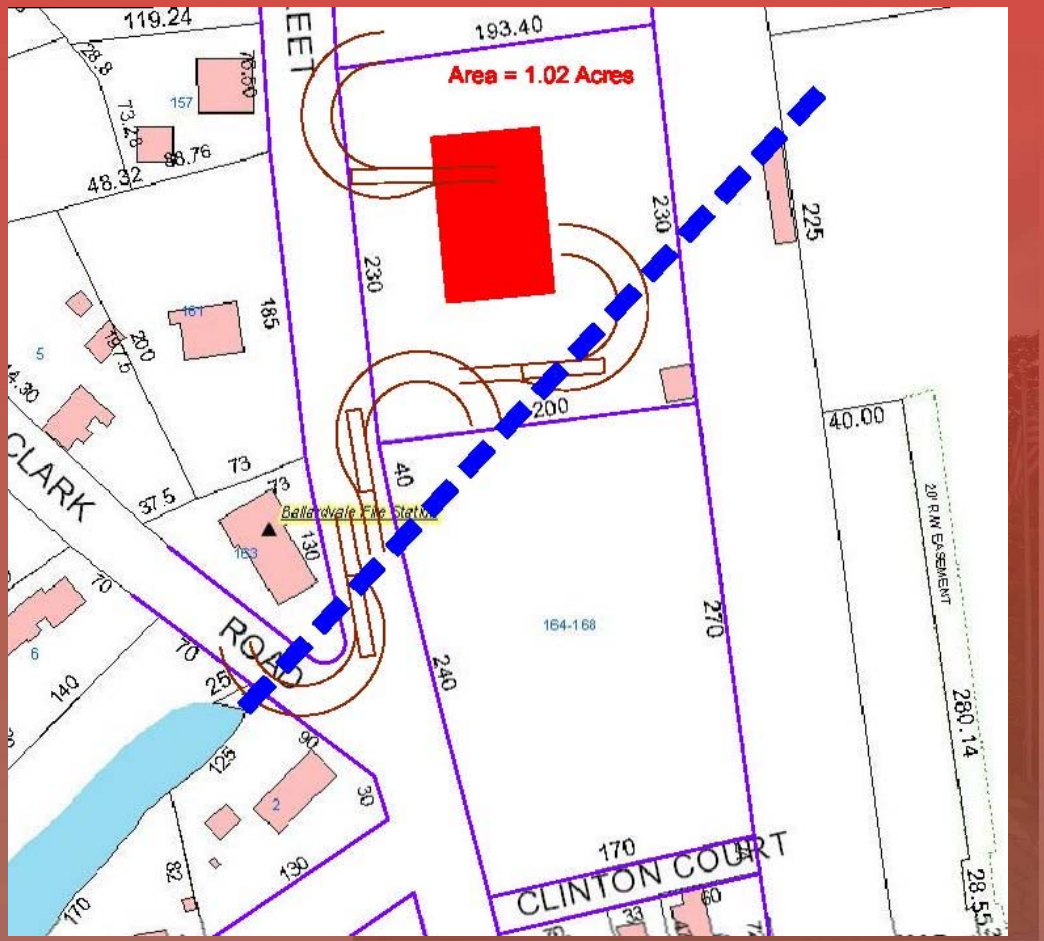
Alternative: Downtown Ballardvale



Little League Field at Andover Street

1. Outside the Manitou Study Radius = ¼ Mile
2. Loss of Field Without a Replacement
3. Existing Traffic Worse Than at Woburn Street
   - Cars Backed Up to Existing Station
   - Traffic Will Worsen with Double Tracks
   - More Opportunity for Trains to Block Emergency Response

