Boulder City Council
STUDY SESSION
Study Session is Televised

Tuesday
April 14, 2015

5-6 PM
Boards and Commissions Reception
Municipal Lobby

6-7:30 PM
Fire Department Operations
Service, Sustainability and Resilience

7:30-9 PM
Potential 2015 Ballot Item and an Ongoing Look at the Fiscal Future of the City of Boulder

Council Chambers
Municipal Building
1777 Broadway

Submit Comments to City Council
Email: council@bouldercolorado.gov
or
Attention: Alisa Lewis, City Clerk
PO Box 791, Boulder, CO 80306
Fax: 303-441-4478

TO: Members of City Council

FROM: Jane Brautigam, City Manager
Mary Ann Weideman, Assistant City Manager
Michael Calderazzo, Fire Chief
Frank Young, Deputy Fire Chief
Jeffrey Long, Acting Deputy Fire Chief
David Lowrey, Chief Fire Marshal
Maureen Rait, Executive Director Public Works
Joe Castro, Director Facilities and Asset Management

DATE: March 30, 2015

SUBJECT: Study Session – April 14, 2015
Fire Department Operations – Service, Sustainability and Resilience

I. PURPOSE

This study session will provide an update on progress achieving the 33 initiatives identified in the department's 2012 master plan. The session is also intended to solicit feedback from council on the fire department's community outreach and risk reduction goals and to clarify council direction with regard to staff recommendations on fire station locations and station design.

II. QUESTIONS FOR COUNCIL:

Public Outreach and Community Resilience

1. Does council have any questions about the department's proposal to focus more effort and resources on community resiliency with regard to wildfire and life-safety?

Capital Infrastructure

2. Does council have any questions about fire station design needs and proposed priorities involving the relocation and renovation of fire stations 3 and 4?

3. Does council have any questions regarding staff's recommendation to prioritize improved station alerting systems for all fire stations?

III. BACKGROUND

The fire department's first master plan was developed in 1996. As part of an intended 10-year update, a draft document was prepared for city council consideration in February, 2010. During the February study session, council expressed general support for Boulder Fire-Rescue's (BFR) mission, philosophy and goals. However, council also provided some additional direction for staff to consider strategies that address department operations, community needs along with the city's sustainability goals.

Subsequent to the February, 2010 study session, staff and a third party consultant, conducted an assessment of fire department operations, the *Boulder Fire Operation and Management Assessment* Report. This document, completed in 2011, promoted 77 recommendations that would help align the department with industry best practices, sustainability goals, and improve service for the city of Boulder. That report informed the master plan the department updated in 2012. The 2012 Fire Master Plan includes the 77 recommendations in the appendix.

In line with the city's sustainability initiatives, the BFR master plan identified 33 distinct initiatives across all seven of the city's sustainability goals for the 5-year strategic planning period beginning in 2012. In 2015, the department has achieved a number of goals as well as is in the process of fulfilling the remaining initiatives. Key achievements of the plan to date include:

- Conduct a station location assessment (2014) [**Attachment A]**
- Conduct a station needs assessment (2015) [**Attachment B**]
- Adoption of the wildland interface code (2014)
- Construct a wildland fire facility (April, 2015)
- Pilot the use of smaller vehicles for medical emergencies (2013-14) [**Attachment C]**
- Leverage new dispatch system to reduce number of vehicles responding (2013-14)
- Firefighter wellness and fitness program (2015)
- Dedicated specialty team stations (2013)
- Complete a comprehensive community risk analysis (2014-15)

Results of station needs and locations, the light rescue vehicle pilot program as well as initiatives focused on public outreach are the subjects of this study session.

IV. ISSUES

The BVCP stipulates the department's response time standard to be six minutes. It is generally understood this time target includes 1 minute to process the 911 call (call handling), 1 minute for time to alight emergency vehicles (turnout time), and 4 minutes to travel to the emergency location. The 4 minute time standard, also known as travel time, is used along with system demand to gauge appropriate locations for fire stations. In 2014, the department prepared a fire station location study and along with Facilities and Asset Management, completed work on a station design needs assessment. The two studies were designed to answer some basic questions regarding BFR's deployment such as: are stations appropriately placed for the services BFR provides; and, do BFR's stations include all the appropriate features modern fire stations typically possess? Particular attention was paid to regional best practices as well as consideration for the "community fire station" concept. Community fire stations are intended to be the conduit for public outreach for local government and have been used with great success as polling stations, community CPR classrooms, and car seat installation locations among other activities. Many newer fire stations are co-housed with other critical city services for campus-style customer service. Community fire stations can be a critical part of the department's efforts to expand public outreach and improve community resiliency (community risk reduction).

Community Risk Reduction

The Community Risk Reduction Division (formerly the Life Safety Division), headed by the chief fire marshal, is the primary department mechanism for improving community resiliency and reducing risk. It does so through development plans review, code enforcement and inspections, and life safety education delivery. Major activities provided by the division include:

- RA academy (university program)
- Local school fire safety programs (pre-school and elementary)
- Greek leadership fire academy (university program)
- University fire drills (university program)
- Fire extinguisher training (business and industrial training)
- Home safety surveys and smoke alarm installations (residential safety)
- Camp Boulder Fire (middle school program)
- Citizens' Academy (community outreach)
- Business inspections (community safety)
- Development plan reviews (adopted code enforcement)

The division has identified opportunities for increased residential safety and has already begun working to improve home safety. Outreach began in 2014, for instance, with Boulder Meadows, where a tragic fire in October took the life of a 2 year old boy. Of the 500+ homes in the neighborhood, 60 volunteered to have smoke alarms installed on premises. These 60 homes represent a small fraction of the 44,000+ residences in the city that could benefit from increased awareness regarding fire safety, general home safety, and even disaster preparedness. Additionally, given the continuing threat of wildfire and flooding, the department sees more opportunity for public outreach particularly in concert with the new neighborhood liaison in 2015.

Guiding Question for Council

1. Does council have any questions about the department's proposal to focus more effort and resources on community resiliency with regard to wildfire and life-safety?

Current Boulder Fire Station Conditions and Recommendations

Four of Boulder's seven fire stations are more than 40 years old and all of its stations are missing critical features for the crews and for the emergency services BFR provides the community. Stations lack appropriate living and safety features for firefighters such as separate locker and sleeping space for gender diversity, decontamination areas for emergency medical equipment and uniforms, adequate space for exercise, automatic fire sprinklers, and even disaster planning storage areas. Boulder's fire stations do not compare well with other stations in the region.

Station 3 (1585 30th St.)

Station 3 has been identified as a critical facility in need of relocation out of the 100-year flood plain. Recently conducted station deployment analysis has confirmed that the station could be more ideally located in the area of Mapleton ball fields and Boulder Junction (see Figure 1). Locating a community fire station on the site of Mapleton ball fields would need to address a number of issues including the appropriate provision of regulation ball fields so field sports can continue without interruption. If the ball fields cannot accommodate a community center/fire station, then commercial property must be pursued in the recommended relocation footprint. This will substantially increase the project cost since fire administration was intended to be part of the station 3 relocation project. Fire administration is presently leasing office space in 3065 Center Green along with the Information Technology and Human Resources Departments.

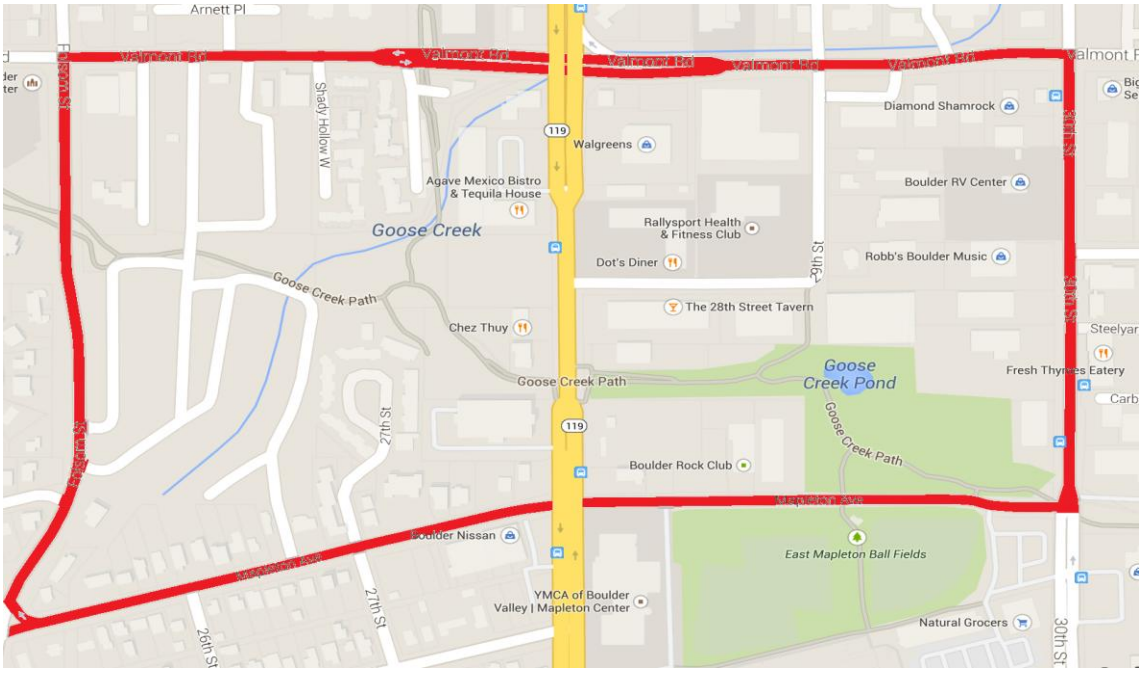

Figure 1. Ideal footprint for Fire Station 3 (access should be on or near main roads or arterials)

Station 4 (4100 Darley)

Station 4 is not in a flood plain but is inappropriate for continued use as a fire station (it is a converted residence). The department's station location analysis recommended relocating the station from its present location slightly north and west, but land availability may be a problem. Station 4 was also one of two fire stations that sustained serious flooding in 2013 and had to be taken off line for a brief period till the flooding issues were addressed. Estimated square footage requirement for a new Fire Station 4 would be approximately 11,000 square feet. Space needs naturally depend on the number of units expected to respond from that location.

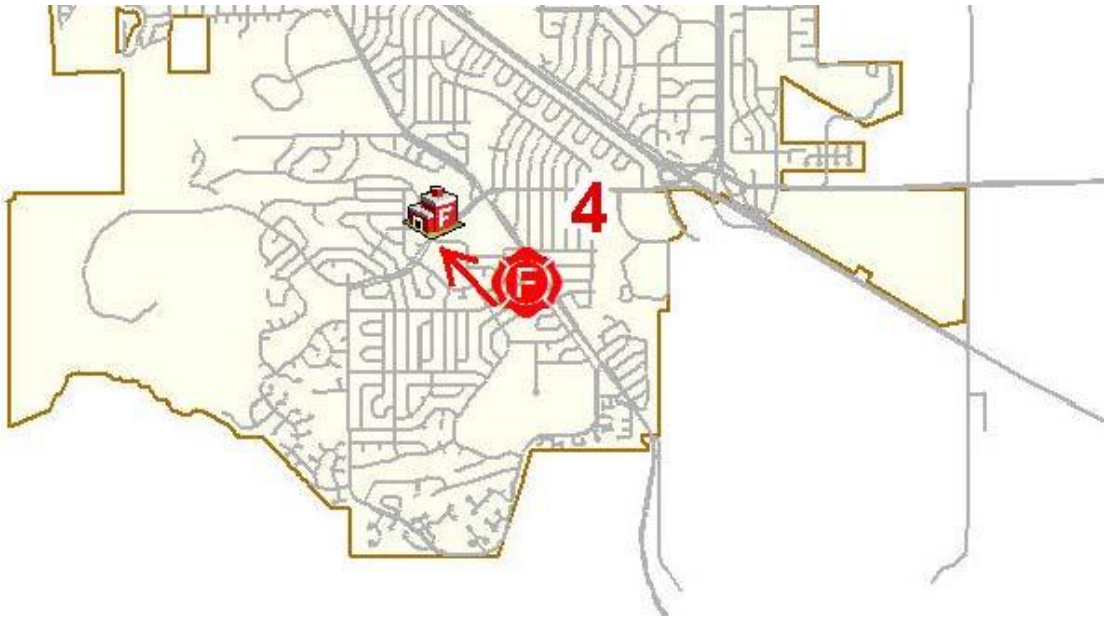

Figure 2. Station 4 is recommended for relocation closer to Table Mesa

The remaining fire stations are all considered in the capital improvement plan for remodeling or rebuilding and it is recommended to proceed with these in stations and in accordance with updated demand analyses and as funding is made available.

Guiding Question for Council

2. Does council have any questions about fire station design needs and proposed priorities involving the relocation and renovation of fire stations 3 and 4?

Station Alerting

Station alert systems are the hardware and software systems designed to integrate with computer-aided dispatching to provide station notification of an emergency call. Modern alert systems can relieve the burden of a dispatcher from having to personally articulate call information during a dispatch. This is critical for 911 centers such as Boulder's, where call takers also function as dispatchers. Newer alerting systems provide visual cues to call locations, map the quickest route, use soft lighting and less harsh tones for notification and dispatch multiple stations at the same time without using critical radio bandwidth.

Boulder's antiquated station alerting systems add 30 seconds or more to response times, especially when multiple stations are alerted. Each station must be toned in sequence and then the dispatcher must voice the notification over the radio, which can tax an already stressed communications system. Moreover, poor audio in the stations makes it difficult for responders to quickly ascertain the nature of the call and its location and must call dispatch to confirm or rely on pagers, which take longer to alert in many cases. It is expected that upgrading Boulder's station alerting system will improve call handling and turnout times as much as 30 seconds per call, particularly for multiple station dispatches.

Guiding Question for Council

3. Does council have any questions regarding staff's recommendation to prioritize improved station alerting systems for all fire stations?

Sustainability and the Master Plan

Light Rescue Vehicle (LRV) Pilot

In 2014, the department concluded a 2 year study into the use of smaller vehicles for emergency medical response as well as administrative activities. The only station capable of housing the unit for cross-staffing purposes is Fire Station 1 (2441 13th St.). Fire Station 1 houses a ladder company, an engine company and a battalion chief. The ladder company was used to cross-staff the ladder and the light rescue vehicle for the project period. When a medical call was dispatched, the personnel would utilize the smaller vehicle to respond instead of the larger ladder truck. This left the ladder truck out of service for the duration of the medical call.

Over the two year period, the LRV responded to 3,576 emergency medical calls. These were all calls that formerly would have been responded to by the primary company at station 1 – either the ladder truck or the engine. It was clear from the results that the vehicle saved both fuel and greenhouse (GHG) gas emissions versus using the larger response vehicles. It was estimated that carbon emissions were reduced by 9.5 metric tons and carbon dioxide emissions were reduced by approximately 3.5 metric tons during the life of the pilot study. And while it is difficult to estimate the maintenance and road impact of using the smaller vehicle (the report suggests a potential of $12,240 per year saved), the LRV logged 11,440 miles of travel distance; this figure represents miles saved on the two larger trucks housed at the same station.

In recent years, a number of fire departments have begun utilizing smaller vehicles for emergency medical response. And while each jurisdiction is different and has differing expenses and differing deployment needs, smaller response vehicles for emergency medical response make good sense. The challenge for a system like that in Boulder is the lack of infrastructure, limited number of units, and limited number of firefighters on duty at any one time.

With only eight units and suboptimal 4-minute travel time coverage for parts of the city, shutting down only one fire unit can have a substantial impact on total system response times. The unit may be continued, but it would have to be operated by the engine company at Fire Station 1 and would need to be upsized to a vehicle with firefighting/rescue capability so the team would not have to return to the station to get in their larger vehicle for structure fires. This would require a new vehicle purchase and ongoing vehicle replacement costs. Estimates have been provided in the accompany report. Unfortunately, the response footprint of such a vehicle would not be any larger than a 4-minute drive time polygon around Fire Station 1. To expand the response footprint would degrade the unit's response time effectiveness and would take the primary unit out of service for longer periods of time. Additionally, in systems around the country where cross-staffing of smaller vehicles is performed, the option to respond in the larger or smaller vehicle is left up to the discretion of the responding officer. This would be the recommended model for Boulder, so GHG savings may be less than anticipated.

As an alternative to the cross-staffing, a fully staffed vehicle could be deployed. This approach would also reduce GHG emissions and achieve the desired result of matching the vehicle more appropriately to the type of call. Moreover, a fully staffed vehicle would provide some critical depth to Boulder's on-duty response force and would reduce overall system response times for all call types. However, though recommended, this option is the most expensive choice and would incur additional personnel costs, vehicle replacement and equipment costs, and would require investment in new or existing fire stations to create capacity for additional firefighters. There are

no stations in Boulder that could adequately accommodate additional firefighters without substantial remodeling or rebuilding.

Despite the lack of capacity at the present time for smaller response vehicles throughout the city, the department has already been able to reduce GHG by other means. In 2013, 911 call handling procedures were changed to better match the type of call to the type of Fire/EMS response available. As a result, overall call volume dropped approximately 10 percent from 2013 to 2014. This reduction in call volume represents a substantial number of responses (1000+) that did not require the larger fire vehicle response thus saving both miles travelled and improved system readiness. The department will continue to explore ways to better match resources to call types and to reduce 911 call volume through the efforts of its Community Risk Reduction team.

CONCLUSION / NEXT STEPS

During the 2016 budget development process, Fire will identify at least 2 community risk reduction outcome measures designed to evaluate behavioral changes in the targeted populations. The Community Risk Reduction will identify any resource needs and tie those needs to the department's 2016 budget request for review by the executive budget team in June, 2015.

Given direction from city council, staff will work with the capital improvements planning committee in 2015 to identify funding for stations 3, 4, and station alerting as well as update cost estimates based on land acquisition needs.

Staff will prepare an RFP for station alerting systems by June, 2015 and identify potential funding sources for retrofitting all 7 fire stations.

Fire will complete its community hazard assessment and incorporate it into a comprehensive "standard of cover" (performance targets) document for City Council consideration by October, 2015. An approved standard of cover will be used as input into the next iteration of the Boulder Valley Comprehensive Planning process.

Boulder Fire Rescue

Station Location Report

Pride · Integrity

Professionalism

March, 2015

Boulder Fire-Rescue wishes to express appreciation to Brent Shafranek and Heidi Tregay for their research and contributions to this report.

Contents

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Executive Summary

Since the early 20th century, Boulder's fire stations have followed the traditional Insurance Services Office (ISO) model of locating stations within approximately 1 ½ miles of each other. As Boulder grows and as street networks have evolved, demand for Boulder Fire's services have increased and complicated travel time. Boulder Fire's scope of response activities have also evolved and the department now provides all hazards response services to the citizens and visitors of Boulder. These factors along with a more diversified workforce, changing building codes and aging facilities, necessitate a reexamination of Boulder Fire's facility locations and deployment plans.

The Boulder Valley Comprehensive Plan (BVCP) and the Fire Master Plan both set a total response time standard of six minutes for emergency response. This means the benchmark travel time for responding from stations should be no more than four minutes. That leaves 60 seconds for 911 call taking and 60 seconds for firefighters to get on the truck and respond. This analysis follows the work that TriData performed as part of the management assessment in 2011. It includes factoring for existing station workloads, four minute travel time calculations and community planning efforts.

Analysis of existing four minute travel times suggest substantial gaps in coverage in the wildland urban interface to the west as well as in north and south Boulder. Workloads are heaviest on University Hill as well as in downtown Boulder. Pockets of high demand also exist outside existing four minute travel time coverage.

Demand and travel time were factored into a GIS analysis of ideal locations for a system consisting of 5 – 10 stations. All existing station locations were ignored with the exception of Station 6 in Gunbarrel, which was preserved throughout the exercise. Station 6 was left in place despite its low call volume because of Gunbarrel's isolation from the rest of Boulder.

Though all scenarios have been included in the appendix, the six and seven station options were chosen because of relatively lower capital improvement costs. Nevertheless, both

scenarios relocate at least three fire stations, which may be difficult to achieve due to high property values.

In the six station scenario, Stations 1 and 3 are recommended for relocation and Stations 4 and 7 are recommended for a new combination station located between the two. The seven station scenario recommends relocating Stations 1, 3, 4 and 7. Either option represents substantial capital investment and requires locating suitable properties that may not even be available.

Given future community development projections and the likely need for additional resources near the center of Boulder, the following recommendations are suggested for consideration:

1. Relocate Station 3 north out of the flood plain and generally within an area bounded to the north by Valmont, to the south by Mapleton, to the east by 30th St. and the west by Folsom Ave. Locations in this footprint provide the best four minute travel time coverage given proximity to present and future demand as well as proximity to existing fire stations.
2. Consider relocating Station 4 northwest of its present location to help assist with the workload handled by Stations 1, 2, and 3 in central Boulder. Station 4 is also in need of replacement due to age, condition and space limitations, which makes the location proposal more appropriate.
3. Station 6 was held constant throughout the location exercise. However, Station 6, even with new Gunbarrel development, is unlikely to reach workload saturation for another 20 years or more. While Gunbarrel must continue to receive proper first-due four minute travel time coverage, there may be an alternative solution to covering that community. Boulder Rural Fire Rescue (BRFR) has a station very close to Station 6 and that facility may provide the coverage answer. Boulder Fire could partner with BRFR in a number of ways to cover Gunbarrel - co-locate with BRFR, engage an automatic aid agreement for Gunbarrel coverage, purchase the BRFR station or combine with BRFR are all potential options. Community and labor sentiment as well as the feasibility of choosing any of the above options must be weighed carefully.

4. If Station 6 is re-purposed, sold or leased, it is highly recommended that BFR add a new station either in northeast Boulder or in southeast Boulder to help with workload in the greater Boulder area as well as to improve system reliability, especially with infill development on CU's campus, the Transit Village and east Arapahoe.
5. If Station 6 is retained, consider moving the Water Search and Rescue team to that Station to reduce the recommended size of future Station 3. Station 3 will need land in a very expensive area of Boulder and the less land needed the less the overall project cost will be. Either way, Station 3 must be built to accommodate two response companies because of workload and infill development. Moreover, Station 6 would need to be renovated to house the additional water rescue equipment.

Introduction

Fire station location is one of the most critical and challenging public safety decisions a community must make. As a major capital investment, fire stations often take many months to fund, to design and ultimately to build. Picking the right location is without a doubt a very important long-term decision that will have long-lasting impacts on neighborhood safety and health, municipal fiscal health as well as the safety and health of firefighters.

There are a number of factors that should be considered when evaluating the potential locations for fire stations. Among those are: present emergency call demand, travel time estimates, existing stations and mutual aid assistance, land costs, construction costs, building codes, zoning, neighborhood development and especially, community values. Because there are so many factors to weigh, there is no special formula or national standard for selecting the site of a fire station. Often, it becomes a matter of cost versus benefit and the availability of funding. The simplest approach to picking fire station locations involves setting a response time standard, incorporating expected demand and then placing resources in hypothetical areas to analyze travel time. That was the approach used in this analysis and is consistent with the department's effort to focus on the safety and community well-being component of the sustainability framework. The department's master plan calls for the development of a comprehensive risk analysis and standard of cover of which this work will be incorporated [1, p. 15].

For response time, the BVCP was consulted, which sets a target of six minutes for total response time. It was assumed, therefore, that the travel time benchmark must be four minutes or less to include time for alarm handling and firefighter turnout. These two response time components are explained in the report.

Existing Demand and Coverage

Boulder Fire Rescue (BFR) provides a variety of emergency response services to the incorporated areas of the City of Boulder. Among those services are: fire, emergency medical, hazardous materials, water search and rescue, and technical rescue responses. BFR protects 25.8 square miles of developed urban infrastructure and an additional 70.8 square miles of city open space land. The department operates 1 ladder truck and 7 engines with designated staffing of 3 firefighters per company. Emergency responders are housed at 7 fire stations located throughout the incorporated areas of the city (see Figure 1). Presently, station 1 on 13th St., functions as the department's on-duty command station, where the shift commander resides and responds from.

In terms of fire and emergency medical response, which form the bulk of BFR's calls, the department provides structural and wildland firefighting as well as basic life support (BLS). In all cases, BFR is tasked with first-due response, which means that based on unit placement; the department is expected to arrive first before any other agency. For example, in the case of emergency medical response, BFR is intended to get to the scene within 6 minutes (from the time of the 911 call) and provide BLS care before the advanced life support (ALS) unit arrives. ALS is presently handled by American Medical Response (AMR), which maintains four ambulances in various locations within the city of Boulder. AMR is expected to arrive on the scene no longer than 11 minutes from the time of the 911 call.

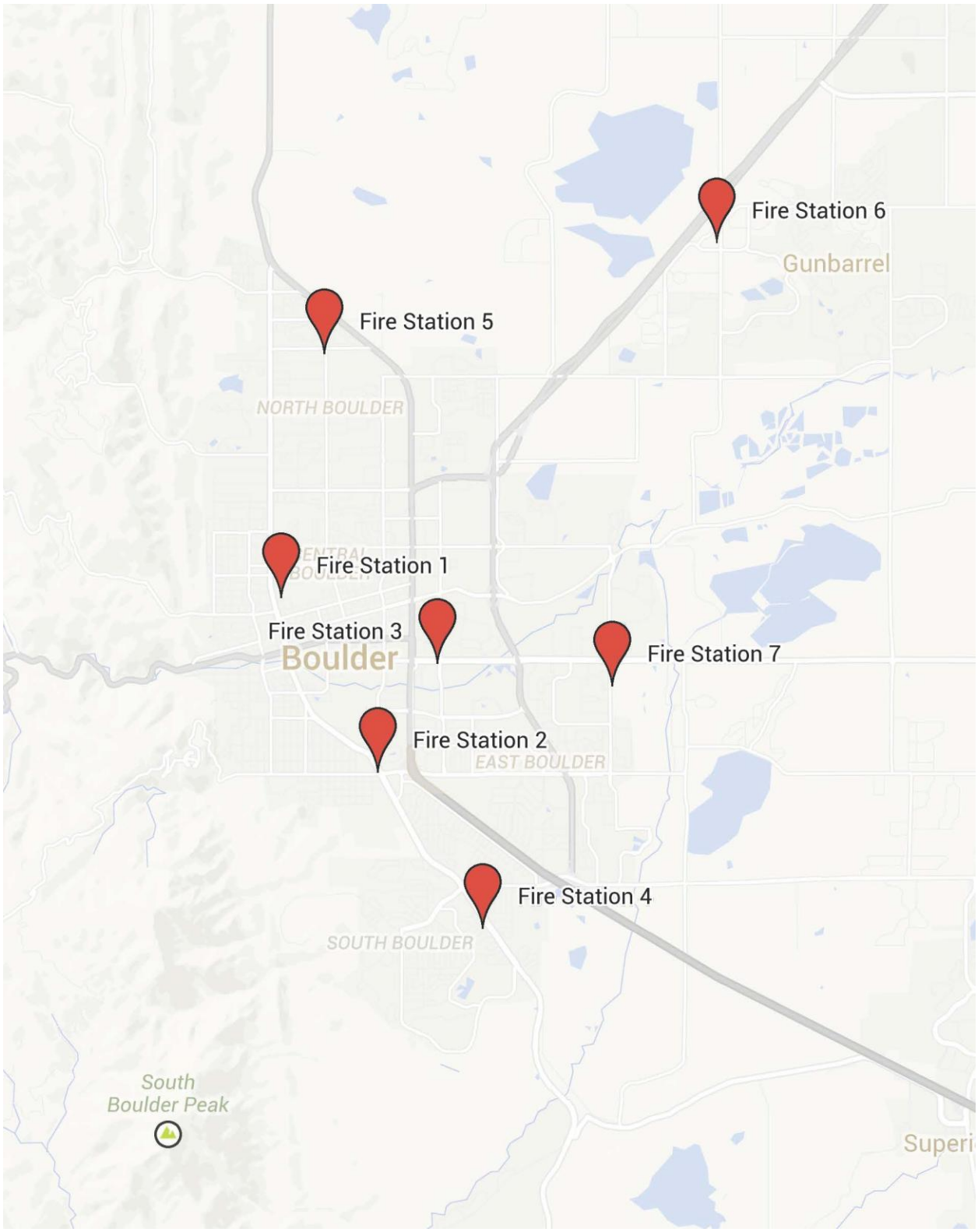

Figure 1. City of Boulder Fire Station Locations in 2014

Table 1 highlights existing station locations along with the available response equipment housed in them. As can be seen in the table, only one station houses multiple units – Station 1.

Table 1. ***BFR Station addresses and the full-time response units housed in them***

Station and Year of Placement	Street Address	Response Unit
1 - 1957	2441 13th Street	Engine, Ladder, Battalion
2 - 1959	2225 Baseline Road	Engine
3 - 1965	1585 30th Street	Engine
4 - 1967	4100 Darley	Engine
5 - 1992	4365 19th Street	Engine
6 - 1979	5145 N. 63rd Street	Engine
7 - 2000	1380 55th Street	Engine

History of Fire Station Location Planning

Historical placement of fire stations in Boulder models the pattern used in most areas of the United States. For well over 100 years, the Insurance Services Office (ISO) rules of thumb for station placement dictated where fire stations should be built. While not a requirement per se, ISO guidelines provided the basis for fire insurance rates in most communities, so adhering to those guidelines was the best way to keep those rates in check.

Till 2012, ISO guidelines gave the most community credit for fully staffed engine companies within 1 ½ miles of each other and fully staffed ladder companies within 2 ½ miles from each other. Engine companies, as defined by ISO, are the triple combination type – they carry hose, water, and have a pump capable of generating enough water flow to put out a structure fire. Ladder companies incorporate a 100 ft. minimum aerial ladder device and a full complement of ground ladders. Departments that failed to place response companies in accordance with these recommendations often scored lower in an ISO rating process. Boulder most certainly followed the ISO guidelines for the last 140+ years. Station placement in Boulder shows clearly that, with the exception of Station 6 in Gunbarrel and small areas in other parts of the city, all BFR stations fit neatly within the old 1 ½ mile ISO model (see Figure 2).

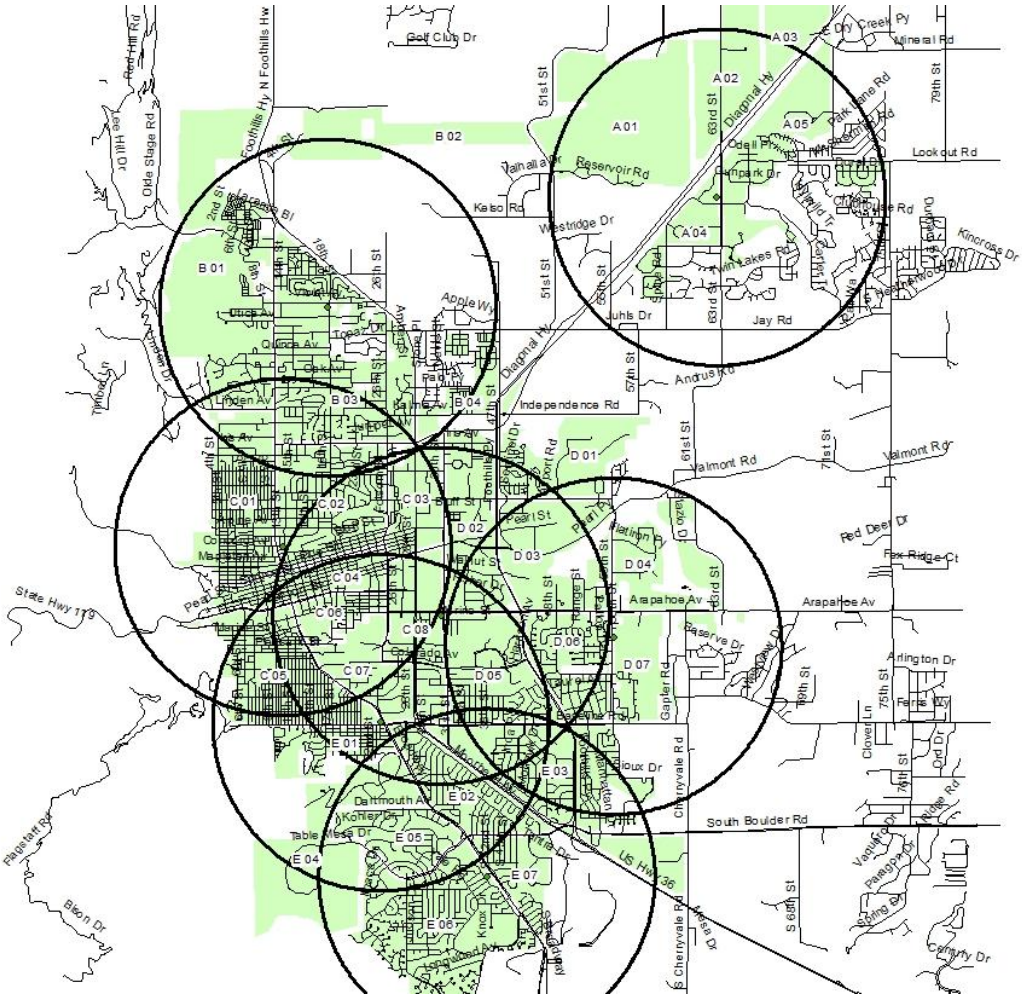

Figure 2. BFR Stations and old ISO 1 ½ Mile Zones

New ISO Guidelines

New ISO guidelines, approved in 2012, embrace the response time standards articulated by National Fire Protection Association standard 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments,* which call for 4 minute travel times for all urban areas of a city. **Travel time** is defined in the fire service as the time it takes for the apparatus to drive from its present location to the time it arrives at the emergency location. Travel time excludes the time it takes for firefighters to don personal protective equipment and mount the vehicle, which is known as turnout time. Travel time also excludes **call or alarm handling time**, which is the time the 911 call was received, obtain information and alert

responders as well as **emergency notification time**, which is the time someone recognized the emergency and called 911. A breakdown of total response time components is shown in Figure 3.

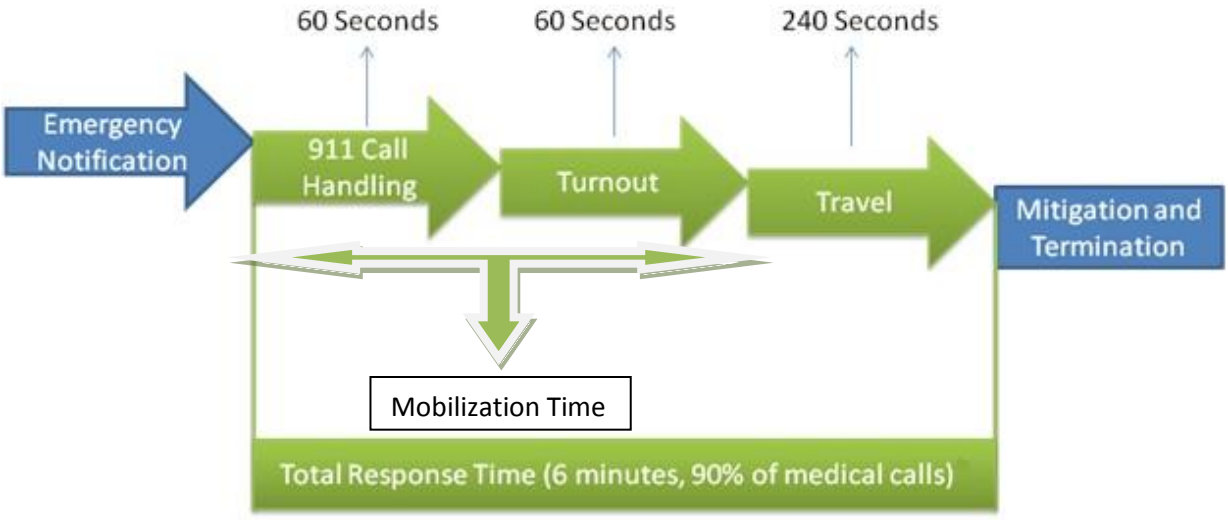

Figure 3. Response times for medical emergencies[1].

It is important to recognize that NFPA standards are recommendations only. As benchmarks, however, NFPA time targets are a credible first due response to emergencies of all types, which is why the BVCP embraces the six minute total response time target. For instance, it has been thoroughly demonstrated by medical research that brain death from cardiac and respiratory arrest can occur in as little as 4 – 6 minutes. Likewise, time from the start of a fire to flashover (the point at which all contents in a room begin burning and survivability is impossible) can occur in as little as 4 minutes. This doesn't give responders much time to intervene during an emergency. Therefore, the lower the travel time the lower the total response time and the more likely responders can effectively mitigate an incident. Four minute travel times allow for one minute call handling and one minute for turnout to arrive at the six minutes for total response time.

[1] Fire responses allow for an additional 20 seconds of turnout time to allow firefighters to don protective clothing before responding.

Of the 3 components of total response time, travel time is clearly the most appropriate metric to use when evaluating fire station locations. Consequently, when looking for sites, it is generally appropriate to map 4 minute travel time polygons around each existing and/or proposed location. GIS is the most heavily used tool for performing this type of analysis.

There are some caveats to using GIS, however. First, it is normal practice to account for impedance - that is, any obstacle to travel time such as negative rights-of-way, traffic calming devices, steep grades, etc. Since most street information incorporates the speed limit, GIS programming can overestimate travel time coverage if impedance is not factored in. Also, GIS can only analyze and predict based on fixed locations. Most modern fire departments, BFR included, now dispatch units using automatic vehicle location, so the closest unit is sent whether they are in the station or not. This factor cannot be accounted for and must be validated with a historical response time analysis. Obviously, this does not work for proposed site locations. Likewise, GIS must be combined with other tools to predict what new multi-company stations can provide in terms of **reliability.** Reliability speaks to the likelihood that a unit is available at the time a call comes in. More units increase system reliability. Finally, as powerful as GIS is for geospatial analysis, its predictive validity is only as good as the assumptions used in the model itself.

Assumptions

For the purposes of this study, traffic speed was estimated at 80 percent of the posted speed limits to account for impedance, which is intended to include a standard fire department policy to stop at all negative rights-of-way during emergency response. This is a departure from the assumptions made by TriData in 2011. Figure 4 is taken from the original management assessment by TriData in 2011. Clearly, no travel impediments were used to calculate four minute drive times in that study. Despite that, large gaps in coverage can still be seen in the northeastern portion of the city and in the outer fringes near city limits. These areas are represented in light green.

Modified four minute drive times are shown in Figure 5. With impedance factored in, the gaps in coverage are even more pronounced. Much of these gaps in coverage are likely due to street connectivity, which is lacking in many areas of the city.