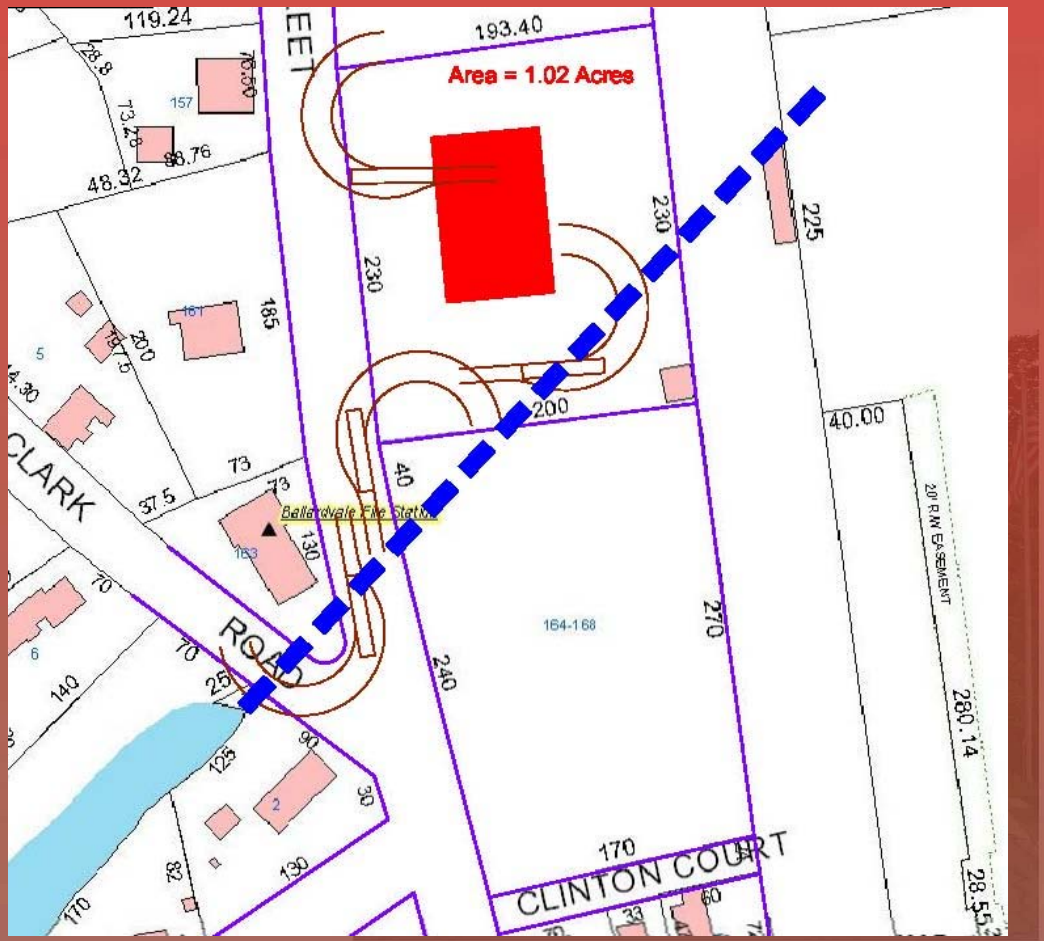
Alternative: Downtown Ballardvale



Little League Field at Andover Street

4. Site Layout Tight, but Could Work with More Engineering
5. Sight Lines OK, but Worse than Playground
6. Considerable Fill Required (± 5 ft Across Site)
7. Tight Radius at Clark Road (Demo Existing Station for Traffic Island)