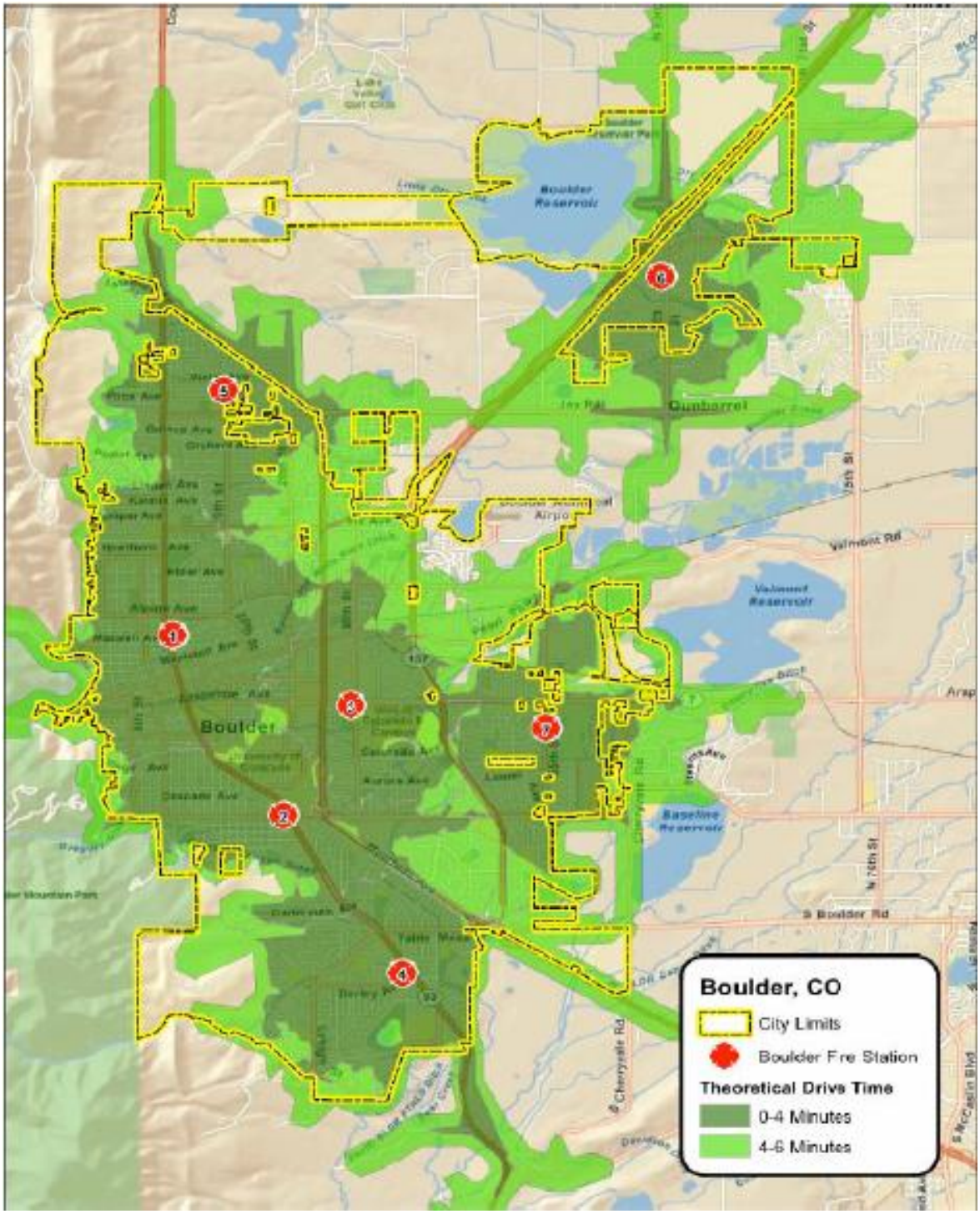

Figure 4. Tri-Data 4 Minute Drive Time Results

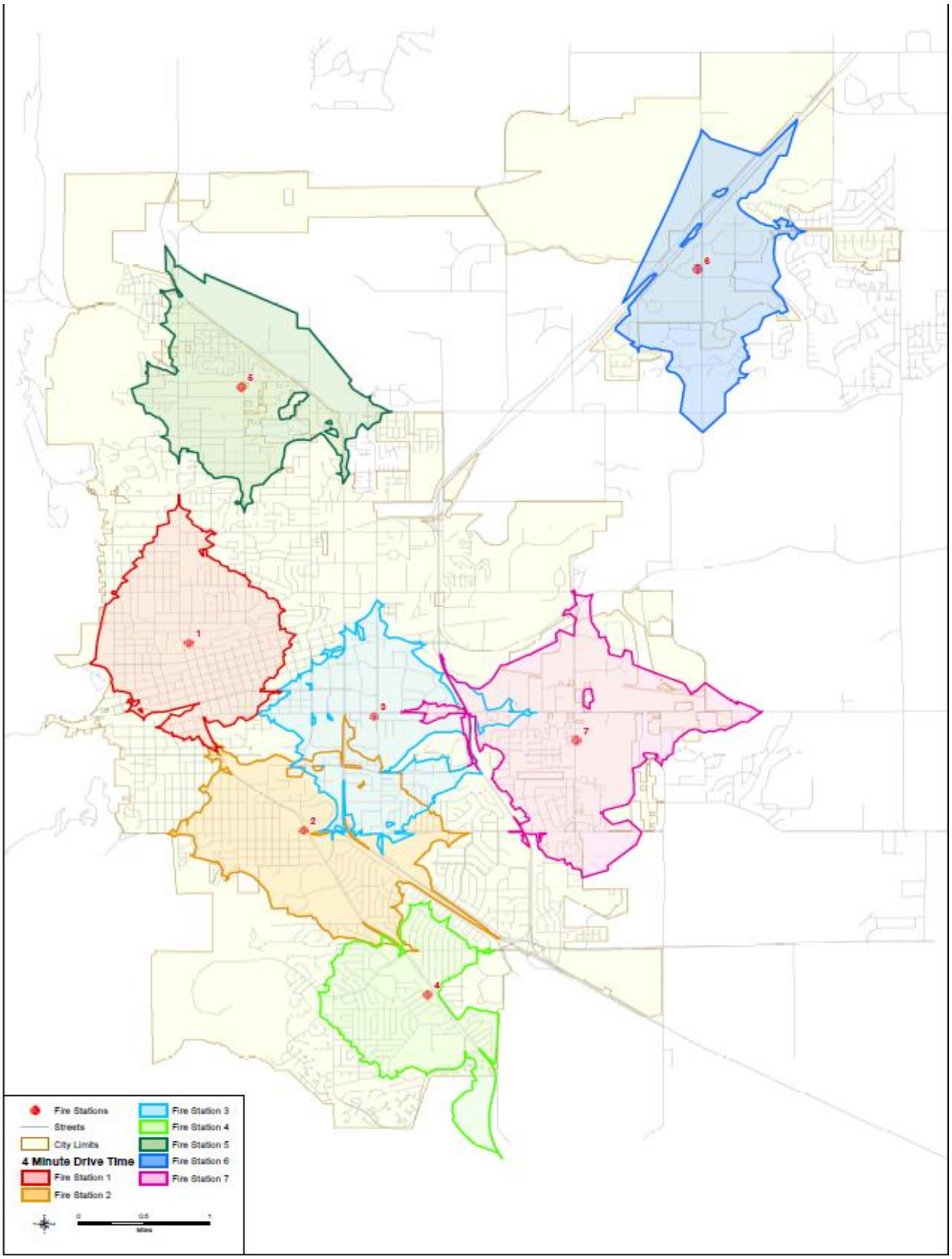

Figure 5. Existing Drive Times Traveling 80 Percent of the Speed Limit

Demand, Distribution and Concentration

Like travel time, demand is an important component for analyzing site locations. GIS can help plot demand hotspots and show whether travel times cover those areas. For the purposes of this report, demand for service is defined as the number of emergency calls that require a fire department response. **Demand** may also be referred to as **workload** since each call for service is assigned one or more units for response.

As stated previously, since BFR provides all hazards response, demand includes: fires, hazardous materials incidents, technical rescue events, water rescue requests, emergency medical calls, and other miscellaneous non-emergency calls. Non-emergency calls were excluded from the analysis since the department response is not required to respond with lights and sirens, so all non-time dependent responses have been omitted.

Boulder's 5-year demand for fire department services is shown in graphical form in Figure 6. Travel time polygons are included to show where hotspots exist outside the benchmark travel times. While most hotspots are covered by the first due unit within a 4-minute travel time, demand in northeast Boulder and south of Gunbarrel presently falls outside of any 4-minute travel time polygon. There are also numerous areas around the city that fall in between 4-minute travel time coverage from existing stations.

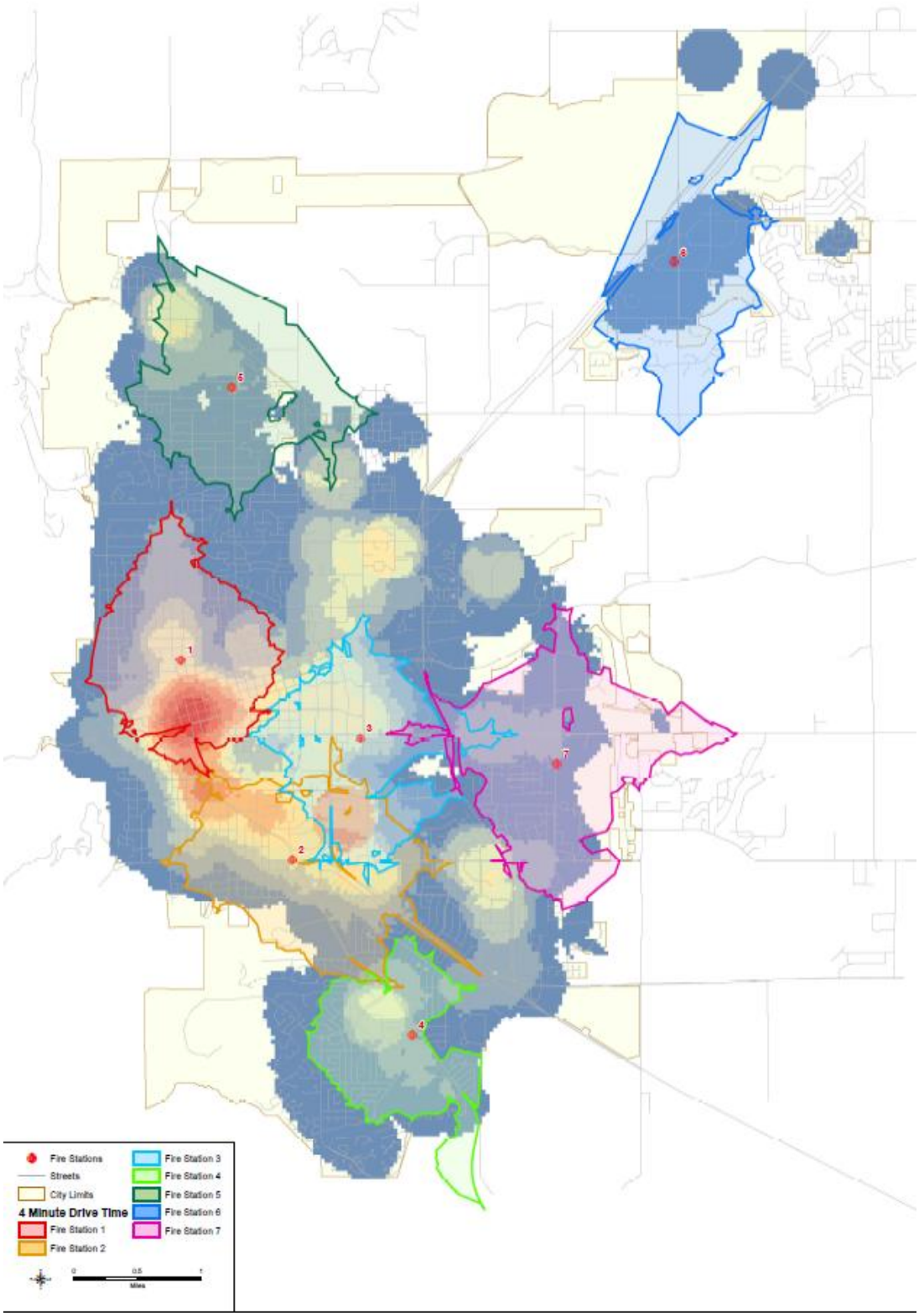

Figure 6. Boulder 3-year Demand Plot (warmer colors depict greater demand)

Another important feature of demand analysis is the workload that is placed on each unit in the system. The higher the workload, the less available the unit will be for response to other calls for service. BFR has used 1,500 calls per year as its trigger point for evaluating the need for additional resources[1, p. 9]. Some systems use as much as 3,500 calls per year as a trigger point for requesting additional resources, but employee burnout can be a real problem as the unit approaches an average of 10 calls per 24-hour period. This is because fire department managers must also account for training, building inspections, restocking, and maintenance activities among other tasks each company routinely engages in.

The most recent (2013) annual workload numbers per unit are shown in Figure 7. Clearly, four of the department's units are exceeding this workload rule of thumb, so system capacity in the heart of the city should be of real concern (2501, 2502, 2503, and 2520). These four units operate from Stations 1, 2, and 3.

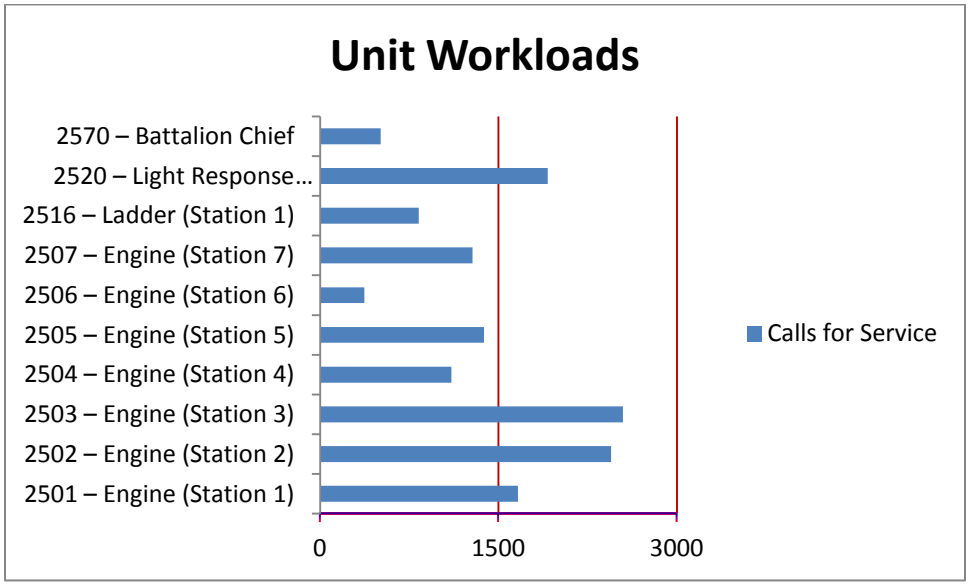

Figure 7. Call Volume for Each BFR Unit in 2013

Another important associated workload measure is unit availability for calls in its own district. Response districts in Boulder were originally designed to ensure that the unit from the closest station is dispatched. Two measures - **unit availability** and **unit reliability**, measure the accuracy of this geographic assumption. In theory, the higher the availability the likelier the

closest unit will get to the call in the least amount of travel time. Boulder Fire's unit availability numbers are depicted in Table 2. Clearly, BFR's units are responding most of the time to calls within their own assigned district (around 90 percent). Unit availability drops off somewhat for fire response. Nevertheless, BFR units are usually available when dispatched to fire calls in their geographic district.

Table 2. ***For the majority of system demand, BFR units are available for their own calls more than 90 percent of the time.***

Unit Availability in First-Due Response Area 2009-2014							
Station	**1**	**2**	**3**	**4**	**5**	**6**	**7**
First-due Workload EMS	10449	6938	7086	2744	3516	782	2247
First-due Availability EMS	89.8%	91.3%	90.9%	93.2%	97.4%	93.9%	92.2%
First-due Workload Fire	388	266	209	80	116	46	53
First-due Availability Fire	83.4%	83.4%	77.4%	87.9%	82.9%	83.6%	77.9%

Unit availability is only part of the picture, though. A unit may be unable to cover its assigned district within the four minute travel time even if available. This speaks to the unit's reliability. The unit may be out of service for another incident, for training or for other reasons; it may be out of its district at the time of the call; or the incident may be located in an area hard to reach because of the street network. Fire departments can measure this by calculating the percentage of time that the first-due unit responds within the benchmark travel time. In Boulder, the four minute travel time objective is used to calculate this figure for each district. The results for the previous five years for fire and EMS calls are shown in Table 3.

Table 3. *Reliability numbers from each station reveal a system coverage or capacity issue*

Reliability Analysis 2009-2014							
Station	**1**	**2**	**3**	**4**	**5**	**6**	**7**
First-due Reliability - EMS Travel Time Benchmark 4 Minutes, 90% of the Time							
First-due Reliability **EMS**	68.7%	75.2%	75.4%	69.3%	65.9%	61.5%	55.1%
First-due Reliability - Fire Travel Time Benchmark 4 Minutes, 90% of the Time							
First-due Reliability **Fire**	75.8%	71.8%	74.2%	63.8%	62.1%	65.2%	50.9%

The data in Table 3 reveals a potential problem in both distribution (where physical resources are located) and concentration (the number of physical resources available in the system). Ideally, all the numbers should be 100 percent in achieving the benchmark travel time objective, though this is rarely achieved in any fire department.

Other Station Location Assessment Factors

Population Density

To determine whether stations are appropriately located in the modern context, it is also helpful to analyze other aspects of the coverage area. Population density is an important consideration since denser regions typically generate more calls for service. Figure 8 shows populations densities for Boulder based on the most recent census. It excludes the day and night time population shifts associated with the university and local employers. Figure 8 also includes the existing four minute drive time polygons to help identify population centers outside of benchmark travel time objectives.

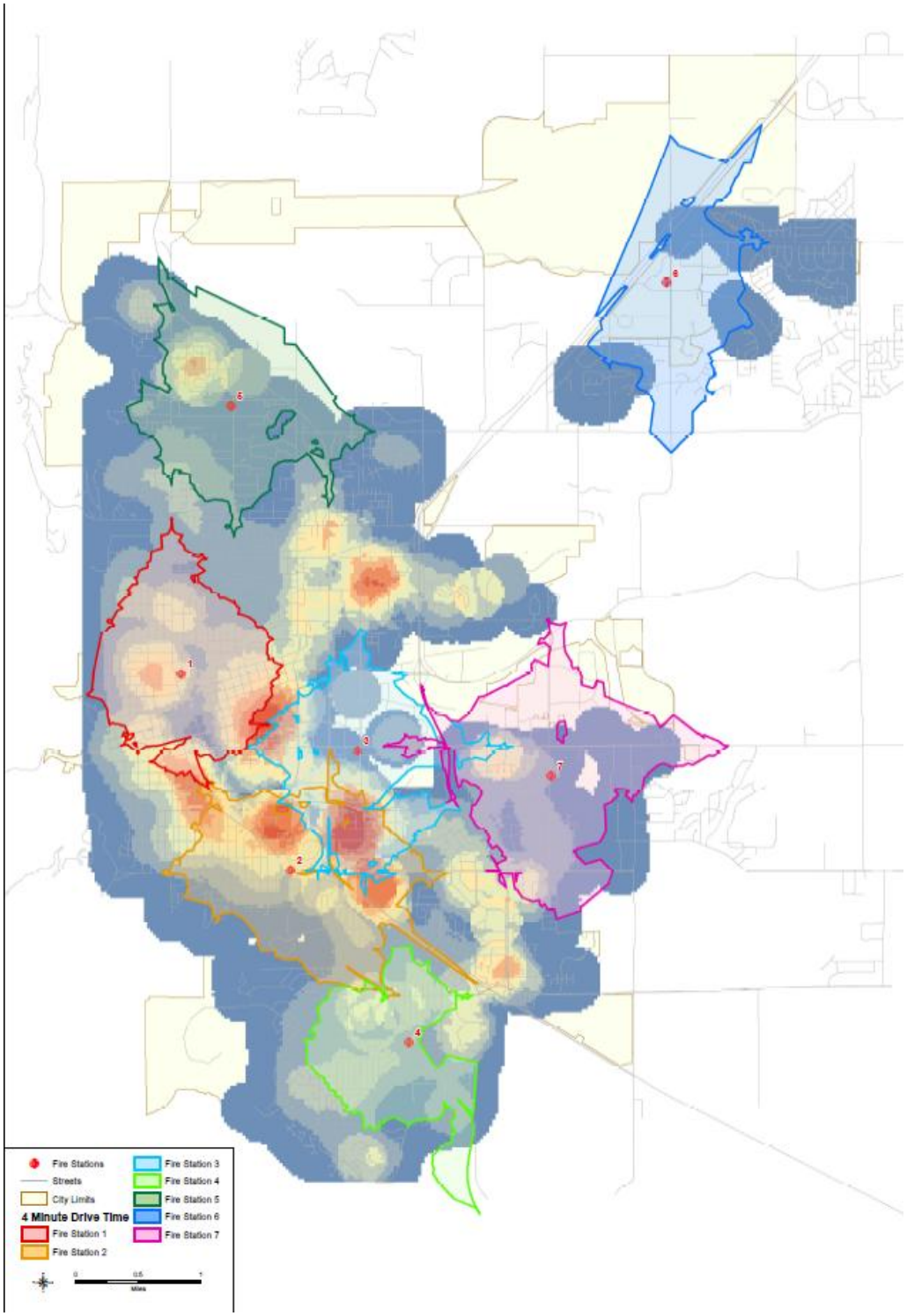

Figure 8. Population Density Centers (warmer colors are denser)[2]

[2] Population shifts due to commuters and university students are not included in this analysis.

As is shown in Figure 8, many areas of the city have population centers outside of 4-minute travel times. Since the census shows residential population numbers, holes in 4-minute travel times have serious implications for timely emergency medical response. Historical analysis of after-hours emergency medical responses in those uncovered areas requires greater scrutiny going forward to verify if assumed drive time impedance is accurate.

The Local Economy

Key drivers of the local economy should also be considered to ensure that fire protection is close enough to prevent or deter disaster. This could include major retail centers as well as large employers, whose loss due to fire or other disaster could severely damage the local economy for the long-term. Analyzing where property values are higher and/or where critical infrastructure is located will also highlight locations without benchmark-level response protection.

Figure 9 illustrates Boulder's commercial hotspots based on sales tax revenue. Most lie within 4-minute travel time protection, but some key areas north along Foothills Parkway lie outside the polygons.

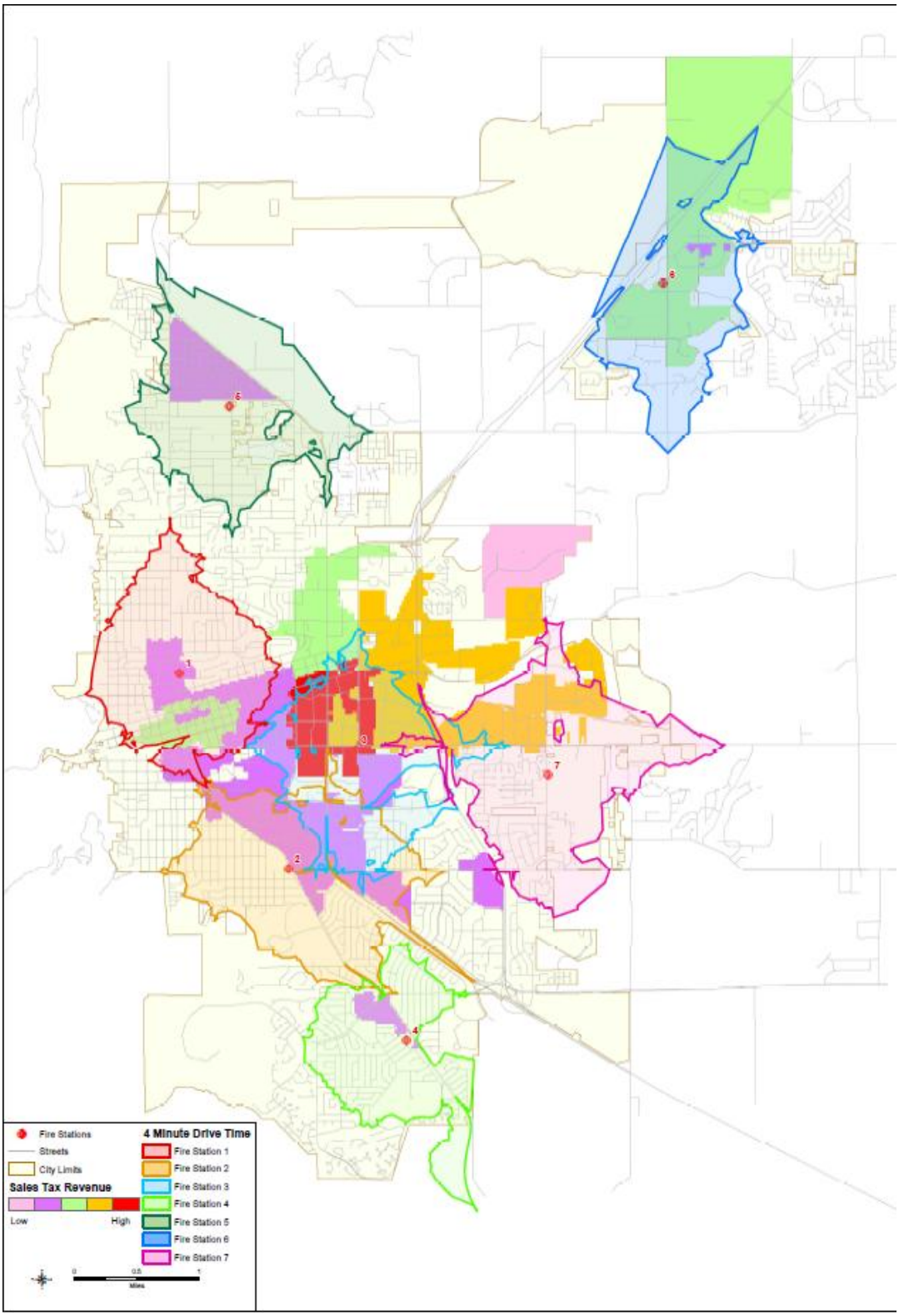

Figure 9. Four Minute Drive Times and Sales Tax Hotspots

The Wildland Urban Interface

Finally, given Boulder's proximity to the wildland interface and the danger of wildfire in the region, it is helpful to analyze travel time into the interface areas on the western edges of town. BFR is expected to be the first due for all wildland fires in both the interface and on open space property. Figure 10 highlights the areas of coverage that fall outside of the four minute travel time benchmark from existing stations. Most of the vulnerable areas are residential and fall outside of travel time objectives because the streets are not as connected as other areas of the city.

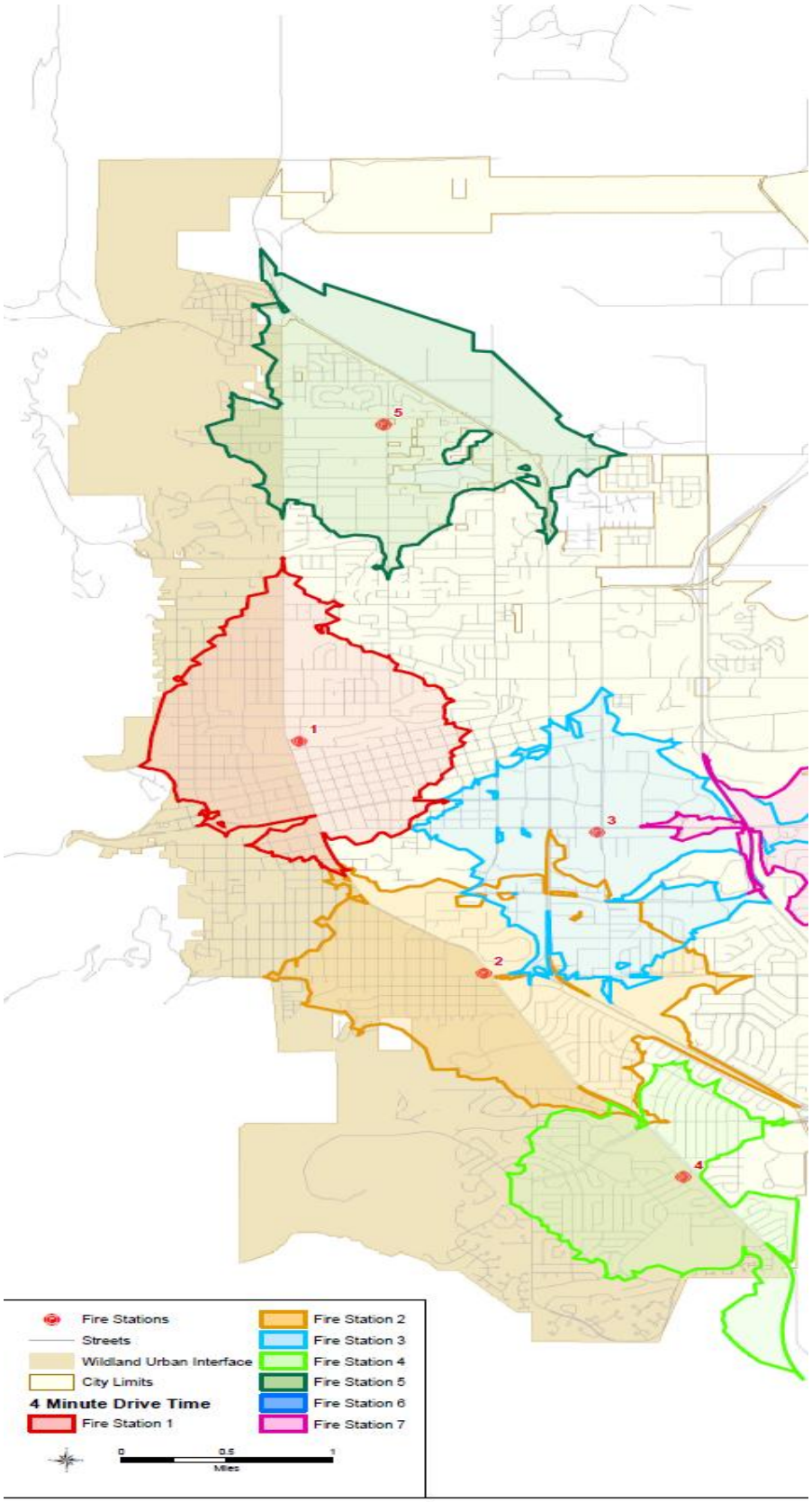

Figure 10. Wildland Urban Interface (WUI) areas in Boulder Outside of 4-minute Travel Times

Planning Impact on the BFR Service Area

Admittedly, demand analysis based on existing response data is one dimensional. It is just a snapshot of the present community picture. Since most stations are expected to last from 30-40 years, it is also important to consider long-term community development planning. In theory, more population or an increasing number of target hazards will likely place a greater demand on response resources. It may also dictate a change in types of resources needed such as more ladder companies with 100-foot aerial devices or a greater number of smaller emergency medical response units. If not planned for, fire stations may end up in locations far removed from demand centers or critical infrastructure.

A number of planning documents were consulted to analyze how Boulder is expected to change over the next few decades: the Transit Village Area Plan, the BVCP, the University of Colorado Boulder Campus Master Plan, and the Envision East Arapahoe Scenario Plans. While it is recognized that these plans may change over time, it is reasonable to assume that the residential populations as predicted by the BVCP should hold true for the next twenty five years. This suggests that the future population of Boulder will be approximately 125,000 and the future enrolled university student population will be 35,000 to 45,000 by 2035[2, p. 7]. Since most of this growth will occur as infill development, it is the population density that is expected to change the most and should be the governing factor. Presently, population density for the city of Boulder is approximately 4,200 per square mile (excluding open space). Though densities vary from area to area, this density figure places Boulder in what is generally considered a “metropolitan” category from a fire service deployment perspective [3, p. 20]. Consequently, regardless of how many additional residential units are added to the Boulder community stock, response planning will be calibrated to the highest benchmark levels for the built environment. No doubt demand will increase in the areas expected to become denser. However, for the most part this will dictate how many units should be in the system rather than where. Planning documents must be consulted to anticipate any non-residential hazards slated

for development since this will be where target hazards and critical infrastructure are likely to be located.

The University of Colorado Boulder has planned most of its new 1-10 year development efforts in its east campus locations (see Figure 11). New research buildings are already being planned for and in some cases already under construction. However, since all campus development is expected to comply with current building and life safety codes as well as include fire sprinkler protection where appropriate, the additional impact on the fire protection system is likely to be minimal for the foreseeable future [4, p. V.13]. Most call volume (emergency medical and activated fire alarms) is associated with residences and dormitories and that is not expected to change in significant amounts.

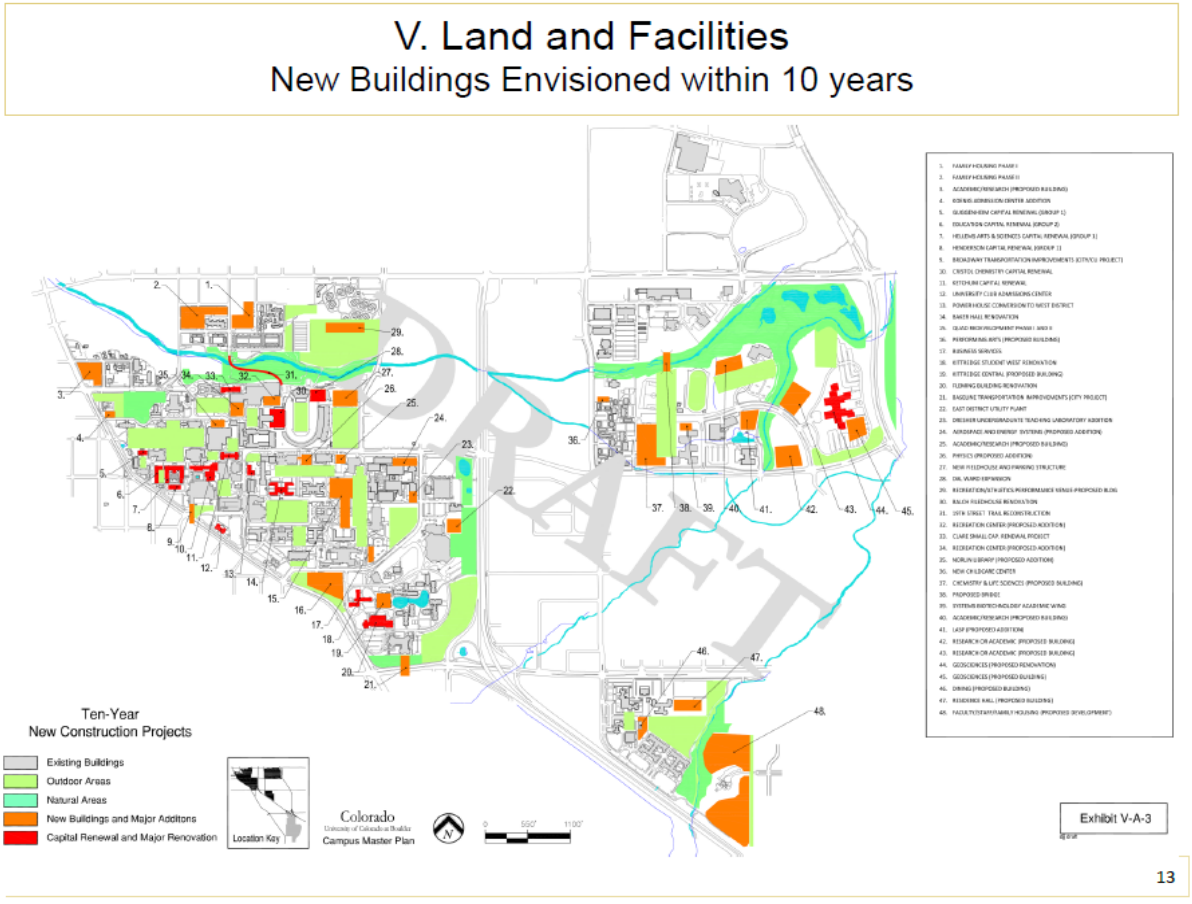

Figure 11. CU Master Plan Projected Development Projects

Service Level Objective for Fire and EMS

As stated previously, the BVCP sets the targeted response time for all calls within the city limits. That standard calls for BFR to have response times normally six minutes or less [2, p. 93]. The word "normally" is interpreted to mean the nationally accepted standard of total response time six minutes or less, 90 percent of the time [5]. This would accommodate 60 seconds for alarm handling, 60 seconds for turnout time and 4 minutes for travel time. It is worth noting that the NFPA allows for an additional 20 seconds of turnout time for fire-related calls and emergencies.

For the purposes of station location, it is simplest to use the 4-minute travel time objective as an appropriate benchmark for station distribution. Consequently, an overall service level objective for fire department response can be set as follows (60 seconds for alarm handling, 80 seconds for turnout, and 4 minutes for travel):

Objective: For all emergency incidents, the first unit shall arrive within six minutes and twenty seconds total response time (call receipt to wheels stop at location). The first-due unit shall be capable of organizing a fire attack or starting rescue or providing basic life support for medical incidents.

This objective represents BFR's approach to the most effective level of response for citizens of Boulder. Progress to achieving that level of service is presented in Table 4. Red times represent baseline times that fall short of the benchmark.

Table 4. Five Year BFR Response Times

Measure	Benchmark (minutes)	5 Year 90th Percentile (minutes)
Call processing time – receipt to dispatch	01:00	02:26
First unit turnout – dispatch to enroute	01:20	02:41
First unit travel – enroute to on-scene	04:00	05:52
Two-in, two-out – receipt to on-scene	None established yet	08:23
First BLS – receipt to on-scene	6:00	07:20
First ALS – receipt to on-scene	11:00[3]	07:59
First chief – receipt to on-scene	None established yet	11:59

[3] As per the current ambulance contract

Methodology

In the literature, a multitude of operations research models have been proposed for siting fire stations [6]. As is the case with all models, the effectiveness of the solution depends a great deal on the assumptions made and the purity of the data used. And though fire departments collect large amounts of response data, it is difficult to compare across organizations and localize any national models. And because mobilization time is not always measured consistently, most departments rely more exclusively on their own data sets or strictly compare themselves with accredited organizations, whose data definitions match the concepts of NFPA 1710. Furthermore as previously mentioned, most departments use some form of automatic vehicle location dispatching, so response is not always from the closest physical facility. This can limit the value of site modeling if historical response information is not accounted for. For this and other previously stated reasons, it is simplest to take the approach used by the TriData team in 2011 as well as incorporate or consider specific target hazards that may skew location results [7]. That operations research approach uses both historical demand and GIS travel time modeling to arrive at potential station coverage solutions [8]. After site locations are proposed, map layers with varying risk factors are overlaid to ensure that travel time coverage is adequate and equitable for the entire community.

Response time data for the previous 3 years was used to assess where concentrated areas of demand were occurring in city limits (see Figure 12). The results of that analysis show a number of hotspots that must be accounted for both in terms of station locations and in terms of response depth (number of response units). In some cases, even if a station were sited close by, if only one unit is available then system response times to subsequent calls will suffer.

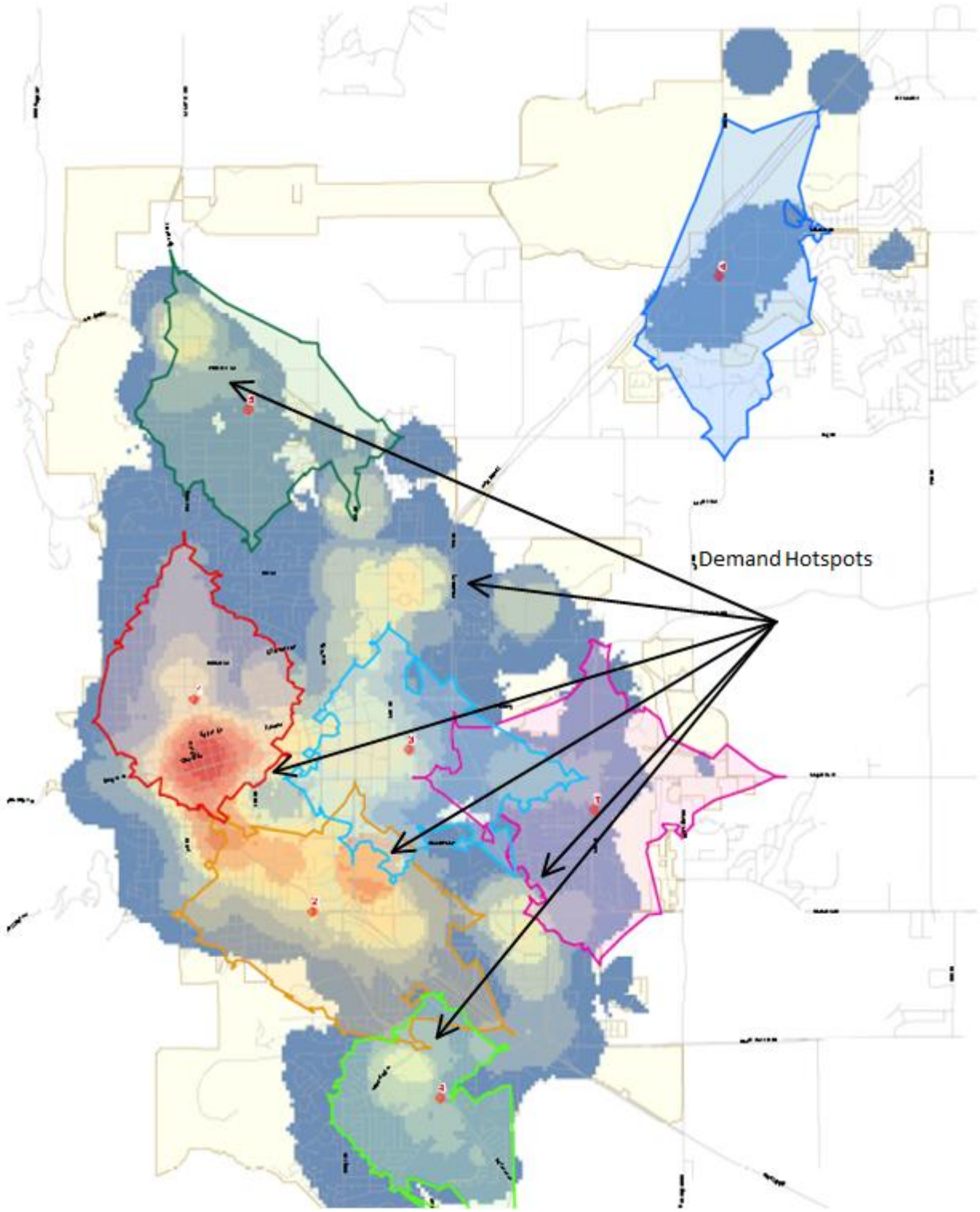

Figure 12. Fire/EMS Demand Concentrations

Response time data used was taken from 2010-2013. Each demand location was geo-coded to allow the GIS software to calculate the closest station regardless of the time of the call. Reliability was not considered as it was assumed that the unit would be available at the specified fire station when the call was received. To simplify the model, no impedance factor was calculated for each street segment nor was time of day considered. Instead of impedance factors for each street segment, existing speed limits were used at 80 percent. In practical terms, this meant the assumption that a fire vehicle could be expected to average 28 mph on a road with a speed limit of 35 mph to help account for stops and acceleration.