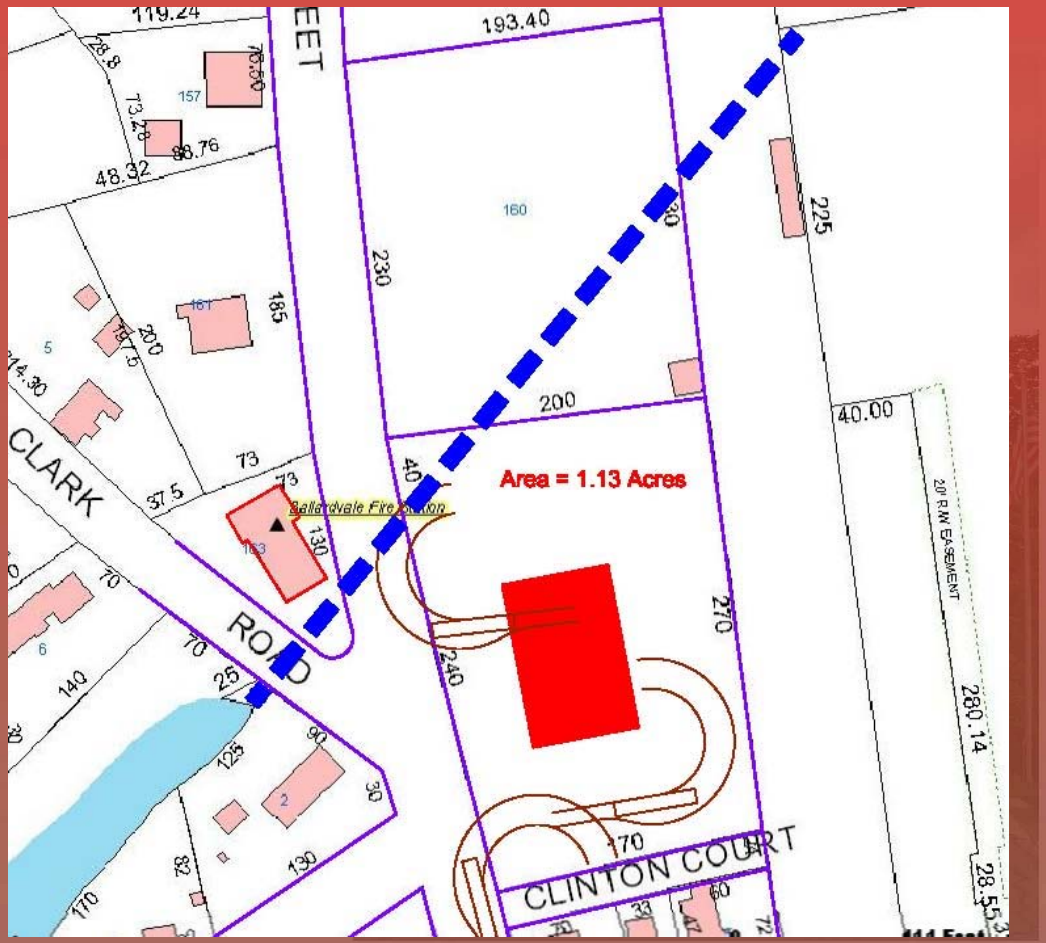
Alternative: Downtown Ballardvale



Little League Field at Andover Street

8. Inside Ballardvale Historic District
9. 36” Drainage Culvert Under Site (Blue Line)
10. Does Not Solve Problems at South School
11. Ballardvale Only Has 3 Acres of Green Space vs. 55+ Acres at South School

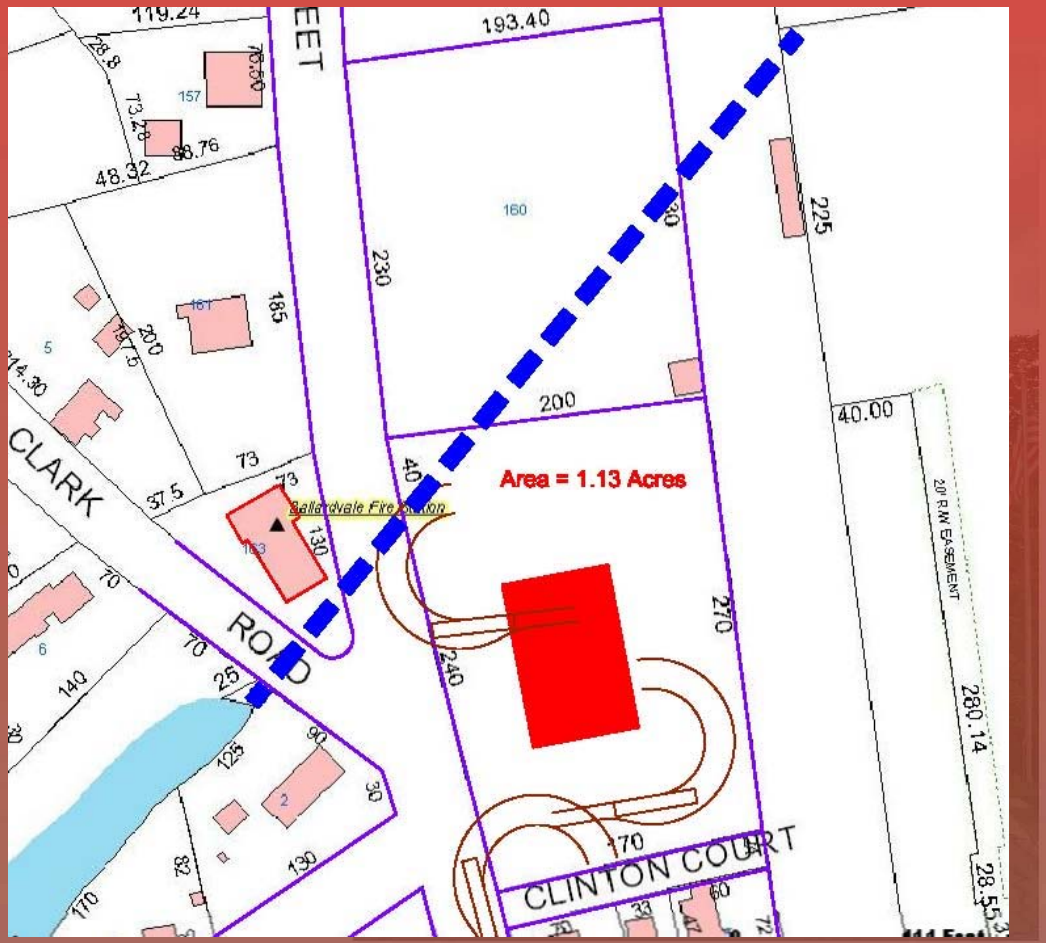
Alternative: Downtown Ballardvale



Playground at Andover Street

1. Outside the Manitou Study Radius = ¼ Mile
2. Playground lost with No Replacement
3. Existing Traffic Worse Than at Woburn Street
   - Cars Backed Up to Existing Station
   - Traffic Will Worsen with Double Tracks
   - More Opportunity for Trains to Block Emergency Response