For the purposes of the exercise, all existing station locations were erased with the exception of station 6. Because of Gunbarrel's distance from the rest of contiguous city limits, station 6 was held constant to ensure coverage despite its low call volume. Each demand point for the 3-year period was mapped from 4 to 15 stations and no limits were placed on where those stations could be placed.

Results and Discussion

Before examining Boulder system capacity and GIS recommendations, it is important to consider the potential for outside assistance with four minute travel coverage. Boulder is surrounded by career and volunteer fire service agencies that have the potential to help with coverage in times of emergency. For the purposes of BFR station location, though, it is only relevant if other fire agencies could cover Boulder city limits with career fire response in four minutes or less travel time. Figure 13 depicts where outside fire stations exist in the region. With the exception of Boulder Rural Fire Department's main station in Gunbarrel, no other career stations can respond as first-due in city limits unless they relocate to existing city stations. To highlight why this is so, Figure 14 shows four minute travel times from the only other close combination (career and volunteer) fire department in the region, Rocky Mountain Fire District. None of the district's four minute travel times reach into Boulder city limits.

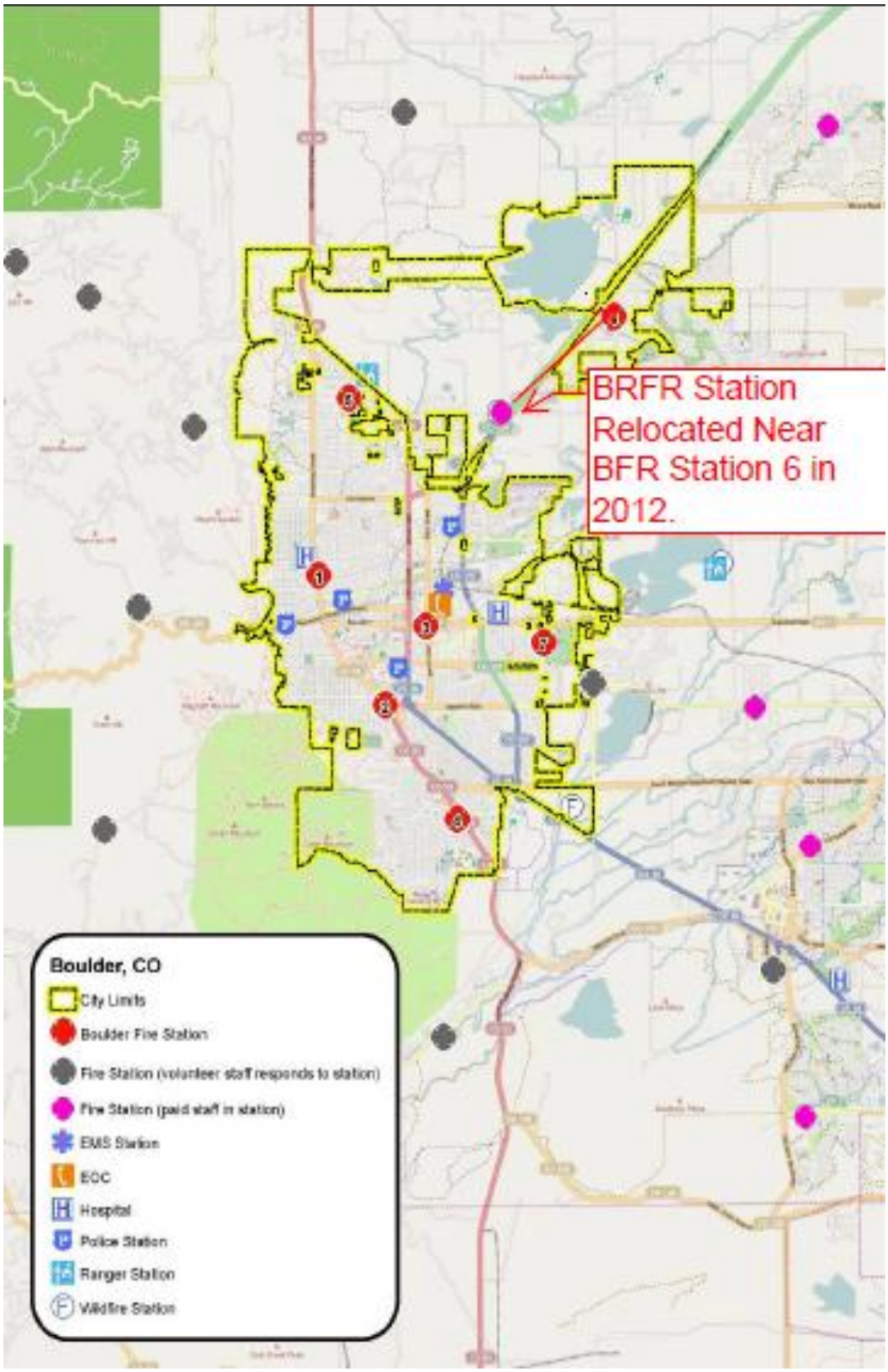

Figure 13. Station Locations in the Boulder Region

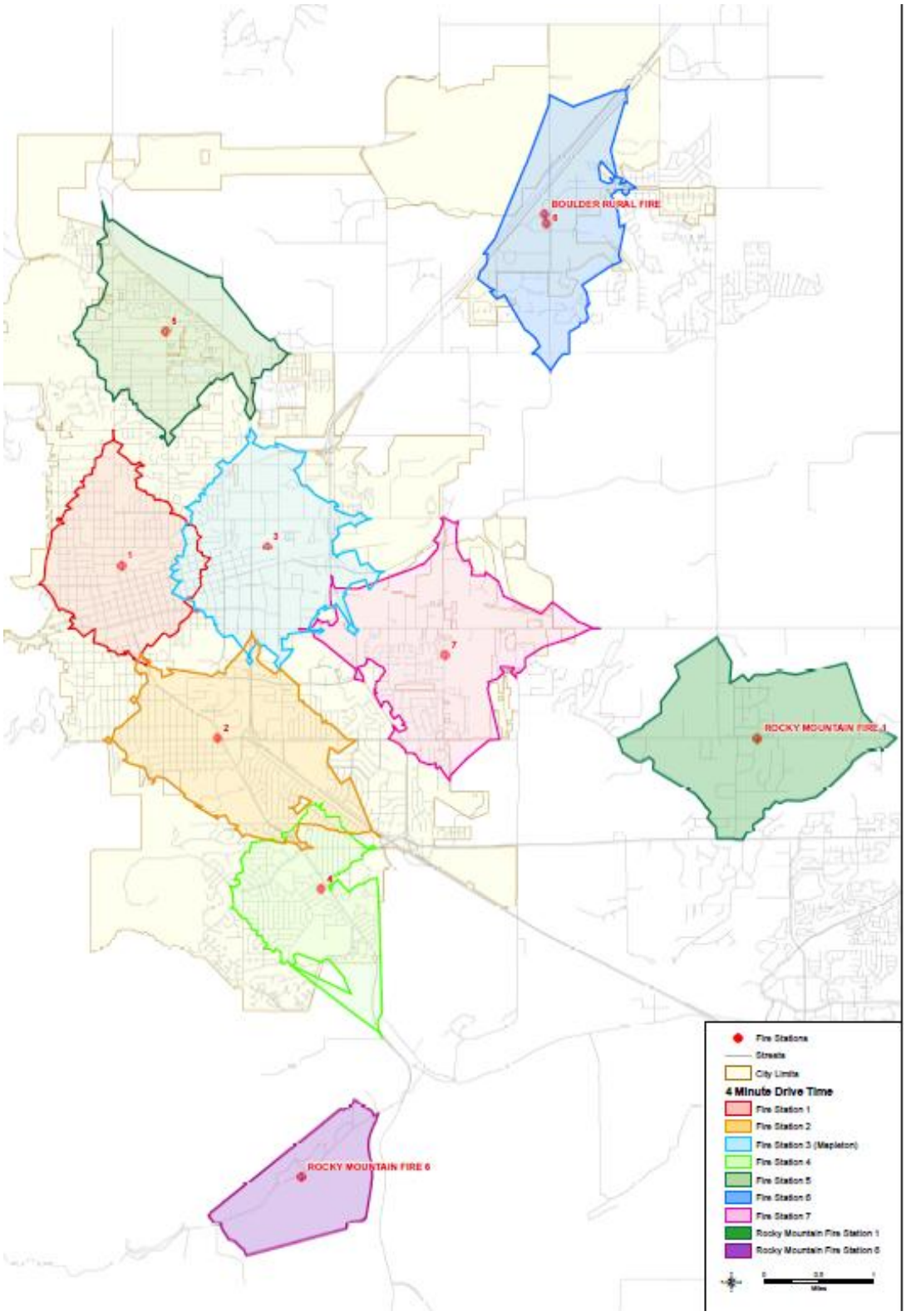

Figure 14. Surrounding Fire Department Travel Time Coverage

Table 5 shows system capacity improvements if existing stations were relocated according to the GIS recommendations. This simplified coverage analysis implies that five properly placed stations could cover the same demand that Boulder's seven stations cover today. However, this analysis does not account for time the response units are out of service during a typical day nor would five stations improve on the travel time gaps that exist with station locations today.

Table 5. System capacity if all station location recommendations were implemented

Total number of stations: 4 **Existing station 6 with 3 newly placed stations**	
Call difference from existing:	-1364
Change from existing:	-7.35%
Call difference from previous:	N/A
Percent difference from previous:	N/A
Total number of stations: 5 **Existing station 6 with 4 newly placed stations**	
Call difference from existing:	338
Change from existing:	1.82%
Call difference from previous:	1702
Percent difference from previous:	9.90%
Total number of stations: 6 **Existing station 6 with 5 newly placed stations**	
Call difference from existing:	1999
Change from existing:	10.77%
Call difference from previous:	1661
Percent difference from previous:	8.79%
Total number of stations: 7 **Existing station 6 with 6 newly placed stations**	
Call difference from existing:	3426
Change from existing:	18.46%
Call difference from previous:	1427
Percent difference from previous:	6.94%

Total number of stations: 8 **Existing station 6 with 7 newly placed stations**	
Call difference from existing:	4615
Change from existing:	24.87%
Call difference from previous:	1189
Percent difference from previous:	5.41%

Total number of stations: 9 **Existing station 6 with 8 newly placed stations**	
Call difference from existing:	5887
Change from existing:	31.73%
Call difference from previous:	1272
Percent difference from previous:	5.49%

Total number of stations: 10 **Existing station 6 with 9 newly placed stations**	
Call difference from existing:	6654
Change from existing:	35.86%
Call difference from previous:	767
Percent difference from previous:	3.13%

To help visualize the GIS results depicted in the table above, existing stations are shown along with new recommended locations in the Appendix (Figures 25-29).

The 6 and 7 Station Scenarios

Considering the capital improvement impact of building, re-building, or relocating fire stations, focus was placed on the 6 and 7 station scenarios. As can be seen from Figure 15, in both instances most of the stations were recommended for relocation. The 6 station scenario would move Station 1 to the southeast, Station 3 to the north, and combine Stations 4 and 7 along baseline between the two existing stations. To accomplish that would require substantial capital improvement and property investment.

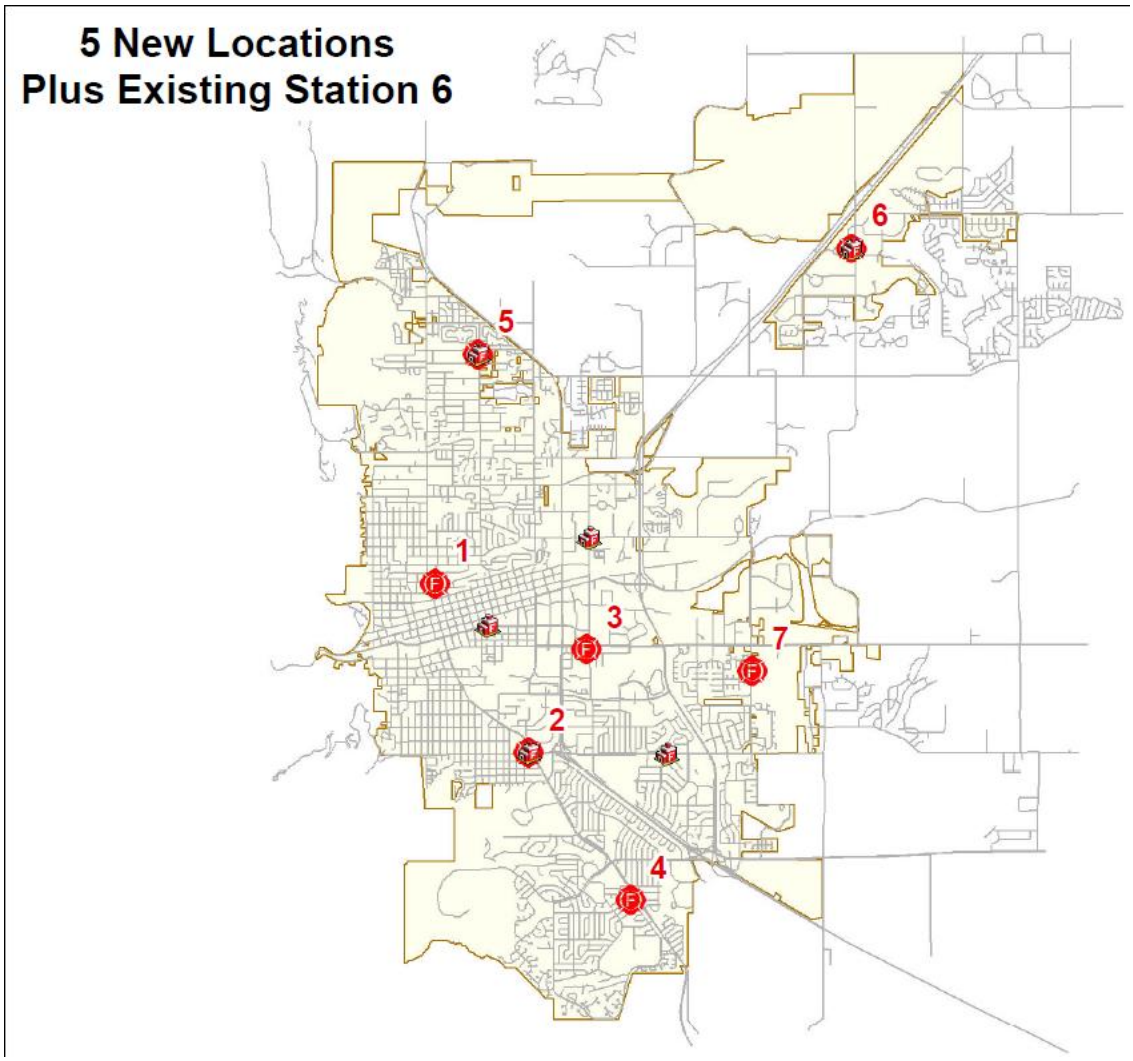

Figure 15. The Six Station System

The 7 station scenario in Figure 16 holds Stations 2 and 5 in their present locations, but recommends relocating Stations 1, 3, 4 and 7. Again, to do so would require substantial capital funding. Both the 6- and 7-station scenarios do not account for growth along the eastern Arapahoe corridor, so Station 7 is most likely in an ideal location regardless of the system recommendations [9]. In time, however, a station to the southwest may be considered depending on demand and CU South build out, though that growth is not expected for another 20 – 30 years[4]. Nevertheless, strong consideration should be given to rebuilding and relocating Station 4, given the new location recommendation and the station's inadequate

size[4]. Likewise, Station 3, in the 100-year floodplain should be relocated to the north to maximize travel time coverage in the city. The other station relocation recommendations would likely be too costly given property values in the city.

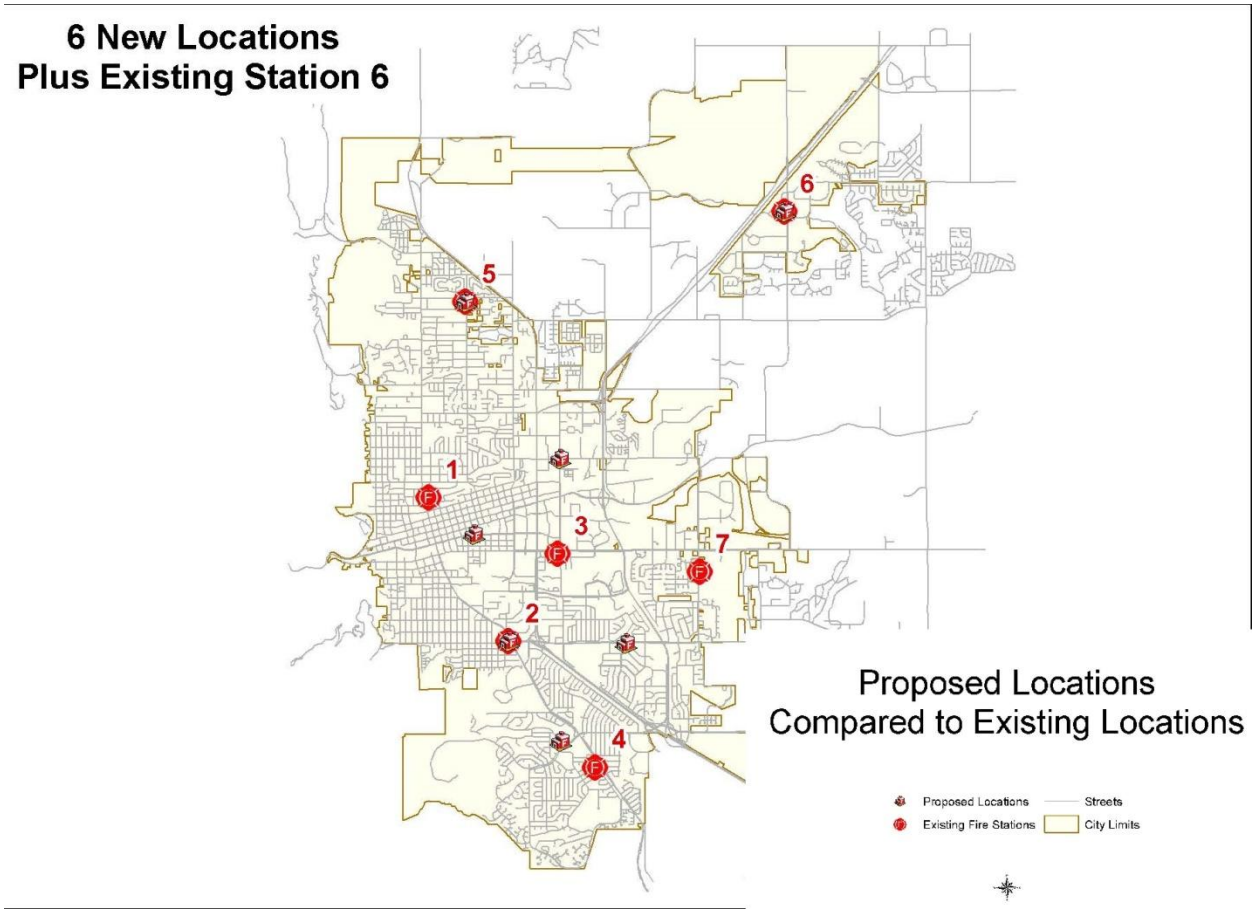

Figure 16. The Seven Station System

[4] A station needs analysis is beyond the scope of this report and will be included in a forthcoming report

Recommendations

Station 3

Station 3 was identified in the management assessment as one of BFR's stations needing replacement. The main reason provided was its location in the 100-year floodplain [7]. However, as has already been noted, response coverage is also an important consideration for relocating the station. Likewise, with infill growth and the workload already on 2503, another response unit will need to be added to Station 3 in the very near future.

Since 2011, a number of locations for the new site have been proposed – all involve locations north of the present location. The largest impediment to relocation has been the cost of acquiring the land needed to build a modern fire station.

Valmont City Park

As Valmont City Park planning progresses, one possibility involves relocating Station 3 to co-locate on that property [10]. That possibility was examined as part of this study. Drive time analysis for incorporating the new Station 3 in Valmont City Park is shown in Figure 17. Unfortunately, based on the existing road networks, locating the station that far east will degrade response times to the west in areas of Boulder that presently experience high demand.

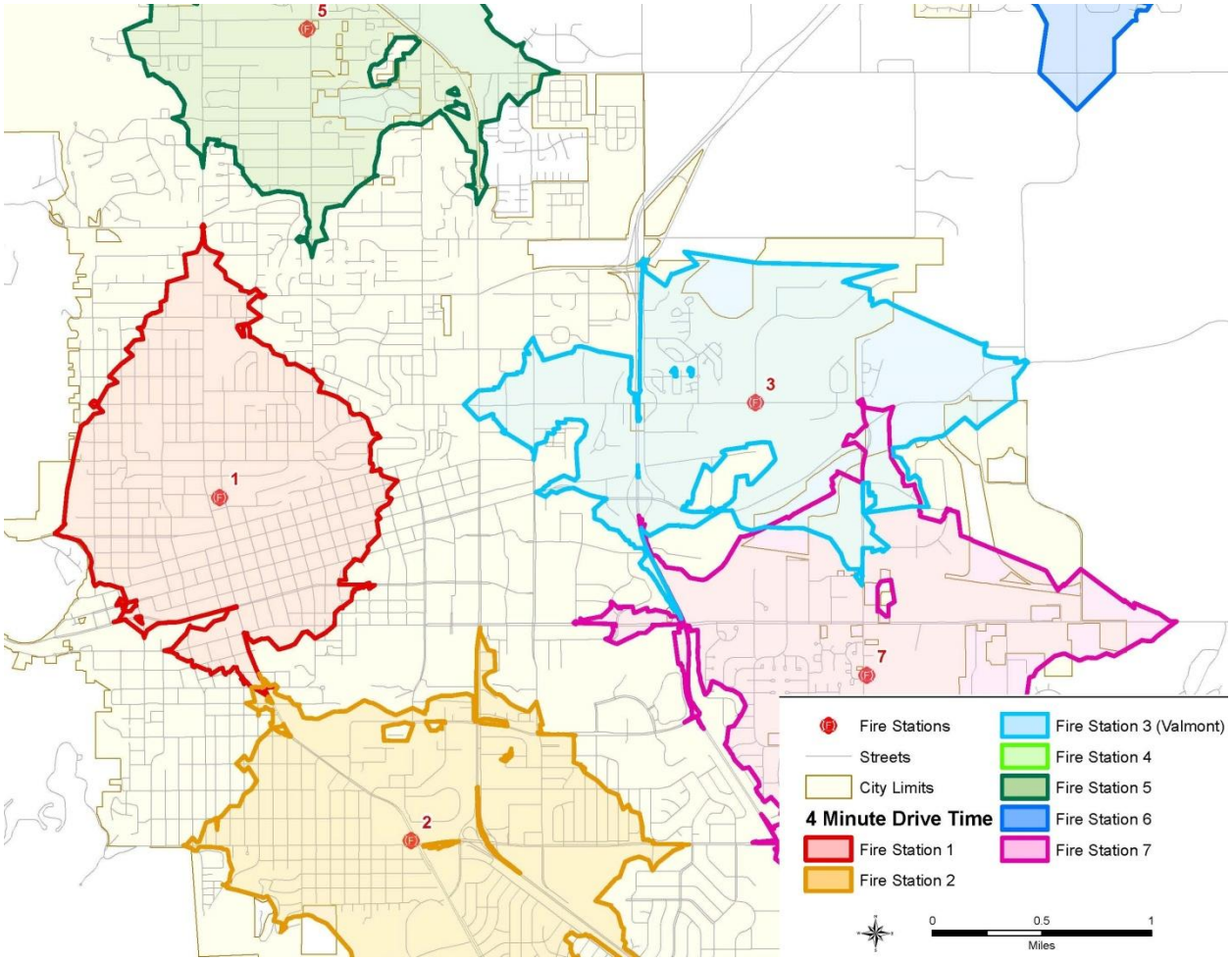

Figure 17. Valmont City Park Option for Station 3 Relocation

Boulder Public Safety Building

Another proposed location involves relocating Station 3 to the Public Safety Building at 1805 33rd St. This idea would incorporate much needed fire department administrative offices, the new fire station and expanded police office and administrative space. While this option has great potential for solving a number of space needs issues for both departments, drive time coverage for Station 3 does not improve over the existing location. That footprint is shown in Figure 18.

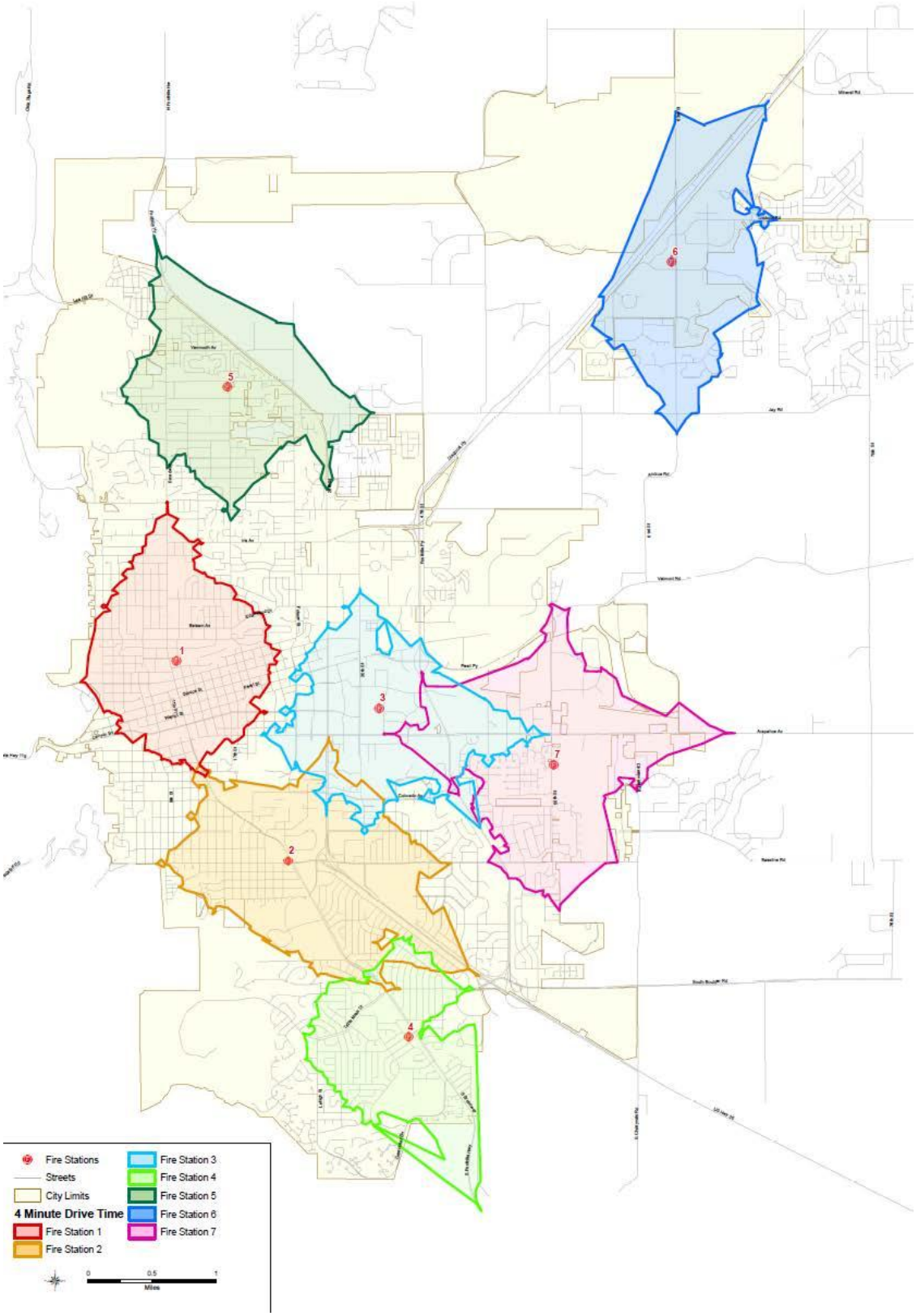

Figure 18. Drive Time Coverage from the Public Safety Building for Proposed Station 3 Location

Boulder Transit Village Area

Other locations for Station 3 place it between Mapleton Ave. and Valmont Ave. This general area appears to provide the best travel time coverage of any other option - public or private (see Figure 19 for ideal placement region). To help assess potential coverage for these options, two specific locations were analyzed: Mapleton ball fields, and new development near the corner of 29th and Valmont.

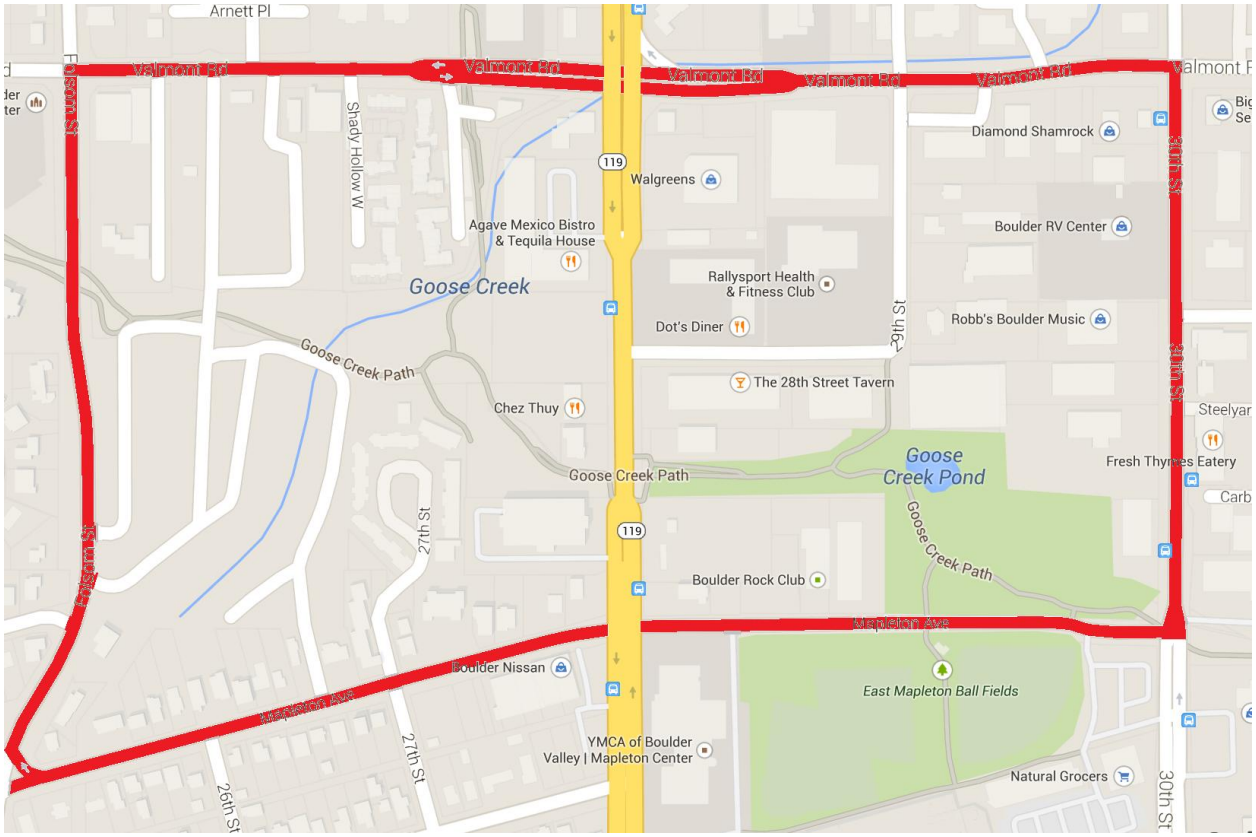

Figure 19. General Area for Station 3 For Ideal Four Minute Travel Time Coverage

Figure 20 shows what that coverage might look like if Station 3 were relocated to the Mapleton ball field space. The Mapleton ball fields could be an example similar to that explored with Valmont City Park. Most newer fire stations are being constructed as community centerpieces designed not only as emergency response facilities, but also allow the community to host public

events, conduct voting, and locate neighborhood mini-clinics (for blood pressure checks and community education and outreach, for example). This station could fit well into those plans.

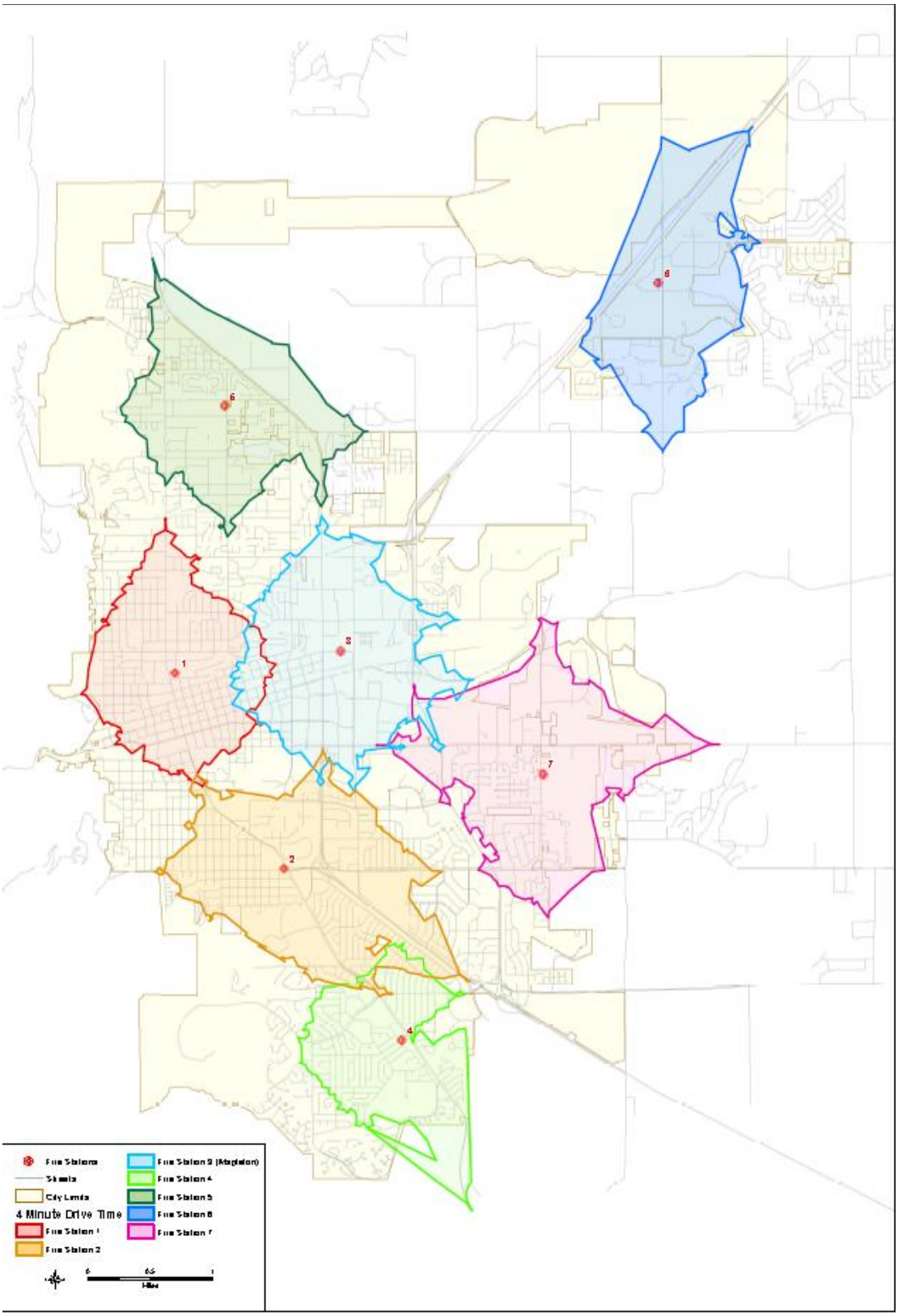

Figure 20. Travel Time Coverage if Station 3 Were Relocated to Mapleton

The other site option is in the transit village as part of a public-private partnership just off of Valmont [11]. That scenario is shown in Figure 21. This location also provides great travel time coverage in association with existing stations. However, it should also be noted that redundancy was not considered in the drive time analysis. If Station 3 houses two units and continues to operate the water rescue team, space in the transit village footprint may make relocation there difficult. Nevertheless, infill growth in the transit village will stretch 2503's availability.

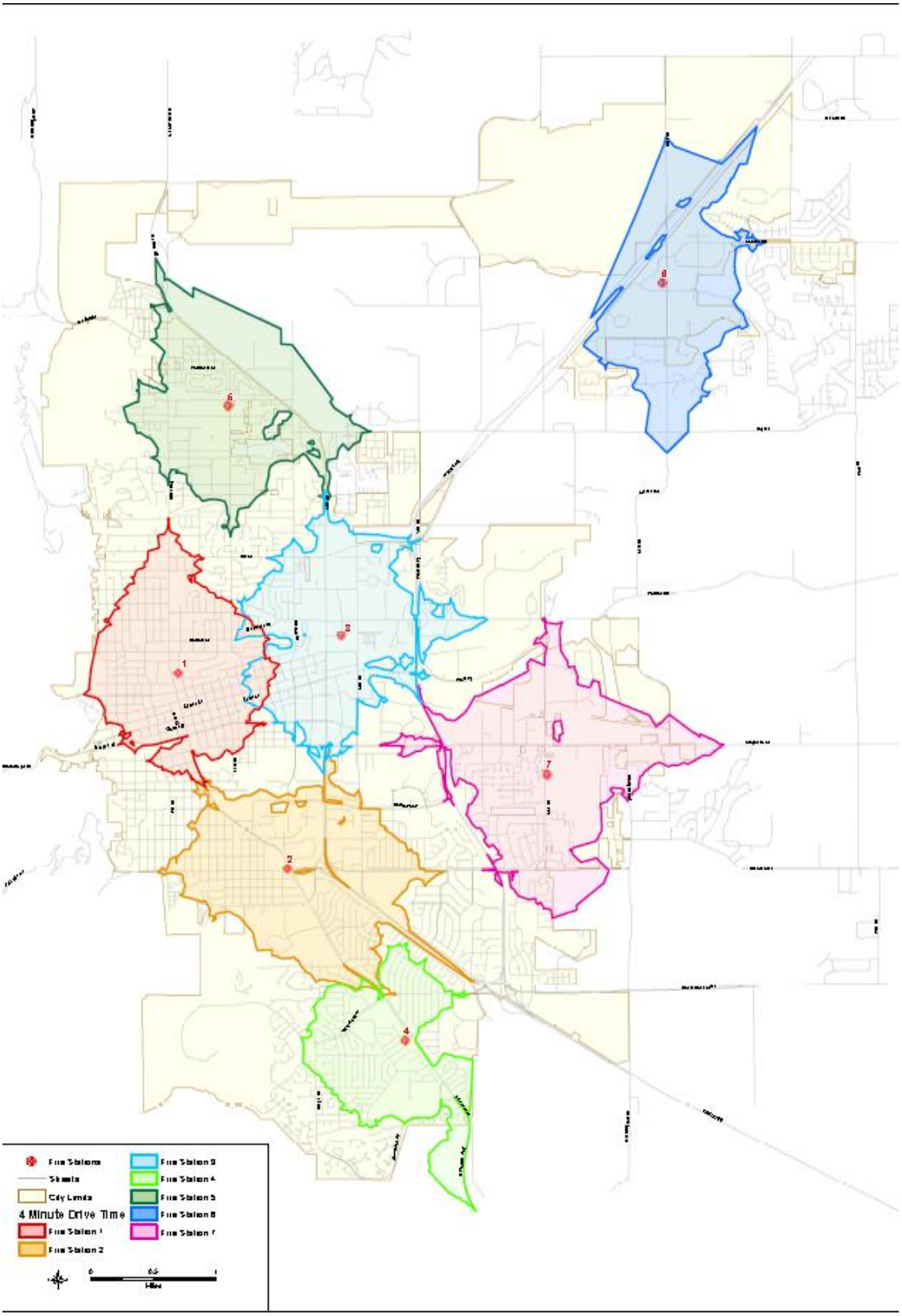

Figure 21. Travel Time Coverage if Station 3 Were Relocated to the Transit Village

Station 4

Given the suggestion of relocating Station 4 in the seven station scenario and the age and limitations of the existing facility, it is strongly recommended that Station 4 be moved to a larger location northwest of its current location. That should better assist existing companies in dealing with demand in and around the campus and downtown Boulder. The recommended area is highlighted in Figure 22. Station 4 should be considered for co-location with an existing city facility or project. Again the idea is to create a community fire station similar in concept to that proposed for Station 3.

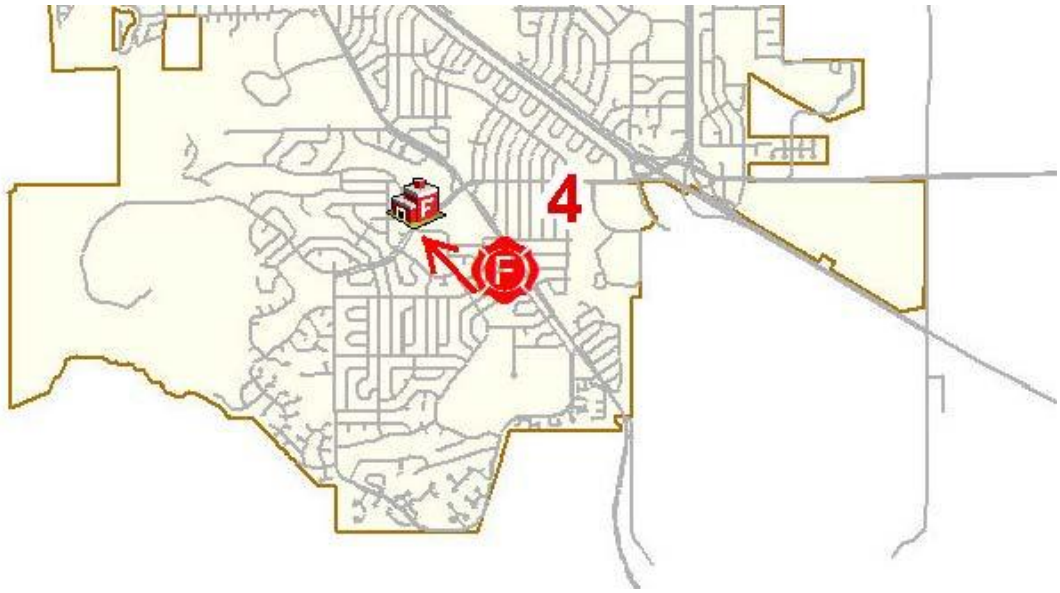

Figure 22. Station 4 Relocation Recommendation

Station 6

In each of the scenarios, Station 6 was held constant. Since the 1970's that station has provided a critical first due response for the Gunbarrel region. Nevertheless, emergency call volume is consistently far less than in other areas of the city (see Figure 7). Moreover, even with growth in Gunbarrel, workload for 2506 is unlikely to reach capacity in the next 20 – 30 years. And since 2011, Boulder Rural Fire Rescue (BRFR) has located its own fire station less than 100 yards from Station 6. This poses some interesting questions worthy of exploration in future capital improvement planning.

Even with Station 3 relocating north out of the flood plain, there are still a number of areas of the city that fall outside of 4-minute travel polygons. Furthermore, with increased demand expected with infill development in the Transit Village and to the east, workload will strain the three stations already burdened with high call volumes (stations 1, 2, and 3). It may be in Boulder's best interest to co-locate with BRFR or enter into an automatic aid agreement to provide coverage for Gunbarrel. In either case, the existing Station 6 could be vacated for alternative municipal use or placed for sale as prime commercial property. It could also be leased to help offset payments to BRFR for the use of their existing station. Another option is to purchase BRFR's station and allow the district to co-locate for a fee.

If the option of vacating Station 6 is pursued, Gunbarrel must be provided coverage since it is essentially disconnected from the rest of the city (see Figure 24). Given the travel time gaps shown in the six and seven station scenarios, it would be best to plan for an infill station somewhere between Stations 1, 3, and 5; that would help with heavy call volume on the Hill as well as adequately cover additional demand in north Boulder and the Transit Village (see Figure 23). An alternative site would be between stations 4 and 7 to the south since there is already sizable population density outside of four minute coverage and growth is expected east along the Arapahoe corridor.

If the option for vacating Station 6 is not pursued, it could be enlarged to accommodate the water rescue team and reduce the space needs of Station 3 near the Boulder Transit Village area. There is room on the existing property to do so. The water rescue team would then be available for quick response to Boulder Reservoir. However, swift water response to creek areas to the south would most certainly be delayed.

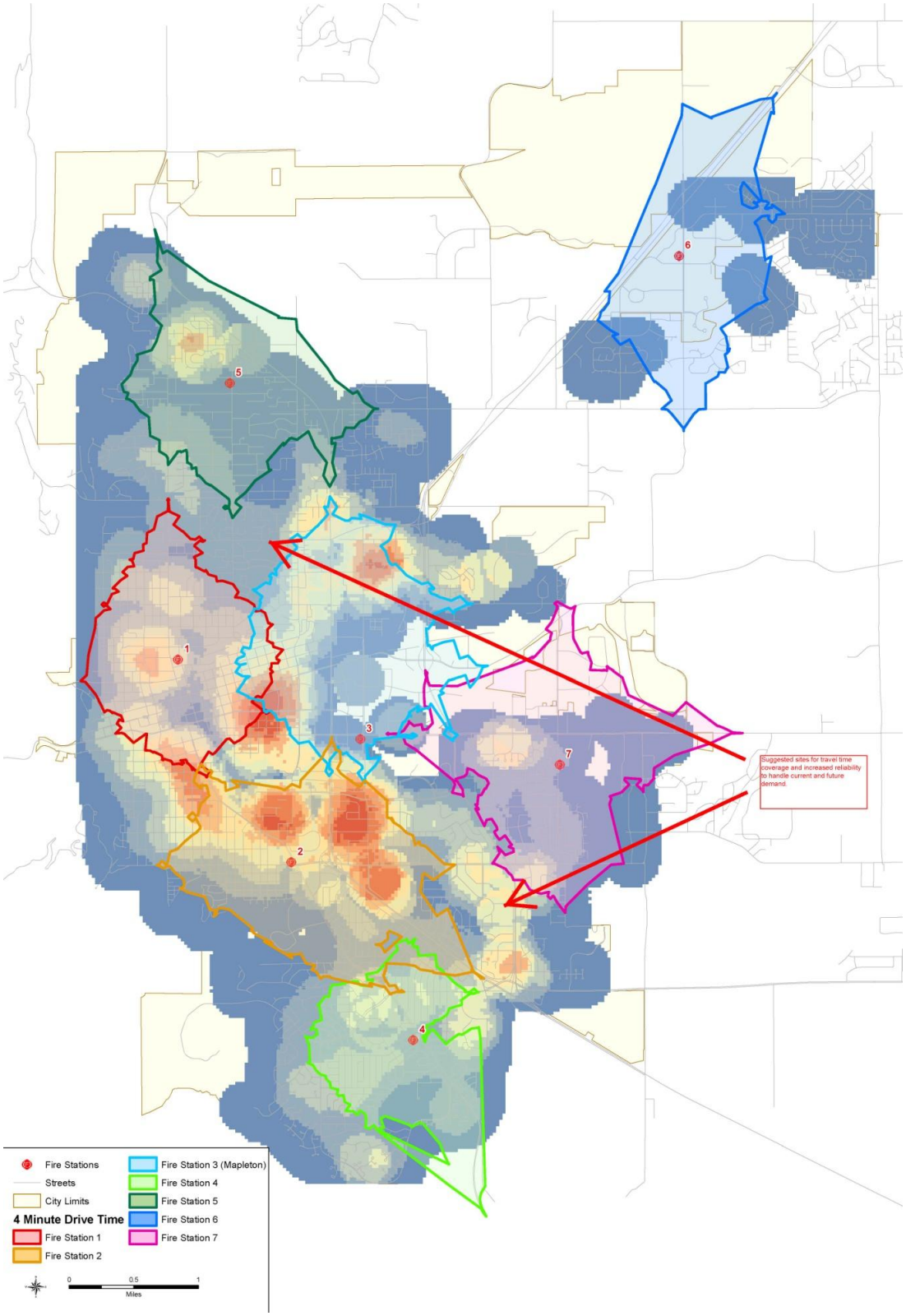

Figure 23. Possible Locations for New Fire Stations to Accommodate Expected Demand

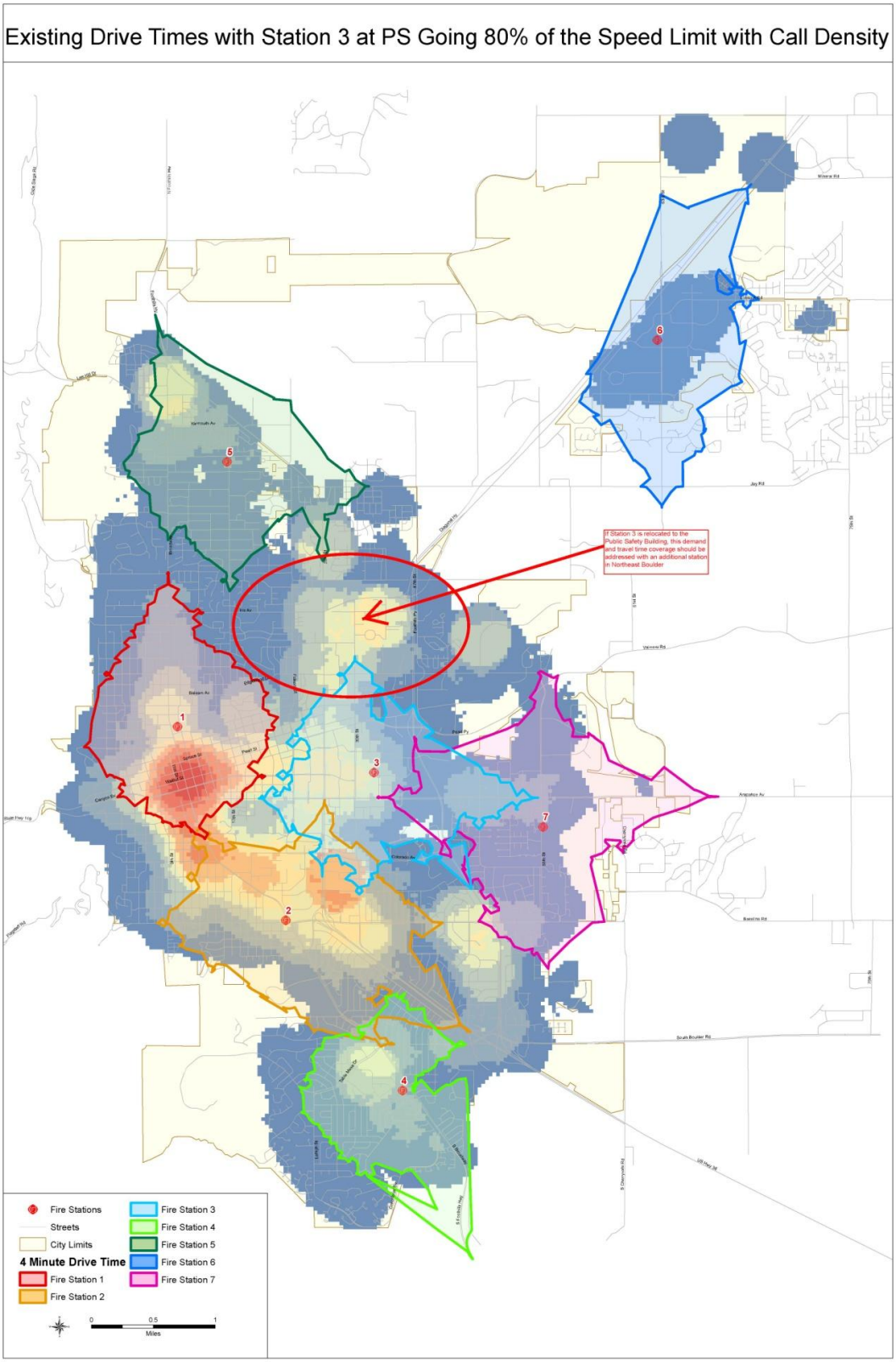

Figure 24. Possible New Station Location if Station 6 Was Abandoned

Conclusion

Boulder is a world class community with very aggressive and forward thinking sustainability policies. Recognizing the fire department's own role in sustainability, the Fire Master Plan challenges staff to look for ways "to reduce the carbon footprint and other environmental impacts as well as" examine "ways to address the changing and dynamic need of the community" [1]. Where possible, the department must achieve these goals as expeditiously and efficiently as possible. Building, relocating, renovating stations and even adding low carbon emissions response units can be very expensive in the short-term. However, if the decision to rebuild or relocate stations to better achieve response time goals is the main goal, these can be achieved with the city's sustainability framework in mind. Fire stations can not only be used as community gathering points and outreach, but they can also serve as models of environmental stewardship (building LEED Gold or higher for example). The department has the opportunity not only to improve response time performance, but it can also reduce its overall carbon footprint for the long-term [1, p. 22].

This report primarily focuses on achieving the response time targets set by the BVCP, so its consideration of environmental impact is admittedly minimal. Station relocation costs and additional unit needs were also not directly addressed with this report. However, it is understood that substantial capital and ongoing operational costs would be associated with relocating stations 3 and 6. If 2506 were co-located with BRFR in Gunbarrel, for instance, there would likely be ongoing lease or maintenance costs with such an arrangement. Likewise, no effort was made to address the potential disposition of either station, which would depend on city policy for existing city property and structures. Moreover, a needs analysis for modern fire station design has been excluded since it is being considered separately in conjunction with potential design options for a new station 3, administrative headquarters and new reserve apparatus storage facility. The results of that report may make additional capital improvement recommendations based on station and workforce needs and should be considered in conjunction with the recommendations made herein.

Appendix

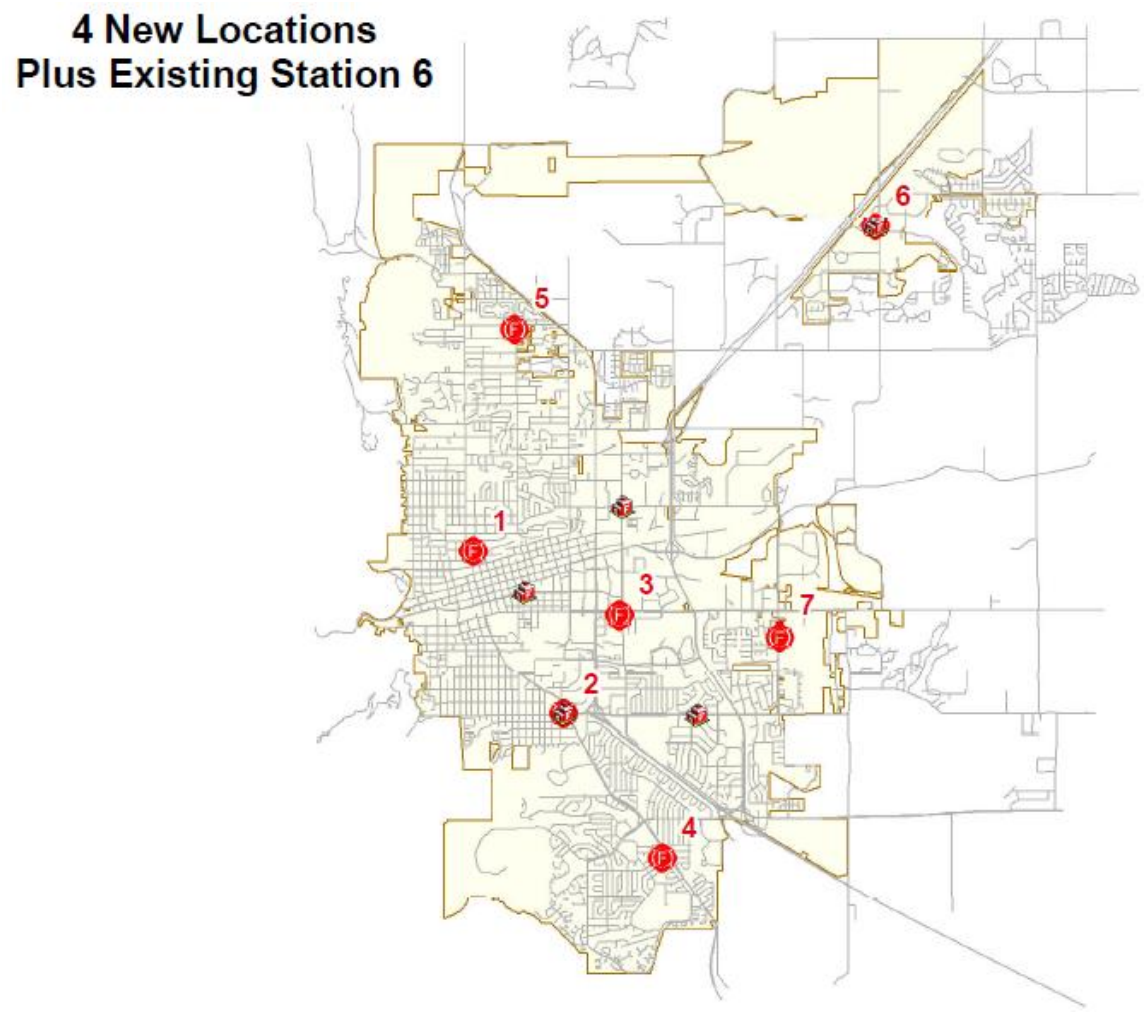

Figure 25. The Five Station Scenario

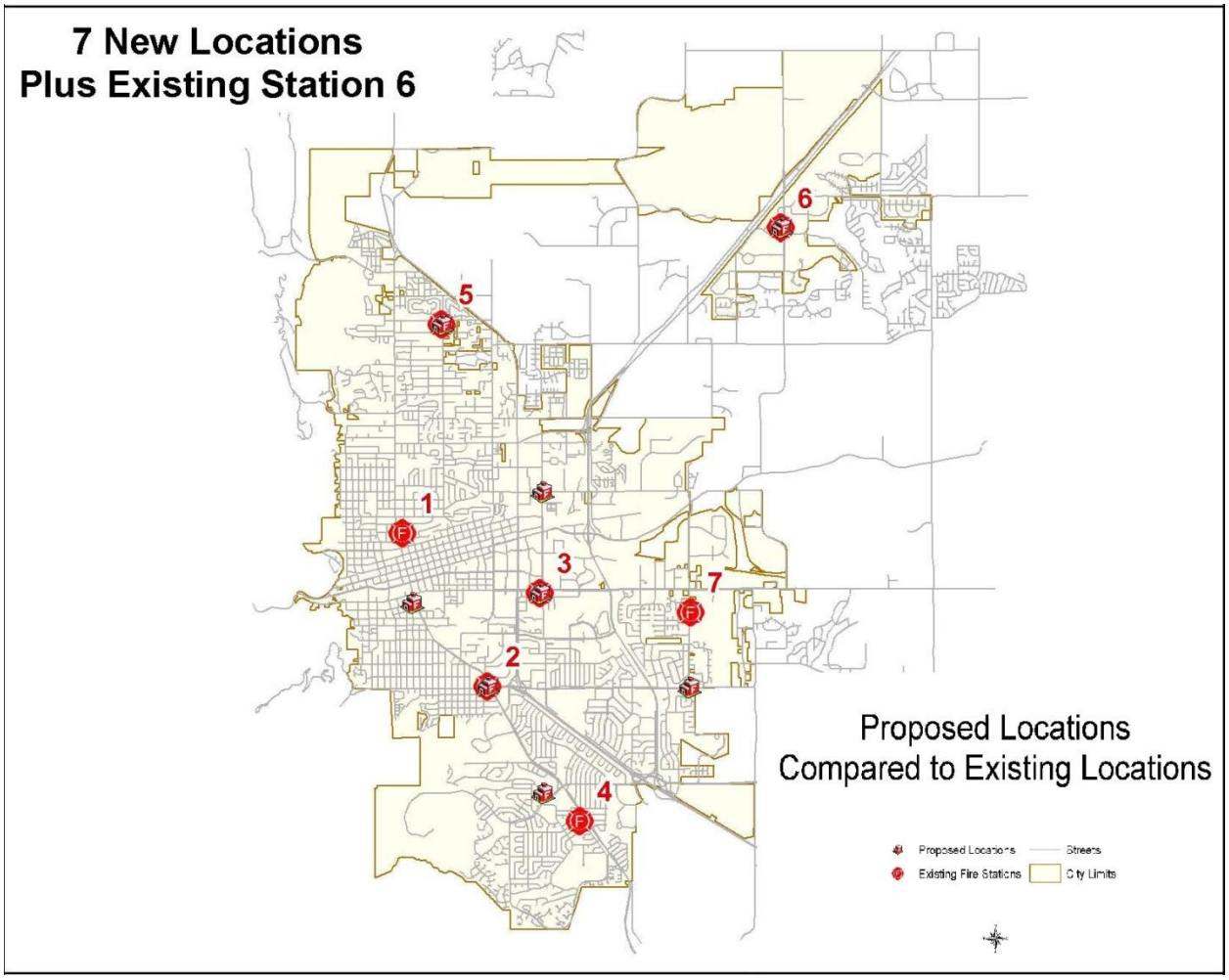

Figure 26. The Eight Station Scenario

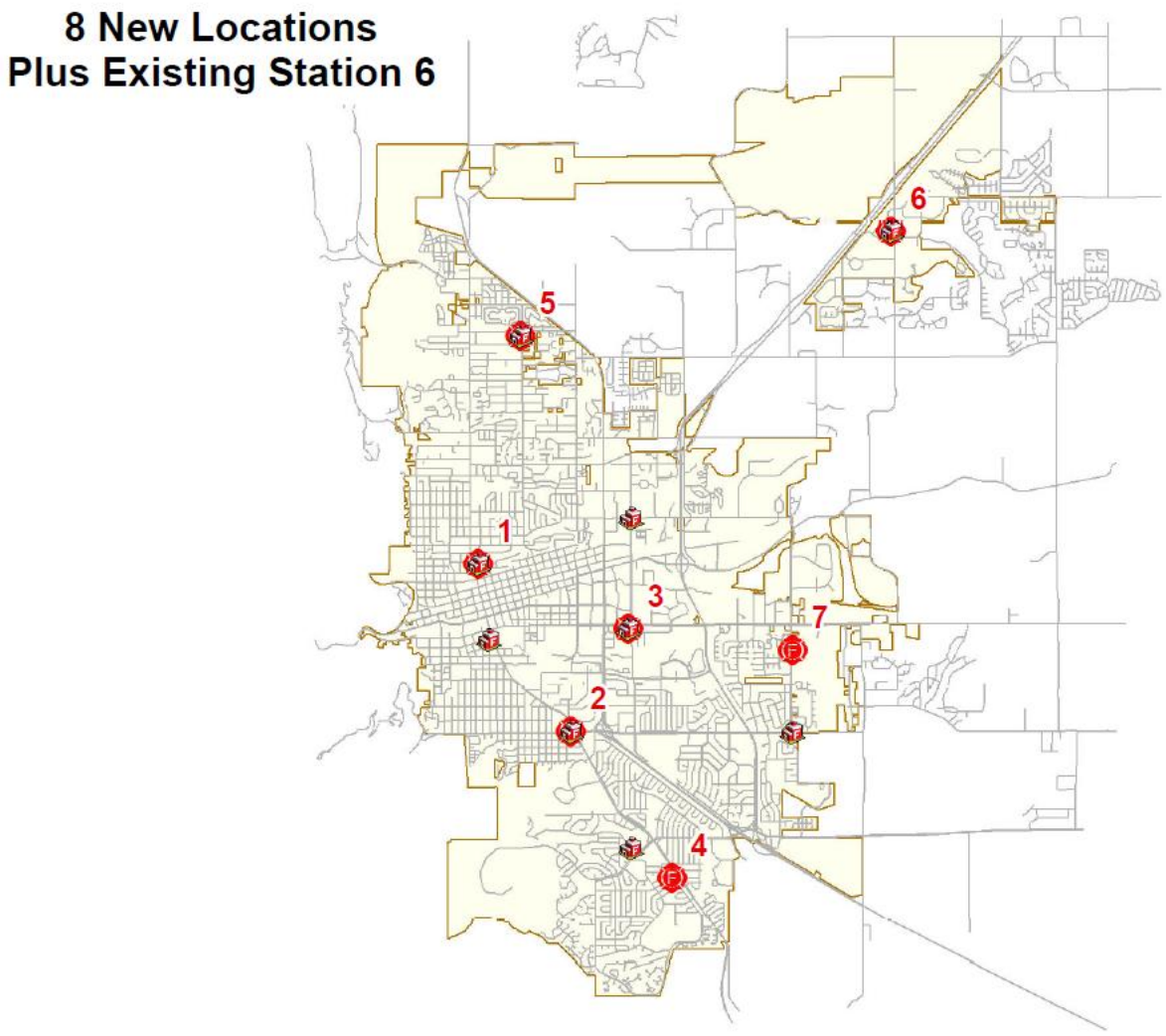

Figure 27. The Nine Station Scenario

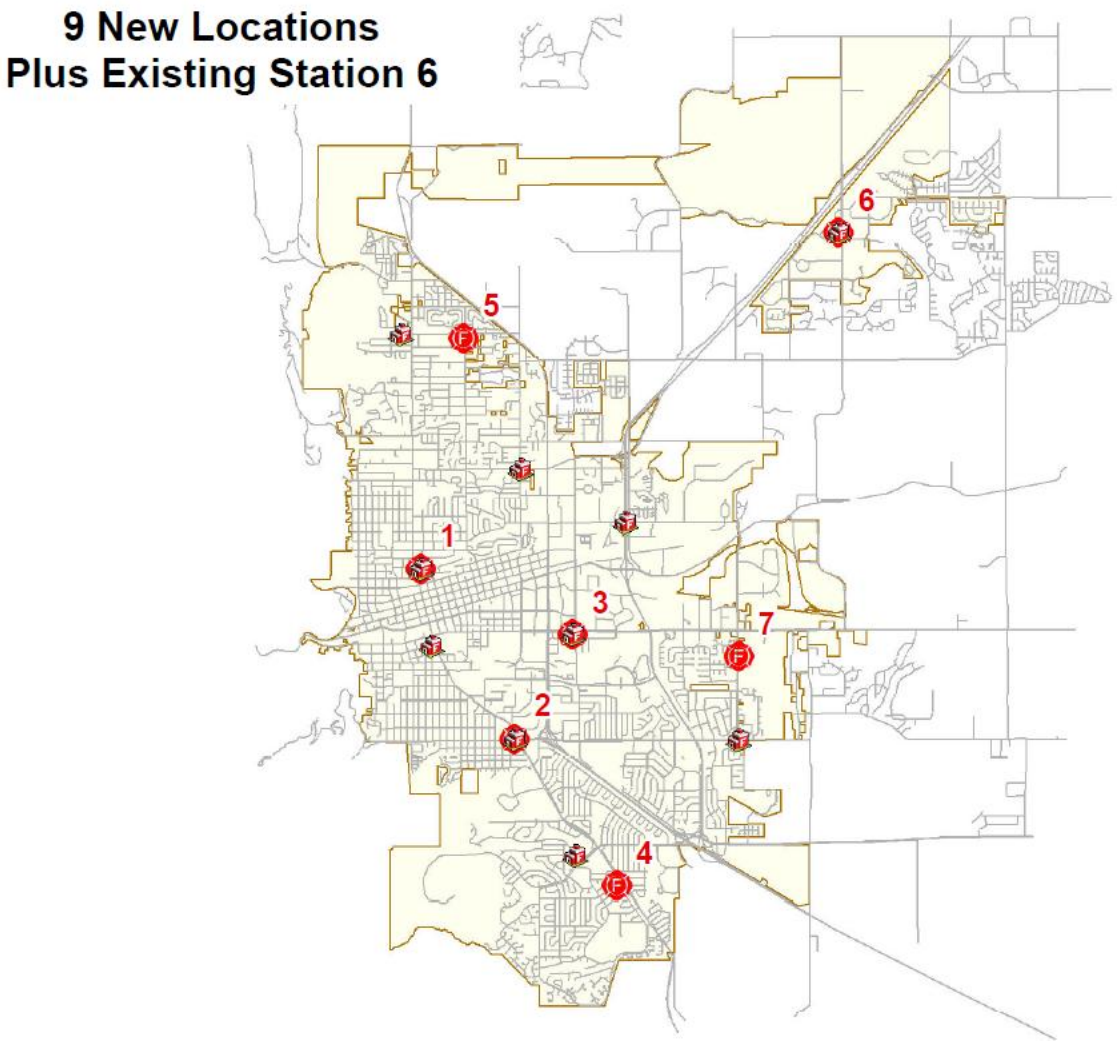

Figure 28. The Ten Station Scenario

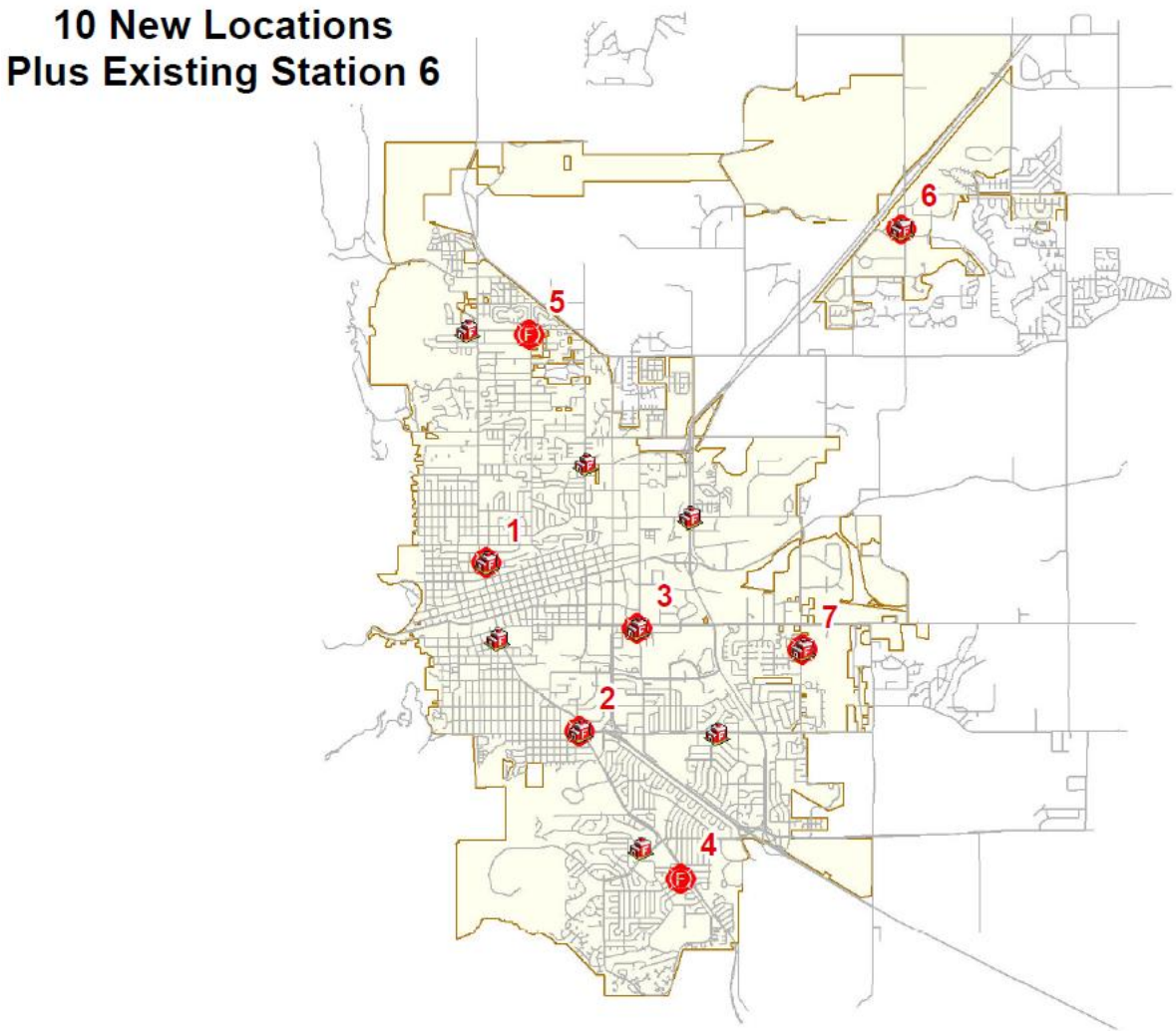

Figure 29. The Eleven Station Scenario

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Trestle Strategy Group's

Space Needs Assessment of Boulder Fire-Rescue Department's Fire Station 3 and Administration Building

March 17, 2015

DRAFT

TRESTLE
strategy group

TABLE OF CONTENTS

1. Overview

A. Purpose of Space Needs Assessment Study

In June 2012, the Boulder Fire-Rescue Master Plan was updated to provide a "10-year plan to guide fire-rescue services by building on BFRD's (Boulder Fire-Rescue Department) strengths, addressing existing deficiencies, and plotting a course for maintaining services and improving them where possible."[1] One of the top recommendations, strategies, and initiatives in the master plan involved "Fire Station #3, which is the third oldest station and the city's busiest, is currently located in the 100-year floodplain. BFRD, in conjunction with the city, will evaluate opportunities to build a new Fire Station #3, including consideration of additional space for administrative staff along with adequate space for records storage."[1] In the fall of 2014, the City of Boulder hired Trestle Strategy Group (Trestle) to conduct a space needs assessment of Fire Station 3. The space needs assessment evaluated the shortages of the necessary spaces with respect to operational and efficiency impacts and identified future adequate space needs for both Fire Station 3 and the BFRD's administration offices.

B. Existing Conditions

Fire Station 3

Fire Station 3 Facts	
Location	30th & Arapahoe
Size	6,160 Square Feet
Year Built	1964
Firefighters	4
Vehicles	Fire Engine Truck & Specialty Vehicle
Floodplain	100-Year & High Hazard

Fire Station 3 is a 4 person engine company and is the Dive Team's home base. The station experienced 2,247 responses in 2014, the second most of all Boulder Fire Stations.[2] The current conditions of Fire Station 3 have a profound negative effect in three key areas: travel times, efficiencies, and employee health and safety.

Travel Times: The travel times from Fire Station 3 are negatively impacted by three key factors.

1. Flood Zone: Station 3 is located within the 100-year flood zone and the City's High Hazard Flood Zone limiting this station's ability to travel to the north during emergency events. Fire Stations are one of the City of Boulder's Essential Services, and are subject to the City's Critical Facilities Ordinance, which went into effect in 2014. Currently, Fire Station 3 does not meet the requirements of the ordinance because it is located within the flodplain and has not been floodproofed or elevated and is not able to be rebuilt in its current location

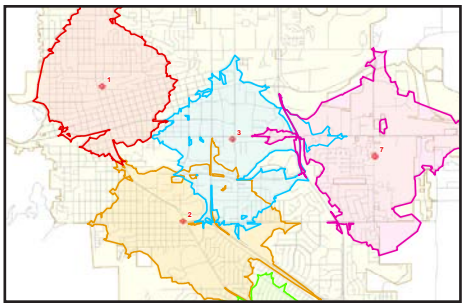
Fire Station 3 Flood Plain Map

1 City of Boulder. "2012 Fire-Rescue Master Plan."

2 Deputy Fire Chief Frank Young, City of Boulder Fire-Rescue Department. February 2015.

without significant changes and costs.

2. Limited Access: Travel times from Station 3 are limited by access to and from the station. The station is located at the very busy intersection of 30th and Arapahoe where the fire department must gain control of the flow of traffic (especially when traveling to an event to the north) prior to departing the station. This extends the travel time beyond the 4-minute national standard and raises safety concerns for both the firefighters and the public.
3. Service Coverage: According to the 4-minute travel time standard, the location of Fire Station 3 creates service coverage overlaps with Boulder's Fire Stations 2 and 7, while generating a large under-serviced area in central to northeast Boulder.



Service Coverage Overlap in Central Boulder

Efficiencies

Operational efficiencies are limited at Fire Station 3 due to the lack of available storage space throughout the building and apparatus bay (garage). The absences of an SCBA air cylinder filling machine and the inability to improve the operational technology and sustainability of the building further hinders the operational efficiencies of the station. Bedrooms at Station 3 are also used for storage and exercise space and they open directly into the garage, generating health concerns in addition to the stations inefficiencies. The garage support areas that have no designated spaces include Emergency Medical Services area, Decontamination area, Bunker Gear Storage, and more. These vital support areas are exposed to the apparatus bay's elements, generating effectiveness concerns.

Health and Safety

Employee health and safety are a concern at Station 3 due to the inability of controlling vehicle exhaust. It is difficult to maintain healthy air quality and temperatures and retrofitting the building would not be cost-effective. The firefighter bunker gear is stored along the garage wall near the fire trucks and has been contaminated by the garage elements, reducing the gear's life cycle.

Fire Administration

Due to space shortages in the Public Safety Building, the Fire Administration offices were moved in October 2014 to a temporary leased location with Information Technology and Human Resources. Fire Administration moved from a 3,600 Square Feet (SF) of space at the Public Safety Building to 6,000 SF at the Center Green offices and includes administrative offices and conference spaces for 23 employees. The long term goal for Fire Administration is to be co-located with a Fire Station in a central location.

C. Methodology

To gain a full understanding of the specific needs for Fire Station 3, Trestle met with BFRD's Deputy Chief Frank Young and Fire Chief Michael V. Calderazzo, City of Boulder Facilities

and Fleet Manager Joe Castro, and Architect/Design and Construction Manager Glenn Magee to learn about the operational characteristics of Fire Station 3 and administrative spaces, current space demands and shortages, and future opportunities. Trestle toured several of Boulder's Fire Stations (including Fire Stations 1, 2, 3, and 4) to observe the space characteristics and discuss efficiency and operational challenges with the firefighters. Trestle took measurements of all visited stations and reviewed floor plans of the remaining stations to identify space allocations by type of use. These floor plans and space allocations are included in Attachments D.

In January 2015, Trestle with Deputy Chief Young toured three Fire Stations in the region that had been constructed since 2010 including: North Metro Fire Rescue District's Fire Station 67, Rocky Mountain Fire Department's Fire Station 1, and Louisville Fire Department's Fire Station 3. Summaries of the square footage allocation and a comparison to the City of Boulder Fire Stations are in Attachment E. Along with touring and measuring other Fire Stations and interviewing the deputy chiefs of these three other facilities, Trestle conducted external research to find industry standards for Fire Station designs within the Denver Metro/Front Range Area. Trestle aggregated and summarized the research to compare the averages to the proposed Fire Station 3 and Administrative Building.

2. Findings

A. Summary

- The current Fire Station 3 is approximately 6,160 SF and houses 1-Company (1 officer and 3 firefighters)
- Fire Station 3 is anticipated to become a 2-Company operation with a total of 11 firefighters with all 5 vehicle types, including a light response vehicle.
- The BFRD's administration staff is expected to grow from 23 to 28 employees by 2016.
- The recommended size of the future Fire Station 3, including fire administration and community space, is 24,697 SF.

Fire Station		Current Fire Station 3	Current Administration at Center Green	Future Combined Station
	Garage & Garage Support	2030		7520
	Common Area & Common Area Support	2000		2580
	Private Spaces & Building Support	2000		3500
Administrative				
	Administrative Offices		3600	3200
	Administrative Common Area & Support			3750
Community				
	Community Room			1000
	Support Area			720

Comparison of current and future Fire Station 3.
Figures are rounded and do not account for circulation.

B. Space Demands

In order to determine the space needs by type, size and quality, Trestle collected qualitative information through interviews with Boulder Fire Rescue Staff, quantified and evaluated the existing facilities through floor plan review and measurements, and conducted a space analysis to identify shortages and deficiencies. All data was compared with other recently constructed and comparable Fire Stations in the region. Based on these methods, the current Fire Station 3 is deficient in the following areas:

- Apparatus Bay (Garage)
- Firefighter Common and Private Areas
- Specialty Uses and Garage Support
- Specialized and General Storage Spaces
- Community Room

Additionally, Fire Station 3 does not provide equal amenities to female firefighters.

Apparatus Bay

Fire Station 3's garage is significantly lacking storage space and designated garage support rooms. Support rooms are essential to maintaining an organized and clean environment for efficient and safe operations. A typical new Fire Station designated garage support areas include:

- Decontamination Area - Personnel and equipment cleaning following response to any call
- Maintenance Compressor Space - Compressor for vehicle maintenance
- Maintenance Work Area - Tools and workbench for all general purposes
- Hose Storage - Storage area for hoses
- Bunker Gear Storage Room - Dry and well ventilated room with lockers for bunker gear storage
- Bunker Gear Cleaning Room - Professional washer/dryer for bunker gear
- EMS Clean Storage Room - Storage for medical supplies and equipment
- SCBA Air Cylinder Filling Room with Tank Storage - Air compressor for air for firefighting and scuba diving purposes
- Garage Storage - Vehicle supplies and materials storage ie. tire chains, oil, washer fluid
- General Storage - General Fire Station storage
- Additional spaces may be included depending on specific Fire Station operations:
    - Battalion Chief Storage Area - Secure storage of additional supplies specific to Battalion Chief
    - Specialty Team Room - Maintenance area specific for dive team purposes

Boulder's Fire Station 3 currently does not meet the standards of the researched Fire Stations in the Denver Metro/Front Range Area. There are few spaces that are provided; however, they are either insufficient or missing, see table 1.

Firefighter Common and Private Areas

The common areas of Station 3 are crowded, serve multiple non-compatible purposes, are not energy efficient, and are visually run-down and outdated when compared to the

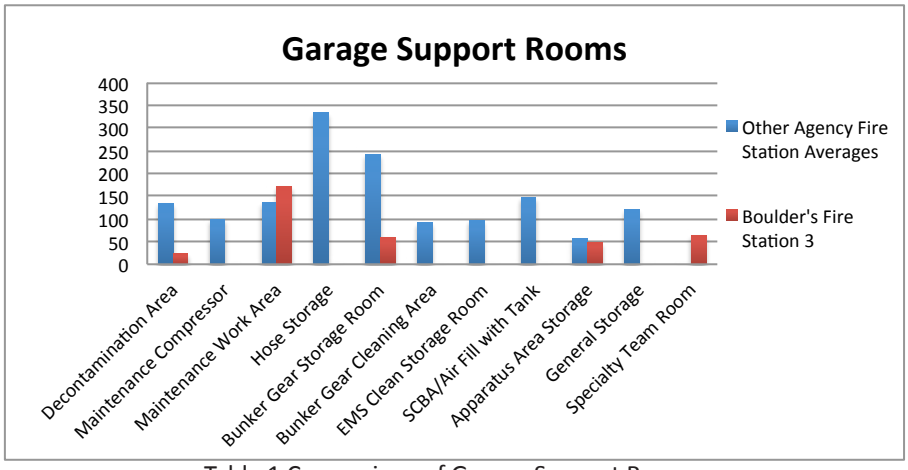


Table 1 Comparison of Garage Support Rooms

recently built Fire Stations. Common area spaces that are missing or significantly lacking space include, see table 2:

- Kitchen Storage
- Exercise Area
- General Storage
- Private Office

The exercise area at Boulder's Fire Station 3 is of significant mention as it is tucked in the back corner of the garage, and is limited in size and access due to its proximity to the fire truck and overflow storage.

The private areas of Station 3 are larger than the researched Fire Stations; however, Station 3's bedrooms are being used for storage and acts as additional exercise space. Current trends have firefighter bedrooms sized at roughly 105 SF and include a few lockers for the different firefighters who use a specific bedroom over time. Although Fire Station 3 has larger bedrooms, the locker room is incorporated into the two shared, gang-style bathrooms. Newer Fire Stations have begun utilizing smaller individual bathrooms over the traditional gang-style bathroom to provide sense a of privacy and equality among firefighters.

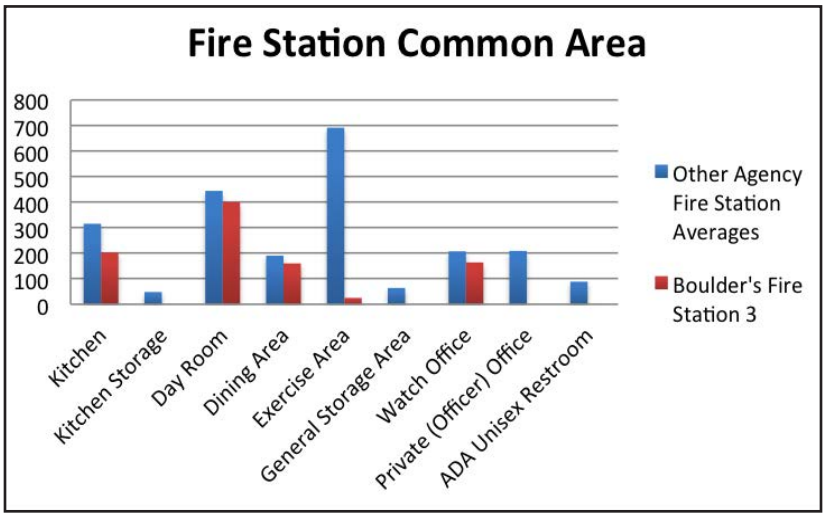


Table 2 Comparisons of Firefighter Common Areas

Community Space

New Fire Stations in the Denver Metro/Front Range Areas are being developed as a focal point of their community. Fire Stations not only function as community icons, but also provide a community gathering space available for public use. Roughly 67% of all new Fire Stations provide a community room that incorporates a large conference/meeting room, public lobby, room storage, service alcove, and two ADA unisex restrooms. None of the Boulder Fire Stations, including Fire Station 3, provide any form of community space.

Equal Amenities Between Male and Female Fire Fighters

Gender equality issues for Fire Station 3 arise in the shared gang-style bathroom configuration. In 1964, Station 3 was built for male firefighters and did not include gender separated bathrooms and bedrooms. Today, a small bathroom has been designated for female firefighter use; however, it is significantly poor in condition and is the location of the station's washer for laundry (the dryer is in the garage). One male firefighter described the female restroom as "pathetic." When no female firefighters are on duty, the restroom is used by male firefighters.

C. Themes and Trends in Fire Station Design

Through Trestle's tours of North Metro Fire Rescue District's Fire Station 67, Rocky Mountain Fire Department's Fire Station 1, and Louisville Fire Department's Fire Station 3 the following trends were identified:

- Community Representative Fire Stations
- Large Community Rooms
- Individual Restrooms
- Large Exercise Spaces
- Designated Garage Support Rooms
- Up-to-date Fire Station Alerting System Technologies
- Ample Storage Space
- Improved Moral

3. Recommendations

As a result of Trestle's research and analysis, and in coordination with the Boulder Fire-Rescue Department and the City of Boulder Facilities and Asset Management office, Trestle recommends the following solution:

Construct a new 25,000 SF Fire Station 3 and Administration Building in the vicinity of 30th and Mapleton.

Key outcomes for this new facility would include:

- Boulder's second busiest Fire Station would be located outside of the flood plain and further north to achieve adequate service coverage
- Fire Station 3 combined with Administration Offices would better serve the community
- Located building out of the floodplain maintains operations during emergency events
- Improved North/South and East/West access to and from the building

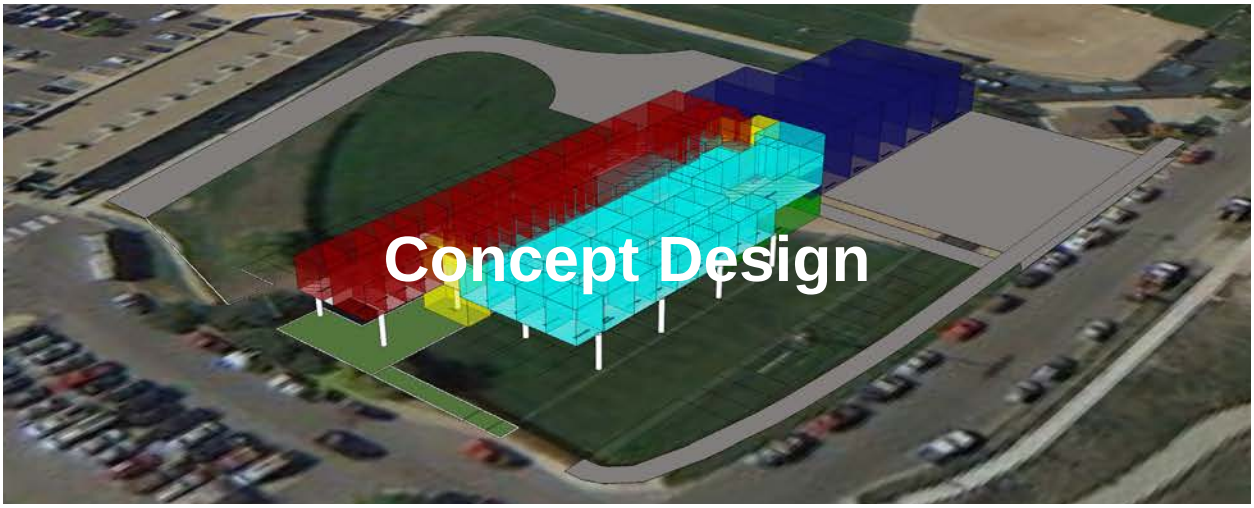
- Gathering and community space for community
- Provides for existing demands and space needs
- Flexibility for future demands and growth - ability to expand operations to a 2-company (11 firefighter) operation with 28 Administration employees
- A sustainable building both from an operational and environmental standpoint
- Consolidated operations and buildings onto one efficient site to reduce overall land requirements.

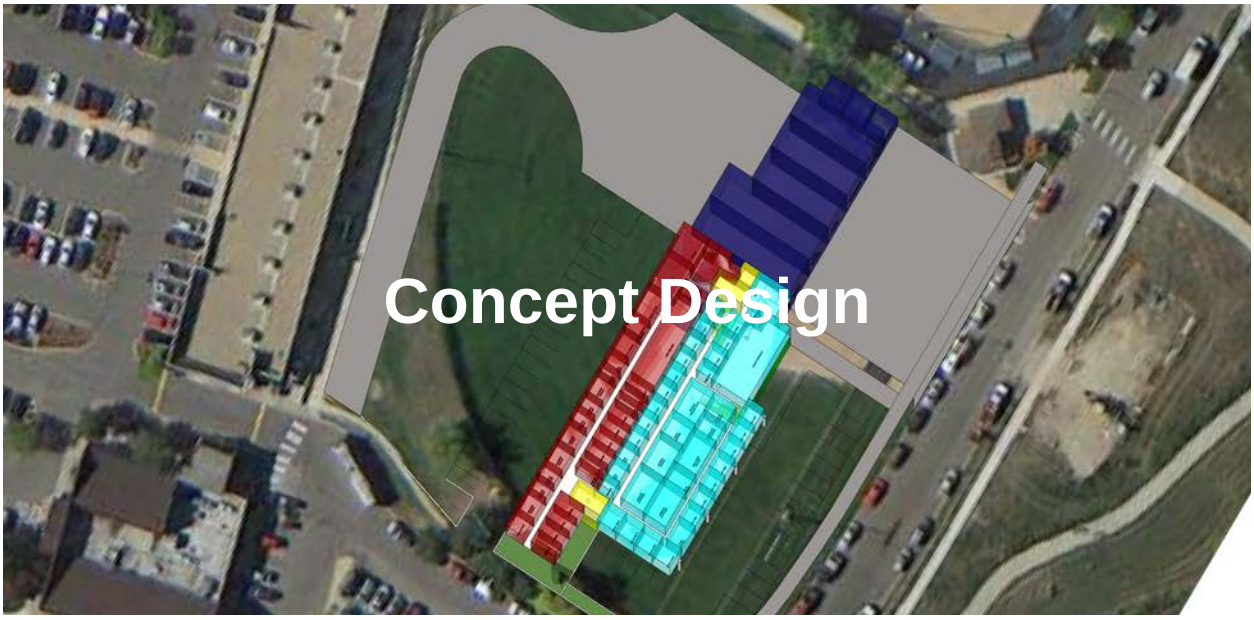
	Current Station 3	Future Combined Station 3
Square Feet	6,160	25,000
Acres	0.97	1-1.5
Stories	1	2

Efficiency Comparison of Existing and Proposed Station 3

4. Appendix

A. Preliminary Concept Design



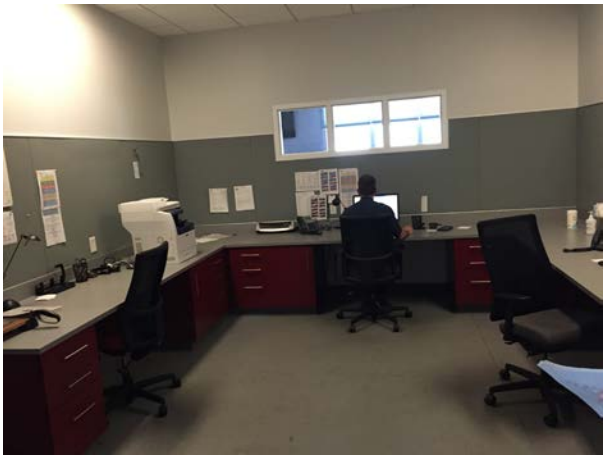


B. Fire Station Comparison Photos

Boulder's Fire Station 3

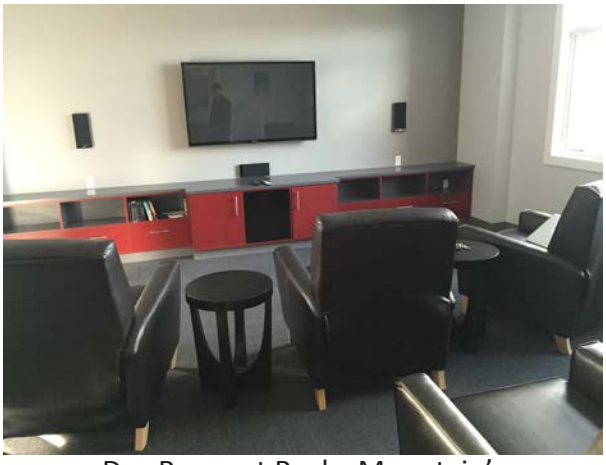
Windsor's Fire Station 3

Watch Office at Boulder's Fire Station 4

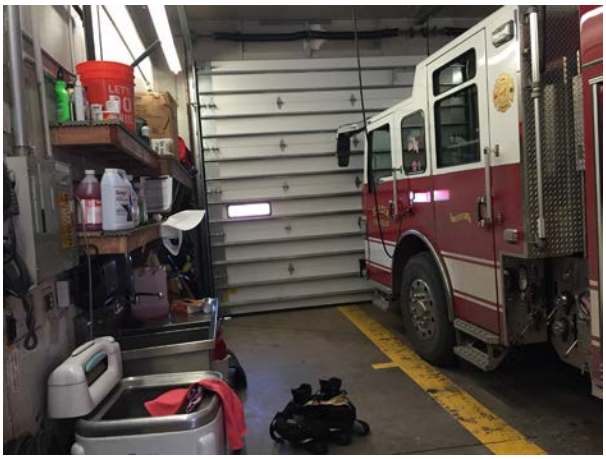


Watch Office at Rocky Mountain's Fire Station 3

Day Room at Boulder's Fire Station 4

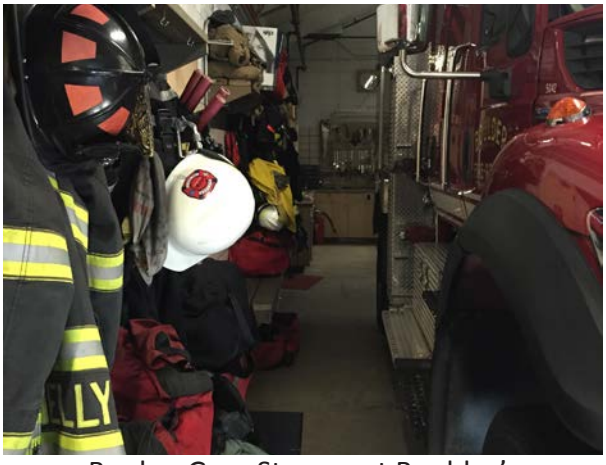


Day Room at Rocky Mountain's Fire Station 3

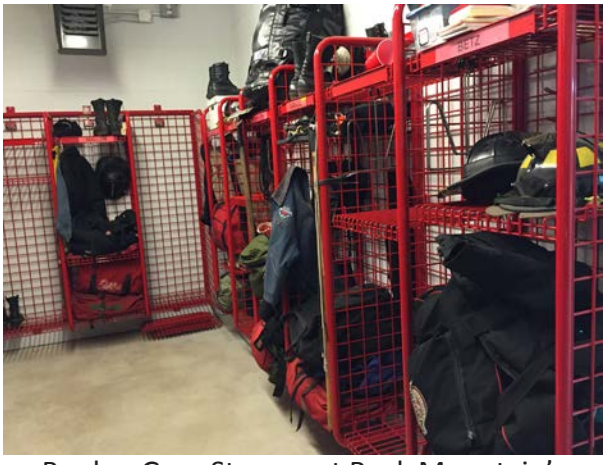


Apparatus Bay at Boulder's
Fire Station 4

Apparatus Bay at Louisville's
Fire Station 3

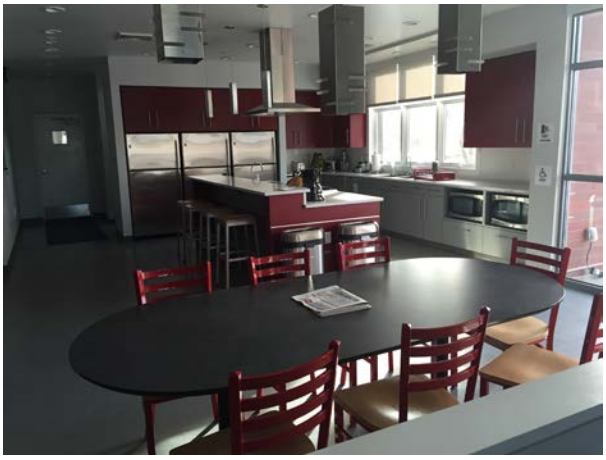


Bunker Gear Storage at Boulder's
Fire Station 2



Bunker Gear Storage at Rock Mountain's
Fire Station 1

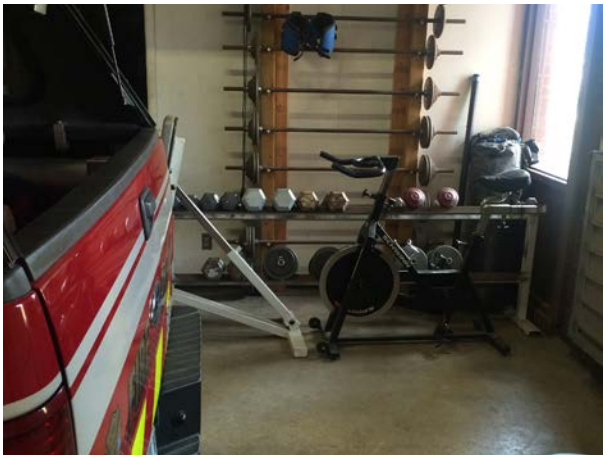
Kitchen at Boulder's
Fire Station 4



Kitchen at Rocky Mountain's
Fire Station 1

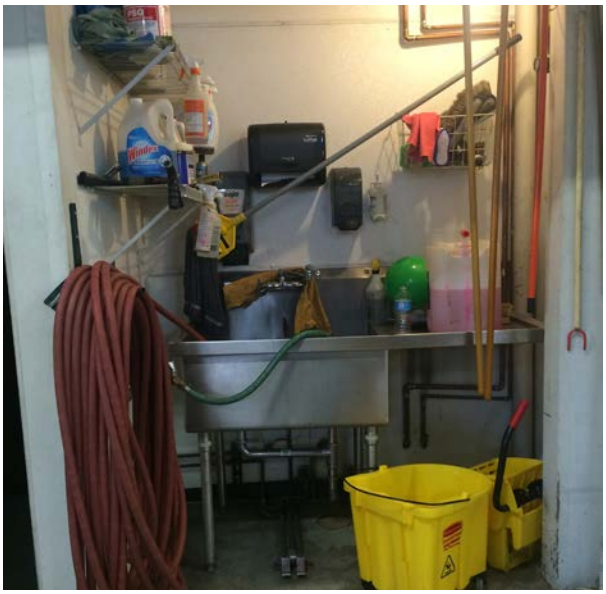
Administrative Files Stored at Boulder's Fire Station 4

Storage Shelves at North Metro's Fire Station 67



Exercise Area at Boulder's Fire Station 3

Exercise Area at Louisville's Fire Station 3 (Soon to be Completed)



Decontamination Alcove at Boulder's Fire Station 3

Decontamination Area at Rock Mountain's Fire Station 1

Community Room at Rocky Mountain's Fire Station 3

Community Room at Louisville's Fire Station 3

C. Excel Spreadsheets

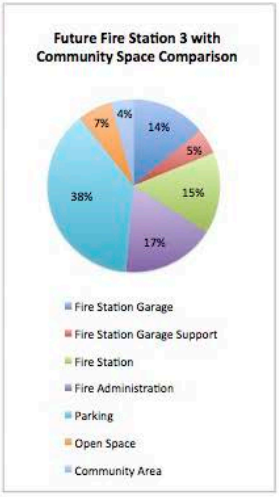
Station 3 and Administration Space Needs

Updated: 15-Feb-15

			Current Station 3: 1-Company with Engine & Specialty Team (4-Firefighter Operation)			Future Station 3: 2-Company Fire Station with Ladder, Engine, BC, Specialty, & LRV (11-Firefighter Operation)			Future Station 3: Design Layout				Average SF from 6 New Neighboring Fire Stations of Varying Company Sizes
			QTY	SF	Total SF	QTY	SF	Total SF	1st Level	2nd Level	Surface/Outdoor	Dimensions	
Garage	Apparatus Bay	Ladder Truck				1	1,300	1,300	1st			20' x 65' x 2 story	1,514
		Specialty Team Vehicle	1	1084	1,084	1	1,300	1,300	1st			20' x 65' x 2 story	1,514
		Engine Truck	1	1084	1,084	1	1,000	1,000	1st			20' x 50' x 2 story	1,514
		Light Response Vehicle				1	1,000	1,000	1st			20' x 50' x 2 story	1,514
		Battalion Truck				1	1,000	1,000	1st			20' x 50' x 2 story	1,514
		Subtotal			2,168			5,600	5,600				
	Garage Support	Decontamination Area	1	23	23	1	150	150	1st				134
		Maintenance Compressor				1	50	50	1st				100
		Battalion Chief Storage Area				1	70	70	1st				
		Maintenance Work Area	1	172	172	1	200	200	1st				136
		Hose Storage				1	190	190	1st				333
		Bunker Gear Storage Room	1	60	60	1	300	300	1st				242
		Bunker Gear Cleaning Area				1	120	120	1st				91
		EMS Clean Storage Room				1	120	120	1st				97
		SCBA/Air Fill with Tank Storage				1	200	200	1st				147
		Apparatus Area Storage	1	48	48	1	200	200	1st				56
		General Storage		Along Bay Wall		1	200	200	1st				120
		Specialty Team Room	1	64	64	1	120	120	1st				
		Subtotal			367			1,920	1,920				
		Garage Total SF			**2,535**			**7,520**	**7,520**				
Building	Fire Station 3	*Common Area*	*QTY*	*SF*	*Total SF*	*QTY*	*SF*	*Total SF*					*Average SF*
		Kitchen	1	203	203	1	270	270		2nd			315
		Kitchen Storage				1	50	50		2nd			48
		Day Room	1	400	400	1	350	350		2nd			444
		Dining Area	1	160	160	1	250	250		2nd			191
		Exercise Area	1	25	25	1	750	750		2nd			691
		General Storage Area				1	150	150		2nd			64
		Watch Office	1	164	164	1	200	200		2nd			207
		Private (Officer) Office				4	120	480		2nd			209
		ADA Unisex Restroom				1	80	80		2nd			89
		Subtotal			952			2,580		2,580			
		Living Quarters											
		Officer's Bedroom	1	248	248	4	120	480		2nd			113
		Officer's Bathroom				4	100	400		2nd			93
		Bedrooms	2	198	396	9	120	1,080		2nd			105
		Restrooms/Showers	2	187.5	375	4	80	320		2nd			150
		Laundry		Along Bay Wall		1	100	100		2nd			92
		Subtotal			1,019			2,380		2,380			
		Additional Support Rooms											
		Mechanical Room	1	250	250	1	250	250	1st				33
		Electrical	1	75	75	1	75	75	1st				24
		Janitor Closet				2	50	100	1st	2nd			40
		Outside Storage	1	80	80	1	300	300			Surface		173
		Computer/Communication/Fire/Alarm Systems	1	75	75	1	75	75	1st				35
		Communications Room				1	100	100		2nd			484
		Sprinkler Riser				1	100	100	1st				25
		General Office Storage/Records				1	64	64		2nd			125
		Fire Pole				2	32	64	1st & 2nd	1st & 2nd		1 pole is 32 SF per floor	25
		Subtotal			480			1,328	582	246	300		
		Station No. 3 SF			**2,451**			**6,088**	**582**	**5,206**	**300**		
	Fire Administration	Large Offices				4	150	600		2nd			
		Medium Offices				10	120	1,200		2nd			
		Small Offices				14	100	1,400		2nd			
		Lobby				1	100	100		2nd			
		Kitchen/Break Area				1	300	300		2nd			
		ADA Public Unisex Toilet				2	60	120		2nd			
		Conference Room				1	1,000	1,000		2nd			
		Meeting Room 2-10 people				2	150	300		2nd			
		Flex Space				2	100	200		2nd			
		Restrooms/Showers				2	324	648		2nd			
		Janitor Closet				1	50	50		2nd			
		Office Supply/Copier/Printer Room				1	120	120		2nd			
		Records Room				1	200	200		2nd			
		Safety Supplies Storage				1	300	300		2nd			
		General Storage Area				1	300	300		2nd			
		Additional Storage				1	120	120		2nd			
		Administration SF						**6,958**		**6,958**			
		Fire Station No. 3 and Administration SF			**2,451**			**13,046**	**582**	**12,164**	**300**		
	Circulation		*%*	*#*	*SF*	*%*	*#*	*SF*	*SF*	*SF*	*SF*		
		% of building area occupied by corridors & foyers	15.33%		376	15.33%		1,954	89	1,865			
		% of building occupied by stairways				3%		382	191	191			
		# of elevators					1						
		% of building area occupied by all elevator shafts				0.34%		43.34	22	22			
		% of building area occupied by elevator machine				0.24%		30.59	11	-			
		Circulation SF			**376**			**2,410**	**333**	**2,078**			
		Building Total SF			**2,827**			**15,456**	**915**	**14,242**	**300**		
Garage and Building Total SF					**5,362**			**22,976**	**8,435**	**14,242**	**300**		
Parking			*QTY*	*SF*	*Total SF*	*QTY*	*SF*	*Total SF*					
	Covered Parking	Firefighter Parking	11	171	1,881	11	171	1,881	1st/Covered			9' x 19'	
		Admin Parking	28	171	4,788	28	171	4,788	1st/Covered			9' x 19'	
		Drive Aisle	5.5	216	1,188	20	216	4,212	1st/Covered			9' x 24'	
	Surface Parking	Visitor Parking				12	171	2,052			Surface		
		Drive Aisle				6	216	1,296			Surface		
		Bicycle				5	15	73			Surface	70" x 30"	
		Parking Total			**3,069**	**56**		**14,302**	**10,881**		**3,421**		
Garage, Building, & Parking SF		**Total**			**8,431**			**37,278**	**19,316**	**14,242**	**3,721**		
Acres	*Open Space SF*	Requirement of 10% Total Building						**2,304**					
	Building Configuration				*Acres*	*SF*	*SF/Acre*	*Building Acres*					
		1 Story		**Lot Size:**	**0.97**	39,581	43,560	**0.91**					
		2 Stories (Bottom Level)				25,340	43,560	**0.58**					

Community Spaces Additions

	Community Rooms	Public Lobby				1	100	100	1st				142
		Community Room				1	1,000	1,000	1st				980
		Community Room Storage				1	200	200	1st				70
		Community Room Service Alcove				1	32	32	1st				114
		ADA Public Unisex Restroom				2	80	160	1st				170
		Circulation				15.33%		229	1st				
		Total						*1,721*	*1,721*				
	New Total Building SF							**24,697**	**10,155**	**14,242**	**300**	
	Parking Reconfiguration	*Covered*				*QTY*	*SF*	*Total SF*				
		Firefighter				11	171	1,881	1st/Covered			
		Administration				23	171	3,933	1st/Covered			
		Drive Aisle				17	216	3,672	1st/Covered			
		Surface										
		Administration				5	171	855			Surface	
		Community & ADA				15	171	2,565			Surface	
		Drive Aisle				10	216	2,160			Surface	
		Bicycle				5	15	75			Surface	
		Total				59		*15,141*	*9,486*		*5,655*	
		Additions Total SF						**16,862**	**11,207**		**5,655**	
	Garage, Building, & Parking	**Total SF**						**39,838**	**19,641**	**14,242**	**5,955**	
		Total Parking Spaces						**59**				
Total Acres	*Open Space SF*	Requirement of 10% Total Building						**2,560**				
	Building Configuration					*SF*	*SF/Acre*	*Building Acres*				
		1 Story				42,398	43,560	**0.97**				
		2 Stories (Bottom Level)				28,156	43,560	**0.65**				

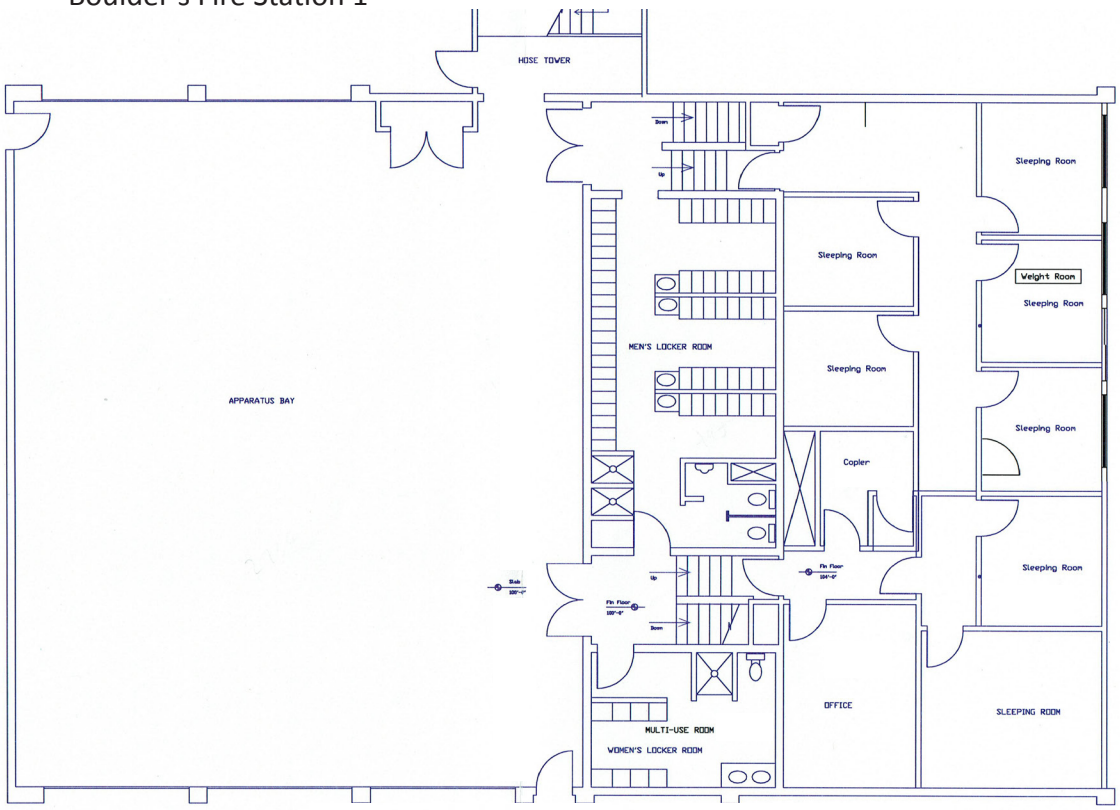


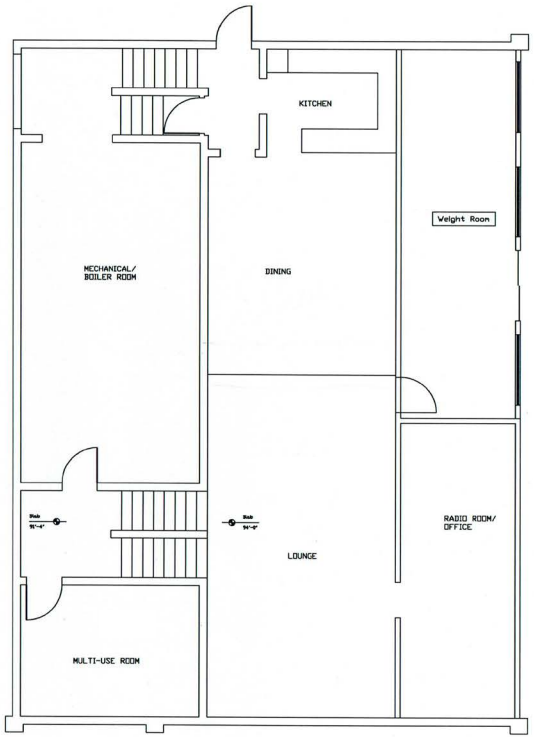
Boulder Fire Department Future Station Planning		1 Company Station			1 Company Station with Specialty Team			2 Company Station with Battalion Chief and Light Response Vehicle		
Updated:	15-Feb-15									
Personnel	Number of Firefighters	3			3			7		
	Number of Officers	1			1			4		
		QTY.	SF	Total SF	QTY.	SF	Total SF	QTY.	SF	Total SF
Garage *Apparatus Bay*	Ladder Truck	-	-	-	-	-	-	1	1,300	1,300
	Engine Truck	1	1,000	1,000	1	1,000	1,000	1	1,000	1,000
	Light Response Vehicle	1	1,000	1,000	-	-	-	1	1,000	1,000
	Battalion Truck	-	-	-	-	-	-	1	1,000	1,000
	Specialty Team	-	-	-	1	1,300	1,300	-	-	-
	Subtotal			*2,000*			*2,300*			*4,300*
Garage Support	*Additional*									
	Decontamination Area	1	150	150	1	150	150	1	150	150
	Maintenance Compressor	1	50	50	1	50	50	1	50	50
	Battalion Chief Storage Area	-	-	-	-	-	-	1	70	70
	Vehicle Maintenance Work Area	1	200	200	1	200	200	1	200	200
	Hose Storage	1	150	150	1	150	150	1	190	190
	Bunker Gear Storage Room	1	120	120	1	120	120	1	300	300
	Bunker Gear Cleaning Area	1	120	120	1	120	120	1	120	120
	EMS Clean Storage Room	1	120	120	1	120	120	1	120	120
	SCBA/Air Fill with Tank Storage	-	-	-	-	-	-	1	200	200
	Apparatus Area Storage	1	200	200	1	200	200	1	200	200
	General Storage	1	200	200	1	200	200	1	200	200
	Specialty Team Work Area	-	-	-	1	120	120	-	-	-
	Subtotal			*1,310*			*1,430*			*1,800*
	Garage Total SF			**3,310**			**3,730**			**6,100**
Building *Station No. 3*	*Firefighter Common Area*	QTY.	SF	Total SF	QTY.	SF	Total SF	QTY.	SF	Total SF
	Kitchen	1	200	200	1	200	200	1	270	270
	Kitchen Storage	1	50	50	1	50	50	1	50	50
	Day Room	1	250	250	1	250	250	1	350	350
	Dining Area	1	200	200	1	200	200	1	250	250
	Exercise Area	1	500	500	1	500	500	1	750	750
	General Storage Area	1	100	100	1	100	100	1	150	150
	Watch Office	1	150	150	1	150	150	1	200	200
	Private (Officer) Office	1	120	120	1	120	120	4	120	480
	ADA Unisex Restroom	1	80	80	1	80	80	1	80	80
	Subtotal			*1,650*			*1,650*			*2,580*
	Firefighter Living Quarters									
	Officer's Bedroom	1	120	120	1	120	120	4	120	480
	Officer's Bathroom	1	80	80	1	80	80	4	100	400
	Bedrooms	3	120	360	3	120	360	9	120	1,080
	Restrooms/Showers	3	80	240	3	80	240	4	80	320
	Laundry	1	100	100	1	100	100	1	100	100
	Subtotal			*900*			*900*			*2,380*
	Additional									
	Mechanical Room	1	250	250	1	250	250	1	250	250
	Electrical	1	75	75	1	75	75	1	75	75
	Janitor Closet	2	50	100	2	50	100	2	50	100
	Outside Storage	1	300	300	1	300	300	1	300	300
	Computer/Fire/Alarm Systems	1	75	75	1	75	75	1	75	75
	Communications Room	1	100	100	1	100	100	1	100	100
	Sprinkler Riser	1	100	100	1	100	100	1	100	100
	General Office Storage/Records	1	64	64	1	64	64	1	64	64
	Subtotal			*1,064*			*1,064*			*1,064*
	Station SF			**3,614**			**3,614**			**6,024**
Circulation		%	#	SF	%	#	SF	%	#	SF
	% of building area occupied by corridors & foyers	15.33%		554	15.33%		554	15.33%		923
	% of building occupied by	3%		108	3%		108	3%		181
	Circulation SF			**662**			**662**			**1,104**
	Building Total SF			**4,276**			**4,276**			**7,128**
Garage & Building Total SF				**7,586**			**8,006**			**13,228**
Parking		QTY.	SF	Total SF	QTY.	SF	Total SF	QTY.	SF	Total SF
	Firefighter Parking	4	171	684	4	171	684	11	171	1,881
	Drive Aisle	2	216	432	2	216	432	6	216	1,188
	Parking Total	**4**		**1,116**	**4**		**1,116**	**11**		**3,069**
Garage, Building, & Parking SF	**Total**			**8,702**			**9,122**			**16,297**
Acres *Open Space SF*	Requirement of 10% Total Building			**870**			**912**			**1,630**
Acreage		SF	SF/Acre	Building Acres	SF	SF/Acre	Building Acres	SF	SF/Acre	Building Acres
	1 Story	9,573	43,560	**0.22**	10,035	43,560	**0.23**	17,927	43,560	**0.41**

Community Space Additions										
		QTY.	SF	Total SF	QTY.	SF	Total SF	QTY.	SF	Total SF
Public Space	Public Lobby	1	100	100	1	100	100	1	100	100
	Community Room	1	1,000	1,000	1	1,000	1,000	1	1,000	1,000
	Community Room Storage	1	200	200	1	200	200	1	200	200
	Community Room Service Alcove	1	32	32	1	32	32	1	32	32
	ADA Public Unisex Restroom	2	80	160	2	80	160	2	80	160
	Circulation	15.33% & 3%		273	15.33% & 3%		273	15.33% & 3%		273
	Subtotal			*1,765*			*1,765*			*1,765*
Parking Reconfiguratio	Firefighter Parking	4	171	684	4	171	684	11	171	1,881
	Additional Parking including ADA	15	171	2,565	15	171	2,565	15	171	2,565
	Drive Aisle	10	216	2,052	10	216	2,052	13	216	2,808
	Subtotal			*5,301*			*5,301*			*7,254*
	Additions Total SF			***7,066***			***7,066***			***9,019***
Totals	**Total SF**			**14,653**			**15,073**			**22,248**
	Total Parking Spaces			**19**			**19**			**26**
Acres *Open Space SF*	Requirement of 10% Total Building			**1,465**			**1,507**			**2,225**
Acreage		SF	SF/Acre	Building Acres	SF	SF/Acre	Building Acres	SF	SF/Acre	Building Acres
	1 Story	16,118	43,560	**0.37**	16,580	43,560	**0.38**	24,472	43,560	**0.56**

D. Boulder Fire Station Floor Plans

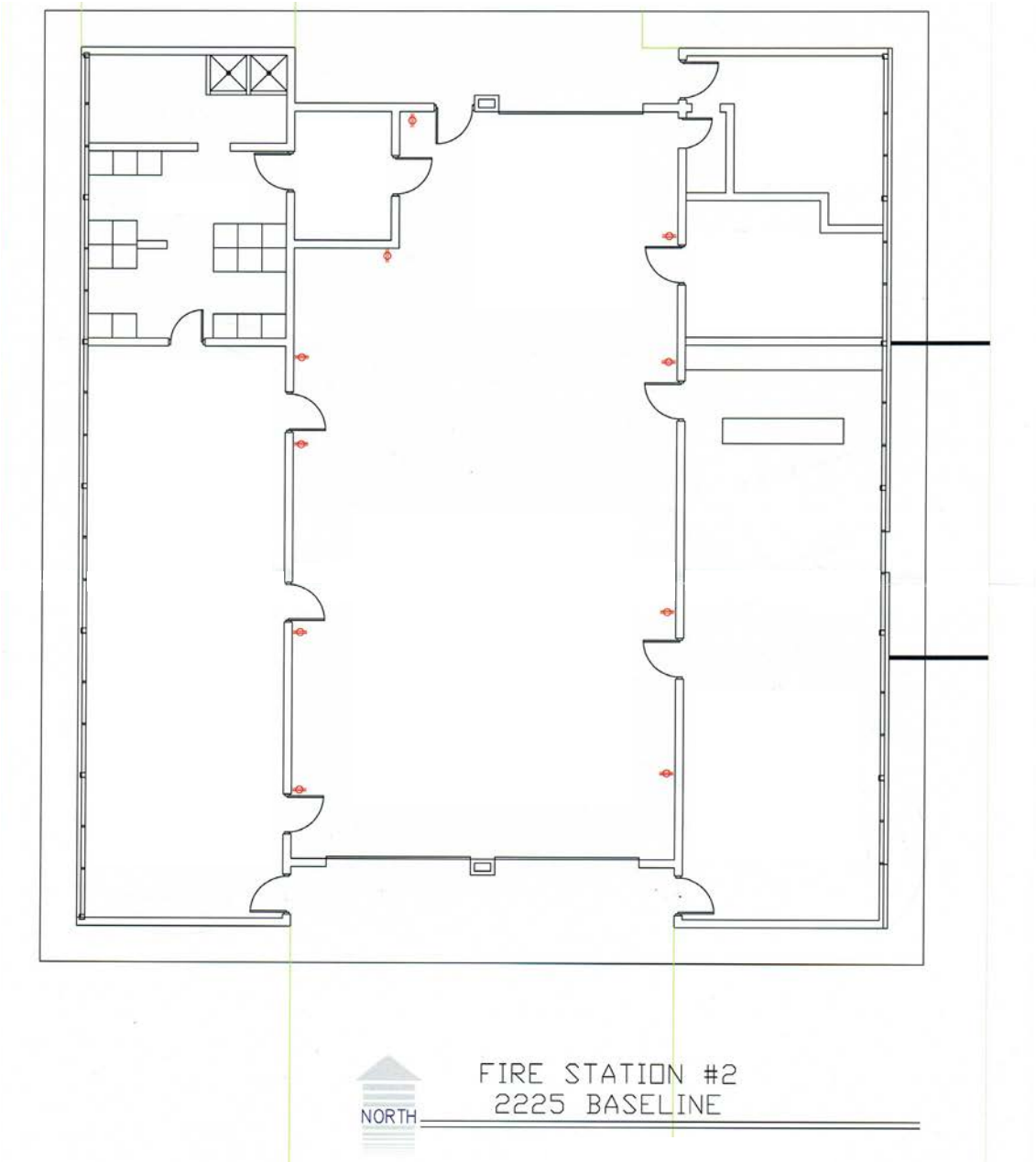
Boulder's Fire Station 1



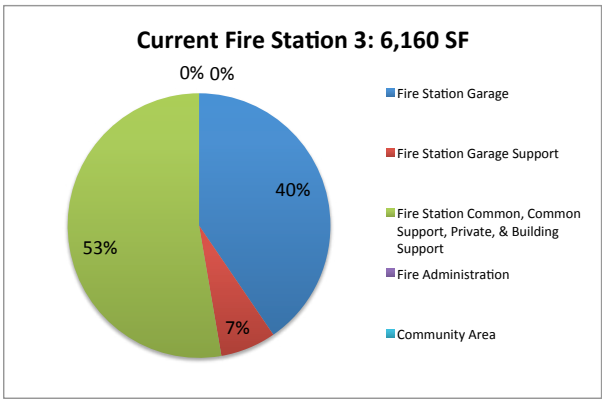


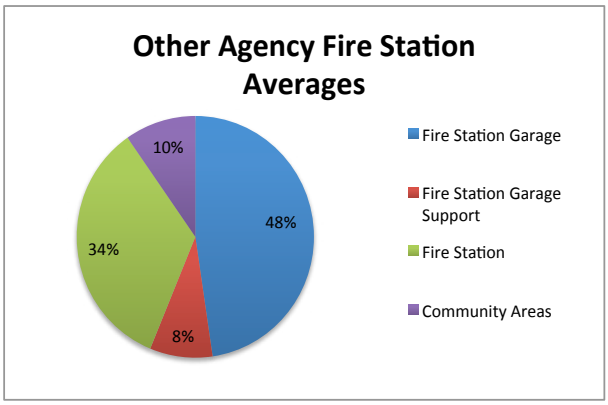
Fire Station #1 - 2441 13th Street

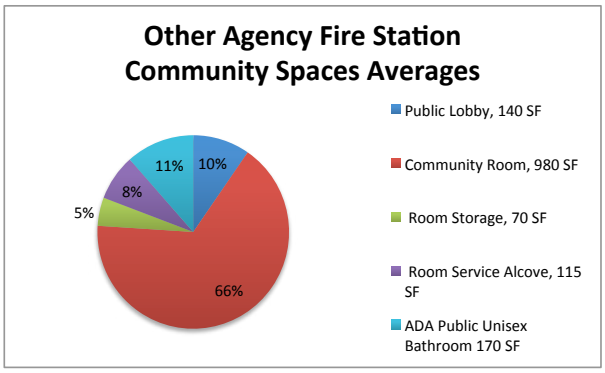
NORTH

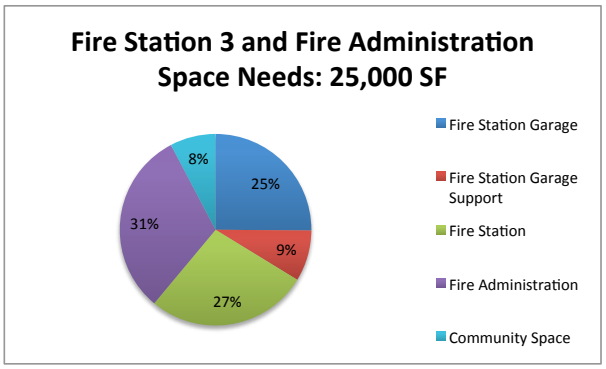

NORTH
FIRE STATION #2
2225 BASELINE

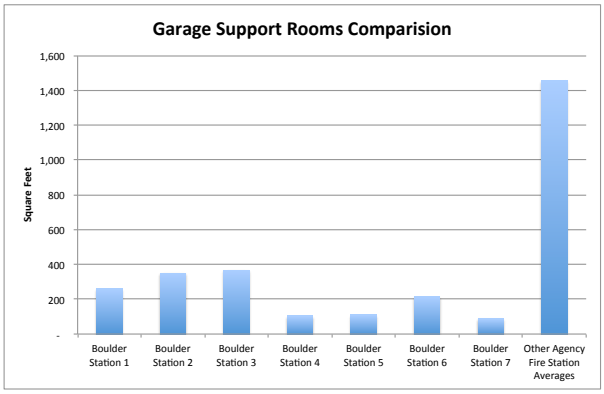
E. Comparison Graphs

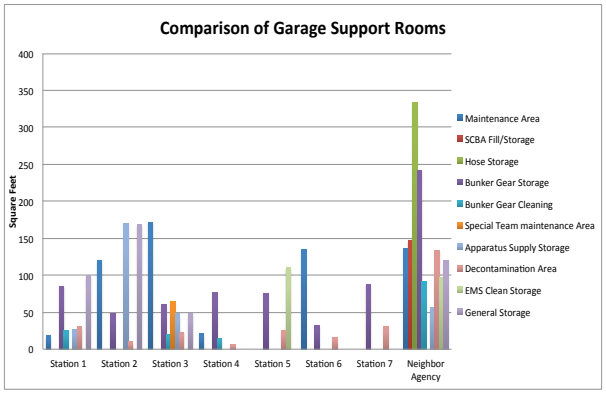


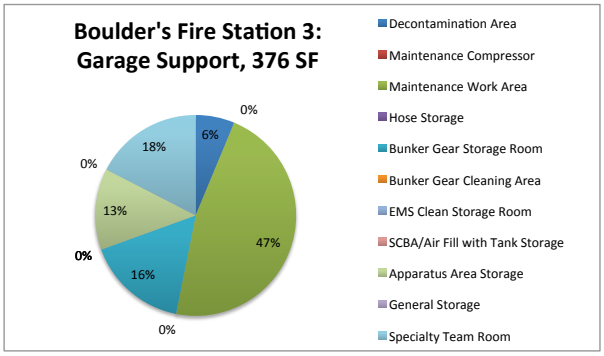


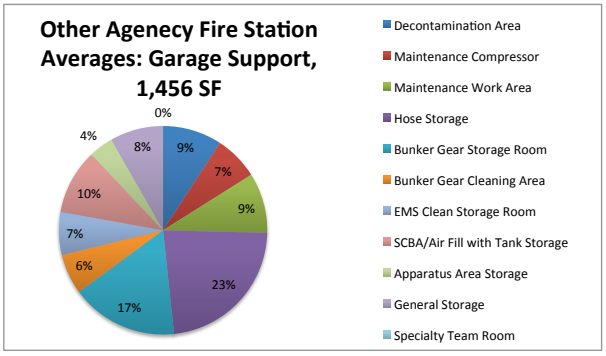


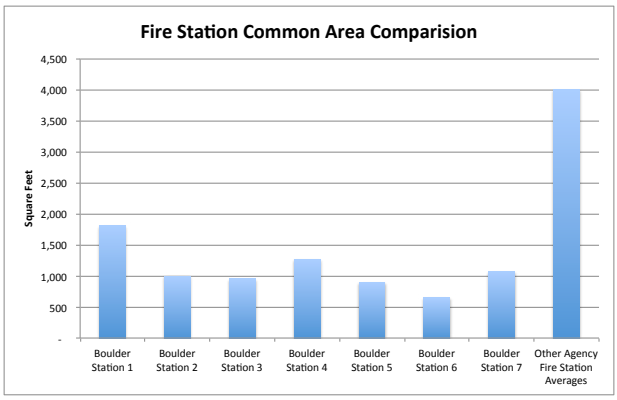


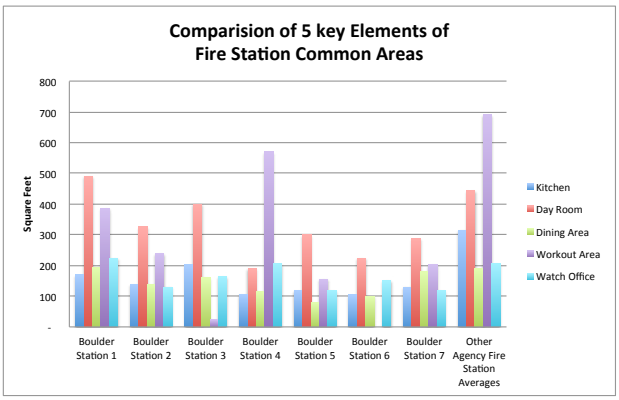


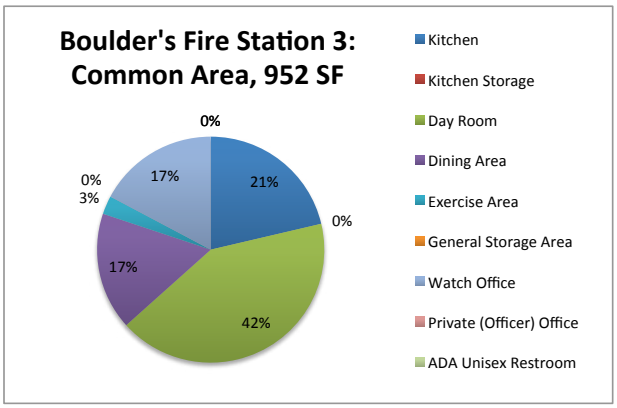


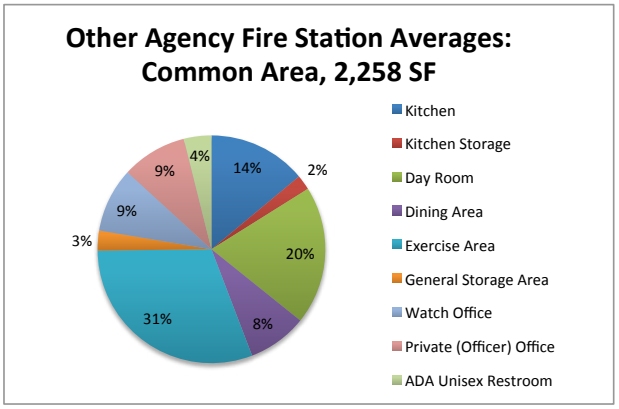


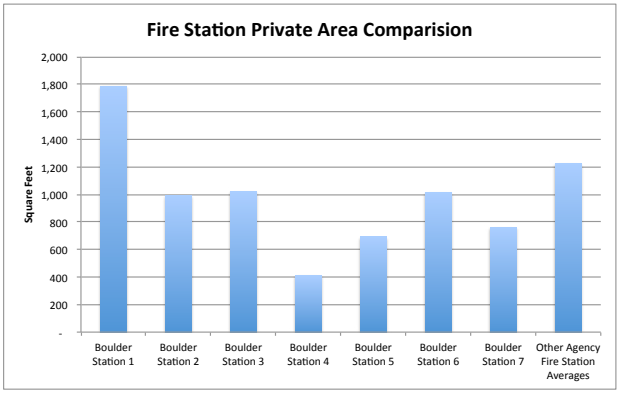


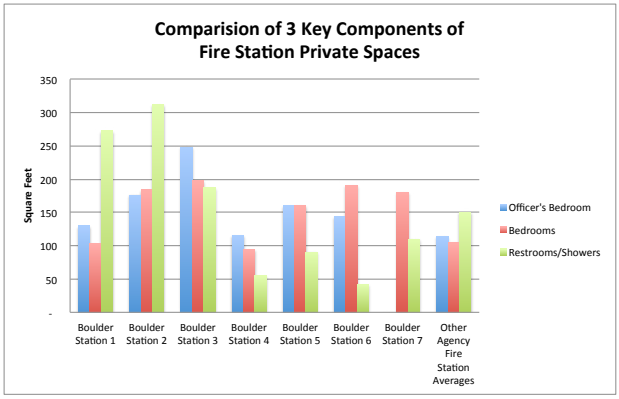

Fire Station Common Area Comparision
Square Feet
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
Boulder Station 1
Boulder Station 2
Boulder Station 3
Boulder Station 4
Boulder Station 5
Boulder Station 6
Boulder Station 7
Other Agency Fire Station Averages

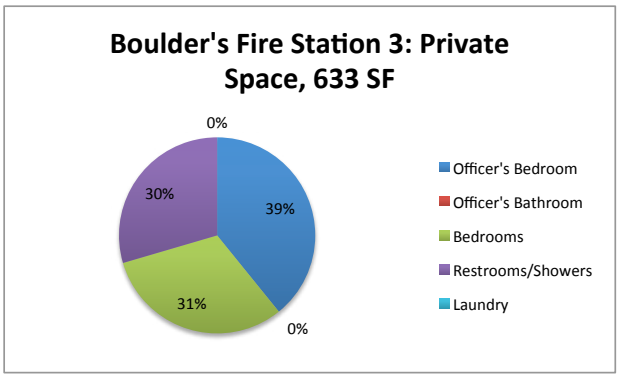

Comparision of 5 key Elements of Fire Station Common Areas
Square Feet
800
700
600
500
400
300
200
100
-
Boulder Station 1
Boulder Station 2
Boulder Station 3
Boulder Station 4
Boulder Station 5
Boulder Station 6
Boulder Station 7
Other Agency Fire Station Averages
Kitchen
Day Room
Dining Area
Workout Area
Watch Office

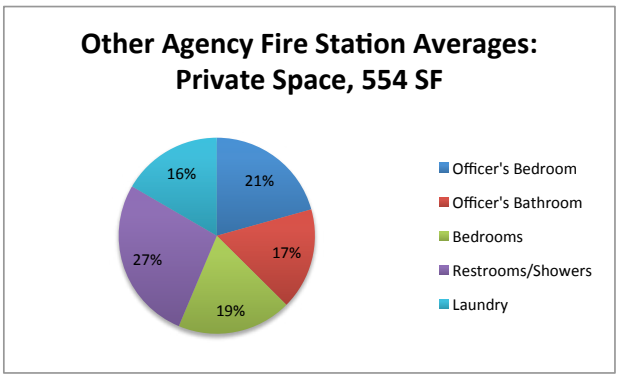

Boulder's Fire Station 3: Common Area, 952 SF
0%
0%
3%
17%
21%
0%
17%
42%
Kitchen
Kitchen Storage
Day Room
Dining Area
Exercise Area
General Storage Area
Watch Office
Private (Officer) Office
ADA Unisex Restroom


Other Agency Fire Station Averages: Common Area, 2,258 SF
9%
4%
14%
2%
9%
3%
20%
31%
8%
Kitchen
Kitchen Storage
Day Room
Dining Area
Exercise Area
General Storage Area
Watch Office
Private (Officer) Office
ADA Unisex Restroom


Fire Station Private Area Comparision
Square Feet
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
-
Boulder Station 1
Boulder Station 2
Boulder Station 3
Boulder Station 4
Boulder Station 5
Boulder Station 6
Boulder Station 7
Other Agency Fire Station Averages

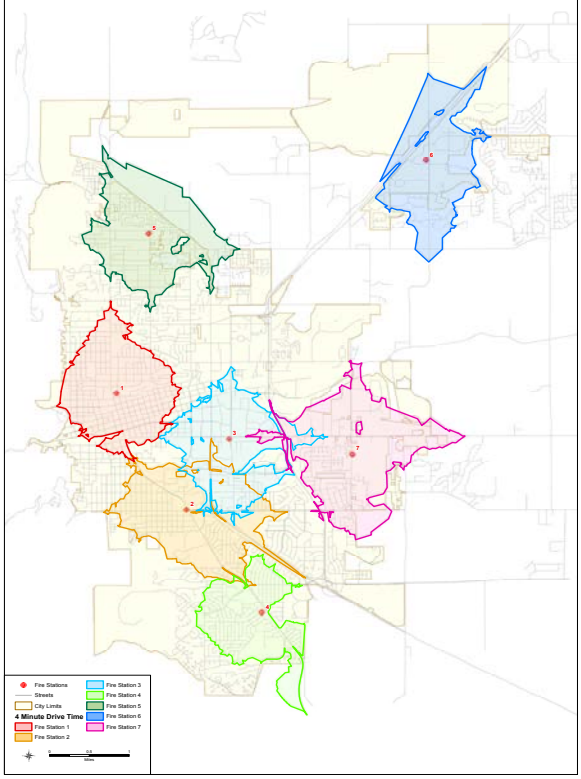

Comparision of 3 Key Components of Fire Station Private Spaces
Square Feet
350
300
250
200
150
100
50
-
Boulder Station 1
Boulder Station 2
Boulder Station 3
Boulder Station 4
Boulder Station 5
Boulder Station 6
Boulder Station 7
Other Agency Fire Station Averages
Officer's Bedroom
Bedrooms
Restrooms/Showers


Boulder's Fire Station 3: Private Space, 633 SF
0%
30%
39%
31%
0%
Officer's Bedroom
Officer's Bathroom
Bedrooms
Restrooms/Showers
Laundry


Other Agency Fire Station Averages: Private Space, 554 SF
16%
21%
17%
27%
19%
Officer's Bedroom
Officer's Bathroom
Bedrooms
Restrooms/Showers
Laundry

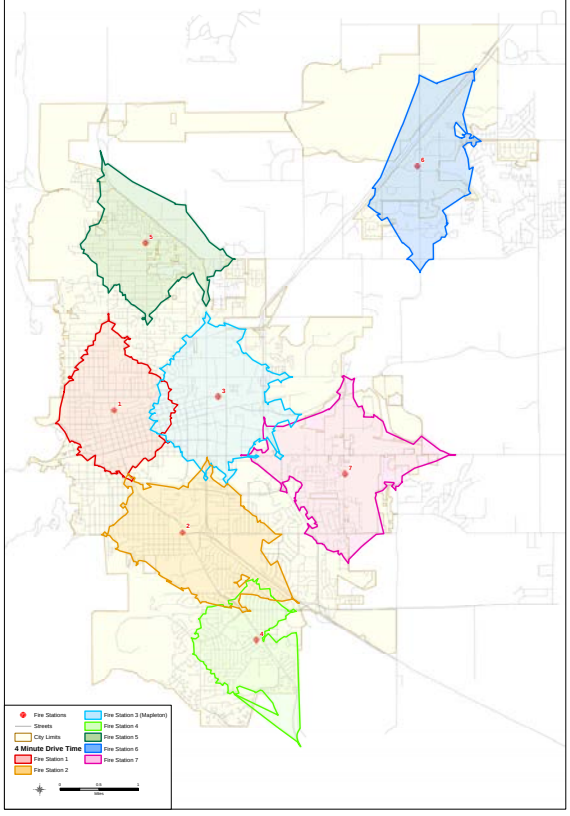
F. Service Map of Fire Station 3

Existing Drive Times Going 80% of the Speed Limit



Existing City of Boulder Fire Station locations generates service overlaps and service gaps.

Existing Drive Times with Station 3 Moving Going 80% of the Speed Limit



Moving Fire Station 3 north evenly distributes service coverage.

G. Site Selection Criteria

Fire Station 3 Site Selection Criteria

Criteria 1	Floodplain	Not in the 100 year floodplain
Criteria 2	Access	Easy N/S/E/W Access. Within 800 to 1,000 feet to a main arterial. At least 250 feet from a signaled intersection. Ability to install traffic control devices. Driving response times not disrupted by train movements
Criteria 3	Topography and Driveway Slop	Level or nearly level with slope of driveway for vehicles is less than 2%
Criteria 4	Ideal Response Zone *(1 to 4 zones)*	Location evenly distributes department's service coverage.
Criteria 5	Estimated Depth of Fill to Elevate to FPE	Fill needed for one foot above 500-year flood levels
Criteria 6	Buildable Site	Unencumbered by easements, utilities, drainage or other subterranean structures
Criteria 7	Adequate Lot Size & Shape	Accommodate 25,000 SQFT of building envelope with an additional 16,000 SQFT parking space for a total of 59 cars. The large apparatus bay must be easily accessible by the large vehicles according to the following: 25.4' minimum inside turning radii, 42.0' minimum outdoor turning radii, 70' long driveway in front of the garage doors, and should ideally be a drive through. An additional space is needed for open space requirements.
Criteria 8	Demo Costs *($15/sf)*	Low demolition costs of any existing structures.
Criteria 9	Total Cost *(parcel + demo)*	Includes parcel and demolition cost. Total cost could also include trade-off/opportunity costs, cost to fill to above 100-yr flood, cost to turn the vacant land into a legal buildable site, and cost of off-site modifications like street improvements, new traffic signals.
Criteria 10	Govn't Owned	Preferred
Criteria 11	Vacant or Underutilized Property	Preferred
Criteria 12	Access to Public Utilities	Appropriately sized water, sewer, electric & natural gas
Criteria 13	Compatible Zoning	Use by right in Business, Industrial, Downtown and PE.

City of Boulder
Fire-Rescue Department

Light Response Vehicle Pilot Program Review

MARCH 2015

City of Boulder Fire-Rescue Department

Light Response Vehicle Program

Executive Summary

One of the recommendations included in the operational and management assessment of the Boulder Fire-Rescue Department (BFRD) was the consideration of two person rescue squads. Beginning in January 2013, BFRD initiated a two-year pilot program to evaluate the benefits of a Light Response Vehicle (LRV) before any full scale implementation.

The following analysis explores various aspects of the program to help ensure that continued implementation fully addresses City goals around the issues of social, environmental, and economical sustainability.

Social Impact

- Quicker on scene times due to smaller more maneuverable vehicle
- Smaller footprint when parked on the streets
- More maneuverable in the streets; especially during inclement weather
- Decrease in damage to the City's streets due to lighter response vehicle
- Created an additional response unit when extra staffing allowed

Environmental Impact

- 3,282 gallons of diesel fuel consumption reduced
- Estimated 9.56 metric tons of carbon avoided and 34.44 metric tons of carbon dioxide (CO2) avoided through fuel savings

Economics Impact

- Average of $5,391 per year in fuel costs savings
- Estimated $12,240 per year reduction in heavy apparatus maintenance and repair
- Cost $0.61 dollars per mile to operate LRV versus $2.75 per mile to operate the ladder truck

The primary benefit of this LRV program is that the department can ensure a better utilization of its resources while maintaining a cost-effective response configuration. According to Michael Baker, director of EMS for Tulsa, OK F.D., "many other departments have also recently made the move to smaller vehicles, including Spokane, Washington, Fort Worth, Texas, and Memphis, Tennessee, all of which have made a move to downsize their EMS delivery vehicle in the past few years." (Source: http://www.jems.com/article/vehicle-ops/replace-big-apparatus-better-fire-service) During the ongoing implementation of these departments' LRV programs, all LRVs were staffed full time in lieu of jumping between rigs, which is how the BFRD is currently utilizing its LRV.

City of Boulder Fire-Rescue Department

Light Response Vehicle Program

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Top Three Options: Light Rescue Recommendation Policy

Of the six options that BFRD reviewed, the following are the top three options considered as viable for the continuation of the City's goals focusing on the social, environmental, and economic impacts.

Top Recommendation:

Options # 5 - Staff the LRV, replace/re-equip with appropriate equipment

This will create an additional unit for response and increase the benefits of the pilot program objectives; the truck will remain in service when the LRV is out on a call and additional funding will have to be allocated.

Second Choice Recommendation:

Option # 6 - Staff three LRVs in stations 1, 2, and 3

This will create three additional units for response and increase the benefits of the pilot program three fold; the truck and two additional engines will remain in service when the LRVs are out on calls and additional funding will have to be allocated.

Third Choice Recommendation:

Option # 1 - Eliminate the current LRV and return services to pre-pilot program status

The department can absorb the LRV truck through staff vehicle attrition and incur no further added future costs.

BFRD recommends the implementation of option #5. Although option #6 is where the department is heading as the city grows, option #5 increases the department's customer service while foregoing the immense costs associated with station modifications and capital investment of equipment for full implementation. As newer stations are built and the call demand become more severe, option #6 will be less cumbersome to reach in the future.

City of Boulder Fire-Rescue Department

Light Response Vehicle Program

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Terminology

The following terms will be used throughout this report. A brief explanation for each reference used is included.

1. **Boulder Fire-Rescue Department (BFRD)** is the fire department serving the City of Boulder, Colorado.
2. **Light Response Vehicle** or **LRV** may also be referenced as "2520" for the purposes of this analysis.
3. The **ladder truck** or **truck** may also be reference as "2516" or "Truck 2516" for the purpose of this analysis.
4. The **engine** may also be referenced as "2501" for the purpose of this analysis.
5. The **pilot program** was based out of Station #1. Although BFRD does not have exact districts due to Automatic Vehicle Location (AVL) dispatch, Appendix B provides a BFRD response district map within the city limits assuming all vehicles are in their station.
6. The **pilot program period** is defined as January 1, 2013 through December 31, 2014.
7. **Apparatus** is defined by National Fire Protection Association 1710, as a motor-driven vehicle or group of vehicles designed and constructed for the purpose of fighting fires. (Appendix G.1)
8. **Heavy apparatus** are defined as large motor vehicles that carry fire fighters and equipment and support extinguishing operations. For the purpose of this analysis heavy apparatus will be defined as engines and trucks.
9. A **crew** is the personnel of a unit, an Officer (Captain or Lieutenant - the boss), Engineer (driver), and Fire Fighter (worker).
10. A **unit** is a BFRD vehicle dispatched on calls for service.
11. **Calls for service (CFS)** are the incidents to which the fire department responds. Multiple units may respond on a single call.
12. **Unit responses** track the number of times a unit was dispatched on calls for service. (Appendix G.1)
13. **Emergency Medical Dispatching (EMD)** or Priority Dispatching allows the dispatcher to quickly narrow down the caller's emergency situation, so as to better dispatch emergency units appropriately. BFRD began EMD on December 9th, 2013.

FIGURE 1 - LRV 2520 IN FRONT OF STATION 1

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Light Response Vehicle Program

Background

In June 2011, the TriData Corporation completed an Operational and Management Assessment of the Boulder Fire-Rescue Department (BFRD). One of the recommendations included in the report was to consider incorporating two-person rescue vehicles at the busiest fire stations to respond to medical emergencies. The recommendation was that heavy fire apparatus use fuel inefficiently, need to be preserved due to their immense cost, and are often unnecessary for the medical calls to which they respond. (See Appendix E)

When the Dispatch Center receives a 911 call for help regarding a medical emergency, based on the Emergency Medical Dispatch (EMD) code, it notifies the Ambulance Company and/or the BFRD and each agency responds accordingly. If the fire engine is unavailable, the ladder truck responds. The engine and truck are each staffed with a crew of three fire fighters.

FIGURE 2- STATION ONE WITH ENGINE 2501 AND TRUCK 2516; HOME TO THE LRV PILOT PROGRAM

In June 2012, BFRD proposed a pilot program to City Council incorporating a Light Response Vehicle (LRV) at Fire Station #1. This station is currently the busiest fire station in the city with over 4,000 unit responses in 2014. Medical emergencies account for 58.3% of BFRD's total call volume, whereas Station #1 had 60.7% in 2014 (*Appendix A*). The comparison between current costs and operations at Fire Station #1 and the new approach under the pilot will be the platform for analyzing the pilot program's effectiveness.

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Light Response Vehicle Program

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Purpose

The intent of the Light Response Vehicle (LRV) Program is to meet the city's ongoing sustainability evaluation using the Triple Bottom Line (TBL). The TBL is the idea that to be sustainable an organization must recognize the environmental, social, and economic effects of its actions.

Triple Bottom Line Assessment:

- The Social Assessment will review impacts on response times to medical emergencies as well as impacts on operational effectiveness.
- The Environmental Assessment will involve fuel savings and associated reduction in Greenhouse Gas (GHG) emissions in relation to the costs associated with adding a vehicle to the fleet.
- The Economic Assessment will review the cost benefit associated with light response vehicles for the City of Boulder.

FIGURE 3 - LEFT TO RIGHT: TRUCK 2516, ENGINE 2501, LRV 2520

Objectives

A two-year Light Response Vehicle Pilot Program was designed to evaluate the concept's effectiveness on four specific objectives:

1. Reduce fuel consumption and greenhouse gas emissions
2. Reduce damage and deterioration to the city's streets and roads
3. Extend the life of the city's fire engines through decreased usage
4. Increase maneuverability of response vehicles

City of Boulder Fire-Rescue Department

Light Response Vehicle Program

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Implementation

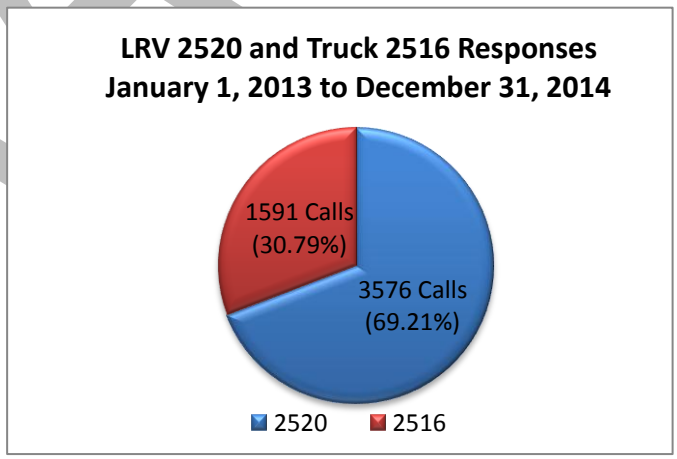
On January 1, 2013, the Light Response Vehicle (2520) was placed in service at Fire Station #1 (see Appendix B). Station #1 was selected because of its high call volume, including a large number of emergency medical calls. The Light Response Vehicle Pilot Program was implemented with the purchase of a 2013 Ford F-150. The LRV was staffed as a jump vehicle. This required the fire fighters to move from the Ladder truck (2516) to the LRV depending on the type of call being dispatched. Depending on available staffing the response was as follows:

- **2516 staffed with three fire fighters:** the entire crew will jump to the LRV
- **2516 staffed with four fire fighters:** the officer and engineer will stay on 2516 and the two fire fighters will jump to the LRV. Personnel assigned to the LRV would need to have a minimum qualification of acting officer and acting engineer.
- **Extra personnel available:** If there were additional personnel available, dependent on vacation and sick leave, the LRV would be staffed with two extra personnel leaving 2516 in service with the normal crew of three fire fighters.

The LRV was dispatched on all Emergency Medical Service calls except car accidents and any responses on highways (a safety concern). The crews assigned to 2516 were advised to use the LRV for inspections, trips to the grocery store, classroom training, and public education programs. They were also to take the truck to fire ground trainings at the Boulder Regional Fire Training Center.

Analysis

The Light Response Vehicle (2520) was activated at Fire Station #1 on January 1, 2013. Data for the initial pilot program time period, January 1, 2013 through December 31, 2014 was analyzed to determine the viability of the concept.



First-Year/Second-Year Results

First year responses by the LRV: 1,917 responses
Second year responses by the LRV: 1,658 responses

During the first year of the program, Truck 2516 had 832 responses. The LRV 2520 responded 1,917 times. Of the total 2,749 responses, 70% were by the LRV and 30% were by the truck.

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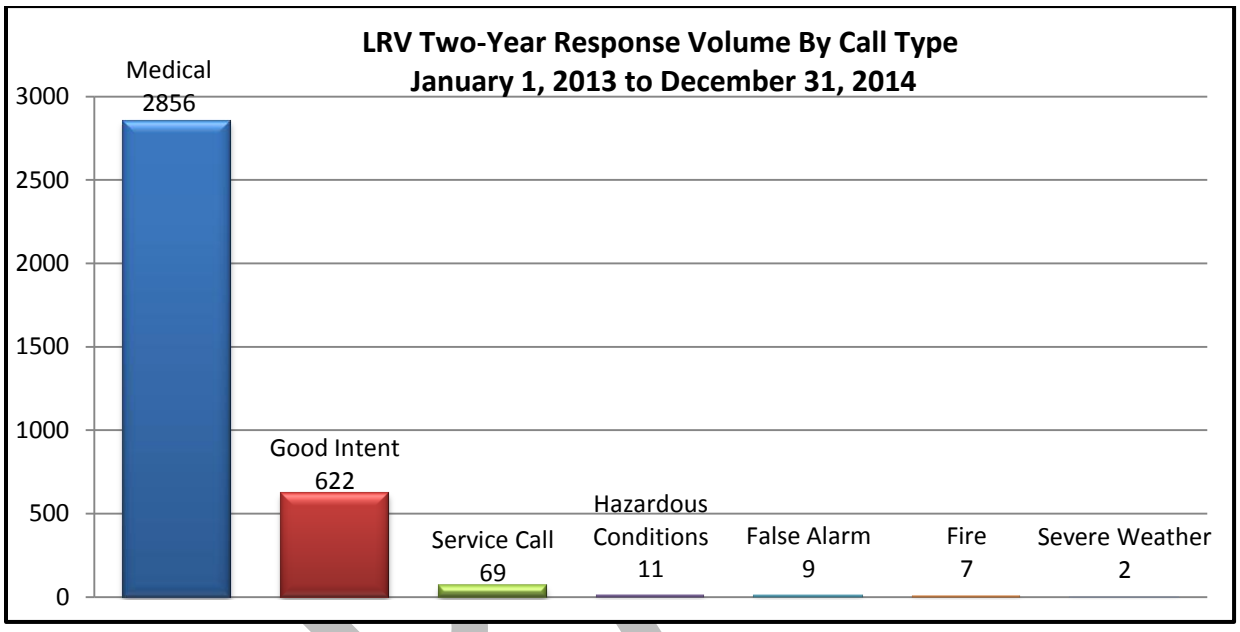
For the second year of operations, the LRV had 1,659 responses (68.5%) and the truck had 761 responses (31.5%). As dictated by the program's parameters, the LRV was dispatched for all Emergency Medical Service calls. However, based on the staffing and availability it was also used on more complex incidents to provide additional fire fighters for service.

The following chart illustrates the LRV's responses by incident types:



Response Times:

By using the smaller, more versatile LRV, the response times were reduced an average of 19 seconds for emergency calls compared to the rest of BFRD fleet. The city's average unit response time to arrive on scene of a medical call was 3 minutes and 52 seconds. The LRV averaged a response of only 3 minutes and 33 seconds. The conclusion being that the smaller vehicle provided quicker medical services to the citizens in Boulder.

Fuel Savings:

(All fuel costs and quantities were collected from City Fleet records)

First Year Mileage, reduction on heavy apparatus: 6,101 miles
Second Year Mileage, reduction on heavy apparatus: 5,339 miles

The LRV responded to incidents that would have otherwise required a heavy apparatus response. The vehicle was also used for non-emergency driving that occurred in the normal course of operations. Some common examples of non-emergency driving would be for fire

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inspections, trips to the grocery store and headquarters, and public education programs. Therefore, it can be assumed that every mile driven by the LRV was a mile avoided by a fire engine.

From January 1, 2013 through December 31, 2014, the LRV accumulated a total of 11,440 miles. This shift in mileage from a heavy response vehicle to a lighter vehicle will extend the useful life expectancy of the heavy apparatus as well as lower the maintenance costs.

First Year Fuel savings: ≈$5,318 using the 2013 Ford F-150 Crew Cab 4x4 (8.86 mpg)
Second Year Fuel savings: ≈$5,463 using the 2013 Ford F-150 Crew Cab 4x4 (9.13 mpg)

During the two-year pilot program, the LRV averaged 8.99 miles per gallon, compared to Truck 2516 averaging 2.52 miles per gallon. The following tables illustrate fuel costs and fuel quantities for Truck 2516 (new and old), Engine 2501, and the LRV; all the vehicles currently running out of Station 1 (vehicles affected by the use of the LRV). Because of the distribution of miles driven and the greater fuel efficiency of the LRV, when compared to the 2011-2012 average fuel costs, the first year fuel cost savings was approximately $5,318 and the second years savings was approximately $5,463 for a total savings of approximately $10,782.

FUEL COSTS				
Unit	**2011**	**2012**	**2013**	**2014**
LRV 2520	$0	$80	$2,455	$2,021
ENG 2501	$10,561	$10,543	$7,357	$7,880
OLD 2516	$11,457	$11,569	$0	$0
NEW 2516	$0	$2,424	$8,187	$7,953
Total	$22,018	$24,617	$17,999	$17,854
Ave Cost	$23,318		**$5,318**	**$5,463**

FUEL QUANTITY (in Gallons)				
Unit	**2011**	**2012**	**2013**	**2014**
LRV 2520	0	25.30	663.44	584.57
ENG 2501	2594.03	2548.06	1773.38	2080.59
OLD 2516	2856.97	2799.12	0.00	0.00
NEW 2516	0.00	646.41	2326.01	2234.00
Total	5451.00	6018.89	4762.83	4899.16

Throughout the two years, the LRV was fueled with a combination of E-85 and regular unleaded. This could have affected the fuel efficiency as well as the frequent practice of driving emergent to calls. Depending on future LRV purchases/replacements, a more fuel efficient vehicle will help increase the fuel cost savings. The fuel efficiency of the truck is lower than the manufacturer's ratings due to long times spent on fire scenes with high idling to operate the truck's pump and aerial controls.

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Maintenance:

(All Fuel, PM, & Repair costs were collected from city Fleet records)

Due to the size and weight of a fire apparatus, the preventative maintenance (PM) is significantly higher than that of a medium-sized passenger vehicle. In comparing the maintenance costs of the truck versus the LRV, the PM expense costs on average $2,682 more per year. Looking at the two-year average during the pilot program (2013-2014), repairs for the truck cost on average $3,882 per year more than the LRV to repair and keep in service. Regarding repairs, the truck is an average of five times more expensive to maintain.

Preventative Maitenance (PM)				
Unit	**2011**	**2012**	**2013**	**2014**
LRV 2520	$0	$0	$187	$304
ENG 2501	$3,890	$3,850	$2,691	$0
OLD 2516	$2,330	$2,632	$0	$0
NEW 2516	$0	$0	$3,390	$2,464
Total	**$6,219**	**$6,482**	**$6,267**	**$2,768**

REPAIR				
Unit	**2011**	**2012**	**2013**	**2014**
LRV 2520	$0	$0	$1,719	$263
ENG 2501	$7,290	$9,141	$9,441	$0
OLD 2516	$11,794	$11,412	$0	$0
NEW 2516	$0	$55	$790	$8,955
Total	**$19,084**	**$20,608**	**$11,949**	**$9,218**

One interesting fact is that since the start of the LRV pilot program in 2013, the total annual costs for Station 1 apparatus has decreased. A large contributor to this is caused by the replacement of Truck 2516 at the end of 2012. However, it is shown that the cost of the aging engine (2501) has also been significantly reduced during the pilot program.

TOTAL ANNUAL COSTS (Fuel, PM, & Repair)				
Unit	**2011**	**2012**	**2013**	**2014**
LRV 2520	$0	$80	$4,361	$2,588
ENG 2501	$21,742	$23,535	$19,488	$7,880
OLD 2516	$25,580	$25,613	$0	$0
NEW 2516	$0	$2,479	$12,366	$19,371
Total	**$47,322**	**$51,707**	**$36,215**	**$29,840**

According to Fleet records, the average annual cost saved each year the LRV has been in service is $16,487. When comparing the overall cost per miles, the truck averages $2.75 per mile while the LRV operates at $0.61 per mile.

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Conclusion

When looking back to the objectives of the LRV pilot program:

- *A two year Light Response Vehicle Pilot Program was designed to evaluate the concept's effectiveness on four specific objectives:*
    1. *Reduce fuel consumption and greenhouse gas emissions*
    2. *Reduce damage and deterioration to the city's streets and roads*
    3. *Extend the life of the city's fire engines through decreased usage*
    4. *Increase maneuverability of response vehicles*

The first objective was met by reducing over 3,282 gallons of diesel fuel consumption. Considering diesel emits 2.77 Kg of carbon per gallon and gasoline emits 2.40 Kg of carbon per gallon, GHG emissions were reduced by 9.56 metric tons of carbon or 3.42 metric tons of CO2. (Source: http://www.epa.gov/climateleadership/documents/resources/mobilesource_guidance.pdf)

The second objective was quantified based on the fact that the miles saved from driving the 80,000 lbs ladder truck on the streets reduced deterioration and damage to the streets.

The third objective was met by lessening the miles and usage on the roadway, maintenance costs, and deterioration of the heavy vehicle to extend its useful life expectancy. These tie into the last objective of increasing maneuverability; with the increased maneuverability of the LRV, medical response times have decreased compared to the BFRD fleet's response times (Appendix G.2). With more vehicles, cyclists, and pedestrians on the roadways as well as smaller street design, the smaller vehicle has proved to be more maneuverable, especially in inclement weather. However, when stopped on the roadway the larger vehicles do offer much more scene protection and safety.

In closing, the Light Response Vehicle Pilot Program validated the anticipated benefits of the concept:

- Sufficient demand exists for a Light Response Vehicle to respond to medical calls that do not require a heavy fleet vehicle.
- A Light Response Vehicle reduces mileage that would have been driven by a heavy apparatus.
- A Light Response Vehicle's greater fuel efficiency reduces fuel costs while increasing the ability to provide services on scene quicker.

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All Options Overview: Light Rescue Recommendation Policy

The following are all the options that BFRD consider as viable for the continuation of the City's goals focusing on the social, environmental and economic impacts.

1. **Eliminate the current LRV and return services to pre-pilot program status**
   The department can absorb the LRV truck through staff vehicle attrition and incur no further added future costs.

2. **Continue as is, leave the current LRV in service as a jump rig**
   This will continue current services with no changes operationally. The truck will remain out of service when the LRV is out of the station running calls and additional funding will have to be allocated.

3. **Continue the LRV as a jump rig, replace/re-equip with appropriate equipment**
   The current LRV can be reutilized within the department and a Light Rescue vehicle will be purchased and equipped to be more self-sufficient on calls; the truck will remain out of service when the LRV is out of the station running calls and additional funding will have to be allocated.

4. **Staff the LRV, leave with current rig/equipment**
   This will create an additional unit for response and continue the benefits of the pilot program; the truck will remain in service when the LRV is out on a call and additional funding will have to be allocated.

5. **Staff the LRV, replace/re-equip with appropriate equipment**
   This will create an additional unit for response and increase the benefits of the pilot program objectives; the truck will remain in service when the LRV is out on a call and additional funding will have to be allocated.

6. **Staff three LRVs in stations 1, 2, and 3**
   This will create three additional units for response and increase the benefits of the pilot program three fold; the truck and two additional engines will remain in service when the LRVs are out on calls and additional funding will have to be allocated.

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Detailed Options for Future Actions

The need for the LRV has been proven through the pilot program results. It meets the needs of the department and is in line with the direction of Boulder citizens and City Council. Below are the reasons for and against the 6 options the BFRD find viable. These options would keep response operations at levels that would be in line with the city's Triple Bottom line analysis:

Option 1: Eliminate the LRV and return to service pre-pilot program

Option 1 - PROS:

- **Eliminates Dispatch confusion/staffing confusion**
  By eliminating the LRV, communications with dispatch would be clear confused as which truck to tone and which truck was In-Service. When the LRV was on a call, the truck would then become Out Of Service (OOS) based on staffing.
- **No need for a vehicle replacement fund**
  By eliminating the LRV, there would be no need for a replacement fund to be established. When the LRV program was initiated, there were only one-time funds of $76,649 given to support the study with the purchase and two years worth of maintenance funding.
- **Eliminates the LRV maintenance costs**
  By eliminating the LRV, an ongoing operations and maintenance budget of $6,500 annually will NOT need to be established. Again, only funds for the two year pilot program were secured at the time of implementation.
- **Eliminates Jumping**
  By eliminating the LRV, the truck crew would no longer need to 'jump' between the LRV and the truck. This would make for quicker response times out the door. Since this was only a pilot program, no additional Full Time Employees (FTEs) were hired; therefore crews had to 'jump' between the LRV and the truck for staffing.
- **No additional personnel costs**
  By eliminating the LRV, BRFD operations would return to staffing as normal and no additional personnel costs would be needed.
- **Truck is always in service/Eliminates returning to station for 2516**
  By eliminating the LRV, the truck would return to being staffed 24/7/365.

Option 1 - CONS:

- **Increased fuel consumption/unleaded is cheaper than Diesel**
  Through the results of the LRV study, it was determined that over 3,282 gallons of diesel were saved from being consumed. This equated to $10,782 in fuel savings.
- **Increase in heavy vehicle maintenance costs**
  Through the use of the LRV, it was determined that an estimated $24,482 was saved in vehicle maintenance costs over the two years.

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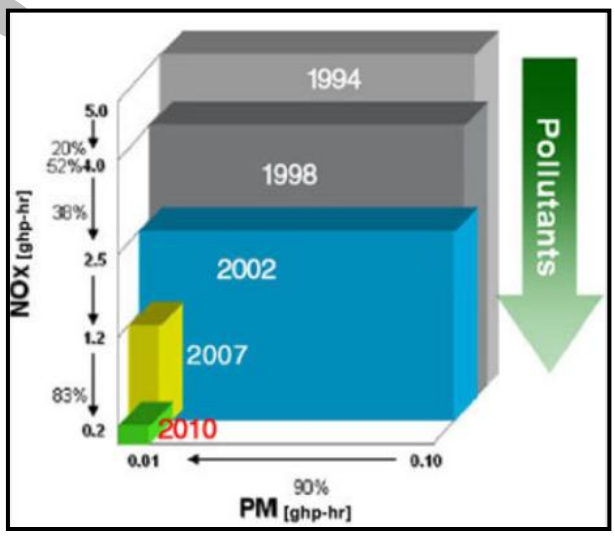
- **Heavy vehicles returning to running all medical calls**
  By eliminating the LRV, the truck would return to running calls as before and adding additional miles to the heavier apparatus.
- **Decreased Maneuverability**
  By eliminating the LRV, and the truck returning to the street causes decreased maneuverability through traffic, in both emergent and non-emergent business, and creates a larger footprint while parked on the streets.
- **Decreased Flexibility for moving crews and handling calls**
  With the LRV, crews were able to easily make trips to trainings, inspections, errands around town, and public education events. The LRV proved useful making these trips less cumbersome to both crew members and citizens in the community.

Option 2: Continue as is, leave LRV a jump rig

Option 2 – Pros

- **Decrease in fuel consumption/unleaded is cheaper than Diesel**
  Through the results of the LRV study, it was determined that over 3,643 gallons of diesel were saved from being used. This equated to $14,841 in fuel savings.
- **Reduces the miles placed on heavier apparatus**
  Through the use of the LRV, over 11,440 miles were reduced from being placed on the truck. This was shown in the LRV pilot program.
- **Reduced heavy maintenance repair cost**
  Through the results for the LRV pilot program, the LRV was found to save on maintenances costs $12,241 annually
- **No additional personnel costs**
  By continuing the LRV as a jump rig, BRFD operations would continue as they have for the last two years. No additional FTEs were hired for the pilot program.
- **Reduction in greenhouse gases**
  The 2010 EPA Emissions Standards require greater fuel economy with fewer emissions, totaling a 90% cut in nitrogen oxide (NOx). All Pierce Manufacture® apparatus meet the 2013 On-Board Diagnostics (OBD13) and 2014 Greenhouse Gas (GHG14) regulations. (See Appendix F)



- **Smaller footprint while parked on scene**
  Based on the size and maneuverability of the LRV, the footprint while parked on scene would create a smaller footprint easing street congestion.
- **Already own the current LRV**
  Continuing the current LRV makes since; until the need for a replacement vehicle is determined. The funding was already used to purchase and operate the current vehicle until now; minimal annual funds would be needed to continue as is.

Option 2 – Cons

- **Creates Dispatch confusion/staffing confusion**
  By continuing the LRV as a jump rig, dispatch continues to be confused as to which truck to tone if and when the truck is OOS while 2520 is on a call. This also creates an accountability issue with engine companies due to frequent crew swaps.
- **A need to create a vehicle replacement fund along with an operations and maintenance fund**
  By continuing the LRV, a replacement budget will need to be started as well as an ongoing operations and maintenance budget of $6,500 annually. Again, only funds for the two year pilot program were secured at the time of implementation.
- **Reduces the ladder truck availability/part time staffed**
  Last year, the LRV responded to 1,659 calls. Using dispatch times, the LRV was on scene for over 1,765 hours. Including an average 2.5 minute drive back to the station, the truck was Out Of Service for over 1,821 hours or over 10 weeks and 5 days. This directly affects the trucks availability to respond to structure fires.
- **Increased response times for the Truck when crew is on 2520**
  In addition to the delay from medical calls, the truck company has been delayed due to inspections, public education events, trainings, and when used for running errands.
- **ISO's Public Protection Rating**
  By delaying the truck's initial response to structure fires, the City's ISO rating is negatively affected – which affects Boulder citizen's fire insurance.

  ISO Fire Suppression Ration Schedule
  540 Ladder/Service Companies:
  The standard response on the initial alarm to fires in structures consists of a minimum of 1 ladder or service company. The responding fire department must provide enough ladder and/or service companies to ensure the response of at least 1 ladder or service company to all alarms for structure fires.*

  Also, a fire protection area needs a ladder/service company in an existing fire station when that station serves 50% or more of a standard response district not within 2½ road miles of other ladder/service companies. A standard response

district is a built-upon area with a creditable water supply (as defined in Section 201A3) within a response distance of 2½ road miles.

- **LRV Truck too small/ill-equipped**

  Due to the size and limited space on the current LRV body (F-150 pickup/short bed) crews were required to call an additional engine out to assist on multiple calls due to a lack of equipment on the LRV.

- **Increases apparatus response when 2nd rig is requested**

  Due to the LRV needing additional equipment once on scene (water can, ladder, forcible entry tools…), there were longer response times to provide services on scene (i.e. an additional engine would have to respond) which also created an increase in heavy apparatus mileage, fuel consumption, and unneeded manpower. The delay in needed equipment slows down the services provided therefore lowering our level of customer service.

Option 3: Continue LRV as a jump rig, replace/re-equip with appropriate equipment

Option 3 – Pros

- **Eliminates the need to request additional rig for equipment**

  By increasing the basic capabilities of the LRV with minimal equipment, the need for requesting an additional apparatus to responds to assist would be limited. This would allow services to be provided on scene sooner which creates better customer services.

- **Decrease in fuel consumption/unleaded is cheaper than Diesel**

  Through the results of the LRV study, it was determined that over 3,643 gallons of diesel were saved from being used. This equated to $14,841 in fuel savings.

- **Reduces the miles placed on heavier apparatus**

  Through the use of the LRV, over 11,440 miles were reduced from being placed on the truck. This was shown in the LRV pilot program.

- **Reduced heavy maintenance repair cost**

  Through the results for the LRV pilot program, the LRV was found to save on maintenances costs $12,241 annually

- **Can work as brush truck, ambulance**

  Depending on the apparatus purchased, in addition to running basic medical calls, it could be used for wildland fires (if it's a Type 6), or Basic Life Support (BLS) transport ambulance (See Appendix C). This could be the first step towards Fire Based EMS.

Option 3 – Cons

- **Creates Dispatch confusion/staffing confusion**
  By continuing the LRV as a jump rig, dispatch continues to be confused as to which truck to tone and if and when the truck is OOS while 2520 is on a call. This also creates an accountability issue with engine companies due to frequent crew swaps.
- **Reduces the ladder truck availability/part time staffed**
  Last year, the LRV responded to 1,659 calls. Using dispatch times, the LRV was on scene for over 1,765 hours. Including an average 2.5 minute drive back to the station, the truck was Out Of Service for over 1,821 hours or over 10 weeks and 5 days. This directly affects the trucks availability to respond to structure fires.
- **A need to create a vehicle replacement fund along with an operations and maintenance fund**
  By continuing the LRV, regardless of vehicle type, a replacement budget will need to be started as well as an ongoing operations and maintenance budget of $6,500 annually. Again, only funds for the two year pilot program were secured at the time of implementation.
- **Purchase price of more capable vehicle**
  The cost of purchasing and equipping a new emergency vehicle that is more capable of light rescue response would be needed. See Appendix C for various apparatus types.
- **Increased response times for the Truck when crew is on 2520**
  In addition to the delay from medical calls, the truck company has been delayed due to inspections, public education events, trainings, and when used for running errands around town.
- **ISO's Public Protection Rating**
  By delaying the truck's initial response to structure fires, the City's ISO rating is negatively affected – which affects Boulder citizen's fire insurance.

  ISO Fire Suppression Ration Schedule
  540 Ladder/Service Companies:
  The standard response on the initial alarm to fires in structures consists of a minimum of 1 ladder or service company. The responding fire department must provide enough ladder and/or service companies to ensure the response of at least 1 ladder or service company to all alarms for structure fires.*

  Also, a fire protection area needs a ladder/service company in an existing fire station when that station serves 50% or more of a standard response district not within 2½ road miles of other ladder/service companies. A standard response district is a built-upon area with a creditable water supply (as defined in Section 201A3) within a response distance of 2½ road miles.

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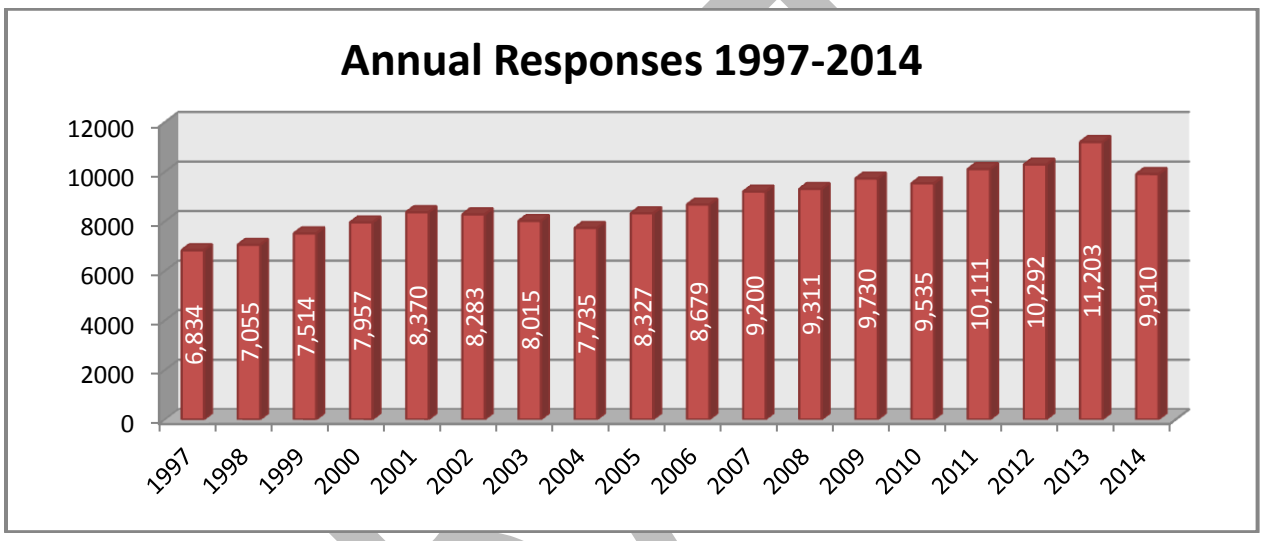
Options for Staffing the LRV

In 1997 BFRD purchased a Light Rescue vehicle (see APPEDIX D) to assist in medical calls during the peak times. With the purchase of that light rescue, there were 8 staffed apparatus available to respond to emergencies within and around the City of Boulder. The rig was used until 2009 when it was taken out of service to save money during the economic downturn. The rig was sold and the two person crew was absorbed through attrition. Today only 8 apparatus are staffed for emergency response. Meanwhile, the emergency call volume has increased from 6,834 calls in 1997 to 9,910 calls in 2014. The large decrease in calls in 2014 was due to the implementation of Emergency Medical Dispatching (EMD).



The next three options involve full time staffing of the LRV/Light Rescue

Option 4: Staff LRV, and leave with current rig/equipment

Option 4 – Pros

- **Eliminates Dispatch confusion/staffing confusion**

  By staffing the LRV, communications with dispatch would be clear as to what vehicle is staffed and available to tone at all times. During the pilot program, when the LRV was on a call, the truck would be at the station Out Of Service without a crew.

- **Eliminates Jumping**

  By staffing the LRV, the crew would no longer need to 'jump' between the LRV and the truck. This would make for quicker response times out the door. Since the LRV was only a pilot program, no additional Full Time Employees (FTEs) were hired.

- **Creates a multi-unit station for quicker response to first due area**
  By staffing the LRV, an additional unit is available for emergency response within the district. This creates shorter response times when a second call is toned and the LRV is out on the first call.
- **Increase personnel available on critical incidents**
  By staffing the LRV, the crew could respond to structure fires (if available) meet up with the truck company to create a 5 person truck company. The 5 person truck company complies with the National Fire Protection Association (NFPA) Standard 1710.
- **Reduces the miles placed on heavier apparatus**
  Through the use of the LRV, over 11,440 miles were reduced from being placed on the truck or 3,643 gallons of diesel from being burned. This was shown in the LRV pilot program.
- **Reduced heavy maintenance repair cost**
  Through the results for the LRV pilot program, the LRV was found to save on maintenances costs $12,241 annually
- **Smaller footprint while parked on scene**
  Based on the size and maneuverability of the LRV, the footprint while parked on scene creates a smaller footprint easing street congestion.
- **Already own the current LRV**
  Continuing the current LRV makes since until the need for replacement vehicle is determined. The funding was already used to purchase and operate the current vehicle throughout the pilot program.
- **Leaves 2516 available for fire calls**
  By staffing the LRV, not only would the truck be available to run fire calls, but an additional response unit would be available for duties such as inspections, preplans, trainings, and public educations events.

Option 4 – Cons

- **A need to create a vehicle replacement fund along with an operations and maintenance fund**
  By continuing the LRV staffed, regardless of vehicle type, a replacement budget will need to be started as well as an ongoing operations and maintenance budget of $6,500 annually. Again, only funds for the two year pilot program were secured at the time of implementation.
- **Cost for additional FTEs**
  The cost for the needed 6 FTEs (two per shift, three shifts – A, B, & C) will be $733,000 annually.

- **Increases apparatus response when 2nd rig is requested**

  Due to the LRV needing addition equipment once on scene (water can, ladder, forcible entry tools…), there were longer response times to get services on scene (i.e. an additional engine would have to respond) which also created an increase in heavy apparatus mileage, fuel consumption, and unneeded manpower. The delay in needed equipment slows down the services provided therefore lowering our level of customer service.

Option 5: Staff LRV, replace/re-equip with appropriate equipment

Option 5 – Pros

- **Eliminates Dispatch confusion/staffing confusion**

  By staffing the LRV, communications with dispatch would be clear as to what vehicle is staffed and available to tone at all times. During the pilot program, when the LRV was on a call, the truck would be at the station Out Of Service without a crew.
- **Reduces the miles placed on heavier apparatus**

  Through the use of the LRV, over 11,440 miles were reduced from being placed on the truck or 3,643 gallons of diesel from being burned. This was shown in the LRV pilot program.
- **Reduced heavy maintenance repair cost**

  Through the results for the LRV pilot program, the LRV was found to save on maintenances costs $12,241 annually
- **Smaller footprint while parked on scene**

  Based on the size and maneuverability of the LRV, the footprint while parked on scene creates a smaller footprint easing street congestion.
- **Creates a multi-unit station for quicker response to first due area**

  By staffing the LRV, an additional unit is available for emergency response within the district. This creates shorter response times when a second call is toned and the LRV is out on the first call.
- **Can work as brush truck, ambulance**

  Depending on the apparatus purchased, in addition to running basic medical calls, it could be used for wildland fires (if it's a Type 6), or Basic Life Support (BLS) transport ambulance (See Appendix C). This could be the first step towards Fire Based EMS.
- **Leaves the truck available for fire calls**

  By staffing the LRV, not only would the truck be available to run fire calls with no delays, but an additional response unit would be available for duties such as inspections, preplans, trainings and public educations events.
- **Eliminates the need to request additional rig for equipment**

  By increasing the basic capabilities of the LRV with minimal equipment, the need for requesting an additional apparatus to responds to assist would be limited. This

would allow services to be provided on scene sooner which creates better customer services.

- **Increase personnel available on critical incidents**

  By staffing the LRV, the crew could respond to structure fires (if available), meet up with the truck company and create a 5 person truck company. The 5 person truck company complies with the National Fire Protection Association (NFPA) Standard 1710.

Option 5 – Cons

- **A need to create a vehicle replacement fund along with an operations and maintenance fund**

  By continuing the LRV staffed, regardless of vehicle type, a replacement budget will need to be started as well as an ongoing operations and maintenance budget of $6,500 annually. Again, only funds for the two year pilot program were secured at the time of implementation.

- **Cost for additional FTEs**

  The cost for the needed 6 FTEs (two per shift, three shifts – A, B, & C) will be $733,000 annually.

- **Purchase price of more capable vehicle**

  The cost of purchasing and equipping a new emergency vehicle that is more capable of light rescue response would be needed. See Appendix C for various apparatus types.

Option 6: Place 3 fully staffed LRV in stations 1, 2, & 3

Option 6 – Pros

- **Eliminates Dispatch confusion/staffing confusion**

  By staffing three LRVs, communications with dispatch would be clear as to what vehicle is staffed and available to tone at all times.

- **Reduces the miles placed on heavier apparatus**

  Through the use of three LRVs, the mileage on three heavy apparatus would be reduced while saving cost on fuel.

- **Reduced heavy maintenance repair cost**

  Through the results for the LRV pilot program, the LRV was found to save on maintenances costs $12,241 annually. By increasing these effects to three heavy apparatus, the results could be estimated to save $36,723 annually.

- **Smaller footprint while parked on scene**
  Based on the size and maneuverability of the LRVs, the footprint while parked on scene creates a smaller footprint easing street congestion. This could be critical in the busier stations in the core of the city.
- **Creates multi-unit station for quicker response to first due area**
  By staffing three LRVs, additional units are available for emergency response within each district. This creates shorter response times on second calls when the LRVs are out on the first call.
- **Can work as brush truck, ambulance**
  Depending on the apparatus selected and purchased, in addition to running basic medical calls, it could be used for wildland fires, light rescues or Basic Life Support (BLS) transport. (See Appendix C) This could also be the first step in moving to Fire Based EMS.
- **Increase personnel available on critical incidents**
  By staffing three LRVs, there would be more available units to either respond to structure fires (if available) or stay in service to cover the city during a fire.
- **Additional apparatus and staffing**
  By staffing three LRVs, not only would the truck be available to run fire calls with no delays, but additional response units mean there will be less empty stations during trainings, there would be more available units for duties such as inspections, preplanning, and public educations.

Option 6 – Cons

- **A need to create vehicle replacement funding for three apparatus along with an operations and maintenance fund**
  By continuing the LRV staffed and adding two more, two purchases and three separate replacement funds will need to be created as well as an ongoing operations and maintenance budget for each vehicle.
- **Cost for additional FTEs**
  The cost for the needed 18 FTEs (six per shift, three shifts – A, B, & C) will be $2.2 million annually.
- **Facility development would be needed to house personnel and equipment**
  To accommodate the additional personnel and staffing, station facilities would need development to house the added personnel and equipment. This could be something that takes place over multiple years due to expense and budgeting.

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APPENDIX A: Call Volume Analysis

BFRD Calls vs. Medial Based Calls						
Year	BFRD Total Calls	BFRD Medical Based Calls	BFRD Medical Based %	Station 1 Total Calls	Station 1 Medical Based Calls	Station 1 Medical Based %
EMD Difference	**-1,293**	**-1,135**	**-3.40%**	**-410**	**-263**	**-0.46%**
2014	9,910	5,781	58.34%	2,704	1,641	60.69%
2013	11,203	6,916	61.73%	3,114	1,904	61.14%
2012	10,292	6,337	61.57%	2,887	1,856	64.29%
2011	10,111	6,251	61.82%	2,799	1,707	60.99%
2010	9,535	5,991	62.83%	2,537	1,613	63.58%
2009	9,730	5,917	60.81%	2,602	1,509	57.99%
2008	9,311	5,668	60.87%	2,369	1,420	59.94%
2007	9,200	5,716	62.13%	2,402	1,496	62.28%
2006	8,679	5,344	61.57%	2,208	1,293	58.56%
2005	8,312	5,279	63.51%	2,148	1,365	63.55%

Unit Responses By Station					
	Station # 1			Station 2	Station 3
Year	Truck 2516 Unit Response	Engine 2501 Unit Response	LRV 2520 Unit Response	Engine 2502 Unit Response	Engine 2503 Unit Response
EMD Difference	**-71**	**-84**	**-258**	**-109**	**-302**
2014	761	1,583	1,659	2,346	2,247
2013	832	1,667	1,917	2,455	2,549
2012	1,563	2,572	0	2,238	2,569
2011	1,614	2,464	0	2,310	2,506
2010	1,510	2,307	0	2,198	2,435
2009	1,502	2,345	0	2,207	2,278
2008	1,328	2,310	0	2,070	2,303
2007	1,366	2,275	0	1,980	2,226
2006	1,267	2,101	0	1,947	2,056
2005	1,239	2,108	0	1,812	2,057

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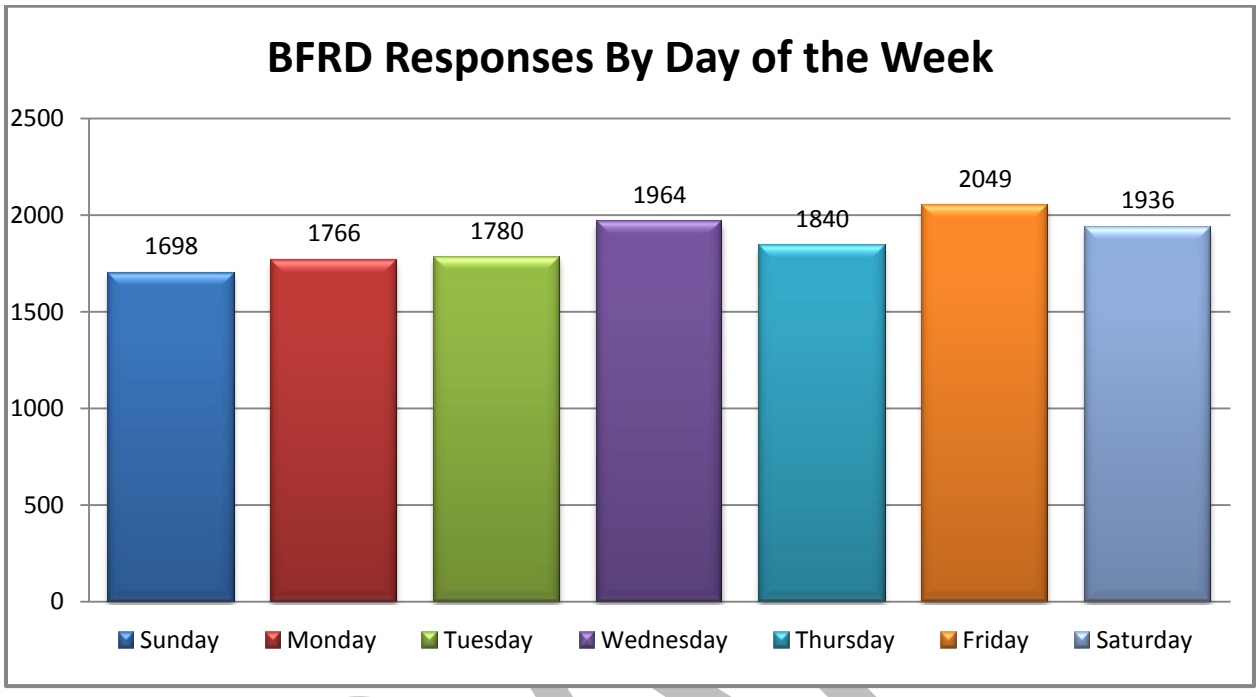
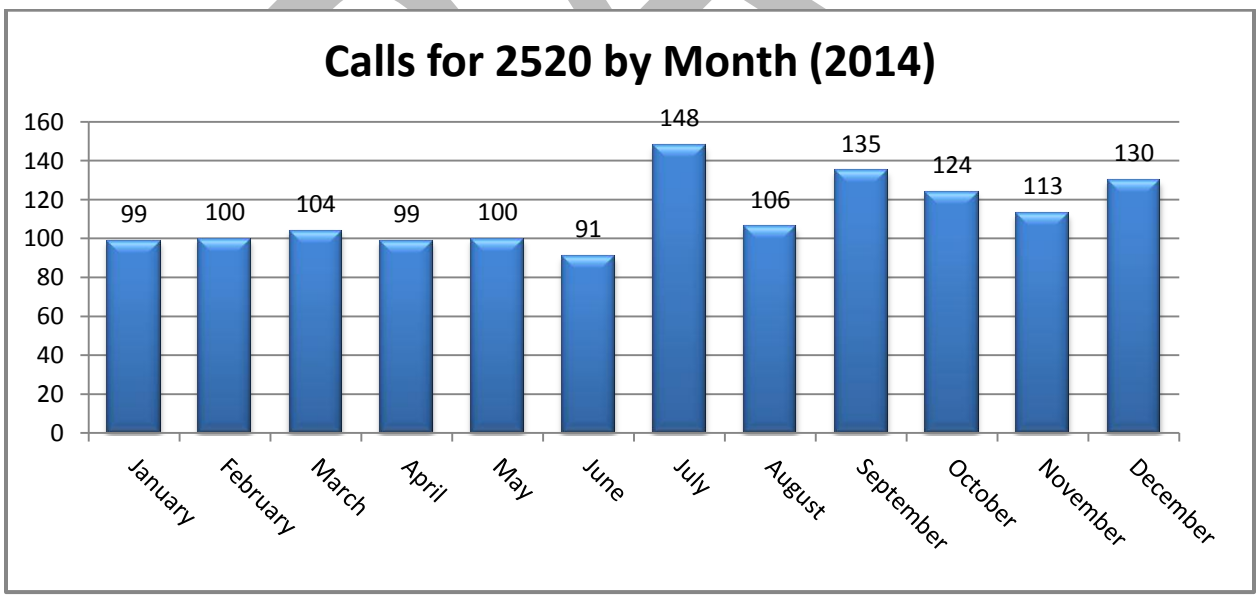
APPENDIX A: Call Volume Analysis *(Cont.)*





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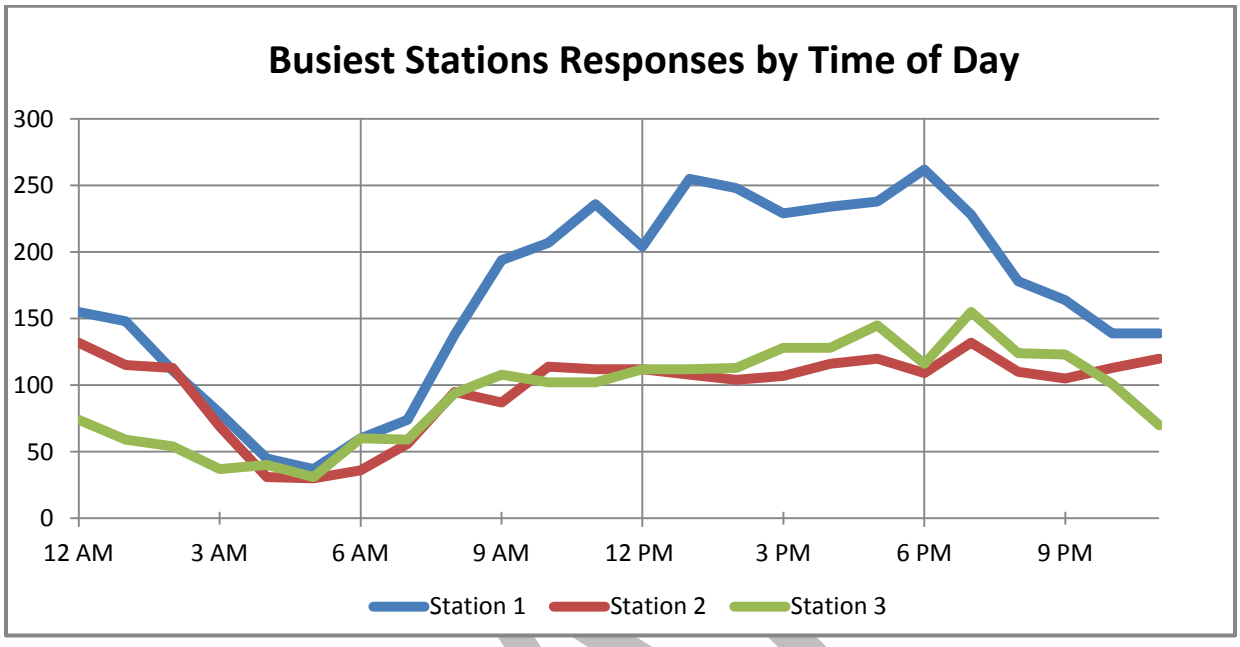
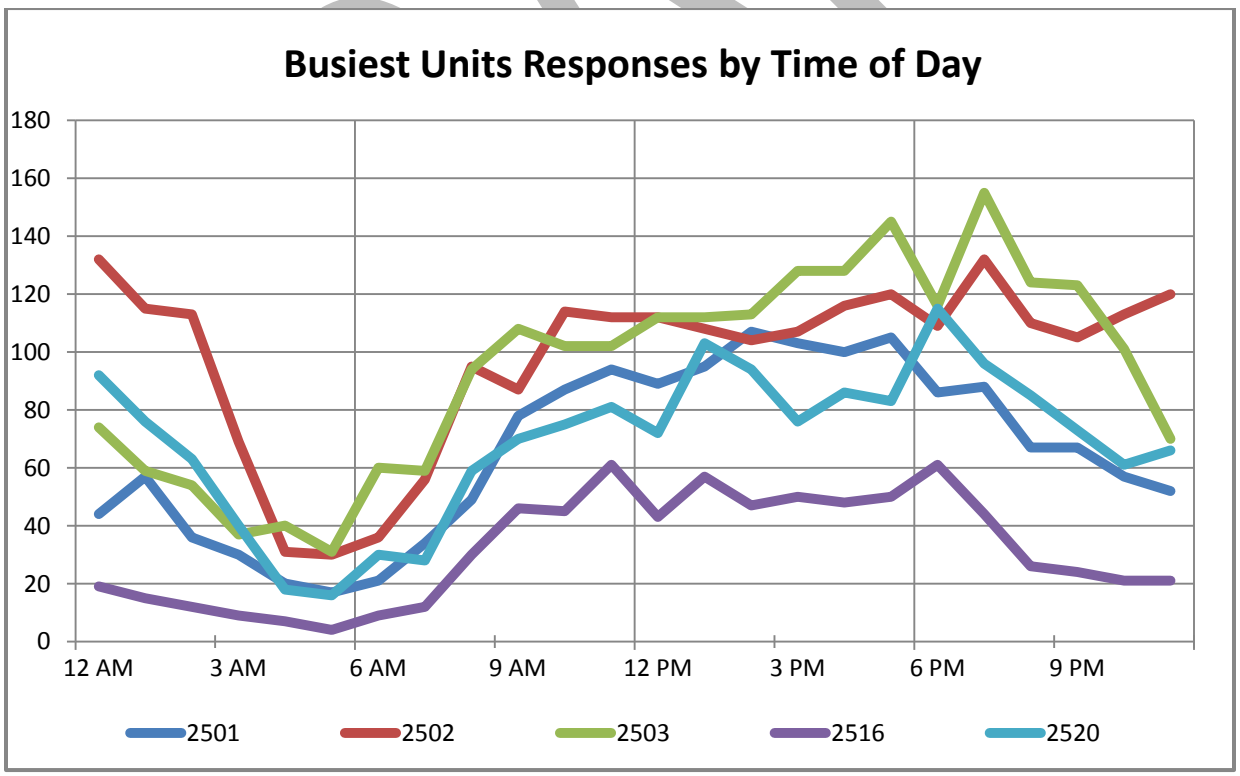
APPENDIX A: Call Volume Analysis *(Cont.)*





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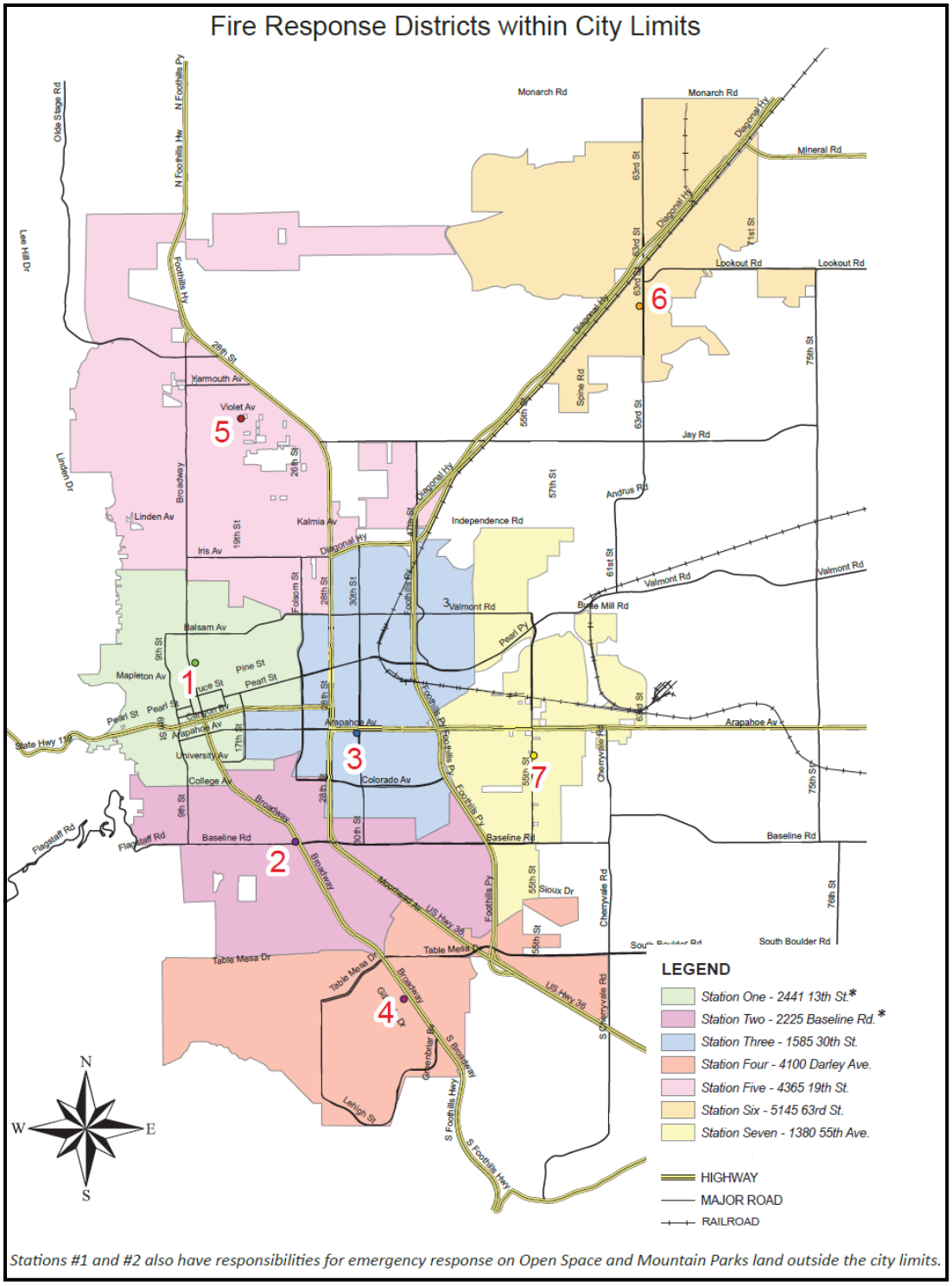
APPENDIX B: Maps



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APPENDIX C: Currently Owned LRVs and Recommended Types

Current Owned LRV/Pickup

Past BFRD LRV/Rescue vehicle

LRV/Light Rescue

LRV / Type 6

Current Owned BFRD Type 6

LRV/ BLS transport

Blue Box = LRV Type Recommended

Circled boxes= BFRD Owned Fleet Vehicles

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APPENDIX D: BFRD's Rescue Squad/LRV History

In the 1997 Public Safety Tax initiative, voters approved funds for the purchase and operation of a rescue squad vehicle as one element of the Fire Department's Master Plan. The cost of the vehicle and all of the equipment it carries for specialized rescues was $176,000.

This vehicle is designed to better serve the community and reduce response times. The rescue squad, staffed by a two-person crew, is equipped for medical rescues, swift water rescues, ice rescues, high angle rescues (ex: a rescue from a tall building), confined space rescues, mass casualty incidents (ex: airplane crash), auto extrications, and hazardous materials incidents.

FIGURE 4 - RETIRED SQUAD 2523, USED FROM 1998-2009

The rescue squad vehicle is stationed at fire station number three (located at the corner of 30th and Arapahoe), Boulder's busiest fire station with the heaviest call load. Prior to the rescue squad, the fire engine at station three was over capacity, that is, it could not efficiently respond to the volume of emergency calls in the district. Consequently, a fire engine from another district responded, increasing travel times and therefore, response times. The rescue squad vehicle would respond to medical emergencies, allowing the fire engine to remain available for other incidents.

The two-member crew of the squad operates the rescue truck Mondays through Fridays, from 7 a.m. to 4 p.m., adding more coverage during the busiest response times for the Fire Department.

The squad vehicle's response times were better than city response times on the whole. In 1999, where 72% of city-wide emergency calls had on scene arrivals within 6 minutes, the squad responded within 6 minutes on 85% of its emergency calls.

In 2009 the squad was taken Out Of Service (OOS) due to city wide fiscal restraints. The personnel were removed from the squad and placed on engines to cover retirements. The personnel for the rescue squad position have never been replaced.

APPENDIX E: Tridata Staffing LRV Options

(See Tridata Report Appendix E, page167-168)

We propose that this two person rescue configuration can be achieved through several options. We propose these options for the purpose of further discussions to reach the desired goal of having a rescue squad configuration for its future emergency response needs in the following ways:

Tridata - Option 1

1. Currently minimum staffing for each shift is 25. 24 firefighters and 1 shift commander (BC) per shift. Six extra personnel per shift are staffed to cover vacations, sick leave, etc. equaling 31 persons per shift.
2. There are 7 engines (1 of which is technically a quint) and 1 ladder/quint located in seven stations. There are 3 persons staffing each of these apparatus per shift equaling 24.
3. Place the engine (2501) at Station 1 out of service (O.S.S) and replace it with one rescue unit which requires 2 person staffing.
4. This will change staffing from 6 to 5 (3 on the ladder two on the rescue) and free up one person per shift.
5. With the placing of 2501 O.O.S and adding another rescue unit to an additional station, minimum staffing will go from 25 to 26 by reducing the number of coverage staff from 31 to 30 and adding the extra firefighter to the minimum staffing roster (25 firefighters and 1 shift commander (BC).
6. This will reduce the number of extra personnel per shift for coverage from 6 to 5.

Overall, we feel that the current staffing configuration has the ability to provide coverage with 5 extra personnel instead of the current 6. This should be predicated on a thorough evaluation of the department's leave authorization process that leads to better managerial practices. Additionally if the overtime reduction trend continues, the system will be able to further absorb this change.

Tridata - Option 2

This option would embody all of the recommendations in Option 1, except that it would also include the hiring of three additional personnel. These three personnel would fill the vacant extra coverage personnel that would be lost through the above proposed re-staffing plan from 5 back to the original 6.

Tridata - Option 3

This option would include hiring additional personnel to staff two – two person rescue units at two stations, and include the hiring of 9 additional personnel. These 9 personnel would staff two units per shift (3 shifts) totaling a 6 per shift minimum. The additional 3 personnel would be extra personnel per shift added to cover vacations, sick leave, etc., totaling 9. This staffing configuration would not require putting any current units out of service.

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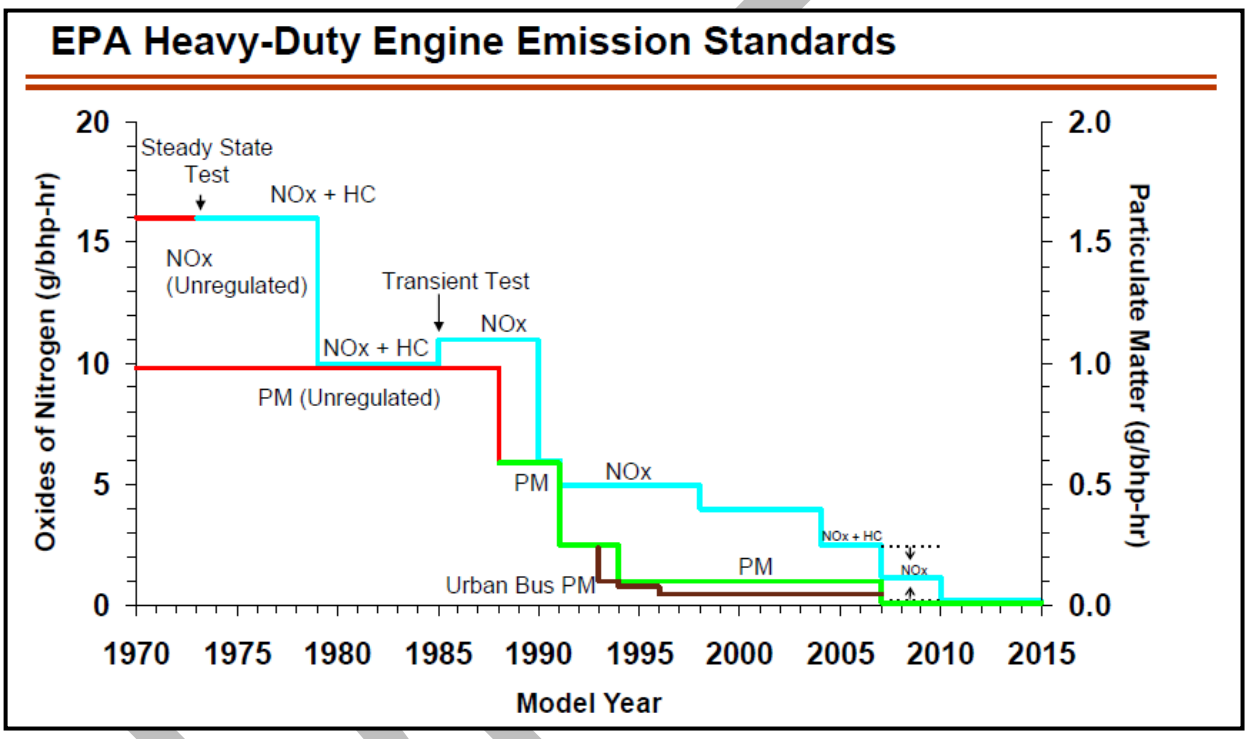
APPENDIX F: Clean Diesel Exhaust Fluid

Optimizing engine performance favors the production of higher levels of NOx. Selective Catalytic Reduction (SCR), in turn, reduces NOx after it exits the engine, which allows the engine to run better, stay cooler and last longer. Manufacturers using SCR are able to optimize engine performance, with increased hp ratings and 3%-5% better fuel economy. This is why over 90% of the trucks produced in North America that meet 2010 EPA standards will utilize SCR technology. This is also why over 500,000 (and growing at 25,000 per month) in Europe utilize SCR technology. (Source: www.factsaboutscr.com/performance/default.aspx)



How It Works

SCR is a technology that injects a urea agent, Diesel Exhaust Fluid (DEF), into the exhaust stream by way of a catalyst positioned downstream of the Diesel Particulate Filter (DPF). The urea initiates a chemical reaction that converts NOx into harmless nitrogen and water, which is then expelled through the tailpipe.

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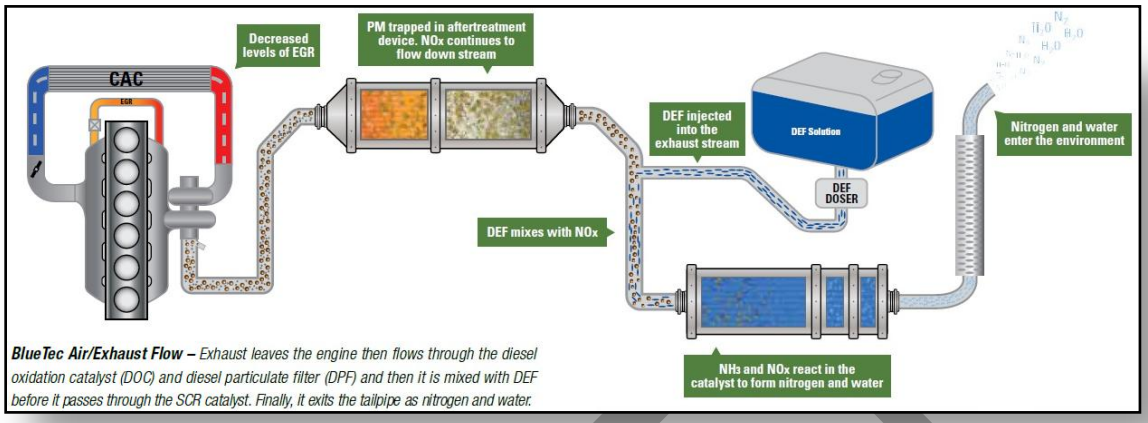
APPENDIX F: Clean Diesel Exhaust Fluid *(Cont.)*



DEF is a crucial component of SCR technology. It is a 32.5% strength urea-water solution that is non-toxic, non-polluting and non-flammable. With an odor similar to that of ammonia, DEF is nonetheless safe to handle and store, posing no serious risk to humans, animals, equipment or the environment with proper handling.

The Detroit Diesel DD13 engine, the engine in all new Pierce® fire apparatus' meets 2013 OBD (OBD13) and 2014 Greenhouse Gas (GHG14) regulations.

APPENDIX G: References

G.1 National Fire Protection Association (2010) *NFPA 1710 Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments* (Chapter 3 and 4). Anaheim, CA; National Fire Protection Association.

a. Sections detailed below:

i. Apparatus refers to Chapter 3, 3.3.10
ii. Fire Fighter to Chapter 3, 3.3.21
iii. Alarm Time to Chapter 3, 3.3.5
iv. Dispatch Time to Chapter 3, 3.3.53
v. Total Response Time to Chapter 3, 3.3.53.6
vi. Turnout Time to Chapter 3, 3.3.53.8
vii. Time Objectives, Chapter 4, 4.1.2.1.1 (1) through 4.1.2.1.1 (4)
viii. Level of Service Evaluation, Chapter 4, 4.1.2.5

G.2 FIREHOUSE Software® Fire and EMS Records Management Software (Version 7.16.7) [Enterprise Data Access]. (1993-2010) ACS, A Xerox Company, Des Moines, IA

CITY OF BOULDER
STUDY SESSION

To: Members of City Council

From: Jane S. Brautigam, City Manager
Tom Carr, City Attorney
David Gehr, Deputy City Attorney
Maureen Rait, Executive Director of Public Works
David Driskell, Executive Director of Planning and Sustainability
Alisa D. Lewis, City Clerk
Carl Castillo, Policy Advisor
Bob Eichem, Chief Financial Officer
Elena Lazarevska, Senior Financial Analyst
Cheryl Pattelli, Director of Finance

Date: April 14, 2015

Subject: Potential 2015 Ballot Items and an Ongoing Strategic Look at the Fiscal Future of the City of Boulder

I. PURPOSE

This memorandum and the staff presentation at the study session:

- Identify potential items and next steps for the 2015 November city ballot;
- Report relevant and current information involving potential city, school district, county, regional and state ballot items.

The focus of the discussion at the study session will cover the time period from 2015 through 2039 (when the last sales and use tax will sunset) and continues the focus on long range fiscal sustainability and resilience of the City of Boulder.

II. QUESTIONS FOR COUNCIL

Does council want staff to move forward with next steps to:

Revenue Items:

1. Place on the November 2015 ballot a five year extension of the Occupation Tax for General Fund Operations that currently expires on December 31, 2017. This is the tax that took the place of the franchise tax that the City used to receive from Xcel. This would not include the portion of the current Occupation Tax that is used for clean energy programs

2. Place a short term rental tax item on the November ballot that would tax these types of transactions?

Charter Items:

1. Place a revision to the Library Commission Charter language on the ballot?
    - If yes, what revisions would Council like to include?

2. Place a change in council compensation on the ballot?
    - If yes, what change?

Other Items:

1. Does council want staff to bring forward any additional ballot items or information on other items for the 2015 November ballot?

III. BACKGROUND AND ANALYSIS

The two Blue Ribbon Commission (BRC) reports (see **Attachment 1** for a brief summary of the reports) have become the blue print for the long range fiscal planning in the city. The two reports dealt with operational costs in the city and did not address capital needs.

Originally, the update for the two plans (called the Comprehensive Financial Strategy or CFS) was to occur during late 2013 and into 2015. Due to a variety of major work plan efforts, including the implementation of a new finance, human resources and payroll system, the 2013 flood work that continues to require large amounts of staff resources, and numerous other work plan items, the operational aspects of CFS was delayed and will be presented during 2015. Due to the heavy workload a consultant has been utilized to help staff update the reports.

To begin to address the capital side, the $49 million bond issue that was approved by the voters in 2011 was done without a tax increase. The annual debt service payments are made with funds that were available from bond issues that had been paid off, previously voter approved new revenues, and efficiencies savings derived from operating costs. This

bond issue mainly dealt with taking care of infrastructure priorities and basic needs that the city could not address with operating dollars only.

In November 2014 voters approved a .3%, 3-year sales and use tax increase that will be used to fund community, culture, and safety capital investments that cannot be funded with current revenues. The focus of this tax is on high priority and new projects as opposed to ongoing maintenance backlogs. Projects funded through this tax will provide a significant impact to the community in a short amount of time by offering opportunities for everyone to enjoy the uniqueness and quality of life in Boulder. Updates on the progress of these projects will be coming to council in the near future.

The rest of this forward looking strategic analysis will review which revenue items need to be addressed in the near term, intermediate and longer term, and potential ballot items to consider in 2015 and the future.

To help provide a broader context and additional background information, **Attachment 2** contains a summary of ballot items that have passed and failed in the past ten years. In addition, **Attachments 3, 4 and 5** contain a summary of the taxes that sunset in the future, and sales tax rates, and mill levy comparisons for nearby and comparative communities.

A. Near Term Ballot Items for Consideration 2015-2019

This category includes taxes that will sunset by the end of 2020, or that have previously been discussed as potential ballot issues. This timeframe corresponds to the current year plus five year look that is found in the fund statements of the annual budget each year.

There are no sales and use taxes that sunset during this time spectrum. The taxes that do sunset during this time are the Utility Occupation Tax and the Climate Action Plan Tax:

- the Utility Occupation tax consists of two parts and sunsets on December 31, 2017. :
  - the first part of the occupation tax took the place of the franchise tax for electricity and is approximately $4.3M annually
  - the second part of the utility occupation tax pays for the study of whether to create an electric utility and is approximately $2.0 million annually.
- the Climate Action Tax that sunsets March 31, 2018 (app. $1.8M annually).

This time spectrum also includes information regarding what staff has observed regarding the competing citywide needs in capital and operating needs requiring additional revenue currently and in the future.

Staff recommends that Council consider asking voters to extend the General Fund portion of the Utility Occupation Tax that expires on December 31, 2017 for another five years (through December 31, 2022). This portion of the tax replaced the former franchise tax that is approximately $4.3 million annually. The revenue generated from this portion of the Occupation Tax is used to pay for general fund programs or transfers to police, fire, library, parks maintenance, planning and human services. For prudent long range fiscal

planning it is better to know early on if such funds will be available in future years. If renewal of the tax was not approved by the voters, $4.3 million of services would have to be reduced or eliminated in the general fund. Since it would be extremely disruptive for those who receive such services it would be better to phase in the reductions during the annual budgets that would be considered in 2016 and 2017. This is the same process that has been used for sunsetting sales and use taxes that have been placed on the ballot in past years.

Staff suggests the remaining portion of the Occupation Tax (approximately $2.0 million annually) and the Climate Action Plan Tax not be considered as ballot items in 2015. Within another year more will be known about the possibilities regarding a city electric utility and these related items can be considered at that time.

1. Utility Occupation Tax	
Revenue Generated	Approximately $6.3 annually
Expiration	One portion of the occupation tax that sunsets on December 31, 2017 is a general fund revenue that took the place of the franchise tax for electricity (app. $4.3M annually). The second portion of the tax is the occupation tax that pays for the study of whether to create an electric utility (app. $2.0M annually). Both components sunset the earlier of December 31, 2017, when the city decides not to create a municipal utility, or when the city commences delivery of municipal electric utility services.

2. ***Climate Action Plan Tax***	
Revenue Generated	$1.8 million annually
Expiration	March 31, 2018
Description: The Climate Action Plan Tax funds programs and services to reduce greenhouse gas emissions. Some examples include EnergySmart energy efficiency services and rebates for the residential and commercial sectors, and SmartRegs implementation assistance and rebates for residential rental properties. The tax also funds four positions to support the programs and services. This item is an informational item at this time since options will become clearer as the path to clean energy unfolds.	

3. Short Term Rental Tax	
Revenue Generated	Unknown
Expiration	N/A or Unknown at this time

Description:

A Short Term Rental type of tax would be levied on the rental amount charged for short term rental accommodations of less than thirty days. This topic was discussed at the City Council Study session held February 10, 2015.

As was discussed at the meeting this type of rental comes from a new and developing economy market segment. It does not readily fit into the current definition of the accommodations tax and it is unique and different type of economic transaction than a hotel or motel stay. To be certain there would be legal authorization that the tax could be assessed and collected it would be necessary for the registered voters of Boulder to approve the taxation of vacation rentals.

From a staff point of view, this is a compliance issue than a revenue issue. These transactions are occurring illegally in many neighborhoods in the city and continue to proliferate. They are advertised in various forms of media and often on web sites. One of the most perplexing issues has been that if the city taxes these transactions the city will be taxing something that is illegal within the city and the city has not done this in the past. It is expected that council will address the regulatory issues before the ballot issue is finalized.

There is a wide discrepancy in what advocates of this tax have projected it will produce and what staff has found the tax produces when checking with the mountain towns that have such a tax. Advocates believe it would generate several hundred thousand dollars per year. Previous information gathered from mountain communities that tax vacation rentals indicates the administrative burden for collecting the tax is great and the revenues received have been small in relation to the work required to collect the tax.

At the February 10 study session there appeared to be interest by Council in creating a new type of tax to cover these types of transactions that are occurring in the new service sharing economy. The tax rate would be tied to the same rate as the lodging tax rate and if the lodging tax rate would change the tax rate for these types of businesses would change too. While this does not address the legal question of running this type of business it does make it a taxable transaction. As was discussed at the study session staff feels it would be best to consider having a separate type of tax for this new and fast evolving business segment. There are significant administrative differences in implementing and gaining ongoing compliance for this type of transaction if it is taxed. Therefore, staff feels it would be best to separate the taxation of these types of transactions from the accommodations tax transactions. Since this would be a new type of tax it would require voter approval.

Staff would also recommend that if this item is placed on the ballot and if it were successful, no sharing of these new revenues occur until there is a multi-year history of

revenues collected and costs incurred by the city for this new program. Based on the discussion at the study session it is unknown at this time how much would be recovered in fees and how much of the new costs incurred from this program would be paid from new taxes collected. From conversations held with other entities that collect such a tax it is evident it will be more labor intensive and have higher administrative and collection costs. Until appropriate data is collected and actual costs are known this would help ensure that the city was not spending more than is collected to administer the tax.

4. Funding for start up and transition costs for a possible city electric utility	
Revenue Generated	Unknown at this time
Expiration	Unknown at this time
Description: Since this is a comprehensive look at citywide strategic financial planning this item is put in as a placeholder at this time. Options for funding start up costs are being further analyzed. Staff will return to council at a later time with additional information on this topic. Staff does not feel it needs to be considered in 2015.	

5. Increases in either sales tax or property tax to cover current ongoing or new operating costs.	
Revenue Generated	Unknown at this time
Expiration	Unknown at this time
Description: .1% of sales tax generates approximately $3.2M of revenue per year. A one mill increase in property tax generates approximately $2.5M of revenue per year. Staff does not recommend placing an increase on the ballot in 2015.	

B. Intermediate and longer term ballot items for consideration 2020 and beyond

This category looks at city revenue ballot issues from 2021 through 2039 when the last time limited sales and use tax expires:

- the non-dedicated .15% general fund sales and use tax that will sunset on December 31, 2024.
- the .25% Parks and Recreation dedicated tax that expires at the end of 2035.
- the .15% sales and use tax that will expire at the end of 2039.

Items in this category are not up for current consideration. They are presented so council members are aware of taxes that sunset in future years.

7. .15% Sales and Use Tax Currently used for General Fund Operations	
Revenue Generated	Currently $4.8 million annually
Expiration	December 31, 2024
Description: This tax sunsets but is not dedicated. It is used to fund General Fund programs.	

8. .25% Sales and Use Tax Currently Dedicated to Parks and Recreation	
Revenue Generated	Currently $8.0 million annually
Expiration	December 31, 2035
Description: Debt service for bond repayment annually is $2.2 million. The bonds will be paid off in 2015. The remaining $5.8 million is spent on the following programs listed in order of magnitude of funding: park operations and ground maintenance, major renovation and refurbishment of park and recreation facilities, capital improvement program, sports fields maintenance, department administration, planning and project management, civic park complex improvements, and city-wide historical and cultural facility maintenance. Examples of the latter are Columbia Cemetery, Chautauqua, and Harbeck House.	

9. 33% and .15% dedicated to Open Space. Increases in either sales tax or property tax to cover current ongoing or new operating costs.	
Revenue Generated	Currently $15.4 million annually
Expiration	Please see description below
Description: Based on voter approval in 2013: The .33% does not sunset and was reallocated starting in 2019. The .15% sunsets in 2039 and is reallocated beginning in 2020.	

C. Information Regarding Other Types of Revenues and Ballot Items

This category covers new revenue items council may have discussed in the past but for which no in-depth analysis or consideration has occurred to date. If City Council indicates an interest in further analysis of any items in this category, they will be added to the work plan. Some of the items came from the Blue Ribbon Commission I study and others have been brought up or considered in various meetings, community groups or staff. This category also includes potential charter changes that City Council may want to consider.

10. Occupational Privilege Tax (OPT), also known as a head tax	
Revenue Generated	Unknown at this time
Expiration	Unknown at this time. Depends on how such a tax was applied, that is, employee only, owner only, or both.
Description: The OPT is in place in Aurora, Denver, Glendale, Sheridan and Greenwood Village. A minimum threshold level is often implemented if the tax is approved by the voters. The Blue Ribbon Commission I report stated that previous examinations of this tax in the City of Boulder identified three significant concerns: 1. It would place Boulder businesses at a competitive disadvantage to those in the	

region.
2. Governments do not have to pay the employer portion and Boulder has a significant government employment base.
3. There would be a negative impact on non-profit organizations.

Based on this, the Blue Ribbon Commission I assumed only employees would pay the tax and Boulder businesses would not pay the tax, but would collect it from employees and remit it.

When the BRC I report was prepared, it was estimated that based on the number of employees in the city at that time, every one dollar of OPT per employee per month would generate approximately one million dollars annually. If council is interested in discussing the OPT, staff would re-analyze all calculations and projections.

Background information on other types of taxes:
Items such as a real estate transfer tax, a local income tax or increases in the gas tax have not been included in this memo. Such taxes, which are currently prohibited in the Colorado constitution or in the case of the gas tax, prohibited by state law tax, could be lobbied for at the state level and would need to be added to the legislative agenda.

The current federal prohibition against taxing internet sales continues to erode the tax base of the city. This prohibition also puts bricks and mortar establishments within the city at an operational disadvantage. At the same time, any internet retailer that has an office or store (a physical presence) in the city must collect retail sales tax from a purchaser and remit the sales tax to the city.

Based on a study conducted by the Leeds Business School Business Research Division in 2013, the City of Boulder estimates its current losses to be in excess of $4.5 million per year in sales tax collections due to internet sales. This equates to over $117 million of sales per year.

11. Charter Amendments for the City of Boulder Charter
The charter committee has met and will be suggesting two charter changes for consideration.

1. Revise the Library Commission Charter language to redefine the role and function of the Library Commission to bring it in line more closely with current practices.

2. A change in council compensation.

A brief memo is attached regarding this area of the ballot process (**Attachment 6**).

D. Ballot items that may be brought forward by other means or levels of government

This category is provided so that City Council is provided information to understand what other levels of government will be doing in the coming years. The information

provided for this study session is based on what is known at this time. It is recognized that change may occur in the future that will impact issues that may need to be considered by City Council.

The following ballot item descriptions could influence the city's decisions with regard to revenue related ballot measures and timing.

12. Renewal of the .10% Scientific and Cultural Facilities District (SCFD) extension.

The SCFD tax was originally passed in 1988. The Scientific Cultural Facilities District Tax or Cultural District (CD) tax is a 0.1% tax. The tax boundaries for SCFD are basically the same as the Regional Transportation District (RTD) boundaries. Although state collected, after the tax is collected it is distributed to localities in which it applies for the purpose of supporting scientific and cultural organizations in the Metro Denver region.

The SCFD board has decided to ask for the renewal in November of 2016, two years prior to its 2018 expiration date.

SCFD distributes over $52 million annually to over 300 organizations in 7 counties. Additional information can be found at http://www.scfd.org/.

13. Boulder County

At this time, staff is not aware of any tax that Boulder County plans to put on the ballot in November.

14. Boulder Valley School District (BVSD)

At this time, staff is not aware of any tax that BVSD plans to put on the ballot in November.

15. Regional Transportation District (RTD)

At this time, staff is not aware of any tax that RTD plans to put on the ballot in November.

16. Colorado Department of Transportation (CDOT)

At this time, staff is not aware of any tax that CDOT plans to put on the ballot in November.

17. State of Colorado

At this time it is not certain what revenue or ballot items may be considered by the state. Staff will provide additional information as it becomes available.

18. Various initiatives that may be brought forward via the city process

While no specific topics have been submitted to the City Clerk, it is possible that initiatives could occur in the coming months.

IV. NEXT STEPS

Based on council guidance provided at the study session, staff will bring back more detailed information on ballot items council wants to consider further, and the timeline that will need to be met.

The date by which the final reading of any ballot issue should be completed is Tuesday, August 19. This will allow the City Clerk's office time to complete all administrative requirements and meet all deadlines required in Colorado laws for elections.

ATTACHMENTS

Attachment 1: Brief History of Long Range Fiscal Planning in the City of Boulder
Attachment 2: Tax Measure Results, 2002-2014
Attachment 3: Expiration of Current Taxes
Attachment 4: Municipal Sales and Use Tax Rates in Neighboring Cities
Attachment 5: Mill Levy Rate Comparisons
Attachment 6: Charter Committee Memo dated March 30, 2015

Brief History of Long Range Fiscal Planning in the City of Boulder

The genesis of the long range fiscal sustainability and resilience work for the City of Boulder began with the Blue Ribbon Commission I (BRC I) report that was presented to council in January of 2008. The primary finding of the first study was that revenues for tax supported funds were increasing at three percent per year and expenditures were rising at four percent per year. Based on this mismatch, and if the trend was not changed, an annual deficit of $135 million would occur by the year 2030. This shortfall was termed the GAP. Since then, steady progress has been made in reducing this projected $135 million annual shortfall. Staff and an outside consultant have been working on updating the projections and extending them through 2035. The results will be reviewed with counsel at an upcoming council meeting.

The BRC I report focused mainly on revenue issues and how they are influenced by Colorado's public finance structure, policy choices, inflation, and demographic shifts that are occurring within the community. The report highlighted a number of observations, challenges and recommendations to help stabilize and create a more predictable revenue stream for the city. There were several key action items recommended by the report that have been presented to and approved by the voters. A full summary of ballot items for the past ten years can be found in **Attachment 2**. Ballot items approved by the voters since the BRC I report have been:

- Renewal and removal of sunset and dedications provisions (to improve flexibility in future years) for the .38% and .15% sales and use tax;
- Removal of the last Taxpayer Bill of Rights (TABOR) limits on property tax;
- An increase in the accommodations tax;
- An update of the growth impact fees and excise taxes;
- A renewal and extension of the dedicated .25% sales and use tax for parks and recreation;
- Renewal and extension of the occupation taxes that replaced the franchise tax and to support the municipalization study; and
- Renewal of the CAP tax.
- Renewal, reallocation and removal of the sunset on the .33% sales and use tax that was originally set to expire at the end of 2018;
- Renewal of and reallocation of the sunsetting .15% sales and use tax that was originally set to expire at the end of 2019;
- Approval of new taxes on non-medical marijuana (sales and use and excise)
- Approval of new 3-year, 0.3% sales and use tax used to fund community, culture, and safety capital investments.

In addition, the following fiscal issues were also approved by the voters:

- Converting Open Space sales tax revenue bonds to general obligation bonds which will reduce the interest rate and remove a ten percent reserve requirement when issued;

- Authority to use pension obligation bonds without a tax increase to stabilize payments in the old hire fire and police pension plans; and
- Issuance of $49 million of Capital Improvement bonds without a tax increase with a focus on addressing deficiencies in capital projects.

Long range fiscal analysis continued with the work of a second Blue Ribbon Commission (BRC II). BRC II focused on the expenditure side of fiscal sustainability and presented their report to the City Council in 2010. Major recommendations included:

- Enhancing the city's budget process;
- Implementing performance measures for city services;
- Updating compensation policies; and
- Implementing the budget stabilization plan.

Each of these recommendations has been or is being implemented.

Other changes that have contributed to narrowing the GAP have been the implementation of best practices in financial policies. The two policies having the greatest impact have been the following:

1. On an annual basis, ongoing revenues will be matched to ongoing expenditures, and one- time revenues will be used for one-time expenses.

2. Adequate reserves shall be maintained to offset unexpected downturns in the economy or natural disasters (each fund is analyzed individually to determine the appropriate level of reserves that should be maintained for each fund).

The changes on both the revenue and expenditure sides of the equation for current operating costs are expected to reduce the GAP from $135 million to less than $10 million annually by 2030. The GAP does not include new capital and operating costs as programs are added. If programs and new service are added without adding new revenues or reducing current expenditures the GAP will widen. While great progress has been made, there is additional work to do. This will require a continued emphasis on both looking at revenues of the city and continuing to control expenditures in coming years.

	Ballot Measure Summary	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	.15% Sales Tax for Public Safety	X												
2	.15% Sales Tax for Open Space		P											
3	.15% Sales Tax for General Fund Services		P											
4	One Year .15% Sales Tax for Fire Training Center					P								
5	Climate Action Plan Tax					P								
6	.38% Sales and Use Tax							P						
7	De-Brucing: Remaining Property Taxes							P						
8	.15% Sales and Use Tax								P					
9	Increase of Housing Excise Tax								X					
10	Accommodations Tax Increase From 5.5% to 7.5%									P				
11	Utility Occupation Tax to Replace Franchise Fee									P				
12	Increase Utility Occupation Tax by $1,900,000										P			
13	Climate Action Plan Tax Extension											P		
14	.25% Sales and Use Tax for Parks and Recreation Renewal											P		
15	.15% Sales and Use Tax for Transportation												P	
16	0.33% Sales and Use Tax for Open Space and General Operations												P	
17	0.15% Sales and Use Tax for Open Space, Transportation and General Operations												P	
18	Recreational Marijuana Tax												P	
19	0.3 Cent Sales and Use Tax Increase for three years													P

X = Measure Failed

P = Measure Passed

	2015 Projected Revenue	Tax Expiration Date
Utility Occupation Tax- General Fund	$4.35M	12/31/2017
Utility Occupation Tax- Energy Strategy	$2.00M	12/31/2017
CAP Tax	$1.80 M	3/31/2018
.15% General Fund Tax	$4.80 M	12/31/2024
.25% Parks and Recreation Tax	$8.00 M	12/31/2035
.15% Sales and Use Tax	$4.80 M	12/13/2039

City	Sales and Use Tax Rate (%)[1]
Longmont	3.275
Arvada	3.460
Superior	3.460
Louisville	3.500
Lafayette	3.500
Thornton	3.750
Westminster	3.850
Boulder	3.860
Broomfield	4.150

[1] March 11, 2015, Colorado Department of Revenue, "Revenue Online"

City	Tax Rate (mills)
Westminster	3.650
Arvada	4.310
Louisville	6.710
Superior	9.430
Thornton	10.210
Broomfield	11.457
Boulder	11.981
Longmont	13.420
Lafayette	14.335

TO: Members of City Council

FROM: Council Charter Committee Members George Karakehian, Lisa Morzel and Sam Weaver

DATE: March 30, 2015

SUBJECT: April 14, 2015 Study Session on Budget Update and Ballot Issues

The Council Charter Committee convenes annually to research and provide recommendations on potential Charter Changes to be considered for placement on the November ballot. On March 17 the Charter Committee meet to discuss items it would recommend bringing forward on the November 2015 ballot. Two items were identified: 1) City Council Pay increase; and 2) Charter Language changes recommended by the Library Commission.

Council Pay Increase - The members of the committee acknowledged that the work load and number of meetings of the city council had significantly increased over the past year with no indication of this trend ceasing. They indicated support for bringing forth a measure that would double the current per meeting rate that city council members are paid. This would be an increase from $206.97 per meeting to $413.94 per meeting. The maximum payment to any individual council member per year would then be $21,524.88 if attendance for 52 meetings was met. The current language is:

> **Sec. 7. - Compensation.** Council members shall receive as compensation $100.00 per meeting at which a quorum of city council is present, not to exceed fifty-two meetings per calendar year, plus an annual escalation each January 1 in a percentage equivalent to any increase over the past year in the Consumer Price Index (All Items) for the statistical area which includes the city maintained by the United States Department of Labor, Bureau of Labor Statistics; this amendment shall become effective January 1, 1990. For purposes of this section only, a "meeting" shall mean a gathering of a quorum of the council, which gathering is noticed to the public as a regular or special meeting as provided in this Charter.

The committee welcomes any input from the council on this item.

Library Commission Language Changes – The following changes are being recommended by the Library Commission who worked on this over the past year with the goal of aligning the language with current operating practices.

Article V.
ADMINISTRATIVE SERVICE

The City Manager

Sec. 65. - Administrative departments.
The following administrative departments are hereby created:

(a) Department of public works;

(b) Department of finance and licensing;

(c) Department of parks and recreation;

(d) Department of public safety;

(e) Department of planning; and

(f) Department of library and arts.

Sec. 88. - General powers and duties

A director of Library and Arts shall be appointed by the city manager. The director will be subject to the supervision and control of the city manager in all matters and the general powers and duties of which shall be established by ordinance adopted by the city council.

Library Commission

Sec. 89. - Library Commission established.

There shall be and is hereby established a library commission which shall have the primary responsibility as an advisory board with regard to the provision of library services to the Boulder community. The members of the commission shall be qualified to serve on an advisory commission pursuant to Section 130, shall not hold any other office in the city, and shall serve without pay.

The library director shall see that minutes are kept of all meetings and shall distribute copies of the minutes to all commission members within one month following the meeting; approved minutes will be distributed to the city council within one month following approval by the commission.

Sec. 90. - Powers and duties of library commission.

The library commission shall advise the city council in matters concerning the library, and the commission shall have the following duties:

(a) Adopt bylaws, rules, and regulations for its guidance and governance;

(b) Work with the director to prepare and submit to city council a master plan for the development and maintenance of a modern library system within the city and from time to time revise and amend the plan;

(c) Review annually the library budget prepared by the library director prior to its submittal to city council and make recommendations regarding approval or modification of the same;

(d) Review periodically the director's operational service plans and make comments and recommendations;

(e) Make recommendations to the director and the city council on library facilities, including capital improvements, maintenance of existing facilities, and need for new facilities;

(f) Review the library director's annual report and make comments and recommendations;

(g) Represent the library to the community and the community to the library with the goal of building awareness, understanding, and support;

(h) Administer such gifts of money or property or endowments as may be granted to and accepted for library purposes and to take steps as the library commission may deem feasible to encourage grants or gifts in support of the library.

Sec. 91. - Library fund.
The city council shall make an annual appropriation, which shall amount to not less than the return of one-third of a mill tax levied upon each dollar of assessed valuation of all taxable property in the City of Boulder. All revenue from such tax, together with all other moneys collected by the library shall be paid into the city treasury and be designated as the "Library Fund"; and be applied to the purposes herein authorized.

Sec. 92. Library Support Fund
There shall be a library support fund. This fund shall consist of the following:

(a) Gifts, bequests, and donations to the fund.
(b) Proceeds of the sale of any library property or equipment whether real, personal, or mixed.

Expenditures from this fund shall be made only upon the favorable recommendation of the library commission. Said fund shall be used only for the benefit of the library.

Any portion of the fund remaining unexpended at the end of any fiscal year shall not in any event be converted into the general fund nor be subject to appropriation for general purposes. Money appropriated from the fund which is not expended in whole or in part shall be returned to the fund and shall not be subject to appropriation for general purposes.

Article IX. ADVISORY COMMISSIONS

Sec. 130. - General provisions concerning advisory commissions.
[No changes recommended.]

Sec. 131. - Council may create.
[Repealed by Ord. No. 5575 (1993), § 1, adopted by electorate on November 2, 1993.]

Sec. 132-136.
[Recommended to be repealed.]

Upon review of this text, the Charter Committee supported bringing forward changes but would like to provide further work on the charter section locations and include a clear definition for Boards and Commissions.

The Charter committee is happy to review and make recommendations on any other Charter Issues the council may request.

Respectfully,

Charter Committee Members Karakehian, Morzel and Weaver