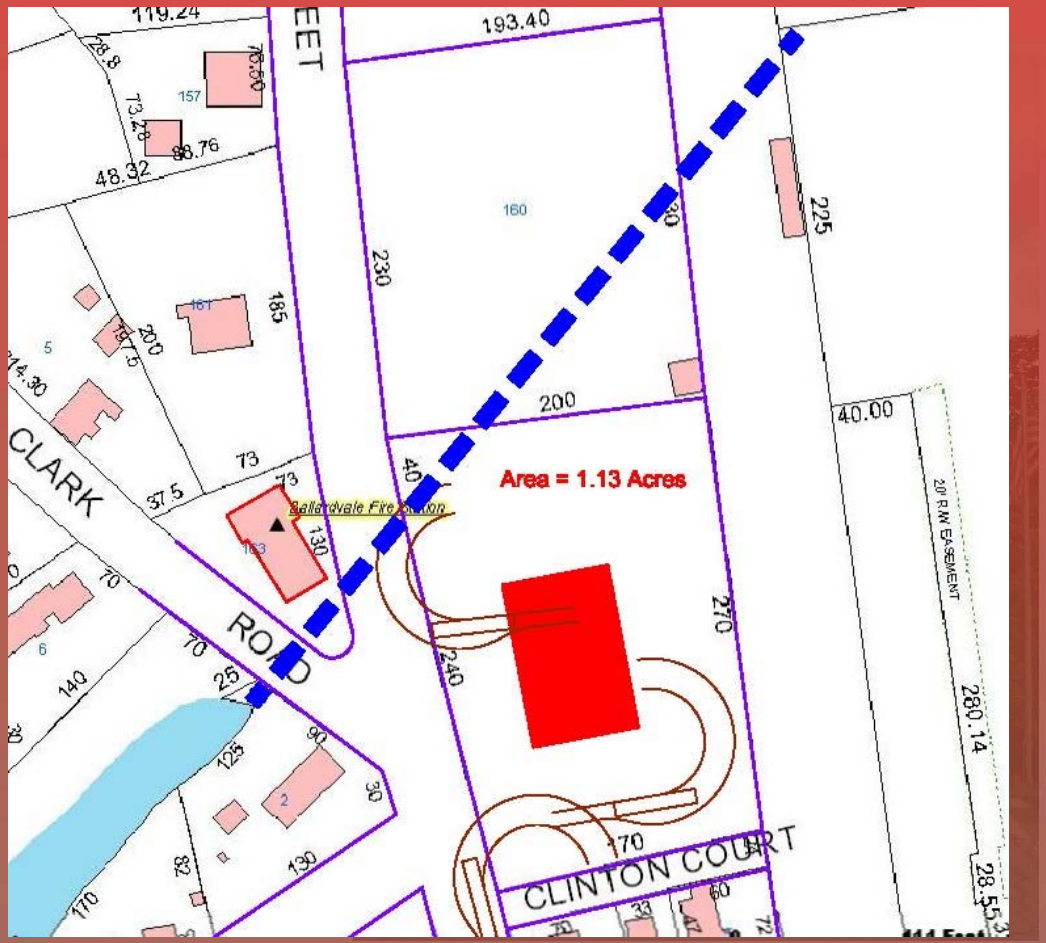
Alternative: Downtown Ballardvale



Playground at Andover Street

4. Site Layout Tight but OK
5. Wetlands on Southeast Corner of Site
6. Sight Lines OK
7. Considerable Fill Required (± 3 ft Across Site)
8. Still Have Parked Cars on Andover Street for Little League Games

Alternative: Downtown Ballardvale



Playground at Andover Street

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Summary

The Committee is Comprised of Attorneys, Engineers, Developers, Firefighters, and Highly Qualified Residents who have Dedicated Over 2 Years to the Analysis and Presentation Today.

The Committee, as Concerned Ballardvale and South Andover Citizens, Recognizes the Necessity for a Replacement Fire Sub-Station

The South School Site, Based on Studies and Extensive Review, is the Optimal Location:

However, the Choice Ultimately Belongs to the Citizens of Andover at Town Meeting

Summary

This is the beginning of a design partnership between:

- Ballardvale & South Andover Neighborhoods
- Citizens of Andover
- Andover Fire Rescue
- Andover School Department
- Andover Board of Selectmen
- Andover Finance Committee
- Parents and Faculty of South School
- Andover Youth Sports
- Andover Design Review Board
- Andover Planning Board
- Andover Green Advisory Board

Summary

Please Fill Out and Return Questionnaire for Committee to Better Inform You and the Andover Community

QUESTIONS?
Thank You for Your Time

HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning