

# *Big Bear City Community Service District*



## **Fire Protection Evaluation and Master Plan**

**Final Report**

**September 2007**



*Emergency Services Consulting inc.*

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# Big Bear City Fire Department

## Evaluation and Master Plan

September 2007



*Emergency Services  
Consulting inc.*

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## **Executive Summary**

### **Purpose of This Report**

This report details the study of the fire protection and emergency medical services for the Big Bear City Community Services District (BCCSD) conducted by Emergency Services Consulting Incorporated (ESCI). The work contracted by the District in early 2007, directed an evaluation of the performance and resources of the fire department; and, based on those findings, development of a plan for the continuation and potential improvement of those services through the year 2025.

The staffs of the Fire Department and the Services District have provided a great deal of written and verbal information to ESCI and its associates during the course of this work. We found everyone most generous in their efforts to provide us with accurate and complete information. We are grateful for their assistance and cooperation throughout this process.

Active and dynamic organizations such as the Big Bear City Fire Department (BBCFD) tend to undergo a process of continuous change. Every effort has been made to compile data that are as comprehensive and accurate as possible. Wherever possible, ESCI makes quantifiable comparisons to other fire service organizations and industry standards. Performance, observations, and recommendations are measured against currently established BBCFD standards, applicable industry standards, and good practices.

The report is divided into three major sections: Section I contains an evaluation of the existing fire protection and emergency medical systems; Section II analyzes current system demand and performance; and Section III provides future demand forecasts, resource deployment analysis, and recommendations. A brief explanation of each of the sections along with a summary of the primary conclusions and recommendations are included in this Executive Summary.

### **Section I: Current System Analysis**

Section I provides a detailed evaluation of the fire department arranged into nine chapters, beginning with organizational governance and working through the various fire department components such as fiscal management, organizational management, staffing, delivery system,

training, and prevention. In addition, the agency's facilities and apparatus are evaluated; although this piece, by virtue of the ESCi contract, is less detailed. The analysis in Section I establishes a baseline from which to build the fire department's long-term service plan through the year 2025. As a second benefit, it also yields a series of short- and mid-term management suggestions that, if implemented, may result in improved administration, efficiency, or services going forward. The recommendations and suggestions generated by this discussion are compiled in table format in Appendix A: Summary Table of Short and Mid-Term Organizational Recommendations. The table is cross-referenced to the appropriate report chapter to ease its use. In keeping with the advisory nature of most of these items, the listings in the table are not rank ordered or prioritized.

## **Section II: System Demand Projections**

This section of the report targets the community risk the fire department is tasked with protecting and the capability and reliability of fire department's emergency response delivery system. The difficult question of population is discussed at length since it is so closely aligned with emergency service demand and the transient nature of the population due to the resort and recreational nature of the Big Bear area. While the resident population of the BBCCSD is approximately 12,000, the effective population protected (including the transient population) is estimated at about 25,000, with the population of the extended ambulance service area reaching 50,000.

Services are currently provided from two fire stations. They are located in areas of highest service demand and high residential population density. While the fire department responds to all types of demands for emergency services, requests for emergency medical assistance is by far the most frequent. The BBCFD's current response goals call for fire suppression activities to commence within six minutes of dispatch 73 percent of the time and within a nine-minute timeframe 90 percent of the time. Response time goals for EMS calls are specified by the San Bernardino County Ambulance Service Area standards. The response time coverage capability of the BBCFD is depicted in numerous maps in this section. Based on this analysis, the BBCFD missed its 73<sup>rd</sup> percentile goal for fire calls by 1 minute and 28 seconds and its 90<sup>th</sup> percentile goal by one minute and eight seconds. The 90<sup>th</sup> percentile performance for medical calls within the District was slightly better but still about one minute over the current target. There are three basic factors that dictate response time performance and response reliability: travel distance,

workload, and concurrency (the number of overlapping calls). Unit workload and concurrency is not excessive at this time, although complicated by drawdown of resources to accommodate scheduled and non-scheduled non-emergent medical transports. Routine transports, while a critical service, remove both personnel and apparatus from service for response to calls for emergency assistance.

### **Section III: Recommended Long – Term Strategies**

This section addresses the two central elements of a master plan; the identification and analysis of options, along with future recommendations. It begins with a discussion on projected population growth and service demands. Based on these predictions, this section presents recommendations for the amount and location of BBCFD facilities, apparatus, and staffing for the target year 2025.

#### Future Deployment Strategies and Recommendations

While emergency service demands are not expected to increase dramatically, new development anticipated to the east of Highway 38 will result in an increased number of calls in an area remote from either of the existing fire stations. Five separate station deployment strategies are identified and evaluated in this section. The analysis shows that the existing geographical deployment of the BBCFD stations serves the District well at present; and, more importantly, by maintaining the current station locations and adding just one new station the potential exists to maintain and improve emergency response time performance and reliability even as development within the District continues.

Station location is only part of the long-term challenge. Increased emergency and non-emergency call volume also results in a need for increased staffing. The comparatively slow predicted increases in call volume indicate that staffing increases can and should be evaluated incrementally over time. The basic long-term analysis indicates a future need for an additional engine at the new station and the staffing of the ambulance that is currently cross-staffed at Station 292 (Sugarloaf Station). While both a minimum and maximum staffing configuration is identified in the report, the maximum staffing strategy is probably not indicated by the workload analysis.

### Projecting Future Operational Costs

Obviously, the addition of a new station, apparatus, and staffing will result in higher cost. Unlike many fire departments that are almost fully reliant on assessed value tax support, the BBCFD also receives income from ambulance transport fees, a Fire Prevention and Protection parcel tax, and a new Community Facilities District fee.<sup>1</sup>

It is impossible to predict how quickly demand for services will change and when each of the recommended deployments should and will be carried out. Nevertheless, in order to make reasonable judgments of future cost, we use the BBCFD 2008 budget adjusted for projected changes in assessed value and revenues along with changes related to equipment, personnel, and call volume; and then modify it by historical inflationary trends through the 2025 planning horizon. This methodology provides a means by which to compare the cost of fire and emergency medical services as it exists today with the projected cost of the recommended configuration in the future.

One key benchmark in measuring the community cost of fire protection is to compare the cost based on the assessed value of the property protected. If the BBCCSD chose to provide fire and emergency medical services at the minimum staffing level for the preferred strategy in this report, the public cost (that portion of the revenue derived from property tax) would increase from the current rate of about \$0.790 per \$100 of assessed value to \$0.1094 per \$100 of assessed value. The cost to provide the maximum level of staffing would be \$0.2942 per \$100 of assessed value. The minimum staffing level strategy represents a 38.48 percent increase, while the maximum staffing level strategy would be well over three times higher.

An annual rate of 3.00 percent was used to project future assessed value in this model. The historical assessed value growth over the last 15 years has averaged 6.53 percent and over 14.00 percent over the last five years. If, for example, the assessed value growth in the future averaged 5.00 percent, the public cost (cost per \$100 assessed value) to sustain the recommended minimum staffing strategy would remain consistent with today's cost.

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<sup>1</sup> The Community Facilities District fee has only recently been enacted and is modeled to start bringing in revenue in year 2011.

While it may be tempting to immediately abandon the preferred strategy based on the financial analysis, it is important to remember that it is a long-term goal and that the pace of development is such that time exists to track and see how revenue projections actually develop in the future. The other non-AV related revenue sources of the district are substantial and have the potential to vary from the model used as well. Revenues may be sufficient to support the future strategy or clearly insufficient, in which case additional funding would have to be identified or a lesser level of service accepted. Several incremental steps, short of building a third station, which would improve service on the short- to mid-term, are offered in this report. For example, Station 292 is currently staffed with only two personnel who cross-staff an engine and an ambulance. Staffing the existing engine and ambulance separately would improve response reliability in the Sugarloaf area and areas east of Highway 38. Another important incremental step would be to secure property for a potential future station while land is still available.



## **Section I – Current System Analysis**

### **Objective One: Organizational Governance**

#### **Agency Overview**

The Big Bear City Community Services District (BBCCSD) is a governmental entity, formed under the laws of the State of California and granted authority to levy taxes for the purposes of providing municipal services fire and emergency medical services. The Big Bear City Fire Department (BBCFD) operates under the authority of the Big Bear City Community Services District; the fire department's jurisdiction encompasses all areas within the boundaries of the BBCCSD. The response area includes areas containing resort infrastructures, small to medium commercial, and residential and seasonal use development, as well as rural and wildland interface areas.

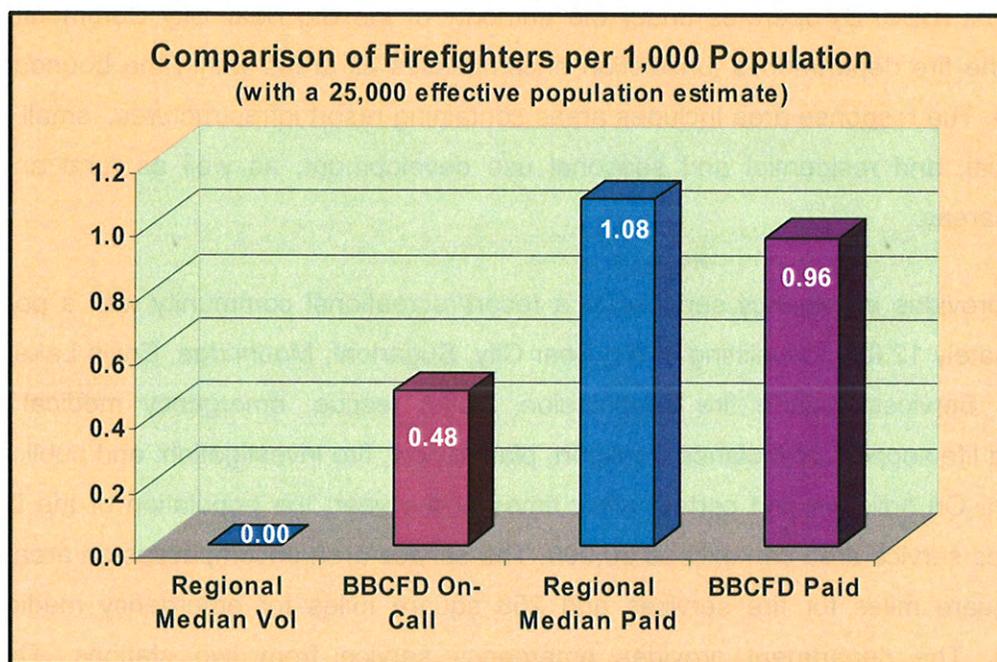
BBCFD provides emergency services to a resort/recreational community with a population of approximately 12,000, consisting of Big Bear City, Sugarloaf, Moonridge, Erwin Lake, and Lake Williams. Services include fire suppression, victim rescue, emergency medical response, advanced life support, ambulance transport, plan review, fire investigation, and public fire safety education. On holidays and certain other times of the year, the population of the District and ambulance service area can exceed 50,000. The service area encompasses an area of roughly 21.12 square miles for fire services and 258 square miles for emergency medical service response. The department provides emergency service from two stations. The BBCFD maintains a fleet of vehicles including three fire engines, one brush/engine, five ambulances, one tender, and several utility and command units.

BBCFD currently employs 21 full-time employees to deliver emergency services to the residents of the service area. Additionally, there are seven administrative and support personnel for a total of 28 full-time career personnel (A Customer Service Representative and a Fire Inspector position have been added in the 2007/08 fiscal year budget). The department also currently employs the services of a paid on-call complement of 12 firefighters (up to 20 paid on-call firefighter positions are included in the budget). A fire chief heads the department, overseeing an administrative staff, including uniformed and non-uniformed employees. Day-to-day

emergency operations are under direction of a shift captain who leads each of the three shifts of emergency responders. The Assistant Fire Chief supervises the activities of the three Captains. Staffing of emergency response is provided with minimum on-duty shift strength of eight personnel each day, consisting of career and paid on-call personnel.

The following chart shows how BBCFD compares to the regional median of departments located in the western United States of similar size. To determine the population figure, we use an effective population of 25,000. This accounts for the seasonal affected population that attracts tourist to destination communities like Big Bear.<sup>2</sup>

Figure 1: Comparison of Firefighters per 1,000 Population



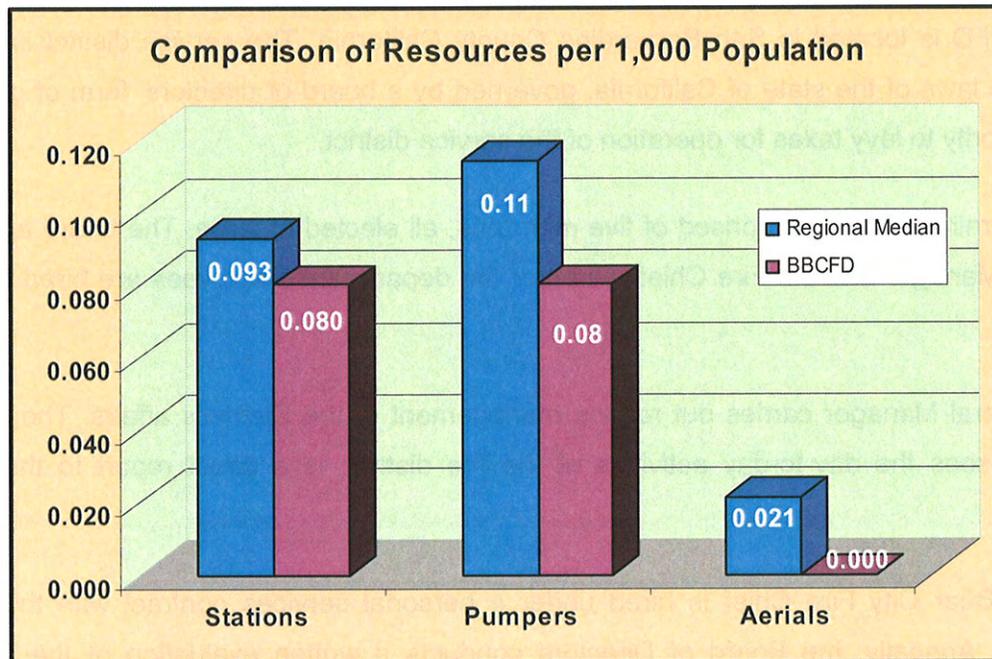
The paid component of the BBCFD staffing is only slightly lower than the Regional Median.<sup>3</sup> Statistics on volunteer staffing are not maintained for communities with populations over 25,000. We caution that this is a comparison of many types of departments with varying levels of service, some of which may not provide full paramedic and transport services as does BBCFD.

<sup>2</sup> See discussion on population estimates in Section II, page 81.

<sup>3</sup> Comparison data is from the National Fire Protection Association's "Fire Department Profiles- 2002."

Figure 2 below provides a comparison of the BBCFD's fire suppression resources with the average resource allocation in other communities of similar size within the western region of the United States.<sup>4</sup>

Figure 2: Comparison of Resources per 1,000 Population



The chart illustrates that BBCFD has a little less allocation of stations and pumpers when compared to the median of other western U.S. communities serving a similar population base. Additionally, the department does not have an aerial apparatus.

BBCFD is currently rated as a Class 4/9 fire department on the Insurance Services Office (ISO) community fire protection rating system. The system is used to determine fire insurance rates on many structures within a community. The most recent full survey conducted by ISO was in January 1991 and indicated that the department received 67.89 points of a maximum 100 points. The ISO conducted a review of the full survey in 2002 with no adjustment to the current overall rating.

<sup>4</sup> Comparison data is from the National Fire Protection Association's "Fire Department Profiles- 2002."

- Due to the length of time since the 1991 rating, the current ISO standards should be reviewed to ensure the District is in a position to receive maximum credit for the next official rating.

### **Responsibilities and Lines of Authority**

The BBCFD is located in San Bernardino County California. The service district is organized under the laws of the state of California, governed by a board of directors' form of government with authority to levy taxes for operation of the service district.

The governing body is comprised of five members, all elected at large. The board appoints the General Manager and the Fire Chief. All other fire department employees are hired by the Fire Chief.

The General Manager carries out routine management of the District's affairs. The Fire Chief, who oversees the day-to-day activities of the fire district, is a direct report to the Board of Directors.

The Big Bear City Fire Chief is hired under a personal services contract with the Board of Directors. Annually, the Board of Directors conducts a written evaluation of the Chief as a means of documenting performance and establishing personal objectives. The Fire Chief's authority is outlined in the personal services contract and Community Services District (CSD) Ordinance 186.

### **Foundational Policy**

Organizations that operate successfully are typically governed by a set of clear policies that lay the foundation for an effective organizational culture. These policies set the boundaries for both expected and acceptable behavior, while not discouraging creativity and self-motivation.

A comprehensive set of departmental operating rules and guidelines should contain at least two primary sections. The following format is suggested:

**Administrative Rules:** This section contains all of the rules that employees and members are required to comply with at all times. Administrative rules, by definition, require certain actions or behaviors in all situations. The governing body should adopt or approve the administrative rules since district staff is also subject to them; however, the officials should then delegate authority to

the Fire Chief for oversight of rule enforcement. The administrative rules (personnel policies and rules) should govern all members of the department — uniformed and civilian. Where rules and policies, by their nature, require different application or provisions for different classifications of members, these differences should be clearly indicated and explained in writing. Specifically, the administrative rules should contain sections that address the following areas. The Department currently has many related policies and guidelines that address these categories.

- Public records access and retention
- Contracting and purchasing authority
- Safety and loss prevention
- Respiratory protection program
- Hazard communication program
- Harassment and discrimination
- Personnel appointment and promotion
- Disciplinary and grievance procedures
- Uniforms and personal appearance
- Other personnel management issues

**Standard Operating Guidelines (SOGs)** – This section should contain the “street-level” operational standards of practice for personnel of the department. SOGs are different from administrative rules in that variances are allowed in unique or unusual circumstances where strict application of the SOG would be less effective. Another way to think of a guideline is that it is a basis for determining a course of action. The document should provide for a program of regular and systematic update to assure the documents remain current, practical, and relevant. SOGs should be developed, approved, and enforced under the direction of the Fire Chief.

BBCFD maintains internal rules and regulations and standard operating guidelines for subjects specific to department operations. In addition to these, the BBCCSD maintains a set of personnel policies and rules overarching all district employees; these are promulgated and maintained by the district human resources director.

The document was last updated in 1997; we note that the fire service and organizational underpinning of BBCFD have changed significantly in the interim.

- The rules and regulations of the BBCCSD should be reviewed and revised routinely and systematically to assure they remain current, practical, and relevant.

The BBCFD SOGs are available for reference by employees. Copies are issued to each employee at the time of hire. Development of new SOGs is described as “when needed” or as situations arises. The training program does not include a comprehensive review or training on all SOGs by department personnel. Selected SOGs such as personnel accountability,

respiratory protection, and personal protective equipment are reviewed during monthly training activities.

- SOGs should be compiled and maintained in a single manual. Copies should be provided in all workplaces, and training should be provided on the intent and application of all SOGs.
- The BBCFD should consider creating an administrative policy manual separate from a standard operating guideline manual. Both manuals should be reviewed for completeness. A list of needed policies/SOGs should be created and appropriately assigned to departmental personnel for development. The SOG manual should be considered for publication in a pocket-sized field guide format and issued to all department personnel.

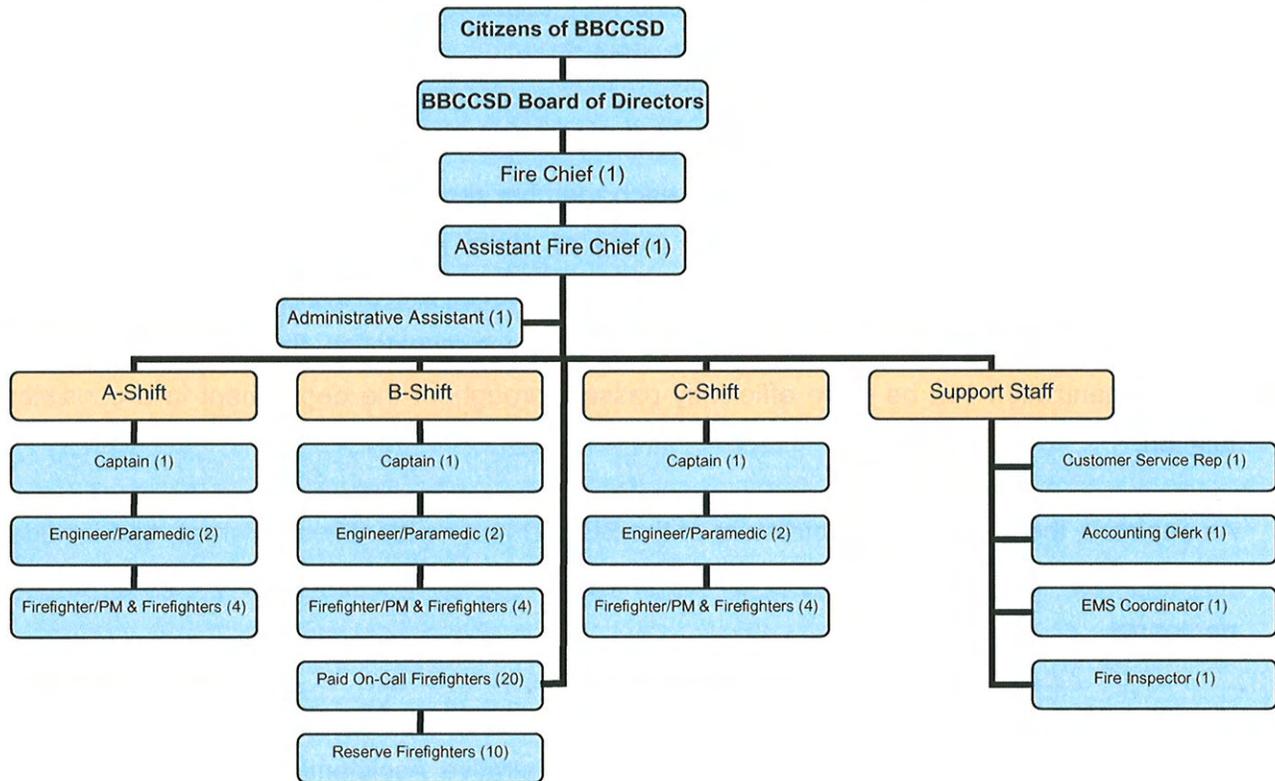
### **Organizational Structure**

A well designed organizational structure should reflect the lines of responsibility and authority within the agency, provide for the equitable distribution of the workload, and clearly define the official path of internal communication. The lines of an organizational chart visually clarify accountability, coordination, and supervision. Detailed job descriptions should provide the particulars of each job within the organization, helping to ensure that each individual's specific role is clear and focused on the overall mission of the organization.

The BBCCSD Human Resources Department typically reviews and revises job descriptions when position functions change or when a job becomes vacant.

A review of the organizational chart shows the fire department is organized as a typical top-down hierarchy. The following organizational chart indicates a well-defined chain of command and reasonable distribution of responsibilities and authority. The Customer Service Representative and the Fire Inspector positions are new positions in the 2007/08 fiscal year budget.

Figure 3: Current Organization Structure



Span of control, also known as span of management, is a human resources management term that refers to the number of subordinates a supervisor can effectively manage. Developed in the United Kingdom in 1922 by Sir Ian Hamilton, the concept of span of control evolved from the assumption that managers have finite amounts of time, energy, and attention to devote to their jobs. In his research of British military leaders, Hamilton found that leaders could not effectively control more than three to six people directly.

This generally accepted rule of thumb for span of control is still considered relevant today and applies not only to the military, but correspondingly to the fire service. It is important to note that all managers experience a decrease in effectiveness as their span of control exceeds the optimal level. In other words, the limitations implied by span of control are not shortcomings of individual managers but rather of managers in general. In addition, it is important to understand that span of control refers only to direct reports, rather than to an entire corporate hierarchy (all personnel in the fire department).

*"Extending span of control beyond the recommended limits engenders poor morale, hinders effective decision making, and may cause loss of the agility and flexibility that give many entrepreneurial firms their edge."<sup>5</sup>*

The organizational structure of the department, as illustrated by the organizational chart above, demonstrates unity of command, in which each member reports to only one supervisor (within the context of any given position) and is aware of whom he or she is accountable to. This encourages structured and consistent lines of communication and prevents positions, tasks, and assignments from being overlooked. With clear lines of communication, the goals and objectives of the organization can be more efficiently passed throughout the department in a consistent fashion.

As depicted, the organizational structure of the BBCFD has no identified divisions, and includes three shifts of full-time emergency responders, the paid on-call firefighters, and the support staff personnel.

The Fire Chief (chief executive officer) supervises the Assistant Fire Chief. The Fire Chief and the Assistant Fire Chief jointly supervise the Administrative Assistant/PIO, Accounting Clerk, EMS Coordinator, Fire Inspector, Customer Service Representative, and the shift Captains. The Chief's and Assistant Fire Chief's spans of control falls within the range typically considered acceptable. This is a positive reflection on the agency's organizational structure, since many times chief officers accept or encourage a span of control that greatly exceeds their ability to maintain good communication and leadership, often with good intentions but just as often to the detriment of the department. With this said, we caution that the span of control of the Assistant Fire Chief is at the higher end of the supervision and oversight recommendations. Future organizational changes should evaluate the extent of the span of control of the Assistant Fire Chief.

- A reorganization of the span of control and functions should be considered. As the department grows, organizational divisions should be considered that will provide a clear span of control by divisional responsibilities (operational and administrative).

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<sup>5</sup> Hendricks, Mark. "Span Control" Entrepreneur. January 2001.

### **Maintenance of History**

A historical record serves as a helpful tool for planning and decision-making. It allows quick recollection of how the department has adapted to changes in the community. It provides valuable historical data to agencies, such as the Insurance Services Office, for evaluation purposes. It also permits archival of the collective memory of the people who have contributed to the success of the department in its service to the community.

The BBCFD can trace its origin back to 1936. The original fire district joined the Community Services District when it was formed in 1966. The Administrative Assistant and Assistant Fire Chief have taken the responsibility to maintain the department history.

A well prepared annual report can serve to assist in maintaining historical and department milestones. In addition, an annual report is a wonderful communications tool, providing important information about the department to the public. The BBCFD does not produce an annual report; however, the department does provide regular updates and statistical information to the governing body at its board meetings.

### **Requests for Emergency Assistance**

The BBCFD provides a complete range of emergency assistance within the jurisdictional boundaries of the district, including emergency medical service (EMS) and medical transport (ambulance). According to the data provided by BBCFD, the department responded to 410 fire and miscellaneous calls and 2,920 medical related calls during calendar year 2006. This report more fully examines relationships between the types of service provided, the number of requests for emergency assistance, the population of the district, and the time-related workload of the fire department under the heading *Emergency Response Activity*.



## **Objective Two: Fiscal Management**

Financial management policies of the Big Bear City Community Services District are the responsibility of the Board of Directors and the General Manager. The District Finance Section oversees the financial processes and procedures of the District. The Finance Section provides long-range financial projections, cash and investment management, debt administration, purchasing, accounts payable, accounts receivable, and payroll services for the District as a whole.

The District uses fund accounting to ensure and demonstrate compliance with finance related legal requirements. The District observes a fiscal year budgetary cycle beginning on July 1 of each year. The Fire Chief submits a proposed fire department budget for inclusion and approval through the District's annual budget preparation process.

The fire department is authorized to internally administer its adopted budget (with finance department oversight) within the limits of individual line items. All purchasing must be in accordance with District purchasing policies and rules. If purchasing is necessary outside of line item accounts, submittals for approval are made through the Fire Chief.

### **Revenues and Expenditures**

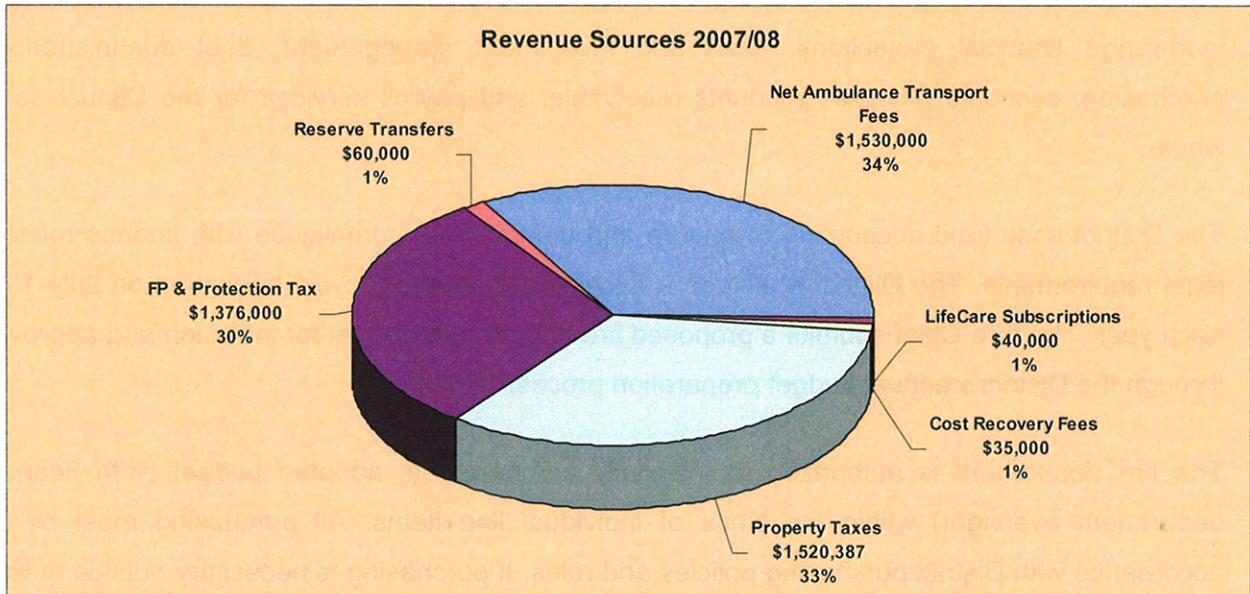
The BBCCSD receives revenue from a variety of sources. Figure 4 details the revenue sources identified in the fire department's 2007/08 budget. The graph reveals that more than half of the total revenue comes from a combination of property tax and a fire prevention and protection tax on residential and vacant properties. Although it does not show in the fire department's budget, a department allocation is subtracted from the general property tax before it is allocated to the fire department budget. This department allocation is earmarked to support general administrative services provided by the BBCCSD.

- Consider including the administrative department allocation as part of the fire department budget to fully disclose the total cost of the fire department within the BBCCSD budget.

A certain amount of the overall property tax is withheld to offset some of the services provided to the fire department by the District itself. The total adjusted property tax \$1,520,387. The fire prevention tax was approved as an ongoing levy in June of 1999. Transport fees and LifeCare

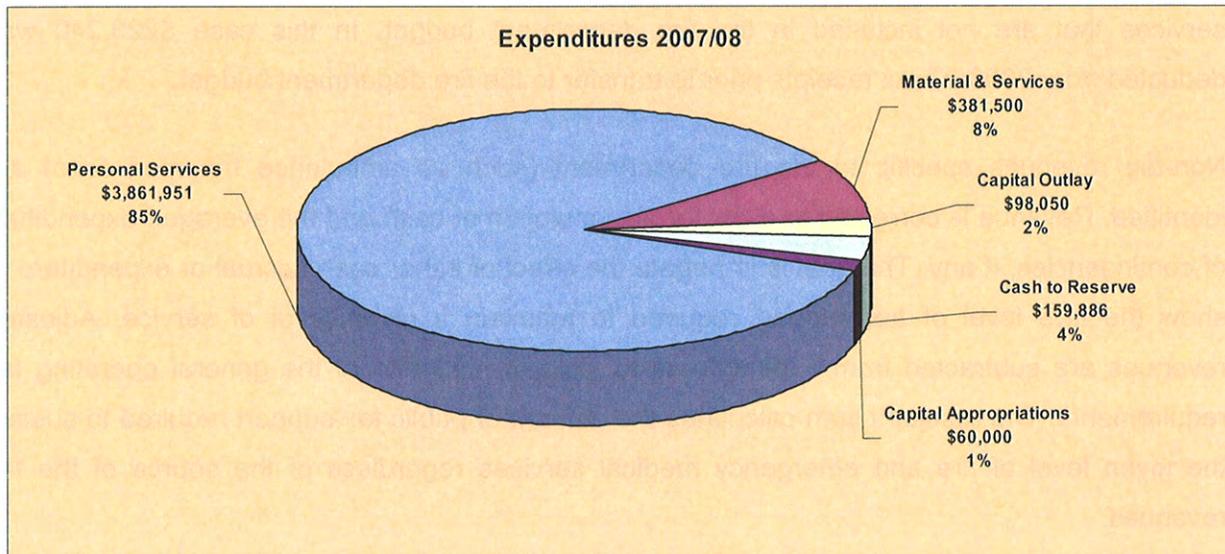
subscriptions account for another 35 percent. An additional \$60,000 was transferred from the fire department reserve fund to the fire department general fund for capital purchases. The total 2007/08 revenues, including the \$60,000 transfer, is \$4,561,387

Figure 4: Revenue Sources, 2007/08



The operating budget of the BBCFD can be divided into personal services, materials and services, capital outlay, and transfers to capital reserve (Figure 5). Personnel costs dominate the fire department's operating budget, as is typically the case in career based fire and emergency medical systems. Note that the capital appropriation equals the transfer into the fire department budget, and that \$159,886 is budgeted for transfer back to reserves for future expenditures.

Figure 5: BBCFD Adopted Expenditures, 2007/08



### Calculating the Public Cost of Service

Determining the cost of fire and emergency medical service to a community is an important element of the financial evaluation and planning process. By knowing the cost of the service as it exists and predicting the cost of that service after organizational changes are made, alternative fire and EMS models may be more fairly judged.

To this end, a computer-driven baseline estimation of the BBCFD service cost during fiscal year 2006/07 has been developed. The baseline is expressed as an equivalent tax rate in dollars per \$100 of assessed value. The estimate provides a scale by which to measure the status quo against any proposed system changes. The model projects cost based on jobs and programs. Therefore, changes to personnel and/or programs that may affect the bottom line are able to be calculated more accurately. A comparison of the cost yields a means to evaluate the financial affects of various alternatives.

Adapting a fire department budget to estimate public cost requires certain conventions and assumptions. Specifically, the current budget of the agency is reformatted, often combining line items expenditures of different governmental funds to reflect a total public service cost. The process groups all expenses into three major classifications; personal services, materials and services, and capital outlay. These classifications are then subdivided to permit the tracking of a program cost (such as fringe benefits or maintenance). All jobs are indexed in each department to relevant compensation levels and salary rates to reflect annual full cost. In some instances,

as may be appropriate, an estimate is added to recognize the cost of municipal overhead services that are not included in the fire department budget. In this case \$223,240 was deducted from 2006/07 tax receipts prior to transfer to the fire department budget.

Non-tax revenues specific to the fire department (such as ambulance transport fees) are identified. Revenue is corrected to allow for accumulation of cash and the averaged expenditure of contingencies, if any. The goal is to negate the effect of either cash accrual or expenditure to show the true level of tax support required to maintain a given level of service. Adjusted revenues are subtracted from expenditures to yield an estimate of the general operating tax requirements. The resultant sum calculates the amount of public tax support required to sustain the given level of fire and emergency medical services regardless of the source of the tax revenues.

It is important to emphasize that this analysis provides a “snapshot” estimate of the public tax cost for the current budget year. There are many forces that may act to change that level in the future, including changes in law, revenue, politics, or contracts. This process uses current revenue and appropriations to generate an estimate of the level of tax support required. This analysis is not intended to predict actual or future actual tax rates.

This analysis of the fire department budget is detailed in Figure 6. For this model, non-tax revenue (line 6) includes ambulance fees, LifeCare subscriptions, and cost recovery fees. Expenditures from the Apparatus and Vehicle Expenditure Fund are excluded since this fund is supported by transfers in from the reserve fire fund. The calculated tax requirement (line 11) is \$1,520,387 with an equivalent tax support rate is \$0.079 per \$100 assessed value. The high percentage of non-tax revenue generated by the ambulance service and the other cost recovery efforts keeps the amount of required general tax support down. The BBCFD is currently in the process of establishing a Community Facilities District (CFD) to provide additional funding to support fire department operations in recognition of ongoing development in the District. CFD funding is not included in this current year’s budget model since it not expected to contribute any revenue until year 2011 but will be included in Section III of this report when long-term strategies are evaluated.

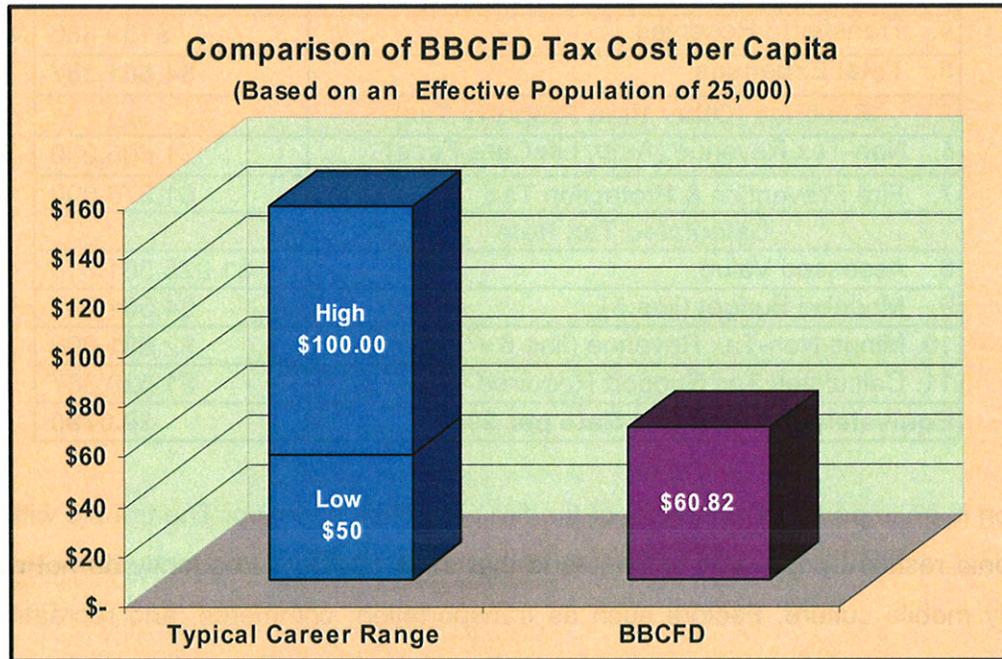
**Figure 6: Modeled Budget with Equivalent Tax Rate**

<b>Expense</b>	<b>Amount</b>
1. Salaries & Benefits	\$3,861,951
2. Materials & Benefits	\$381,500
3. Capital Outlay	\$98,050
4. Transfer to Reserves	\$159,886
<b>5. Total Expenses</b>	<b>\$4,501,387</b>
<b>Revenue (Other than Property Tax)</b>	
6. Non-Tax Revenue (Amb, LifeCare, Fees)	\$1,605,000
7. Fire Prevention & Protection Tax	\$1,376,000
<b>Calculated Tax Rate</b>	
8. Assessed Value	\$1,925,561,310
9. Modeled Budget (line 5)	\$4,501,387
10. Minus Non-Tax Revenue (line 6 + 7)	\$2,981,000
11. Calculated Tax Support Required	\$1,520,387
<b>Equivalent Tax Support Rate per \$100</b>	<b>\$0.0790</b>

Population is an important component of the fire protection equation. The trouble with accepted jurisdictional resident population estimates is that such numbers frequently do not account for our highly mobile culture. Factors such as transportation, commerce, and recreation tend to make the given population for a region fluctuate widely depending on time, day, and season. This situation is well illustrated with the Big Bear area. While the permanent resident population of the BBCCSD is estimated to be approximately 12,000, there are also many part-time and rental properties. The ambulance service area extends over a much greater area than the District, encompassing many more residents and visitors. The recreation and resort nature of the Big Bear area can swell the population by many thousands on weekends or for special events. Taking these factors into consideration, we believe it is realistic, for the purposes of comparison of per capita cost with other fire service agencies, to use an effective population estimate of 25,000. Figure 7 illustrates the per capita cost of the BBCFD using an effective population estimate of 25,000 (in terms of property tax not including the Fire Prevention and Protection tax). Experience has shown that it is very common for the cost of fire protection to exceed \$100 per capita in some settings, trending up to about \$150 in most urban setting. Using

resident population of 12,000, the per capita cost is \$126.70—slightly more than twice that shown in the graph below.<sup>6</sup>

Figure 7: Tax Cost per Capita



The national average cost per capita is considered to be about \$93, but that is dependent on the region. Costs usually trend downward as one compares an urban fire system to suburban and rural settings.

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<sup>6</sup> The per capita cost of certain urban fire protection systems trends very much higher than \$150 per resident. This is usually due to special circumstances such as a high level of emergency medical service commitment or a very low ratio of residential population to risk.

## **Objective Three: Organizational Management**

As with most emergency service agencies, the Big Bear City Fire Department faces challenges to organizational growth and management. In addition to continuing growth of the community and workload, the management of human resources always presents unique issues involving the consistency and adequacy of response, maintenance of competencies, and development of future leaders. This report section examines BBCFD's efforts in this area and the organization's preparation for the future of the agency.

### **Mission, Vision, Strategic Planning, Goals, and Objectives**

The process of strategic planning involves clarifying an organization's mission, articulating its vision for the future, and specifying the values within which it will conduct itself. The BBCFD adopted a strategic plan in May of 2000. BBCFD contracted with Emergency Services Consulting inc. of Wilsonville, Oregon, in late 2006 to develop a long-range master plan for the District's emergency services delivery system.

### **Critical Issues**

It is extremely important that there be a clear understanding of key issues facing the department. Without such an understanding, department leadership cannot be sufficiently prepared. In addition, the articulation of critical issues to employees and members increases their awareness of the organization's priorities and assists them in focusing on solutions.

Issues identified by the members of the department as matters with significant potential for influencing the success of the organization and the effectiveness of its service are as follows:

- Continued long-range funding for department programs and services.
- Insufficient resources (staffing, facilities, apparatus) to accomplish the mission.
- Community risk, especially related to the wildland interface potential throughout the service area.
- Greater enhancement of fire prevention and code enforcement abilities by the department.

As with critical issues, it is important for any agency to have an appropriate level of future thinking. This permits the organization to identify what external challenges may present

themselves to the agency in the coming years. This awareness of future challenges ensures that the department does not miss opportunities or blindly stumble into a crisis unprepared.

Again, further exploration of future challenges should be part of a complete strategic planning process, but the following items have been identified by the officers of the department as external challenges likely to be faced by the agency in the coming years.

- Keeping up with policy and procedures updates.
- Providing and coordinating enhanced training program between the three shifts.
- Career development training for existing and future personnel.

### **Internal and External Communications**

Quality communications is an important and achievable goal for any organization, but one that always seems to be most elusive. To its credit, communication processes within BBCFD provide opportunities for employees to be heard and to be involved; however, room for internal communication improvement always exists.

Management team meetings involving the principal management staff and officers are held monthly. These meetings permit management personnel to openly exchange ideas, share issues and concerns, apply creative teambuilding and problem solving, and improve the overall flow of communications. Such an effort of openness and inclusiveness permits members to share ideas on departmental issues and enhances a feeling of empowerment among employees.

A method for distribution of written communications is in place and is followed, making certain that no members are left out of the information loop. Circulation of information on a wide-ranging list of subjects considered routine is commonly conveyed to personnel through electronic mail over the District's intranet system. This process also provides a critical record of in-house communications that are important to organizational efficiency.

Other efforts to promote open communications include an open-door policy with department administrators and an advisory committee consisting of two board of directors members; additionally the District hosts employee lunches and other events throughout the year. These open exchanges develop a sense of teamwork, keep lines of communication open, and encourage a feeling of ownership among the members.

Fire stations have bulletin boards that are organized, have current information, and are updated on a regular basis. All employees are issued department business e-mail addresses. Electronic mail provides an efficient and verifiable method of information distribution.

Voicemail is a useful means to augment other modes of information exchange. Administration and management personnel are assigned individual voicemail accounts, permitting other department members and external customers to efficiently and quickly leave messages.

The District has not adopted a complaint policy that is applicable to the fire department. The complaint process should outline a formal procedure for resolving complaints from the public and is intended to make certain that each complaint is handled expeditiously, appropriately, and in a consistent manner.

BBCFD has used focus groups and comment cards in the past to determine constituent satisfaction. These surveys, when used appropriately, can provide valuable input for organizational planning. Consideration should be given to establishing a citizens' advisory group that can meet occasionally with department management to provide a customer's perspective on issues within the department and to assist in planning efforts. This process encourages a close connection between the agency's management team and external customers; the program also serves as an additional public relations tool.

- Consider the development of a formal complaint process. Develop and adopt an appropriate administrative manual policy and/or SOG manual guidelines. Provided training for all personnel on receiving and resolving complaints.
- Consider the establishment of a citizens' advisory group to obtain citizen input.

### **Document Control and Security**

Records management is an essential function to any organization. Many uses are made of written records; therefore, the integrity of all such documentation must be protected. State law requires public access to certain fire department documents and data. Clear written procedures are in place to provide for public records access through BBCCSD and BBCFD staff. Paper records (hard copy files) are adequately secured with passage and/or container locks. Important computer files are backed up to a secure data location on a regular and dependable basis.

The BBCCSD has a considerable investment in facilities, apparatus, equipment, and other items in the fire department. Protecting these assets is very important. Fire stations are secured from unauthorized entry by locked doors; however, no electronic security or internal protection systems (sprinklers) are installed in fire stations.

Department computers are programmed with password security, limiting entry to sensitive files and software. In an effort to provide an additional level of security and data integrity, passwords should be changed every 90 days. Firewall protection is in place for computers accessing the internet or outside servers. The protection is satisfactorily up to date and capable of preventing most unauthorized network intrusions. The latest virus protection software is used on all incoming email and files; operating systems are regularly scanned for undetected virus infection. Data files are automatically backed up each day.

The department maintains a current inventory of capital assets. A process is in place to maintain this inventory, and new assets are tagged and recorded at time of purchase.

Petty cash consisting of \$550 is kept in a safe. Captains and chief officers have access to and use of American Express charge cards. Limited purchasing authority allows Captains to purchase goods up to a \$50 limit. The chief officers' spending threshold is \$1,000. Expenditures over the stated limits require approval by the BBCCSD General Manager.

- The BBCFD should continue to work directly with the BBCCSD to update and/or develop a comprehensive information technology policy that includes security and other important features of information technology management.

## **Objective Four: Human Resource Management**

A fire department's employees and volunteers are its most valuable resource. Careful attention must be paid to managing that resource to achieve maximum productivity for the organization and maximum satisfaction for the individual. A safe working environment, fair treatment, and recognition for a job well done are key components to job satisfaction.

### **Personnel Policies and Rules**

It is important that members of the organization know to whom they should go when they have a problem, question, or issue related to their relationship to the organization. In larger corporations, a human resource department typically handles this function. Staff within such a department specializes in handling questions, issues, and tasks related to appointment, benefits, performance, discipline, promotion, or termination of employees.

In a similar fashion, the BBCCSD has an established human resource function in its General Services Section. In addition, the fire department coordinates most human resource functions through the Fire Chief, who serves as the primary point of contact for its members when it comes to questions regarding their employment. Using a single point of contact within the fire department is both practical and productive. The Fire Chief is knowledgeable on issues unique to the fire department and a level of trust and communication is established prior to dealing with any issues that may develop. The Fire Chief also serves as the primary liaison between the fire department and the BBCCSD in general.

The BBCCSD maintain written policies<sup>7</sup> that describe the appointment of employees or members, the salary and benefits to which they are entitled, the conditions under which leave may be used, systems to rate personal performance, qualifications and process for promotion, and systems for grievances. The policy manual is indexed for easy reference and each policy is dated with the latest adoption date. The policies are intended for all District personnel and only address the particularities of the fire department in limited areas.

Newly hired employees are provided with a copy of the District's personnel policies, rules, and regulations. Each employee is required to sign a statement acknowledging receipt. Recruits also

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<sup>7</sup> The written policies are codified in Ordinance 186, "The Big Bear City Community Services District Personnel Management Policy and Procedures Manual," adopted March 6, 2000.

receive basic orientation from the District's human resource representative. Ongoing district wide training on mandated and other selected topics ensures personnel remain abreast of significant policy issues and any changes that may occur.

There is no specific policy related to the routine and scheduled review of the personnel policies in general or individually. The practice is described as "continuous and ongoing." It was noted that the policies are not out of compliance but perhaps outdated and, in some cases, too brief.

The fire department maintains its own department-specific standard operating guidelines (SOGs). The SOGs are not specifically organized in a single location and may not necessarily be readily available for easy reference by all employees and reserve firefighters. The fire department maintains a specific set of rules and regulations that relate specifically to the reserve firefighters.

- Ensure that personnel topics with unique application to the fire department are addressed and/or cross referenced to the appropriate BBCCSD personnel policies.
- Coordinate the development, review, and approval processes of fire department human resource and safety related policies with the District's review and approval processes.
- Develop and approve an official method for review and updating of District and fire department policies and SOGs.
- Complete the organization of all fire department policies and standard operating guidelines into a desk and/or computerized manual for easy reference by all fire department personnel.

### **Compensation and Benefits**

The Big Bear City Fire Department uses a combination of full-time career and on-call personnel to carry out its operational and administrative functions. All administrative and support personnel are full-time employees. Emergency response personnel consist of full-time and paid on-call personnel.

Typical forms of compensation are provided to the full-time members, including salary, retirement, health, dental, vision, and insurance. The purpose of this study is not to provide a

thorough compensation analysis.<sup>8</sup> It is important, however, within the context of this emergency services evaluation and master plan, that consideration be given to the impact of the salary and benefits package as it relates to employee morale, loyalty, and turnover.

The full-time line personnel of the fire department (Firefighter, Engineer, and Captain) are represented by the Big Bear City Professional Firefighters' Association. The current labor agreement extends from July 1, 2006, through June 30, 2009. The clerical and administrative assistant positions in the Department are represented by the Miscellaneous Employees Bargaining Group. The EMS Coordinator and Assistant Fire Chief positions are unrepresented and FLSA-classified as administrative exempt. Historically, annual salary and benefit adjustments for these two positions have been commensurate with that received by the Firefighters' Association. The Fire Chief works under an employment contract with the District. Compensation and benefits for the paid on-call firefighter positions are determined annually through the budget process. The fire department currently has only one reserve firefighter that serves without compensation.

The fire department experiences virtually no turnover of paid employees with the exception of retirements. There are 20 positions budgeted for paid on-call firefighters, 13 of which were filled at the time of this study. There are ten reserve firefighter positions budgeted but only one is filled.

### **Records and Reports**

The maintenance of adequate and up-to-date personnel records is essential to every organization that depends on the effective performance of its members. Personnel records of the fire department members are maintained at the BBCCSD office in the Human Resource Department. The fire department also maintains its own records that are of a non-confidential nature such as training, equipment, and apparatus. Records are maintained in a combination of electronic and hard copy formats. District and fire department electronic records are backed up on a scheduled and regular basis.

Original application and employment records are retained by the District. Reports related to assignments, promotions, discipline, and other personnel actions are maintained by the District.

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<sup>8</sup> Attention is given to salary and benefits within the broader context of fiscal management and projection of future costs in other sections of this report.

Worker compensation, injury, and risk management records related to exposures and vaccinations are maintained primarily by the District but also by the fire department.

Communication between District human resource and risk management personnel and the fire department is reported to be good but improvements in the coordination of documentation and recordkeeping could be implemented.

- Conduct an assessment of fire department documentation and recordkeeping processes to improve efficiency and coordination with District human resource and risk management efforts.

### **Disciplinary Process**

A formal progressive disciplinary process and grievance procedure is maintained as part of the BBCCSD personnel policies. The policies are cross-referenced in the Firefighters' Labor Agreement. The disciplinary policy provides for various levels of discipline focused on addressing the issues in a reasonable and effective manner. The disciplinary policy addresses general principles, guidelines, and levels of authority. The grievance policy describes the mechanism by which an employee may dispute a disciplinary action, harassment situation, or application of a personnel policy in some detail. Both policies were last approved on March 6, 2000. As noted earlier, copies of these policies are available to employees in hard copy or electronically.

The use of the formal BBCCSD disciplinary processes is rarely required in the fire department. To the extent applicable, counseling and discipline is handed at the company and departmental levels by company officers and/or the Fire Chief.

- Review, update, and coordinate the disciplinary policies of the District and fire department.
- Provide formal training for all fire department supervisory personnel on District and fire department disciplinary policies and practices.

### **Counseling Services**

Emergency services bring otherwise ordinary people into life and death situations that sometimes end very tragically. Even though department personnel are trained responders, they

do not have an impregnable shield that prevents them from being affected by traumatic events. Critical incident stress is a very real condition that affects all emergency service workers to some degree or another. It is how emergency workers deal with that stress that makes the difference. The trigger for significant psychological trauma may be a single event or a series of events compounding on each other. Emergency workers may also encounter stress in their lives away from work that can dangerously impact their performance, safety, or safety of others at work as well.

Fire departments across the country have recognized the need to provide a support system for their members who are exposed to such situations. Many departments have joined together in providing critical stress debriefing training to volunteer teams of co-workers. Critical stress intervention by these types of groups is intended to be a short-term process only. While successful for many situations, longer-term support may be needed in some situations. Failure to provide on-going support may ultimately lead to the loss of a valuable member.

An employee assistance program (EAP) is available to all personnel of the BBCCSD as well as the fire department. The District contracts with the Counseling Team International, a company that has provided psychological services to government agencies, law enforcement, fire and emergency services, private industries, and organizations in the state of California since 1983.<sup>9</sup> The program provides free and confidential services on a 24-hour a day basis. The cost of such services are often reasonable and the potential payback significant.

### **Application, Recruitment, and Testing Processes**

Recruitment of personnel is a critically important function for emergency service agencies. The community places a tremendous amount of trust in fire department personnel. Applicants should be assessed for those attributes considered most important to effectively perform emergency services job functions. The process used to select personnel should be comprehensive. Full-time paid firefighters are traditionally hired from the ranks of the paid on-call personnel at the discretion of the Fire Chief. If sufficient applicants are not available, the District advertises in local publications to obtain applicants.

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<sup>9</sup> [www.thecounselingteam.com](http://www.thecounselingteam.com).

The Americans with Disabilities Act (ADA) prohibits discrimination against individuals with physical disabilities, but permits employers to establish the physical standards that are required to perform the primary functions of any job safely and effectively. History has shown that the most effective method of avoiding litigation involving ADA is through reasonable and consistent application of job-relevant pre-employment physical ability testing. Applicants for full-time career positions in emergency response within the department are required to have completed a locally recognized fire academy with a formal physical ability test to measure their ability to perform critical physical tasks and functions. Paid on-call firefighters receive an 8 to 12 weeks of in-house training program.

Modern firefighting and medical response also require extensive technical training, much of which is presented at the college levels. Career applicants must demonstrate their aptitude to learn and perform the necessary mental skills to do the work through written aptitude testing. The BBCFD uses an accepted and validated commercial assessment tool for this purpose.

All applicants offered employment are required to pass a pre-employment medical physical assessment by the District's designated physician. The physician is provided a job analysis by the Department in the assessment. A psychological assessment is also required after a contingent offer of employment.

- Evaluate the current recruiting and hiring practices of the fire department. Ensure District and fire department practices are coordinated and result in attracting and selecting the best candidates possible.
- Provide formal training for all fire department supervisory personnel on District performance appraisal policies and procedures.

### **Ongoing Competency Evaluations**

Once on staff, personnel should be evaluated periodically to ensure their continued ability to perform job duties safely and efficiently. Technical and manipulative skills should be assessed on a regular basis. This provides documentation about a person's ability to perform their responsibilities and provides valuable input into the training and education development process.

Most members of a fire department have a high desire to succeed and sincerely wish to be a contributing part of the department. This basic desire is encouraged through feedback that

allows each member to know what he/she is doing well, and what skills may need improvement. Honest and appropriate feedback encourages members to reinforce mastered skills and to work harder to improve the areas where performance may fall short.

Technical and manipulative skills should be evaluated formally and regularly. Training in the fire department is generally conducted under the leadership of company officers although formal competency evaluation is not conducted nor documented.

- Establish a formal system within the fire department training program for routine individual and company technical and manipulative skills assessment. Document and provide feedback on the results. Use the results to formulate future training goals.

### **Health and Safety**

Although medical exams are required for employment, annual medical exams are not required. Annual medical exams and stress tests are used in the fire service to detect and prevent any developing medical problems. Stress tests are used to determine the amount of stress that a heart can manage before developing either an abnormal rhythm or evidence of ischemia (inadequate blood flow to the heart). The test helps to determine if there is adequate blood flow to the heart during increasing levels of activity such as routinely encountered during fires or other emergency response situations. Fire department members do receive annual physical fitness assessments and individual counseling. It is important to note that the leading cause of firefighter deaths is heart attack at 44 percent. Death from trauma, including internal and head injuries, is the second at 27 percent. Asphyxia and burns account for 20 percent of firefighter deaths.<sup>10</sup>

The District maintains an established safety committee that meets quarterly. The committee has representatives from all departments including the fire department. Routine risk management duties and activities include facilities inspections and accident and injury reviews. Findings and recommendations are forward to the District General Manager and the appropriate department head. Meeting minutes are compiled and maintained by the District.

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<sup>10</sup> The United States Fire Administration (USFA), The USFA Firefighter Fatality Retrospective Study: 1990-2000, October 2002.

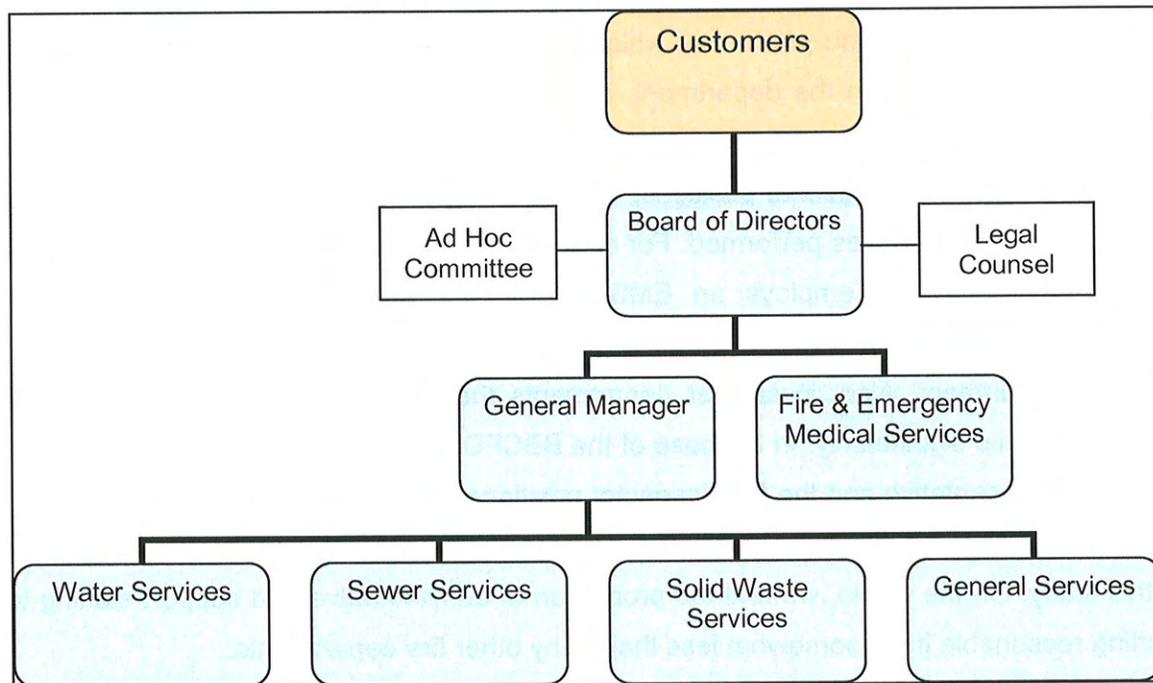


- Stress testing should be provided for all fire department personnel with emergency response duties on a two- to five-year cycle depending on age and other physician-identified risk factors. Stress testing is not currently provided for paid on-call firefighters largely due to cost and availability of personnel. Consider expanding the stress testing program for paid on-call personnel on a two- to five-year interval.
- Consider using the expertise and resources of the Cal-OSHA Consultation Services Section to assess and evaluate facilities and safety related policies and procedures.

## Objective Five: Organizational Staffing

The fire department is one of five departments of the Big Bear City Community Services District. The Organizational structure has recently been modified with the fire department reporting directly to the Board of Directors as opposed to the BBCCSD General Manager (Figure 8). The BBCFD uses a combination of paid full-time career personnel and paid on-call firefighters to deliver emergency fire and medical services to its citizens. Operational personnel work a 56-hour workweek in a three platoon system common to other area fire departments. Administrative and support personnel work a regular 40-hour workweek schedule.

**Figure 8: District Organization Chart**



- Review all District and fire department documentation and procedures to ensure that the recent change in organization structure is adequately represented and that the reporting and working relationships between the fire department and the various BBCCSD Departments are clearly defined.

### **Administration and Support Staff**

The administrative and management functions are the responsibility of the Fire Chief, Assistant Fire Chief, and EMS Coordinator with support from the District.

In the simplest terms, the primary function of administrative and support staff is to make sure that firefighters and paramedics have the ability and means to do their job on the emergency scene. Insufficient oversight, planning, documentation, training, and maintenance will assure the failure of the operational section of the department. As with all other parts of the organization, the administrative section of the agency requires sufficient resources to function effectively.

The number of administrative and support positions is commonly compared to the total FTEs of a fire department to gain a sense of the relative amount of resources committed to this important function. A suitable balance of the two components is essential to the success of the emergency mission of the fire department.

Figure 9 lists the administrative and support positions of the BBCFD. The administrative staff of the BBCFD includes seven personnel, which represents a ratio of 25.00 percent compared to total full-time FTEs within the department, and only 14.58 percent when the budgeted on-call firefighters are factored in. Each organization should determine the proper ratio of administration and support staff to operational positions, dependent upon local need. Consideration must be given to the types of duties performed. For example, since the BBCFD conducts EMS transport and billing activities it employs an EMS Coordinator and Accounting Clerk while other departments may have no need for such positions or may position the billing function in a different department. Also, in smaller departments the addition of one or two positions may change the ratio significantly. In the case of the BBCFD, for example, adding the new Customer Service Representative and the Fire Inspector positions increased the full-time staffing ratio by 5 percent. The addition of the Fire Inspector addresses one of the critical issues identified earlier in this study. On the whole, we find the proportion of administrative and support staffing to total staffing reasonable if not somewhat less than many other fire departments.

**Figure 9: BBCFD Administrative & Support Staff**

<b>Administrative / Support Personnel</b>	
<b>Position Title</b>	<b>Number (FTE)</b>
Fire Chief	1
Assistant Fire Chief	1
EMS Coordinator	1
Administrative Assistant	1
EMS Accounting Clerk	1
Fire Inspector	1
Customer Service Representative	1
<b>Total</b>	<b>7</b>

## **Emergency Services Staff**

The BBCFD provides a full range of emergency response services, including fire suppression, emergency medical treatment and transport, rescue services, and response to numerous other types of emergency situations. It takes an adequate and well-trained staff of emergency service responders to put the apparatus and equipment to best use in mitigating an emergency incident. Insufficient staffing at the emergency scene, regardless of the type of incident, decreases the effectiveness of the response and increases the risk of injury to those at the scene. The BBCFD provides direct customer service with a total of 21 full-time operational personnel supported by a cadre of paid on-call firefighters. Figure 10 summarizes the number of personnel by position assigned to street-level service delivery.

**Figure 10: Operational Staffing by Position**

<b>Position</b>	<b>Minimum Full-Time</b>	<b>Minimum On-Call*</b>	<b>Total Current Staffing</b>
Captain	3		3
Engineer	6		6
Firefighter/Paramedic	11		11
Firefighter	1	12	13
<b>Total Staffing</b>	<b>21</b>	<b>12</b>	<b>33</b>

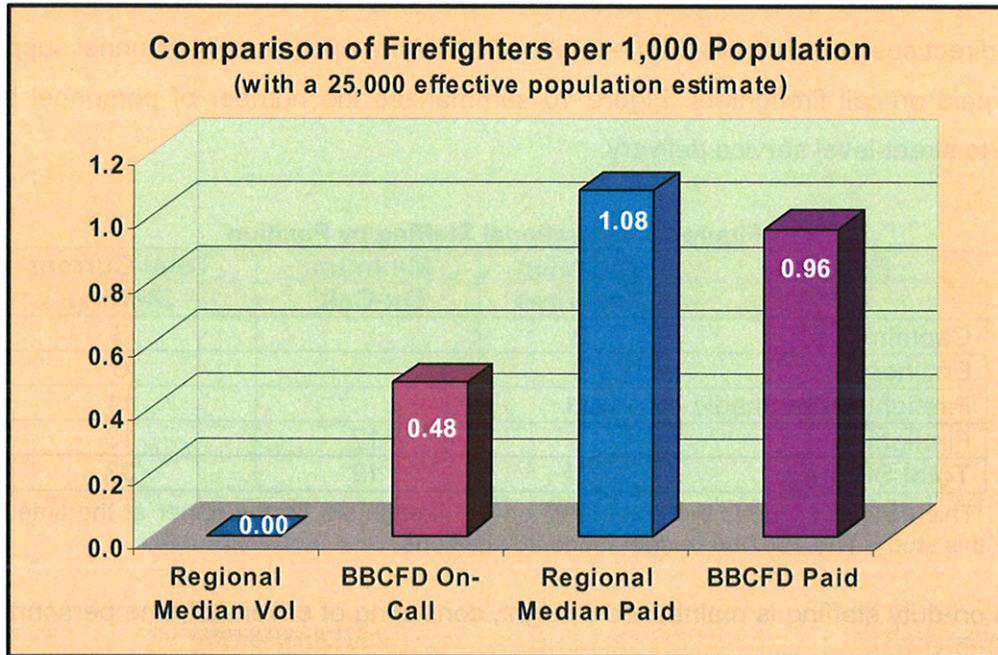
\*This column includes the number of on-call firefighters on the roster at the time of this study. The 2007/08 budget funds 20 positions.

Minimum on-duty staffing is maintained at eight, consisting of seven full-time personnel and one paid on-call firefighter. The main station (Station 291) is staffed with six personnel and the Sugarloaf station (Station 292) with two. Call back of off duty personnel is used to maintain the staffing levels from day to day in response to the absence of workers due to vacation, illness, or injury and the availability of on-call personnel.

An analysis of the BBCFD staffing begins with a comparison of emergency personnel judged against other communities of a size similar to the BBCCSD. Population documentation for Districts are not compiled and easily obtained like they are for counties or cities. Another factor to consider in trying to determine an effective population is that the ambulance service area is much larger than the District itself. The Big Bear valley is also well recognized as a tourist destination for its summer and winter recreation activities. Full-time resident population in the District is estimated to be in the vicinity of 12,000, based on conversations with the General Manager and Fire Chief. Considering the part-time residents and tourist populations, effective population estimates are slightly over 25,000. The effective population estimate for the entire ambulance service area is approximately 50,000.

Figures 11 and 12 use benchmark data from fire departments in the western region of the United States.<sup>11</sup> The data compare the number of paid and volunteer firefighters per 1,000 residents of western U.S. fire departments serving populations between 25,000 and 50,000. Figure 11 makes the comparison with an effective population of 25,000. Note that the survey does not assess the number of volunteer firefighters in this population range.

**Figure 11: Firefighters per 1,000 Population, 25,000 Effective Population Estimate**

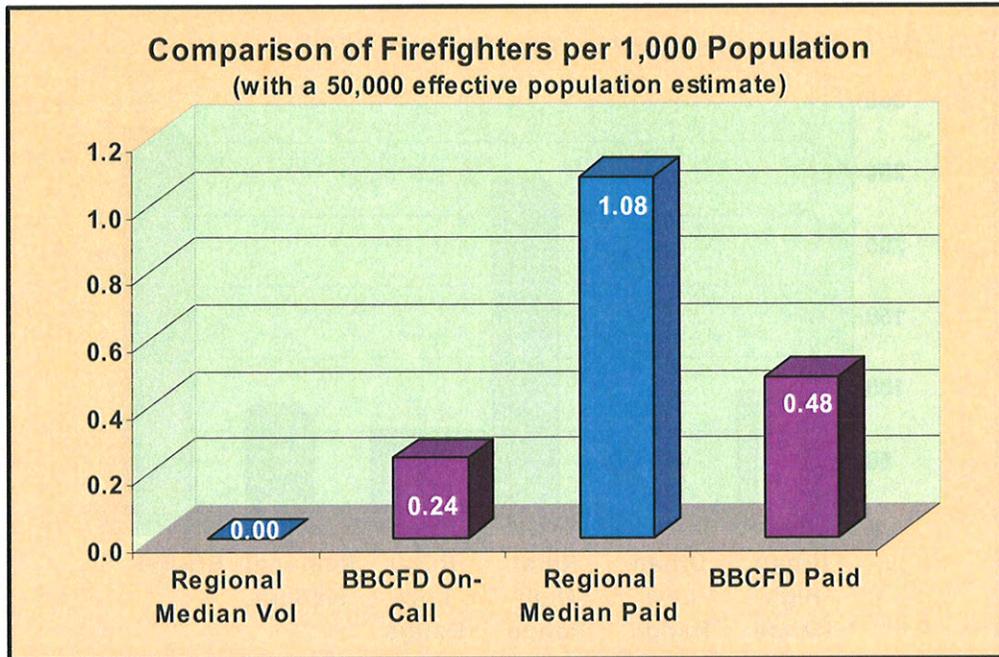


At this population ratio the BBCFD maintains a slightly lower ratio of paid firefighters than the mean of other cities of similar population in the western region. Figure 12 makes the same comparison with an effective population of 50,000.<sup>12</sup>

<sup>11</sup> NFPA, Micheal J. Karter Jr., "U.S. Fire Department Profile Through 2003," January 2005.

<sup>12</sup> The survey does not collect volunteer statistics for departments in this category.

Figure 12: Firefighters per 1,000 Population, 50,000 Effective Population Estimate



It is also likely that some of the departments in this NFPA benchmark study may not provide active EMS and medical transport. Staffing comparisons must be made with these variables in mind.

The impact of the relatively unique resort/recreation nature of the Big Bear area can also be seen in the number of incidents that occur. The BBCFD recorded 3,220 incidents in 2006, 87 of which were fire incidents. Figure 13 provides a comparison of total call volume with the same data set used in Figure 11.

Figure 13: Incidents per 1,000 Population

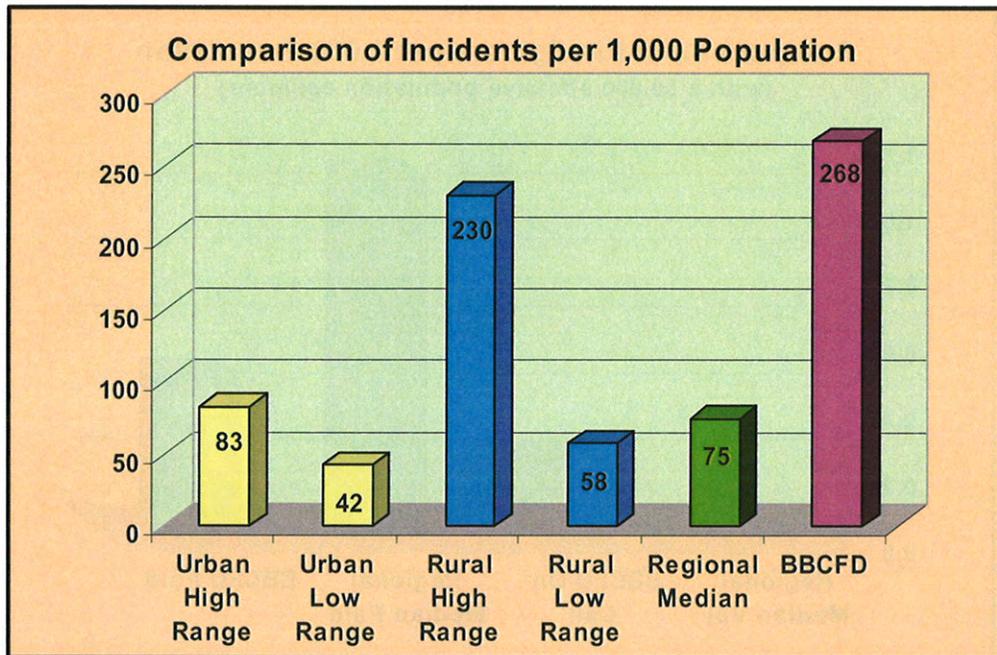
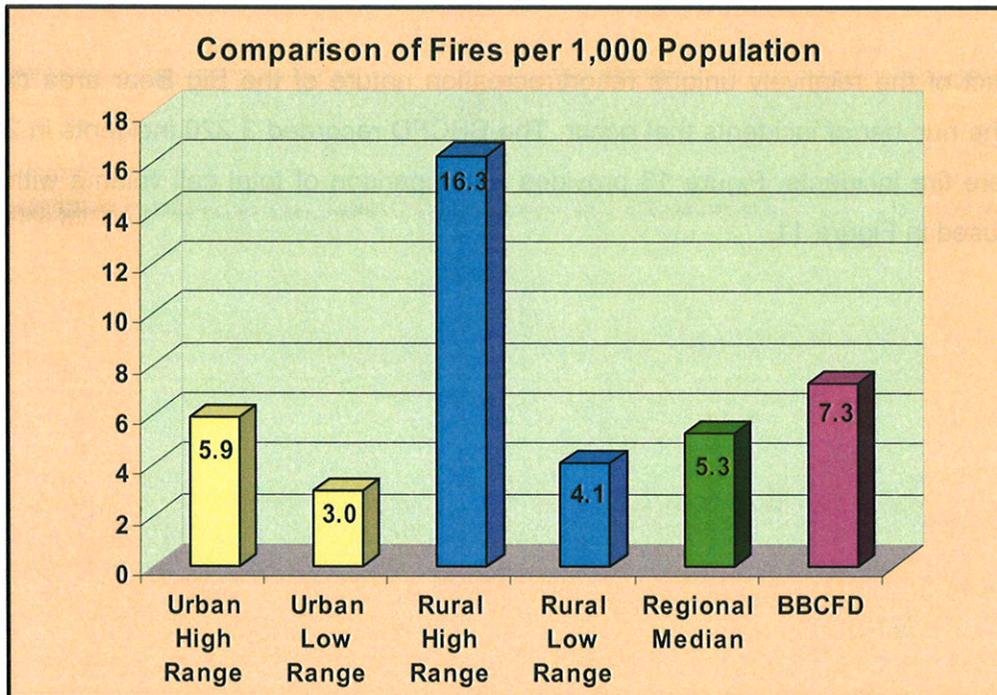


Figure 14 provides the same comparison but for fire incidents only.

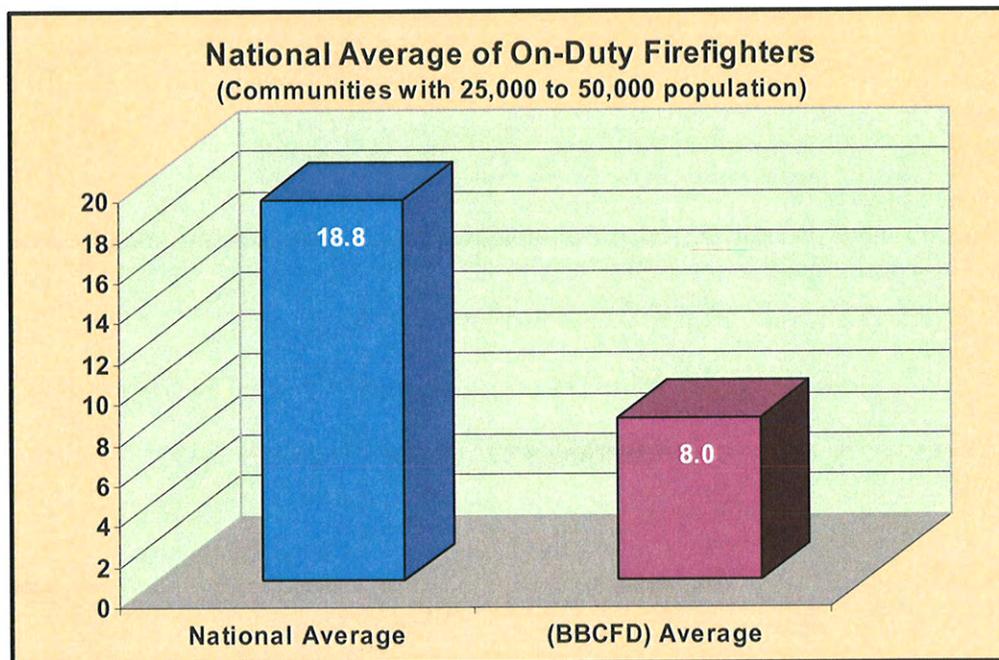
Figure 14: Comparison of Fires per 1,000 Population



The two graphs illustrate the higher than average number of incidents representative of the mobile and resort recreation nature of the Big Bear area population as a whole.

A recent study by the National Fire Protection Association (NFPA) provides the average number of on-duty firefighters in cities with a population between 25,000 and 50,000.<sup>13</sup> Figure 15 compares the average number of on-duty firefighters in the BBCCSD with other fire departments serving a similar population base. As can be seen, the BBCFD staffing level is less than half the national average within this population range.<sup>14</sup> As another point of comparison, the national average for fire departments with a population between 10,000 and 25,000 is 7.2.

**Figure 15: National Average of On-Duty Firefighters**



More detailed discussion and information on the effect of staffing levels at emergency scenes is provided in Section Six: Emergency Service Delivery.

### **Assignment of Responsibilities**

The need for adequate levels of management and administrative support and operational staffing are discussed throughout this report. In some areas the BBCFD is challenged to meet

<sup>13</sup> FEMA/NFPA, "A Needs Assessment of the U.S. Fire Service," FA-240/December 2002.

<sup>14</sup> One of the eight on-duty positions used in this comparison is a paid on-call firefighter.

the staffing demands of a modern emergency services organization. Employee committees are formed on an ad hoc basis in response to particular situations or problems. Individual employees are assigned a variety of basic internal administrative duties. Analysis of the department's current staffing performance and future demands will determine where recommendations for improvement may be indicated.

## **Objective Six: Emergency Service Delivery System**

The delivery of fire suppression and rescue services is no more effective than the sum of the parts. Successful emergency service requires efficient notification of the event, rapid response from well-located facilities in appropriate apparatus with sufficient staffing, and the execution of a well-practiced plan of action. This section evaluates these various components and provides observations of the elements that make up the delivery of the most critical core services provided by the Big Bear City Fire Department.

### **Emergency Communications**

Dispatch operations are essential directly affecting fire/EMS service levels, response times, and overall service delivery. Efficient call taking and dispatch functions are dependent on the following elements:

- Organizational Structure
- Staffing/Operations
- Reporting
- Procedures, Policies and Protocols
- Training
- Quality Assurance
- Facility/Equipment
- Back-up Plan

The following information provides an overview of Desert Com, located in Victorville California. Information for this section is based on interviews with the center's director.

### **Communications Overview**

The San Bernardino Sheriffs Department is the designated 9-1-1 public safety answering point (PSAP) for the Big Bear City Fire Department. Desert Com provides dispatch of fire and EMS and communication services for the BBCFD. The center is managed by a professional director and staff with many years of experience.

The communications section currently operates an InterAct™ Computer Aided Dispatch (CAD) system. CAD is functional and provides the necessary information for initial dispatch.

Station alerting occurs through VHF frequency tone notification and paging. The activation of tones occurs when the dispatcher initiates a dispatch in the CAD for the selected units. The activation of station FAX printouts occurs simultaneously as the tones based on the command from CAD.

Emergency Medical Dispatch (EMD) is Inland County Emergency Medical Agency (ICEMA) certified. The center has initiated benchmarks for performance that include the following performance standard:

- Dispatch Processing Time: One minute average of all 9-1-1 incoming calls. The processing time is the interval between receipt of a call to the initiation of the dispatch sequence.

Data is available to dispatched agencies for analysis. Desert Com reviews calls and statistical data to improve its training programs and to enhance communications services for the eight agencies it serves.

### **Fire Station Deployment**

The Big Bear City Fire Department provides emergency services from two staffed locations. The area protected consists of 21.2 square miles for fire response and 258 square miles for emergency medical response. The BBCFD's stated informal response time goals for fire response within the District is to initiate fire suppression action within six minutes of receipt of alarm by first due units 73 percent of the time and within nine minutes 90 percent of the time.

### **Risk Analysis**

History of fire loss is documented. Data provided shows that from January 2004 through December of 2006, the fire loss was \$1,639,400.

Major target hazards within the response area are identified and mapped and available for reference by responding units. The use of and training with pre-incident surveys are described as "very limited."

BBCFD has mutual aid and automatic aid agreements with surrounding emergency response agencies. BBCFD and Big Bear Lake Fire Department (BBLFD) have a cooperative duty officer rotation system that makes a chief officer available 24 hours a day for both agencies.

During the interview process, several critical issues were identified by BBCFD staff.

- The number of personnel available for response at any given time is limited.
- The Fire Chief and Assistant Fire Chief are expected to be on call and available 24/7.
- Multiple calls and longer response times seem to be increasing.

These issues will be considered in the sections related to current and future service demands and deployment strategies.

- Pre-incident surveys should be reviewed and used routinely in training. They should be shared with automatic aid companies as well. The value of the surveys will be greatly enhanced by on-site visits.

### **Emergency Management**

Emergency management, once a low priority in the minds of the public, has risen to a level of consciousness in everyday life. The Department of Homeland Security, nonexistent only a few years ago, now issues terrorist threat warnings, provides security screening for public transportation, and coordination of effort for all sorts of manmade and natural disasters.

Major disasters occur infrequently, but such events can result in a complete paralysis or destruction of municipal infrastructure, leaving local government incapable of providing basic services to the public. While often given little attention due to their low frequency of occurrence, disasters generally result in high-risk consequences.

Well prepared community governments prepare themselves, other institutions, businesses, and the public to survive disasters by attempting to mitigate hazards to reduce risk. The goal by preparing action plans, developing interagency agreements, and conducting exercises is to help limit or manage the consequences of a disaster. The nature and type of probable disasters facing different communities varies. While history is a good indicator of the probability of natural disasters, manmade disasters may occur unexpectedly. Probable natural disasters in the Big Bear area may include wildfire, earthquake, and/or severe winter weather. With the many tourists and sports activities, the potential for mass causality incidents also exists. The BBCFD recognizes the potential for such incidents and as such participates in local, county, and, state

coordination efforts designed to enhance communications, interagency operations, and to provide for the massing of emergency resources as may be needed.



## **Objective Seven: Emergency Services Training Program**

Providing a safe and effective emergency fire and life safety delivery system requires a well trained response force. The International Fire Service training Association (IFSTA) states:

“...[R]egardless of the particular system used, an effective training program must include: (1) the continuous training of all levels of personnel in the fire department; (2) a master outline or plan; (3) a system for evaluating the scope, depth and effectiveness of the program; and (4) revising the program, as required, to include advances in equipment, products, and technique.”

Without a high quality and comprehensive training program, emergency outcomes are compromised, departmental personnel are at risk, and the department and the BBCCSD may be exposed to liability. The training and education of department personnel are essential functions for the Big Bear City Fire Department.

### **General Training Competencies**

The Vision of the California State Fire Service Training and Education Strategic Plan 2006 is:

“To develop and implement a premier, all-risk, statewide emergency training and higher education system; from the entry level through journey, supervisory, management, and executive levels that includes and credits self-development and experience; and is in collaboration with all fire service organizations and stakeholders.”

To ensure quality emergency performance, the training provided should be based on established standards of practice. There are a variety of sources available for such standards. The BBCFD has selected the International Fire Service Training Association (IFSTA) training material and the fire department’s SOPs and Training Manual as its main sources of material. The department has also selected the California State Fire Marshal’s Certification System and the California Incident Command Certification System (CICCS), which is based on national and state standards. By using these criteria, the Big Bear City Fire Department’s training program provides training to paid on-call and full-time firefighters on an array of subject matter from entry level through career development and specialized services.



The Big Bear City Fire Department is a strong advocate of the California State Office of Emergency Services, Fire and Rescue Division Incident Command System. The challenge faced by the department, however, is staffing the designated positions as required by incident activity. This is an issue facing most departments with limited members, especially those with limited staff positions. The Big Bear City Incident Commander is also designated as Safety Officer. The Incident Commander position needs to be located at the incident command post; whereas, the Safety Officer needs the flexibility to view all aspects of emergency operations. To compensate for this situation, the department utilizes call back personnel and surrounding fire departments.

- Consider developing a cadre of personnel from within the department and surrounding departments who are qualified through training to fill Incident Command positions.

All department members receive training in the Firefighter Accountability System<sup>15</sup> which is included in the Department's Respiratory Protection Guidelines. The system encompasses several levels of accountability beginning when the firefighters report to duty. Their locations are also tracked by apparatus and emergency scene activity. The firefighters have attached to their protective clothing a yellow and red tag. The yellow tag is placed on the assigned unit and the red tag given to the Entry Officer. The system is, however, dictated by the discipline and responsibility of the personnel. Training also extends to OSHA provisions commonly referred to as "two-in, two-out" which relates to worker safety, including being in an environment that is Immediately Dangerous to Life and Health (IDLH).

- Review the department accountability system and procedures for applicability to all incidents regardless of type or size.

Specialized training is conducted annually on low angle rescue, ice and cold water rescue, and confined space rescue. Selected personnel are sent to Trench Rescue Training conducted by the San Bernardino County Fire Department. All paid members of the department are trained and certified at the Hazardous Material Operations level. Chief Officers have completed Hazardous Materials Command classes.

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<sup>15</sup> The Accountability System is primarily designed to track emergency personnel during emergency operations to ensure worker safety.

Big Bear City personnel receive wildland fire training to meet the California Incident Command Certification System (CICCS) standard. The training is based on the requirements of the National Wildfire Coordinating Group 310-1. CICCS is required for California firefighters to receive their 'Red Card' and engage in wildland fire activities. Big Bear can be considered a suburban area with a high wildland fire potential, thus the department provides both structural and wildland response.

Vehicle extrication training is conducted annually. Vehicles are provided for each of the shifts. Captains conduct the annual training. It is acknowledged that the training may lack consistency amongst the three shifts due to the absence of a full-time training officer position. The issue of a full-time training officer is a recurring theme when discussing consistency and effectiveness of training across the department.

- Training consistency between the shifts should be a high priority in the planning and delivery of all training programs.

Defensive driving is included in the department's training schedule but is limited. The department is to be complemented on its good driving record; nevertheless, comprehensive defensive driver training should be provided for all emergency vehicle drivers.

- Evaluate options to improve the quality of defensive driver training for all emergency vehicle drivers on a routine basis.

The department participates in a countywide disaster drill on an annual basis. Drill subject matter includes wildland fires, weapons of mass destruction (WSD), and earthquake and pandemic flu. In addition, multi-agency drills are conducted quarterly; subjects include ice rescue, wildland, low angle, and fires in commercial structures. Inter-station drills involving Stations 291 and 292 are conducted by the shift Captains. Pre fire plan surveys of major occupancies, including occupancies in other mutual aid jurisdictions, are kept in the Target Hazard book in all fire apparatus.

Although the IFSTA Manuals are the primary source of training material, the department has also developed a Training Manual and SOPs, both of which are being used as the secondary source. Manipulative training is the primary instruction method for fire suppression training,

while didactic training is used for paramedic skill development. Since SOPs are a secondary source of training, it is recommended that an official SOP manual be developed.

- Develop an official SOP manual since SOP's are a secondary source of training.

There is no method for establishing measures or evaluations for performance based on the department's training program i.e., there is no competency-based training but consideration is being given to creating a performance-based system. The department should consider the development of performance-based criteria to evaluate its training program and fire company performance.

- Consider the development of performance based criteria to evaluate training programs and fire company performance.

An annual number of hours for training have not been established, though there are approximately 20 night drills scheduled annually. These drills are primarily to address paid on-call firefighter training. There are a variety of documents that can provide guidance on the amount of time a firefighter should spend training each year. The Insurance Service Office (ISO) Fire Suppression Rating Schedule recommends 20 hours per member per month or 240 hours annually. Included in the recommendation are two night drills per year, totaling six hours. The department should consider establishing annual training hours per the ISO recommendation of 20 hours per month for each member.

- Evaluate methods to increase annual training hours towards the ISO recommendations of 20 hours per month or 240 hours per year for each member.

The 2005 department records indicate that 8,613 hours of training were spent in training paid and paid on-call firefighters. When viewed against the existing 2006 personnel roster, 1,798 hours, or 150 hours per month, were spent on personnel currently no longer associated with the department. Lost hours were represented primarily within the paid on-call firefighter category, and hence are not a negative reflection of the department. Today's fire personnel are much more willing to receive their entry level training at the expense of one department to obtain a full-time firefighter position in another department. It is interesting to note that if the 1,798 hours were applied to the paid firefighter category, each firefighter would have received 258 hours of training during 2006, well within ISO recommendations. These hours should not necessarily be

viewed as lost or unproductive hours, but rather as lost opportunities or the consequence of a paid on-call force. These hours do, however, impact personnel that are responsible for training of the paid on-call force and the possible lack of training opportunity for paid firefighters. Although the pool of available paid on-call members in the Big Bear valley may be limited, thought should be given to the feasibility of establishing a collaborative Big Bear Valley Recruit Firefighter Academy. Such a collaborative effort could maximize the available hours for training and increase the training hours of individual firefighters.

**Figure 16: Department Training Hours, 2006**

	Training Hours Existing Personnel 2006			
	Training Hours per Shift	Taining Hours per Month	Training Hours per Year	Total Yearly Department Training Hours
<b>Firefighters</b>	1.45	14.75	177	3,897
<b>Paid-Call</b>		20.26	243	2,918

There is no formal post-incident review process in place, though informal reviews are conducted on some incidents. Learning from past experience is a valuable training tool and of benefit to all department members. The Department should establish a written policy delineating when post-incident reviews will be conducted, both informal and formal, who will conduct the critique, and how the information will be disseminated to department members.

- Establish a written policy delineating when post-incident reviews should be conducted, both informal and formal, including who should conduct the critique and how the information will be disseminated to department members.

EMS protocols are written with EMT-Basic skills being the minimum department standard for paid personnel. EMT-Paramedics are trained as per state paramedic certification requirements. EMT instructors are provided in-house, with the medical director and the EMS Coordinator responsible for the EMS program. In addition, the EMS Coordinator provides liaison with the County EMS agency and area hospitals. There is sufficient time allotted for paramedic training. In the future, the department would like to increase the skill level of paramedics. The annual training should include Rarely Used Skill Training (RUST) for all paramedics. The department is complemented for the competency of its paramedics.

Training is coordinated via a monthly and annual training schedule; however, formal annual training goals and objectives have not been adopted. The annual training schedule does include informal training goals. In addition, the basic recruit training provided twice annually is considered a training goal.

- Consider including training goals and objectives along with performance measurements or outcome statements in the department's annual budget documentation.

The department has not established physical performance standards or requirements for firefighters, though firefighters are encouraged to participate in daily exercise routines. Department members are, however, provided an annual Wellness and Fitness Screening Program.

- Establish a policy and SOGs providing direction and guidance related to physical fitness and physical fitness training.

Captains are required to obtain California State Fire Marshal, Company Officer Certification along with other mandated regional and national certifications. Minimum certification levels are detailed in the Fire Captain job description.

### **Training Facilities**

It is important to recognize that changing technologies in fire suppression, equipment, building construction, and increased emergency service delivery demands and risks require that today's firefighter keep pace, be knowledgeable, and be well trained. NFPA 1402<sup>16</sup> states,

“A proper environment for obtaining this knowledge and training is equally important.”

The first time a firefighter experiences the environment of an emergency should not be during an actual emergency. Quality training occurs when training simulations are created that closely mimic real-life scenarios. Specialized facilities with the flexibility and capacity for realistic training operations involving firefighting, rescue, ladder, pumping, command, and hazardous materials imparts those real-life training circumstances. Providing quality facilities, props, and

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<sup>16</sup> National Fire Protection Association, "NFPA 1402: Guide to Building Fire Service Training Centers," 2007 edition.

tools to support the Big Bear City Fire Department training efforts should continue to be a priority.

The department has a VCR, projectors, and computers networked together at the two stations for training, but does not have dedicated classroom facilities. Depending on availability, the BBCCSD Board Room can be used for training sessions.

Big Bear City Fire Department also does not have a training facility, though there are several props used for training at Station 291. Included are ventilation, forcible entry, confined space, Denver drill and firefighter survival props. There is no training tower or burn structure in the valley. Station 291 serves as the Administrative Headquarters for the fire department and is an active fire station.

There is no drill ground or training tower to lay hose, ladder buildings, or advance hose lines aloft. In reality there is no way to simulate a smoke-filled building or expose firefighters to an actual fire in a burning building. In lieu of a training facility, the department is currently using parking lots or streets to lay hose and using commercial buildings for ladder evolutions. There is no dedicated training site for hazardous material training, trench training, heavy or low angle rescue, self-contained breathing apparatus (SCBA), and Rapid Intervention Team training needed to rescue a trapped firefighter. The ice and cold water rescue team has access to Big Bear Lake for training.

The department has suggested that a Training Facility/Site could be co-located on property presently occupied by the Paradise Maintenance Facility. There is sufficient open space at this location to accommodate a semi-Regional Training Center, which would meet the training needs of the Big Bear City Fire Department as well as other departments in the valley. A consideration in developing any training center is its location, as these sites generate large amounts of training activities during the daylight hours and, in the case of Big Bear City Fire Department, at night. The BBCFD has recognized this need and opportunity and has allocated \$10,000 in its 07/08 budget to initiate development of a training site at the Paradise yard.

There are several options for the Big Bear City Fire Department to consider when contemplating a Training Center:

- The first is to maintain the status quo, and continue firefighter training with the existing facilities. This option is the least costly and complicated but doesn't fulfill the current and

future training needs of the department or meet state and federal training mandates (not following the above mandates may expose the BBCCSD to unwarranted liabilities).

- A second option, and one that is the least expensive of the remaining options, is to install a modular classroom and a training tower on the Paradise Maintenance Facility property. This would provide an improved learning environment and facilitate manipulative skill development. It also provides space for training props essential in learning specialized skills.
- A third option is to develop a fire training center by partnering with other fire agencies in the valley. This can also include partnering with the local community college's fire technology programs. Though this option is a little more complicated, its main attractiveness is cost sharing between the federal, county, city, BBCCSD, and community college agencies. Each agency would then benefit from an enhanced training facility.
- The fourth option would be to create a multi-disciplinary regional training center involving fire and law enforcement agencies. This option is the most complicated and the one requiring the greatest amount of coordination and cooperation. It is, however, the option with the greatest potential for obtaining grants, cost sharing, and revenue generation.

When considering the four options, option two is the one that brings the quickest return on investments in increased efficiency and effectiveness, both in the short and long term. This option addresses the immediate training needs of the department in a cost-effective method. This option also allows time to analyze the other options presented to determine future training needs, not only in fire agencies but throughout public safety agencies in the valley.

NFPA recommends that a cost benefit analysis be conducted to determine what type and level of training center investment is cost effective, and if it is feasible to contribute to a long-range financial commitment. Any analysis must include all participating or potentially participating agencies in developing a training center master plan. The master plan should include the type and number of buildings, burn areas, and props and identify administrative and support issues.

- Continue to financially support and pursue various options to develop and expand the Paradise training site and facilities to support on going technical and specialized emergency response training.

## **Training Staff**

IFSTA states,

“The training program must be organized, supervised, and conducted by individuals who are knowledgeable in this profession.”

The Assistant Fire Chief, in addition to his duties as Fire Prevention Officer, is the designated Training Officer. The Assistant Fire Chief is responsible for the planning, scheduling and management of the training program. The Assistant Fire Chief's dual responsibilities do not allow sufficient time to manage both programs. Consequently, much of the training is shift-based rather than program-based and reflects the interest of each shift rather than representing a department-wide focus. Training is primarily the responsibility of the Captains.

The challenge when an individual is assigned multiple responsibilities is to ensure that there is sufficient opportunity to provide a consistent interpretation and application of the methodology and direction contained in various training and procedure manuals. It is also important to reduce the variations that exist between shifts by providing a consistent message on training.

A training officer who can spend significant time in the role of delivery system planning can have a positive impact on the overall effectiveness of emergency response. There presently exists a gap between the scheduled or planned training and the actual execution of the training. A full-time training officer position can address these important issues. It is indisputable that a full-time training officer position is the most effective method to deliver emergency training. When responsibilities for training program administration are coupled with other responsibilities, the quality of training suffers.

The clerical assistance available to the training division is provided by an Administrative Assistant who also provides clerical support for the Fire Chief and Assistant Fire Chief. The addition of a full-time training officer may cause the need for additional clerical support. At such time the department establishes a full time training position, it should also evaluate the need for additional staff support.

- Consider establishing a full-time training officer position and adequate clerical support services to strengthen overall competency and performance.

### **Entry Level Training**

Presently, the department is continuously recruiting for paid-call firefighters. A full-fledged recruit academy for entry-level firefighters is not conducted. The department provides an in-house 8 to 12 week training academy for on-call firefighters twice yearly. Captains serve as instructors for the recruit training, which basically targets manipulative skill development. The current curriculum is approximately one-half of that contained in the California State Fire Marshal's curriculum of Firefighter 1 certification.

On-call firefighters are hired at the EMT level. Reserves are not EMTs but are trained in First Aid, CPR, and AED. Reserves are encouraged to obtain EMT certification.

Since recruit training is a time consuming ongoing endeavor, Captains are detracted from providing training at a higher level for full-time firefighters. One option that should be considered is to establish a regional recruit academy in conjunction with all valley fire agencies. This approach could distribute basic training workloads across more departments, giving shift Captains additional time for regular skill maintenance training.

- Consider working with other area fire departments to establish a regional approach to basic recruit training.

### **Ongoing Skill Maintenance Training**

Training mandates, recertification, and ongoing skill maintenance are the foundation of a training program. The recruit training which occurs twice annually does not allow for in-service refresher training to ensure efficiency and to avoid degradation of skill levels.

The Insurance Services Office (ISO) and other agencies provide guidance on the amount of time a firefighter should spend training each year to ensure proficiency. ISO recommends that each firefighter receive 20 hours of training per month or 240 hours yearly. The department has established an annual training schedule, which is updated monthly. Captains on each shift provide the training for full-time firefighters, time permitting, since their primary focus is recruit training. The department should consider the establishing a standard on the number of training hours each member is to receive monthly and annually.

The physician advisor and the EMS Coordinator provide oversight of paramedic training. The goal is to provide continuous education necessary to meet the state recertification requirements and fulfill specific departments training needs.

A trained urban search and rescue (USAR) team and a Hazardous Materials team are provided by the San Bernardino County Fire Department. Dive teams for lake rescue are provided either by the Sheriff's Office or the Municipal Water District, which is responsible for lake management.

The use of multiple radio frequencies is identified as an obstacle to effective regional mutual aid training and response. The BBCFD is on a different frequency than San Bernardino County Fire units and operates with a different dispatch center. There are difficulties transitioning to the command channel involving operations with San Bernardino County. This is primarily due to the fact that San Bernardino County Fire uses an 800 mhz radio system. Big Bear City Fire and Big Bear Lake Fire use a VHF radio system. Big Bear City and Big Bear Lake Fire Departments can easily talk to one and another, having the same system. Big Bear City Fire did explore the possibility of switching to the 800 MHz system several years ago. At that time it was determined that the cost of the 800 MHz radio equipment and the monthly service fee were not financially feasible for Big Bear City Fire Department.

### **Competency-Based Training**

Ongoing training should follow an identified plan based on demonstrated training needs. Such a plan is best developed through periodic evaluation of the current employee skill level. Under a competency-based system, an evaluation of skill performance is conducted at scheduled intervals to determine if the person being evaluated can perform the tasks in accordance with predetermined standards.

Competency-based training maximizes the time used for training and ensures that personnel are performing at the level established by the department. To institute a competency-based approach to training, all of the needed skills must be documented to describe the expected standard of performance. These standards may include all skills (i.e., such as hose and ladder handling, apparatus operation, EMS procedures, rescue, and forced entry and ventilation).

The fire department has been contemplating development of a competency-based approach to training on basic evolutions. It is suggested that the fire department initiate a competency-based approach to all training.

- Initiate a competency-based approach to training.

### **Career Development Training**

National standards recommend that personnel demonstrate the skills and knowledge required before promotion to a more responsible position. Department policy is to fill vacant or acting positions from the established lists for Engineer or Captain. The department tests every two years for both Engineer and Captain. Individuals that pass the test are placed on an eligibility list and can act in these positions or be hired as a vacancy occurs.

Ideally, each employee should have an established career development plan that guides educational efforts and helps ensure available funding for personnel to attend training based on their long range goals.

Currently the department does not have a formal career development or educational incentive program that would provide reimbursement for college or higher level courses. There is a process where chief officers review potential career paths with department members and attempt to provide opportunities for members to attend appropriate programs. The department should seek available funding to support development and arrange college classes at the local high school that are convenient and affordable.

- Although the potential student pool may be too low in the Big Bear valley area to support college-level education in the traditional methods, the use of grants or other means should be evaluated in an effort to make such education more accessible.

### **Training Program Planning**

Typically training programs governed by clear policies usually operate efficiently. Well documented annual training plans and annual reports are great communication tools to market the efforts and activities of the training division. To be successful in obtaining adequate funding, the division must develop data and display it convincingly so that policy makers fully understand and appreciate the needs of the division. Merely saying that a need exists because the training demand is growing is not enough. Comprehensive data gathering capabilities and professionally

written and displayed reports are keys to success. Like any other activity, the training and education of the fire department personnel should be conducted under a comprehensive plan.

Effectively accomplishing these functions requires an individual dedicated to the training division. It is difficult to bring these issues to fruition when the individual assigned to training has multiple duties that divert attention from training division.

Ideally, a comprehensive training plan includes:

- Identification of performance standards for all personnel in all training disciplines.
- Provisions for periodic review of individual and company level performance.
- Scheduled maintenance training to prevent skill degradation.
- Scheduled skill improvement training.
- Clearly stated training objectives for each training session presented.
- A process to evaluate the amount of time spent in training.
- Scheduled outside training opportunities.

### **Training Records and Reports**

Training records are an essential part of training program management. As referenced in NFPA 1401, such records:<sup>17</sup>

- Are necessary to meet legal and statutory requirements.
- Assist training management decisions for planning, programming, and budgeting.
- Are used to develop training objectives.
- Provide a base from which to analyze compliance or deficiencies in the training program.

BBCFD training records are maintained using the Firehouse Software® training package. Records are maintained for each individual firefighter. Company training records are not specifically maintained. Data entry is performed by the shift Captains.

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<sup>17</sup> National Fire Protection Association, "NFPA 1401: Recommended Practice for Fire Service Training Reports and Records," 2006 edition.

Reports on department activity are prepared for the monthly BBCCSD Board meetings. Training activity for the month is included in these reports. A comprehensive annual report is not prepared for Board review. Since monthly reports are being prepared on training activity, it is suggested that the monthly data be used to prepare an annual training report to the Board.

- Use monthly reports to prepare an annual training report for the BBCCSD Board of Directors that summarizes the overall training program for the year.

Fire chiefs across the United States are being challenged to find ways to do more with less. Firefighters must be trained to competently and safely deliver emergency services. Many of these services place increased demand on the department along with need for increased training.

The Big Bear City Fire Department's training budget is reported to be adequate for the type and amount of training presently provided. Attention should be given to the training budget as efforts to enhance and/or expand the training program are undertaken.

## **Objective Eight: Fire Prevention Program**

### **Overview**

The Fire Chief serves as the Fire Marshal for the District. The Assistant Fire Chief manages the fire prevention activities. He also serves as the Training Officer and is responsible for emergency operations.

District fire prevention activities include plan review, code enforcement, fire cause investigation, public education, and an engine company inspection program. Captains support the Assistant Fire Chief in carrying out company inspections and fire investigations.

Many fire departments, including the BBCFD, use operational personnel as an element of their fire prevention programs. An increase in emergency workload may diminish the ability of firefighters to sustain an inspection program. BBCFD has established a business occupancy self-inspection program to reduce the inspection workload.

Involving firefighters in fire prevention activities pays dividends well beyond just prevention. After inspecting a property, firefighters are much more aware of the structural conditions of the building and any hazards that may be present. When a fire does occur, firefighters arrive with the benefit of advanced knowledge about the property. Fire suppression and rescue effectiveness are enhanced.

- Continue to utilize operational personnel in fire prevention programs.

### **Fire Prevention Codes and Ordinances**

An aggressive fire prevention program represents the best opportunity for a fire department to minimize the losses and human trauma associated with fire. The International Association of Fire Chiefs defines proactive emergency services as:

“...embracing new, proven, technology, and built-in protection, like automatic fire sprinkler and early detection systems, combined with aggressive code enforcement and strong public education programs.”

A fire department should actively promote fire resistive construction, built-in early warning and suppression systems, and develop an educated public, trained to minimize the risk of fires,

accidents, and medical emergencies. The BBCCSD has adopted the following Codes and Ordinances:

- 2000 Uniform Fire Code
- 2000 Uniform Building Code
- 2002 Ordinance 212; Fire Code Amendments
- 2002 Ordinance 216; Cost Recovery Fees

Big Bear City Ordinance 212 requires an NFPA approved fire sprinkler system in all new buildings 5,000 square feet or larger and in existing buildings when remodeling or alterations where additions are 50 percent or greater than the original building square footage. Buildings over three stories in height are required to install automatic sprinkler systems. Ordinance 212 establishes, pursuant to the California Government Code Section 51179, that every parcel within the boundaries of the Big Bear City Community Services District be designated as within the Very High Fire Hazard Severity Zone for wildfire. This, in addition to other requirements, stipulates that an effective fuel modification area be maintained within 100 feet of any building or structure.

Statistics from both the National Fire Protection Association (NFPA) and the U.S. Fire Administration clearly demonstrate that residential buildings are the occupancies in which the overwhelming majority of fire deaths occur. Many jurisdictions across the county have adopted residential fire sprinkler ordinances as a pro active life safety measure. The results clearly demonstrate the value of such laws. Jurisdictions in California with residential fire sprinkler requirements include, but are not limited to the following:

- San Clemente, California
- San Rafael, California
- Livermore, California
- Napa, California

### **New Construction Review**

All plans for new construction and remodeling of existing structures are reviewed by the fire department in collaboration with the San Bernardino County Building and Safety Division and the San Bernardino County Planning Land Use Services Division. There appears to be a solid work with the county. Plan reviews consider fire and life safety systems, fire suppression water

supply, and fire apparatus access. All new construction is first reviewed by the fire department before being accepted by the Building and Safety Division. Construction plans for large commercial developments or special construction types is out-sourced to a fire protection consultant. The fire department signs off on all sprinkler and alarm systems, access routes to structures, defensible space requirements, or issues involving fuel modification. Figure 17 shows the number of new construction projects for the past three years:

**Figure 17: New Construction Starts, 2004-2006**

	2004	2005	2006
<b>New Construction Projects</b>	499	365	282

Ordinance 216, as adopted by the BBCCSD Board, establishes charges to cover certain services provided by the fire department. The fire department presently has a basic flat rate charge of \$75 for plan review. This fee does not cover the actual cost of performing the service and should be revised to reflect the true cost. Proposition 13, a tax initiative passed by the voters, allows a fee to be charged that reflects the actual hourly rate of the individuals performing the service. The hourly rate should also include any overhead costs or benefits attributed to the individual. During the budget review process, the BBCCSD Board should consider revision to the present fire department fee schedule.

- Consider revising the present fire department fee schedule to more accurately reflect the full cost of plan reviews.

A Key or Knox Box system provides firefighters with safe and secure emergency access to a building. Knox boxes are usually installed at schools, government, and public building. There is no cost to the fire department, as the cost for a Knox Box is borne by the property owners. Knox boxes may be required by the Fire Chief depending on the nature of the occupancy. For example, gated occupancies and schools are required to install Knox Boxes. Locations for Knox Boxes are evaluated during the plans review process. It may be advantageous for the fire department to specify the type of occupancies where Knox Boxes should be installed.

- Consider establishing a written policy/SOG specifying which types of occupancies are required to install Knox Boxes.

### **Fire Safety Inspections**

Property inspections to eliminate potential fire hazards are an important part of an overall fire protection system. The health, safety, and welfare of citizens and firefighters are always in balance. Additionally, more hazardous structures and businesses require a permit to operate in compliance with the applicable code and should require periodic inspections to ensure that a minimum degree of safety exists.

A citation process is in place that allows the fire department to deal with recalcitrant building or property owners. These individuals have been given several notices on code violations or are not in conformance with code provisions. The fire department has not needed to use the program as they have been successful in using "persistence." The inspection of storage tanks and hazardous material storage is not a department responsibility.

The recommended frequency for fire safety inspections varies by the type of occupancy. Generally, inspections are classified by the degree of hazard. Figure 18 describes hazard classifications and the recommended inspection frequency:

**Figure 18: Occupancy Hazard Classification; Inspection Frequency**

<b>Hazard Classification</b>	<b>Example Facilities</b>	<b>Recommended Inspection Frequency</b>
<b>Low</b>	Apartment common area, small stores and offices, medical offices, storage of other than flammable or hazardous materials	<b>Annual</b>
<b>Moderate</b>	Gas stations, large (>12,000 square feet) stores and offices, restaurants, schools, hospitals, manufacturing, (moderate hazardous materials use), auto repair shops, storage of large quantities of combustible or flammable material.	<b>Semi Annual</b>
<b>High</b>	Nursing homes, large quantity users of hazardous materials, industrial facilities with high process hazards, bulk flammable liquid storage facilities, a facility classified as an "extremely hazardous substances" facilities by federal regulations (SARA Title III)	<b>Quarterly</b>

The fire department estimates that there are approximately 231 business occupancies in Big Bear City. To compensate for the operational work load; a self-inspection program was initiated. Approximately 55 self-inspection forms are mailed out to business owners annually. Neither the effectiveness of the program nor the compliance rate is known. Other than the self-inspection form, no organized systematic method of completing inspections based on hazard classification and frequency is in place. This is partially attributed to other time consuming demands placed on the department. Restaurants and other higher risk occupancies are on a scheduled yearly inspection cycle but in reality are found to be inspected every other year. The Fire Prevention Officer (Assistant Fire Chief) conducts approximately 12 inspections annually, the remaining 164 inspections, if divided between the three shifts, would produce an annual shift workload of 55 inspections. It is recommended that an annual company inspection program be implemented that reflects department workload and hazard classification of occupancies. For example, a compliance standard might be to complete 90 percent of assigned inspections within a 12-month rolling time period.

Figure 19 shows the number of inspections completed over the past three years:

**Figure 19: Safety Surveys Conducted, 2004-2006**

	2004	2005	2006
<b>Business Inspections</b>	26	45	23

\*Additional ten inspections scheduled, but occupancy found vacant.

- Commit to an annual company inspection program that reflects workload, hazard classification, and occupancy fire loss history. Data collection should allow for accurate reporting of program activity and compliance rates.

### **Fire and Life Safety Education**

Providing fire and safety education to the public to minimize the occurrence of fire is an appropriate action to take. The responsibility for public education is assigned to the Administrative Assistant. Public education programs include EDITH (Exit Drills In The Home); station tours; kitchen safety programs; and stop, drop, and roll; instruction and fire extinguisher training are provided on request. Smoke detectors are provided by a local service organization. The fire department installs the smoke detectors and replaces batteries.

Public education programs in the schools generally follow the NFPA theme for Fire Prevention Week for that particular year. Due to the department workload, Big Bear City schools have not been visited for three years. The department does, however, participate in other public education events such as Healthy Start, Family Fun Night, National Night Out, Family Fun Day, and Kids' Day. During these events, the department has a variety of activities on wildfire preparedness, candle safety, kitchen safety, and fire drills in the home. The department also hosts an annual pancake breakfast and open house during Fire Prevention Week.

Community Emergency Response Team (CERT) training is provided two to three times annually through a cooperative arrangement with fire departments throughout the valley, who all provide instructors. Today, over 100 valley-wide residents have completed CERT training. CPR and first aid training is provided on the first Saturday of each month for a fee, with instruction provided by off-duty firefighters.

Fire extinguisher classes are taught to groups and companies as requested. Public education materials are available to the community, either at the Headquarters fire station or at public education events. Approximately 50 percent of public education material is bilingual.

The department participates in the Mountain Area Safety Task Force (MAST). The taskforce membership is composed of local, state, and federal fire agencies, which provide educational material and coordinates wildland interface issues cross jurisdictional lines in the valley.

### **Fire Investigation**

The investigation of fires and related emergencies is an important part of providing fire and life safety to a community. The department investigates all fires and related incidents. Fire cause determination is initially performed by Captains who have completed and are certified at the Fire Investigation 1 level by the California State Fire Marshal's Office. The department maintains a fire investigation kit to assist the Captains. In the event that Captains are unable to determine the cause of a fire or it is incendiary or one of a significant nature, the San Bernardino County Sheriff's Arson team is requested to respond. A Juvenile Fire Setter Program is managed by the Assistant Fire Chief and firefighters. Serious cases involving juveniles are handled through a collaborative partnership with the Sheriff's office. Figure 20 provides a summary of the ignition causes for the last three years:

**Figure 20: Juvenile Fire Causes, 2004-2006**

Cause of Ignition	Number			Percentage of all Fires			Total Estimate Loss			Percentage of all Fire Loss		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Cause Other			2			8.33						
Intentional	1		4	3.84%		16.66%						
Unintentional	13	14	10	50.00%	63.63%	41.66%	\$152,800	\$748,600	\$92,000	45.23%	98.55%	16.97%
Failure of equipment or heat source	4	5	3	15.38%	22.72%	12.50%		\$1,000	\$160,000		0.13%	29.52%
Act of Nature	2			7.69%								
Cause under Investigation	3	3	1	11.53%	13.63%	4.16%	\$185,000	\$10,000		54.77%		
Cause undetermined after Investigation	3		4	11.53%		16.66%			\$290,000		1.32%	53.51%

**Incident Information Analysis**

The primary purpose for maintaining a record of emergency responses is to evaluate the effectiveness and performance of programs. The two-record management systems used by the fire department are Firehouse Software® and Healthware Solution®. Paramedics record their patient care information in the Healthware Solution program; all other data on incident information, training, and fire prevention are recorded in the Firehouse software program. Incident analysis on incident time of day, day of week, method of alarm, dispatch times, and response time is maintained by the Regional Communication Center.

The Firehouse Software and Healthware Solution systems are not compatible. The incompatibility is seen in the data collected by the department that results in fragmented information and, therefore, unreliable for analysis. Furthermore, information is difficult to extract from the Firehouse data base, the Healthware Solutions system, and from the Regional Communication Center databases. Information on the cause of residential fires, for example, was not able to be extracted even though the data was entered in the system.

- The delivery of emergency, non-emergency, and transport services is the core activity of the department. Work to coordinate and centralize all incident data collection and reporting processes (fire, EMS, and routine transports) to allow for complete analysis.



## **Objective Nine: Facilities, Apparatus, and Capital Improvement**

### **Capital Plans**

The purpose of a capital improvement program is to provide a comprehensive schedule of planning, design, construction, maintenance, and repair of facilities and infrastructure. Such a plan anticipates major repairs and replacement over a number of years and allows an organization to systematically plan, budget, and finance capital facilities and related equipment. The BBCFD maintains a Capital Improvement Program (CIP) used to budget for public safety facility needs but struggles to maintain adequate funding to fully address all future needs. An Apparatus and Vehicle Replacement Fund<sup>18</sup> is used for the scheduled replacement of emergency vehicles. It is fully funded under today's apparatus replacement costs. A 5-Year Improvement plan for Fire and EMS equipment is also identified and included in the budget.<sup>19</sup>

Major building improvement and /or maintenance needs are identified and addressed through the routine annual budget development process.

The fire department's apparatus schedule covers all of the existing fire department fleet and generally projects annual costs out through the expected life expectancy of the apparatus. The current schedule is based on estimated replacement costs. It is not adjusted for future inflation. The replacement schedule in the 2007/08 budget projects an annual requirement of \$197,449 with a starting cash reserve of \$1,507,289. Based on the following schedule of vehicles (Figure 21) we find the reserve amount (Current Cash Requirement) slightly low.

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<sup>18</sup> Big Bear Community Services District, "Fiscal Year 2006-07 Approved Budget and Work Plan," page 39.

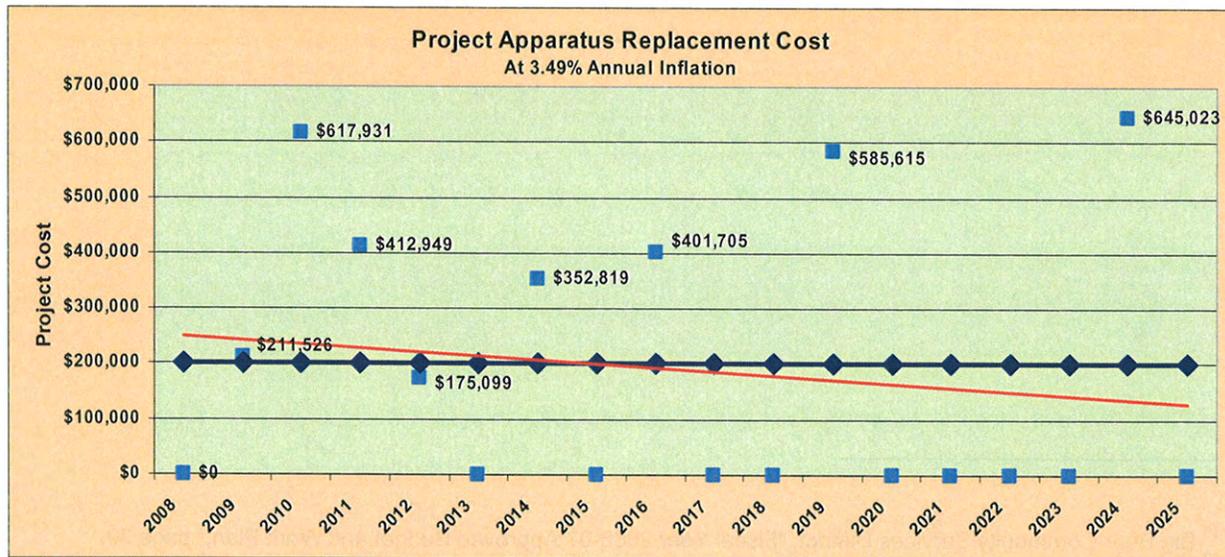
<sup>19</sup> Ibid, page 37.

**Figure 21: Apparatus Replacement Schedule**

(TYPE)	UNIT	YEAR	REPLACEMENT COST	ANNUAL FUND CONTRIBUTIONS	CURRENT CASH REQUIREMENTS
5	E291	2004	\$ 360,000	\$ 18,000	\$ 72,000
5	E291A	1990	\$ 360,000	\$ 18,000	\$ 324,000
8	BE291	1999	\$ 300,000	\$ 15,000	\$ 135,000
6	WT291	2006	\$ 256,000	\$ 10,240	\$ 20,480
12	SQ291	2004	\$ 88,000	\$ 5,867	\$ 23,467
13	SC291	1979	\$ 80,000	\$ 2,286	\$ 66,286
11	2900	2000	\$ 50,000	\$ 5,556	\$ 44,448
11	2901	2000	\$ 50,000	\$ 5,000	\$ 40,000
11	2902	2004	\$ 50,000	\$ 5,000	\$ 20,000
1	MA291	1999	\$ 147,500	\$ 14,750	\$ 132,750
1	MA291A	2000	\$ 147,500	\$ 14,750	\$ 118,000
1	MA291B	2002	\$ 147,500	\$ 14,750	\$ 88,500
1	MA291R	2004	\$ 147,500	\$ 14,750	\$ 59,000
1	MA49	2006	\$ 147,500	\$ 14,750	\$ 29,500
5	E292	1990	\$ 360,000	\$ 18,000	\$ 324,000
1	MA292	2003	\$ 147,500	\$ 14,750	\$ 73,750
11	Admin	2007	\$ 60,000	\$ 6,000	\$ 6,000
<b>TOTALS</b>			<b>\$</b>	<b>197,449</b>	<b>\$ 1,577,180</b>

In addition, the 10-year CPI for the Los Angeles/Riverside/Orange County area is 2.94 percent. During the last five years, the CPI averaged 3.49 percent. At these rates an engine that costs \$360,000 today will cost between \$589,160 and \$645,023 in the year 2025. Figure 22 projects annual apparatus purchase costs with a 3.49 percent annual CPI factor applied based on the District's current schedule. The red line shows the average expenditures through 2025. The blue line indicates that an average annual fund contribution of \$200,157 is necessary to maintain full funding for scheduled apparatus replacement considering the inflation factor.

**Figure 22: Vehicle Replacement Costs with Inflation**



## **Facilities Assessment**

### **Station 291**

Big Bear City Fire Department headquarters, Fire Station 291, is located at 301 West Big Bear Boulevard (at the intersection of Sawmill). The station was constructed in circa 1960, with the Administrative Office portion of the station accommodating the Administrative Assistant, EMS Accounting Clerk and the EMS Coordinator. It was remodeled in November 2006. At the time of construction in 1960, the station was built in conformance with the existing (and applicable) building codes.

The station is considered the Administrative Headquarters, also providing offices for the Fire Chief, Assistant Fire Chief, and as noted, EMS Coordinator, and Administrative Staff. In addition, there is additional office space for the Captains and Firefighters.

The station also houses the fire suppression force and concurrent apparatus with additional structures behind the station used for storage of reserve apparatus (primarily ambulances and a Snow Cat). A shipping container behind the station is used for storage. An additional structure houses the Emergency Generator, oxygen storage tanks for EMS, and general storage.

### **Future Expansion**

There is sufficient open space behind the station to accommodate expansion, which can increase the functionality of the station. This will offer the opportunity, if needed, to accommodate increased staff based on the department workload as a result of operational and administrative service level demands.

The existing space behind the fire department also could accommodate the construction of a new fire station, should that be necessary in the future. Presently, the station is of adequate size to accommodate the existing staff and personnel assigned to the facility, though there are several areas of the station that could benefit from increased space.

The additional space requirements should not to be interpreted as something that needs to be immediately remedied. It is natural for a fire station nearly 50 years old to in adequately accommodate present day fire apparatus, including the demand for multiple types of apparatus,

especially ambulances and today's staffing configuration and work load demands, not to mention other amenities that didn't exist in 1960.

### **Conditions**

During the winter months, there are occasions when the roadway in front of the station's apparatus doors experience flooding which could enter the station. Access to Big Bear Boulevard via Sawmill during emergency responses could be further accommodated by preemption of traffic signals or other warning devices, which would expedite response times and increase firefighter safety.

The apparatus apron directly in front of the apparatus floor doors leading to the street is not of sufficient length to accommodate the full length of today's fire apparatus. This places the firefighters too close to the street when they are cleaning and maintaining the apparatus.

A feature not warranted in the 1960's was a security alarm system for the station. With today's social environment, it may be prudent to alarm the station to protect the fire department assets and the staff working in the facility, especially when fire personnel are absent from the station while on an emergency call.

The Master Planning process will provide an opportunity for the BBCCSD Board to view the future functionality and efficiency of the station predicated on increased population, work load, location to calls for service, staffing increases and office space, overall service level demands, and maintenance and upkeep of the station.

The remodeling of the station's entry and reception area in 2006 has enhanced the public's image of the department as a professional organization and created an environment for one-on-one interaction with the public, along with increasing the effectiveness of the administrative duties and EMS system.

The conference room is of limited size but is adequate to conduct meetings of small to medium sized groups. There is, however, no room capable of functioning as an Emergency Operation Center (EOC) or Fire Operation Center during major emergencies. This deficiency could be remedied by having a combined and centrally located EOC serving the entire valley supported by all fire agencies, local disaster organizations, and sheriff's office.

The offices provided for the Fire Chief and Assistant Fire Chief, along with those provided to the Captains and firefighters, are adequate in size. Adding additional staff positions in the future will require a reconfiguration of office space, sharing of offices, or adding additional office space to the station. The station is also lacking a classroom for ongoing training for both firefighters and the community.

### **Fire Station Living Area**

The station living areas include a kitchen, day room or lounge area, exercise room, dormitories, rest rooms and a locker area. The station has accommodations for both male and female firefighters including separate dormitory, restroom, and shower facilities. There are, however, no separate locker rooms. The exercise room supports a good quantity and quality of equipment but is inadequate in size and height. The equipment does not adequately fit in the room, and the ceiling height is marginal for overhead lifting of weights. Unless due diligence is practiced when firefighters are exercising, unforeseen injuries may occur. Physical fitness for today's firefighters is of paramount importance. Firefighters need to maintain their operational effectiveness as fire and rescue activities are labor intensive and arduous. In addition, physical exercise reduces stress, worker compensation injuries, and sick leave, while maintaining a healthy work environment.

### **Fire Apparatus Area**

The area of the station where apparatus is housed includes a workshop or equipment repair area and a somewhat minimized locker area for storage of protective clothing. The drains on the apparatus floor discharge into a collector system before entering the storm drain system. In addition, a "Decon" area has not been designated for cleaning contaminated clothing and equipment. A residential style washing machine is currently in use for cleaning of contaminated protective clothing, but the waste water is expelled into the sewer without the benefit of an extractor system.

The apparatus bay is outfitted with vehicle exhaust systems. The station has a hose drying tower and a SCBA compressor for filling breathing apparatus cylinders. The intake of air for the compressor is taken from the ambient room air not an outside source, though the air is tested quarterly. The compressor was purchased from funds made available through a 2004 Fire Act Grant. Extra SCBA cylinders are carried on the engines, but additional cylinders stored adjacent



to the compressor should be made available and delivered to the emergency scene by off duty or paid call firefighters which would insure a ready supply of available air. Big Bear Lake Fire Department and Big Bear City Fire Department use the same type of SCBA. This provides for interoperability where spare SCBA bottles are readily exchangeable between departments for use on emergency incidents.

There is no apparatus maintenance area, and vehicle repair is out sourced. Minor repairs are performed on apparatus by firefighters. The small work shop area is limited in size and does not accommodate the repair of small tools and equipment along with SCBA preventative maintenance and repair.

- Install preemption of traffic signals or other warning device at Big Bear Boulevard and Sawmill, which would expedite response times and increase firefighter safety.
- Install a security alarm system for the station.
- Facilitate the development of a Joint Emergency Operating Center (EOC) servicing the entire valley supported by all fire agencies, local disaster organizations, and the sheriff's office.
- Consider installation of a department-wide washing machine with extractor for decontamination of protective clothing.
- Consider future plans for station upgrade to meet service demands.
- The BBCFD should evaluate the adequacy of the number of spare SCBA cylinders it has immediately available. Protocols and interagency agreements should be developed to ensure Incident Commanders can request and obtain sufficient cylinders on the emergency scene in a timely manner.

### **Station 292**

Big Bear City's second fire station is Station 292, located at 550 Baldwin (at the intersection of Maple). The station was rebuilt in 1995 following earthquake damage in 1992. At the time of construction, the station was built in conformance to all applicable codes. The station is on land leased from the Bear Valley Parks and Recreation for \$1 annually. The station is located at an intersection which provides ready response in several different directions.

### **Future Expansion**

The station is small and was originally designed to provide housing for a paid on-call force, not paid firefighters. The station location is in an area which is receiving increased demand for service and the potential for future growth. Though the station is small, as compared to traditional stations, there is sufficient space surrounding the station to provide for future expansion that may be necessary as the area develops and calls for service increase, requiring a different staffing pattern.

### **Conditions**

The station has a small reception area that has easy access directly into the office where there are two computer work stations. If the door of the station is open and personnel are on the upper levels, visitors have unrestricted entry to the office area. There is a small training library but no classroom or study area. The station is situated in a park-like setting at a relatively busy intersection without a security or alarm system and could become easy prey for vandals. A security system for the station would protect its assets and deter any unauthorized entry.

The station is without an emergency generator and there are no means for the public to notify the department of an impending emergency if the crew is not in the station. Without an electric generator to provide power during an outage, the station is without computer usage, power to activate the apparatus doors, and lights to perform essential station duties or provide a place of refuge for area residents.

### **Station Living Area**

The station living area includes a small combined kitchen/day room or lounge area on the second level. The kitchen/day room area can only accommodate the two persons assigned to the station. The dormitory is located on the third level with no other means of accessing the apparatus bays other than the two levels of stairs.

Overall response time is compromised due to the dormitory's location on the third level of the station and means of access to the apparatus. There are no accommodations for male and female dormitories or locker rooms, but the station does have two bathrooms and showers that accommodate both male and female use. Storage space is limited, though there is a hose drying tower. On the apparatus floor there is a small work bench that can be used for minor repair work. The station does not have space for exercise equipment that would ensure a ready force that can handle the rigorous activities at the emergency scene. Additional storage space is needed, especially for storage of protective clothing.

## **Fire Apparatus Area**

The station only has two apparatus bays and houses a single 1500 GPM pumper and ambulance with a combined staff of two firefighters. The apparatus apron in front of the station is sufficiently large to clean and maintain apparatus without extending into the street or path of traffic.

Protective clothing is not washed at Station 292. The washer and dryer located at this station are to be used to wash gym clothes and class B uniforms only. Personnel are directed to wash contaminated PPE at Station 291. A residential type washing machine is available to wash uniform and workout clothing. There is no "Decon" area for the cleaning of contaminated clothing or equipment.

- Install station security system to protect its assets and deter unauthorized entry.
- Consider installation of emergency generator.
- Install emergency notification system for the public if the crew is not in the station.
- Consider future plans to enlarge station to accommodate service demand.

## **Fire Apparatus**

NFPA 1901, standard for automotive fire apparatus, states:

"To maximize fire fighter capabilities and minimize risk and injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities. In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus." And....."It is a generally accepted fact the fire apparatus, like all types of mechanical devices, have a finite life. How long that is depends on many factors. Some of those factors are mileage, quality of the preventative maintenance program, quality of the driver training program and rules enforcement, quality of the original builder and components, availability of parts, and custom or commercial chassis to name a few." and..... "Most would agree that the quality and timeliness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages."

Big Bear City Fire Department has an assortment of fire apparatus including four engines (three Type 1 and one Type 3, with pump capacities of 500 gpm to 1500 gpm), one water tender with a tank capacity of 1500 gallons, one snow cat, six ambulances, and four staff vehicles.

### Overview of Fire Apparatus

The condition of all apparatus, as categorized by the department, was fair, good, or excellent. The engines are categorized as good or excellent, with all ambulances considered fair. It is reasonable to expect that the ambulances are rated Fair based on their purchase date and the majority of emergency calls for EMS; subsequently they accrue the most mileage. The engines range in age from a 1991 to a 2004. Ambulances range in age from a 1995 to a 2007.

The following table represents the fire equipment currently in service:

**Figure 23: BBCFD Apparatus & Vehicles**

Apparatus Designation	Type	Year	Make/Model	Condition	Minimum Staffing	Pump Capacity	Tank Capacity
<b>Station 291</b>							
E-291	1	2004	KME/Excel	Excellent	2	1500	500
E-291A	1	1991	Beck/Pumper	Good	2	1500	500
BE-291	3	1999	Westmark/14	Excellent	2	500	500
WT-291	2	2006	KME	Excellent	1	500	1500
S-291		2004	Ford/F550	Excellent	1	---	---
SC-291	Snow Cat	1979	Theokot/200L	Good	2	---	---
2900	Staff	2000	Chev/Tahoe	Good	1	---	---
2901	Staff	2000	Chev/Tahoe	Good	1	---	---
2902	Staff	2005	Ford/Explorer	Good	1	---	---
U-291	Staff	1991	1991	Poor	1	---	---
MA-291	Amb	2007	Fore/Wheel Coach	Fair	2	---	---
MA-291A	Amb	2004	Ford/Wheel Coach	Fair	2	---	---
MA-291B	Amb	1999	Ford/Mini Mod	Fair	2	---	---
MA-291R	Amb	1991	Chev/Van	Fair	2	---	---
MA-49	Amb	1998	Chev/Van	Fair	2	---	---
<b>Station 292</b>							
E-0292	1	1991	Beck/Pumper	Good	2	1500	500
MA-292	Amb	2003	Ford/Wheel Coach	Good	2	---	---

## Equipment Replacement

The BBCCSD maintains an Equipment Replacement Fund for fire department emergency vehicles. The Vehicle Replacement Schedule is predicated on engines having a first line service of 15 years followed by five years of reserve status, or a total life span of 20 years. The schedule is flexible, however, depending on the condition of the apparatus; and the lifespan of the vehicle could be extended, if warranted. Included in the annual budget review process should be a determination that the Replacement Fund is congruent with the escalating cost of replacing the equipment. Some type of apparatus may escalate as much as 8 percent in a single year. Extending the life-cycle of a unit, due to its good condition, can be prudent; but not to have sufficient funds available when the replacement date becomes due is another issue. Built into the replacement cycle should be the necessary lead time for construction of the unit, which could be as much as a year.

Ambulances have a front line service of approximately six years with an additional two years in reserve status. The department attempts to have a ten-year service life on ambulances, however. Ambulance purchase dates, both for first line and reserve status, range from 3 to 12 years, with first line units ranging in age from three to nine years. Since ambulances respond to the majority of calls, and record the most miles, years of service has a major impact on the overall condition of the units. Staff vehicles have a replacement schedule of eight to ten years. The table below is predicated on the following replacement schedule: engines 15 years, ambulances 8 years; staff vehicles 10 years.

**Figure 24: Apparatus Type and Condition**

Apparatus Designation	Type	Year	Condition	Replacement Year
E-291	Engine Type 1	2004	Excellent	2019
E-291A	Engine Type 1	1991	Good	2006
BE-291	Engine Type 3	1999	Excellent	2014
WT-291	Water Tender Type 2	2006	Excellent	2021
SC-291	Snow Cat			
E292	Engine Type 1	1991	Good	2006
MA-291	Ambulance	2007	Fair	2015
MA-291A	Ambulance	2004	Fair	2012
MA-291B	Ambulance	1994	Fair	2002
MA-291R	Ambulance	1996	Fair	2004
MA-49	Ambulance	1998	Fair	2006
MA-292	Ambulance	2003	Good	2011
2900	Staff Vehicle	2000	Good	2010

2901	Staff Vehicle	2000	Good	2010
2902	Staff Vehicle	2005	Good	2015
U-291*	Staff Vehicle	1991	Poor	2001

\* U-291 was purchased used from the BBCCSD Water Department

### Apparatus Maintenance Records

Fire personnel use a variety of forms to record daily, weekly, and monthly maintenance checks on apparatus and ambulances. Whenever a mechanical problem of any type is identified, a Maintenance/Repair Request Form is completed and forwarded to the Captain responsible for apparatus management. In addition, a contract mechanic uses the Department of California Highway Patrol Truck and/or Tractor Maintenance & Safety Inspection Form for the 90-day inspection of all heavy equipment requiring a California Drivers License of Class 1 or 2 exemptions.

### Service Tests

Pump Service Test records were provided for Engines 291, 291A, and 292. The pump test was conducted at Victorville Station 311, with the records indicating that the pumps all passed the test. Test records were also provided for the Ground Ladder Examination and Test conducted in 2000, in conformance with NFPA Standard 1932. Test records were provided for 11 ladders totaling 206 feet on Engines 291, 291A, and BE 291.

All ladders tested in 2007 were certified by Underwriters Laboratories Inc., with the exception of two ladders that required repair prior to being eligible for Certification. Hose testing is an annual event, with records maintained on the test. Fleet maintenance is outsourced to apparatus maintenance representatives or heavy equipment repair facilities in Redlands. Minor repairs are accomplished through local repair facilities in Big Bear or by department firefighters.

- Evaluate the Equipment Replacement Schedule to ensure that sufficient funds are being allocated to match the escalating cost of replacing fire apparatus.



## **Section II – System Demand Projections**

### **Community Risk Analysis**

#### **Area Risk**

The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk within geographic sub-areas of a community.

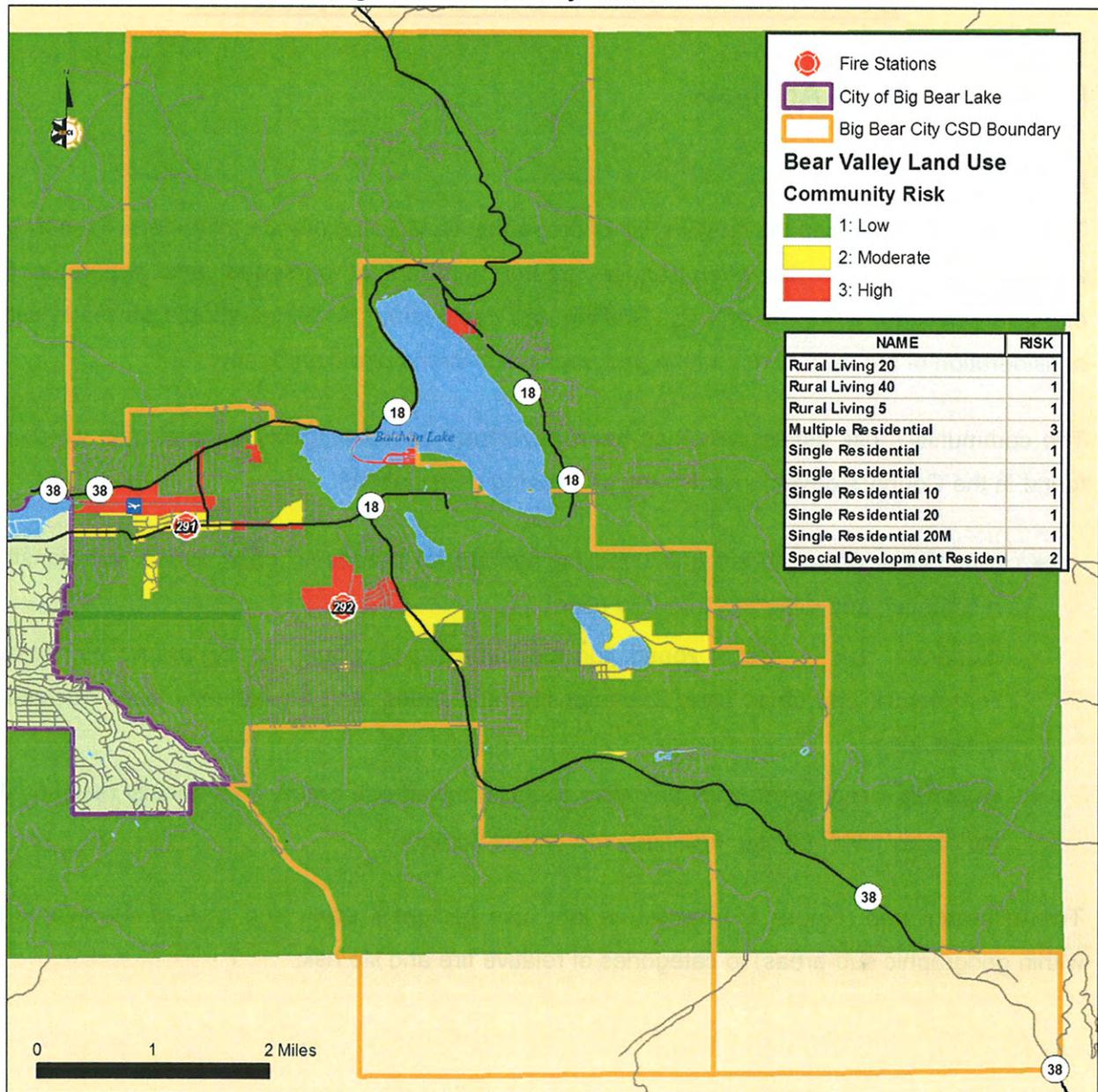
The community's risk assessment has been developed based on potential land use, which is found in the County's development plans and zoning designations.

- Low risk – Areas zoned and used for agricultural purposes, open space, low-density residential, and other low intensity uses.
- Moderate risk – Areas zoned for medium-density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- High risk – Higher-intensity business districts, mixed use areas, high-density residential, industrial, warehousing, and large mercantile centers.

The following map (Figure 25) translates land use (potential scale and type of development within geographic sub-areas) to categories of relative fire and life risk.



Figure 25: Community Risk Assessment



While the ASA contains primarily lower risk properties, there are higher risk properties within the BBCCSD. Although the BBCCSD contains mostly low and moderate risk properties as well, the predominance of highest risk is located near Station 291. Besides the airport, these properties include industrial, commercial, mid-rise, mixed-use, institutional, and multi-family occupancies.

The area's land use patterns generally contribute to development of an efficient fire resource deployment configuration as higher risk properties are near the central area of the District (with

the exception of the remote area east of Baldwin Lake) rather than scattered throughout as is found in some communities.

### **Current Population Information**

The BBCFD provides primary fire protection to a 42-square mile BBCCSD and a 317-square mile area ambulance service area (ASA) within San Bernardino County, California. This section discusses the demographic composition of these two response areas.

### **Community Services District Demographics**

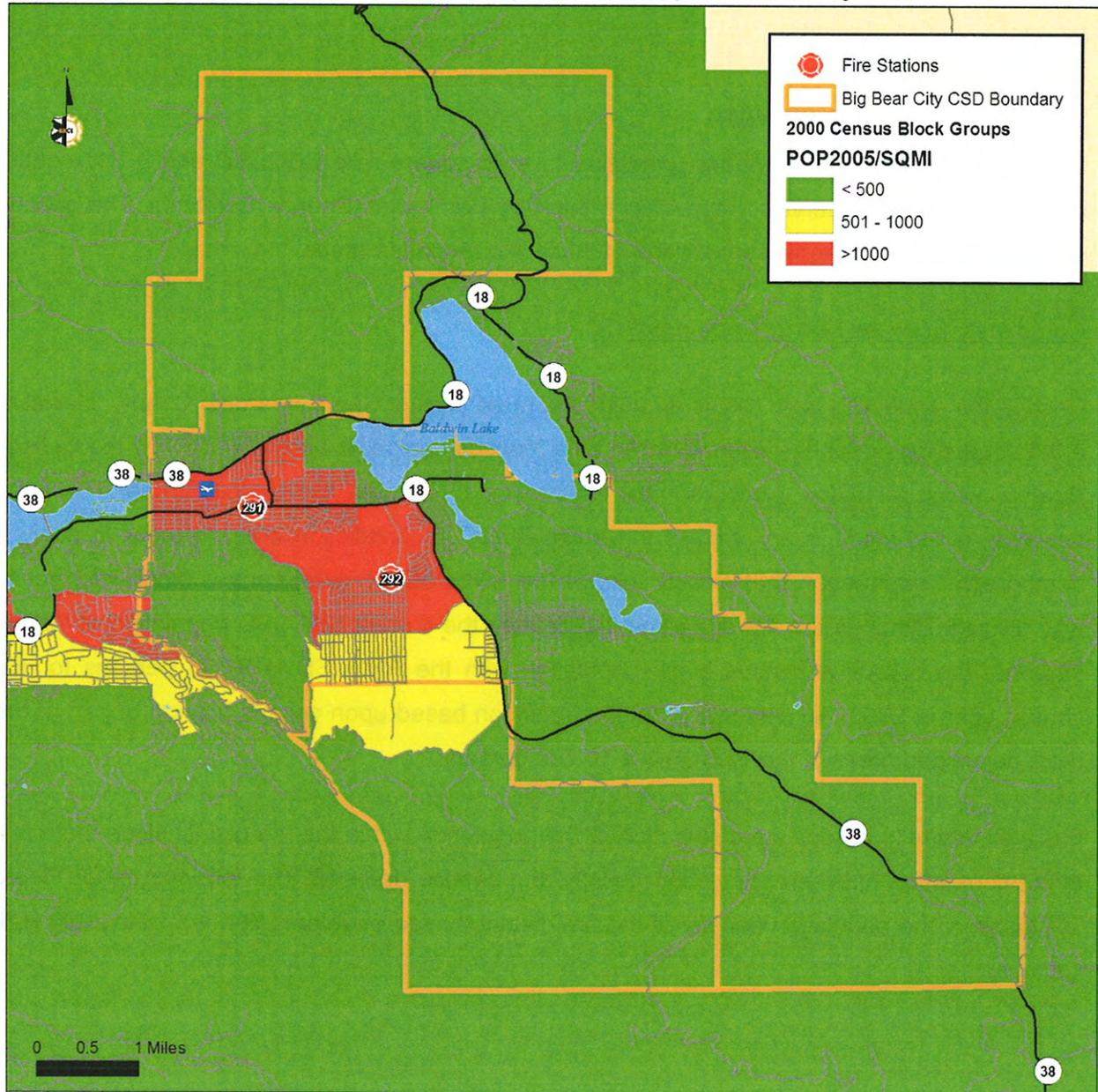
Despite the name, Big Bear City is an unincorporated area of San Bernardino County. However a 3.5-square mile area has been selected as a "census designated place" (CDP) by the Census Bureau, which tabulates demographical information throughout the United States. The area, however, is too small to encompass the entire BBCCSD jurisdiction area. In order to analyze demographic information that closely follows the BBCCSD borders, census block information was utilized. Although the fire department estimates the current BBCCSD population at 12,000 persons, the collective census block population with the BBCCSD is 9,696 persons for the census year of 2000. An estimate of 2005 population based upon census block groups<sup>20</sup> of the most developed areas of the BBCCSD is 10,795 persons.

It is also useful to assess the distribution of the population within the fire district since there is a direct correlation between population density and service demand. The following map (Figure 26) displays the population density of the fire district, based on information from the 2000 U.S. Census.

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<sup>20</sup> Census block groups are statistical collections of smaller census block areas.

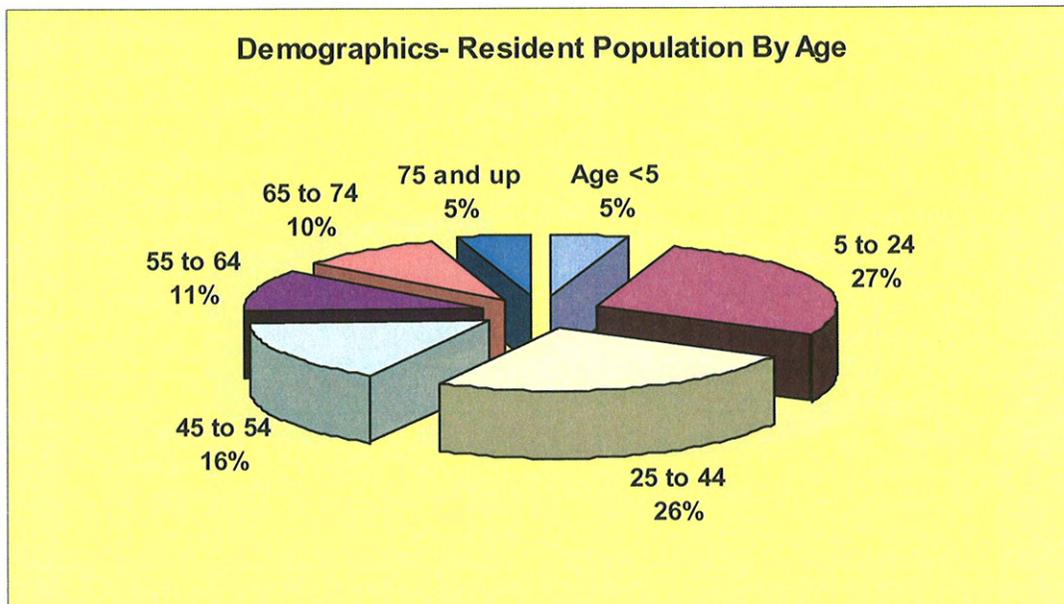
Figure 26: Big Bear City CSD 2000 Population Density



The locations of the fire stations are within and surrounding the areas of higher population density. Bear in mind this is residential population, which does not account for visitors or employed person who live outside the tabulated blocks area.

One of the factors that influences emergency service demand is population growth, and its composition with regards to age and socioeconomic characteristics will need to be examined. The following chart (Figure 27) examines the population segmented by age groups.

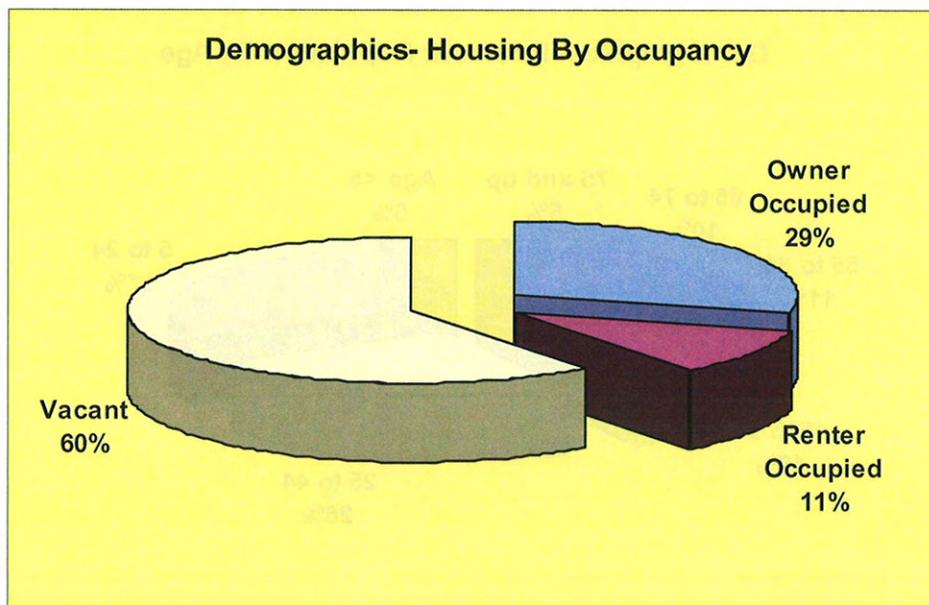
Figure 27: Population by Age



As seen in this figure, 15 percent of the population is 65 years of age or older and 5 percent of the population is under five years of age, placing a total of 20 percent of the area's population within the significant target age groups that pose the highest life safety risk in residential fire incidents.

The type of housing occupancy in an area can be an indicator of economic conditions. A lower socioeconomic profile correlates with higher service demand for emergency services in most cases. The following chart (Figure 28) illustrates the housing by occupancy for the BBCCSD census blocks.

Figure 28: Housing by Occupancy



Normally, the housing composition above would underscore a negative economic environment. However, in areas with institutions of higher education and/or resort areas, higher rental occupancy (vacant) is typical. The Big Bear Valley is approximately 60 miles from the Los Angeles Metropolitan Area and is blessed with two recreational lakes, two ski resorts in the San Bernardino Mountains surrounded by national forests and wilderness areas. Much of the housing is reported to be seasonal vacation and second home ownership by investors who live elsewhere. As such, this housing composition is less alarming but highlights the need to estimate a seasonal population figure.

The owner and renter occupied housing was divided from the total residential population to derive a population multiplier:

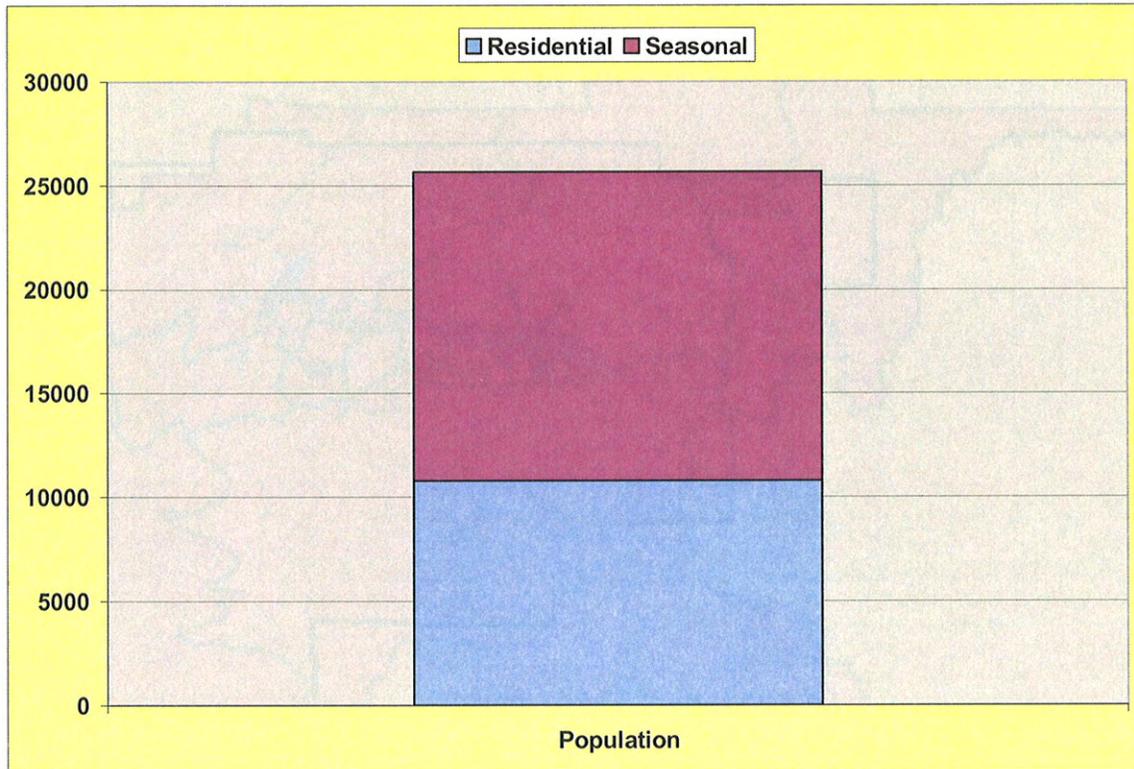
$$\Sigma_{PM} = H_O + H_R / P_T$$

Rental population typically has fewer persons per household than owner occupied, so this blend may closely represent that of vacationers who may have more or less similar persons per unit. This population multiplier is applied to the amount of vacant housing to reveal a potential seasonal population in the BBCCSD.

$$\Sigma_{PM} * H_V = P_S$$

Once this seasonal population is estimated, it is combined with the 2005 estimated population to reveal a total potential peak population for the BBCCSD slightly over 25,000 (Figure 29).

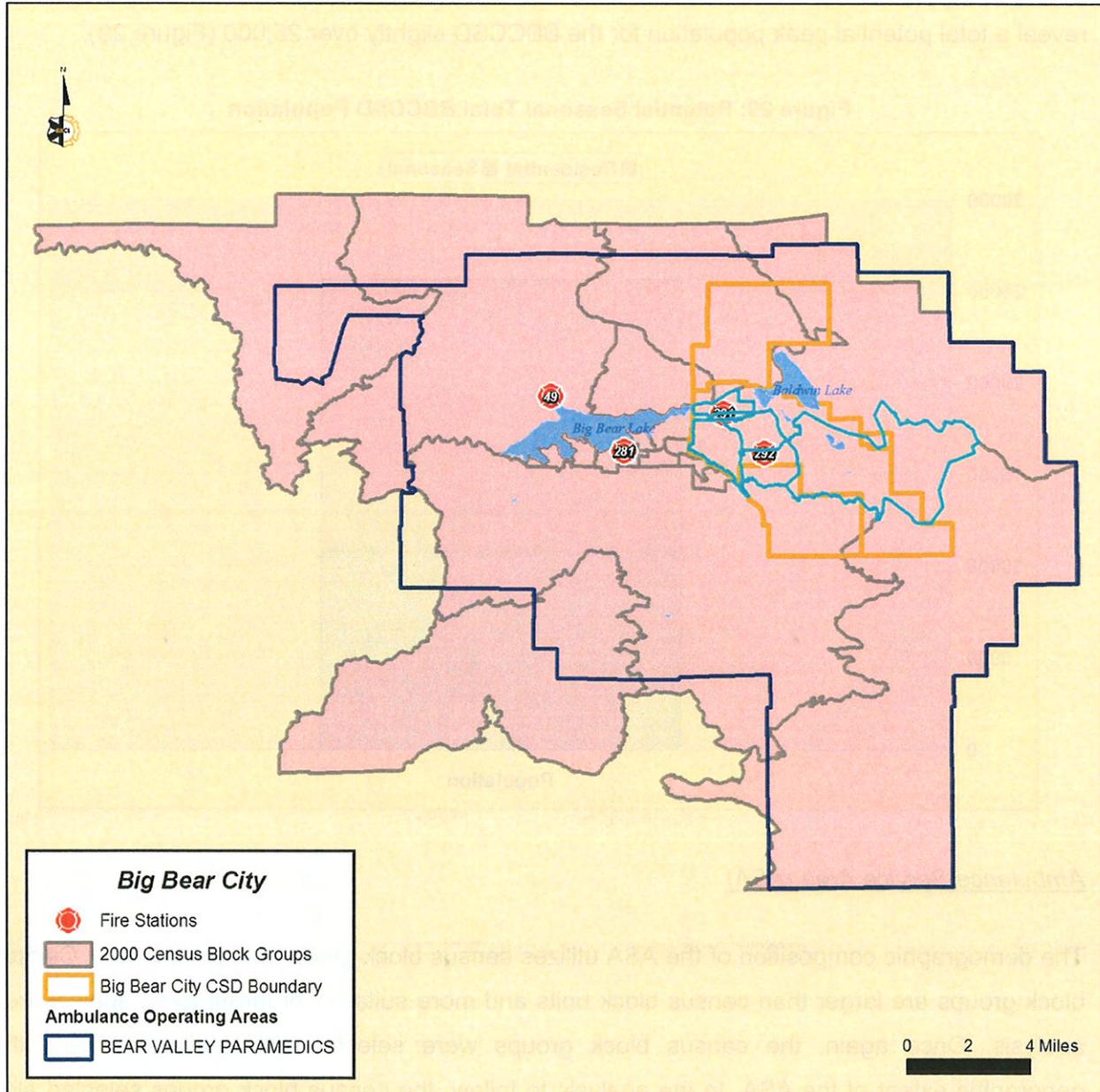
**Figure 29: Potential Seasonal Total BBCCSD Population**



Ambulance Service Area (ASA)

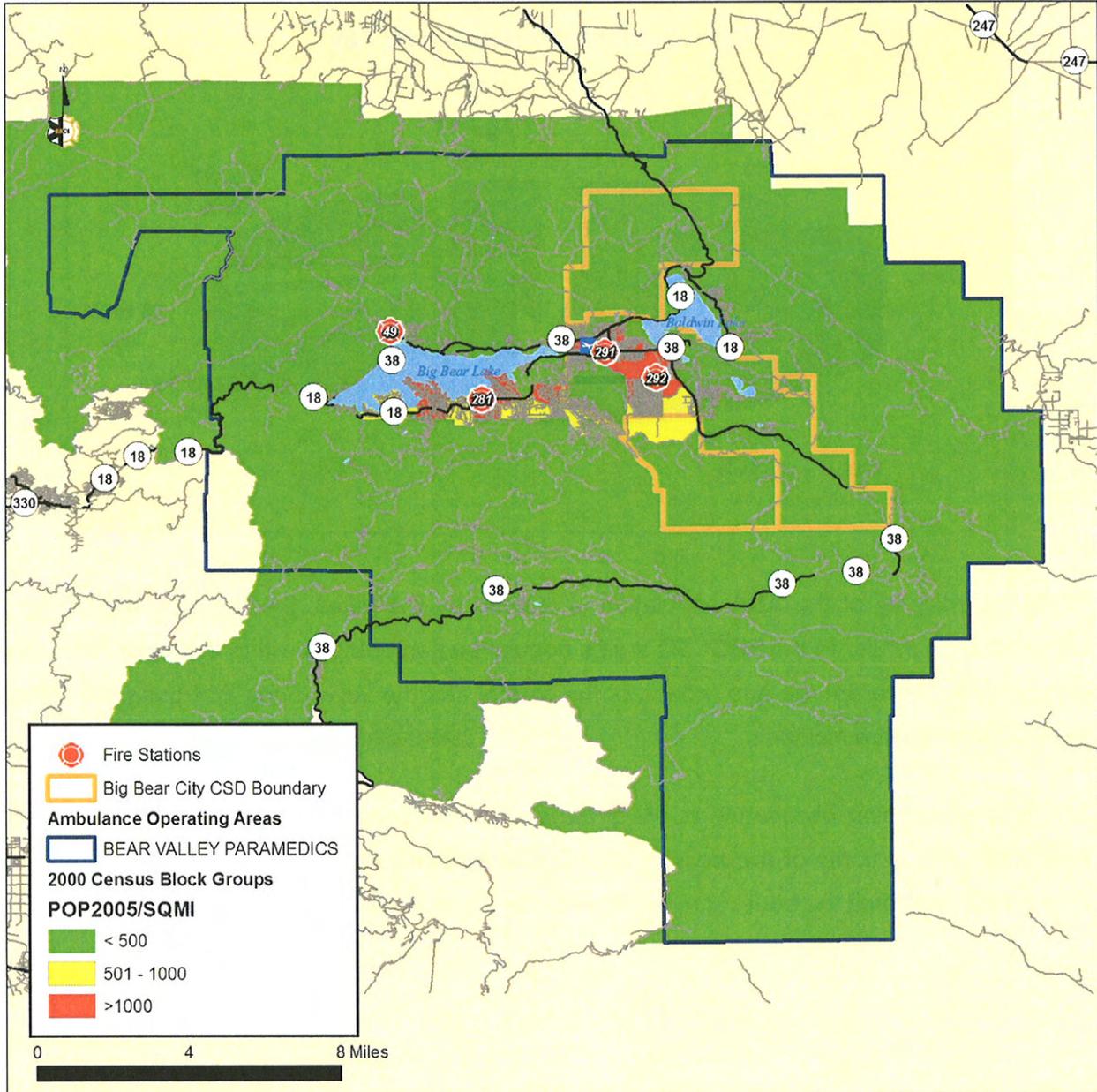
The demographic composition of the ASA utilizes census block group data for analysis. Census block groups are larger than census block units and more suitable for larger geographical area analysis. Once again, the census block groups were selected which closely match the geographic extent of the ASA. In the analysis to follow, the census block groups selected also contain the BBCCSD area. The following Figure 30 illustrates the census block groups selected in reference to the ASA boundary. Highlighted in the center are the census block groups and their relation to the BBCCSD.

Figure 30: Census Block Groups and Response Districts



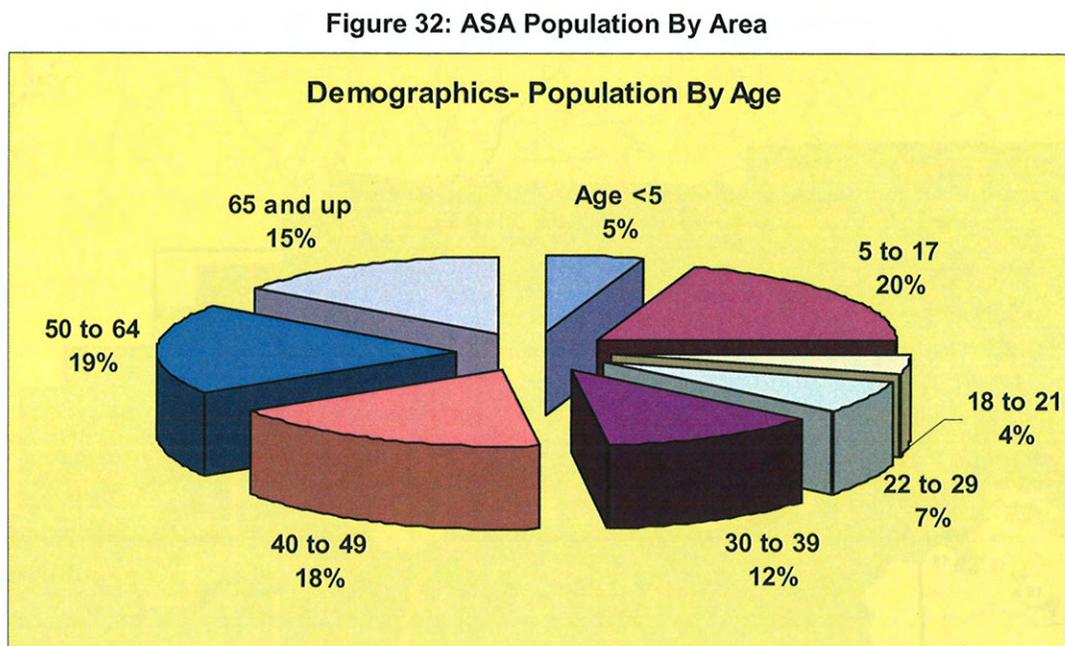
The collective census block population within the ASA is 17,663 persons for the census year of 2000. An estimate of 2005 population for the ASA is 19,937 persons. The majority of population and housing of the ASA is located with Big Bear City and Big Bear Lake. As such, the following map (Figure 31) displays the population density of the ASA in areas of higher population density per census block group, based on estimates for 2005.

Figure 31: 2005 ASA Population Densities



The locations of the fire stations remain within and near the areas of higher population density.

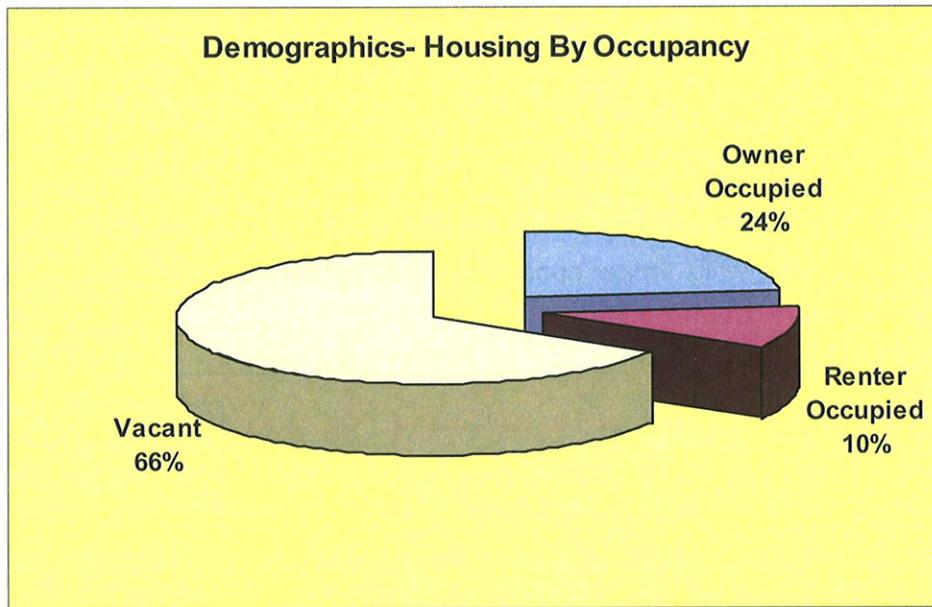
The following chart (Figure 32) examines the ASA population segmented by age groups.



Since the majority of the ASA population is located by the lakes, the resulting demographic composition is similar to the BBCCSD area's population percentages within the significant target age groups. These are the age groups of the elderly and the very young that pose the highest risk in residential fire incidents.

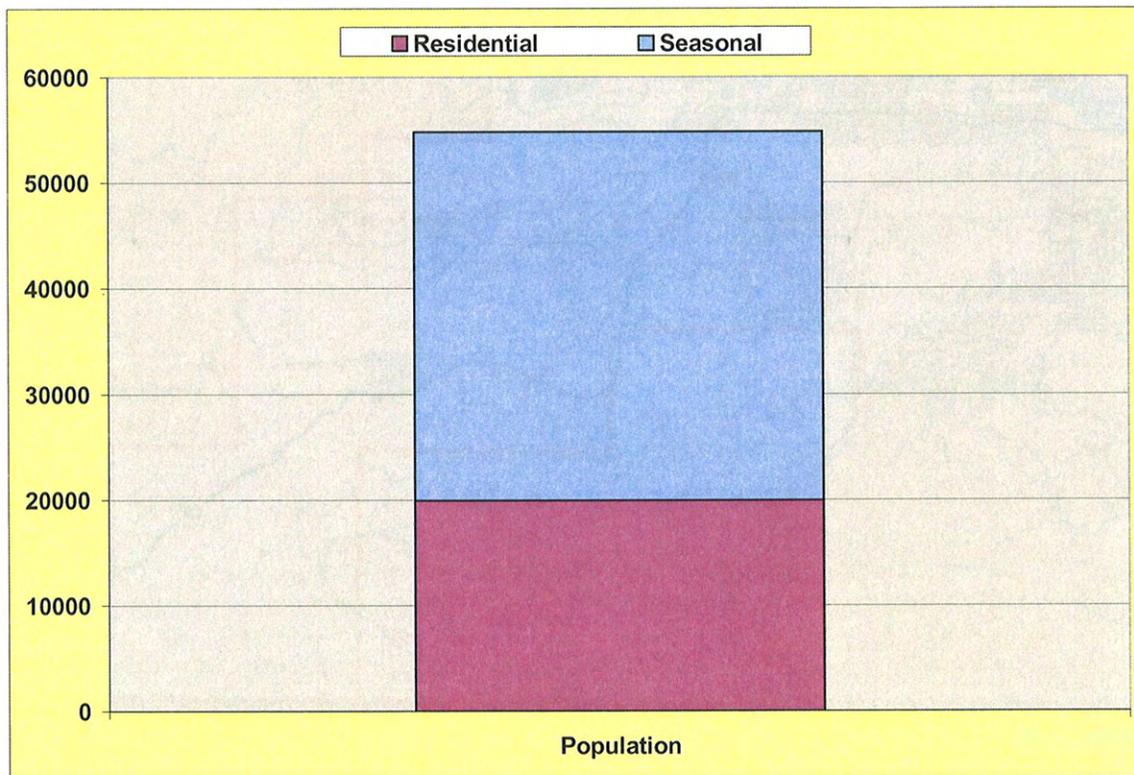
The type of housing occupancy in the area is also similar to the BBCCSD figures. As with population, the majority of the housing stock is located around the lakes. The following chart (Figure 32) illustrates the housing by occupancy for the ASA census block groups.

Figure 33: Housing by Occupancy, Ambulance Service Area



Using the methodology discussed previously, a potential seasonal population of approximately 55,000 was calculated for the entire ASA. Figure 34 displays the result.

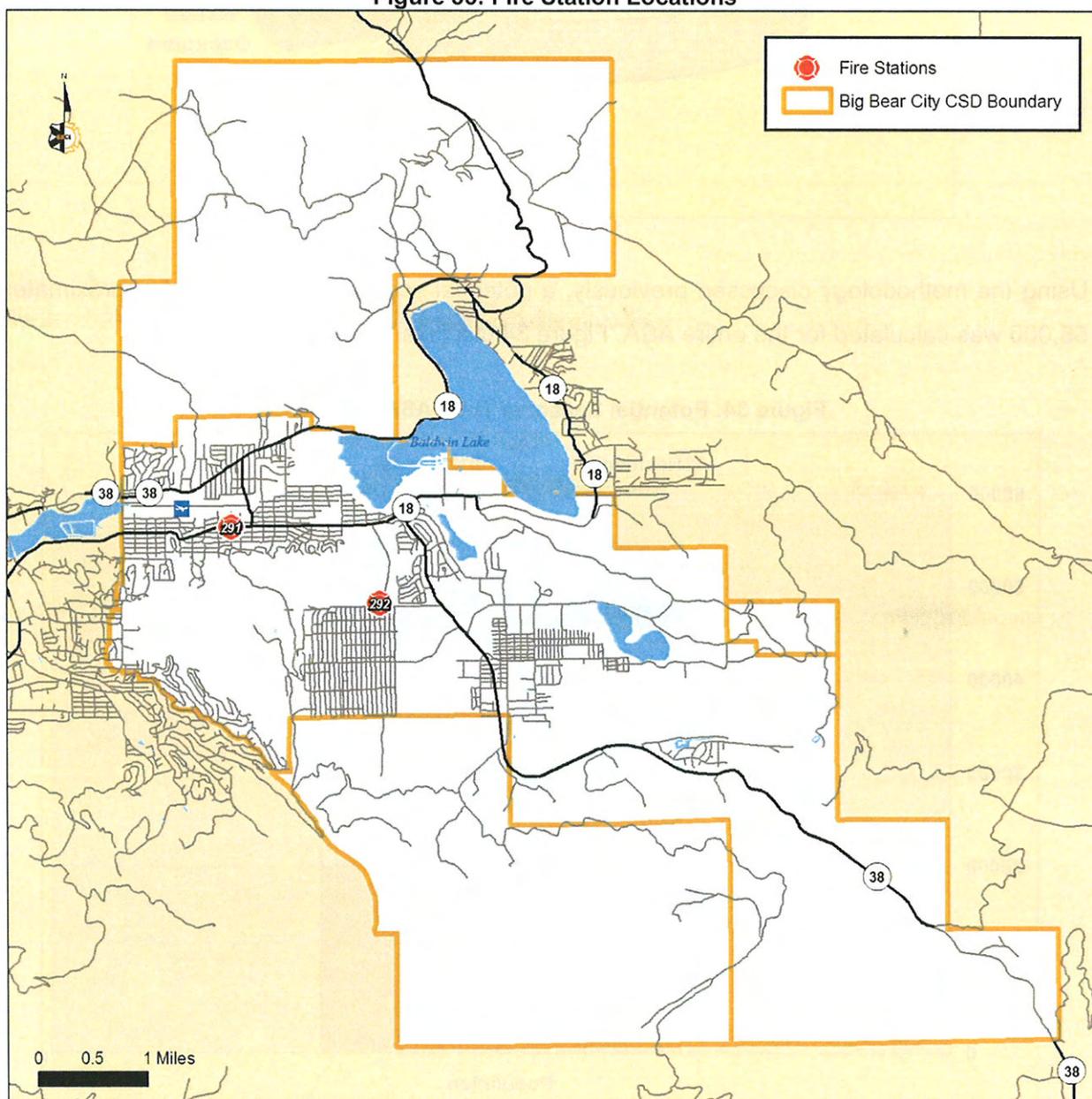
Figure 34: Potential Seasonal Total ASA Population



## Distribution Analysis

BBCFD currently operates out of two fire stations. This section illustrates the fire department's capability from the currently operated stations. The following map (Figure 35) depicts these locations. Areas of the BBCCSD with water and sewer services are represented in white. The full extent of the BBCCSD is outlined in orange. Presumably, hydrants would be located within the area of water service, while tanker apparatus would be necessary outside of this area.

Figure 35: Fire Station Locations



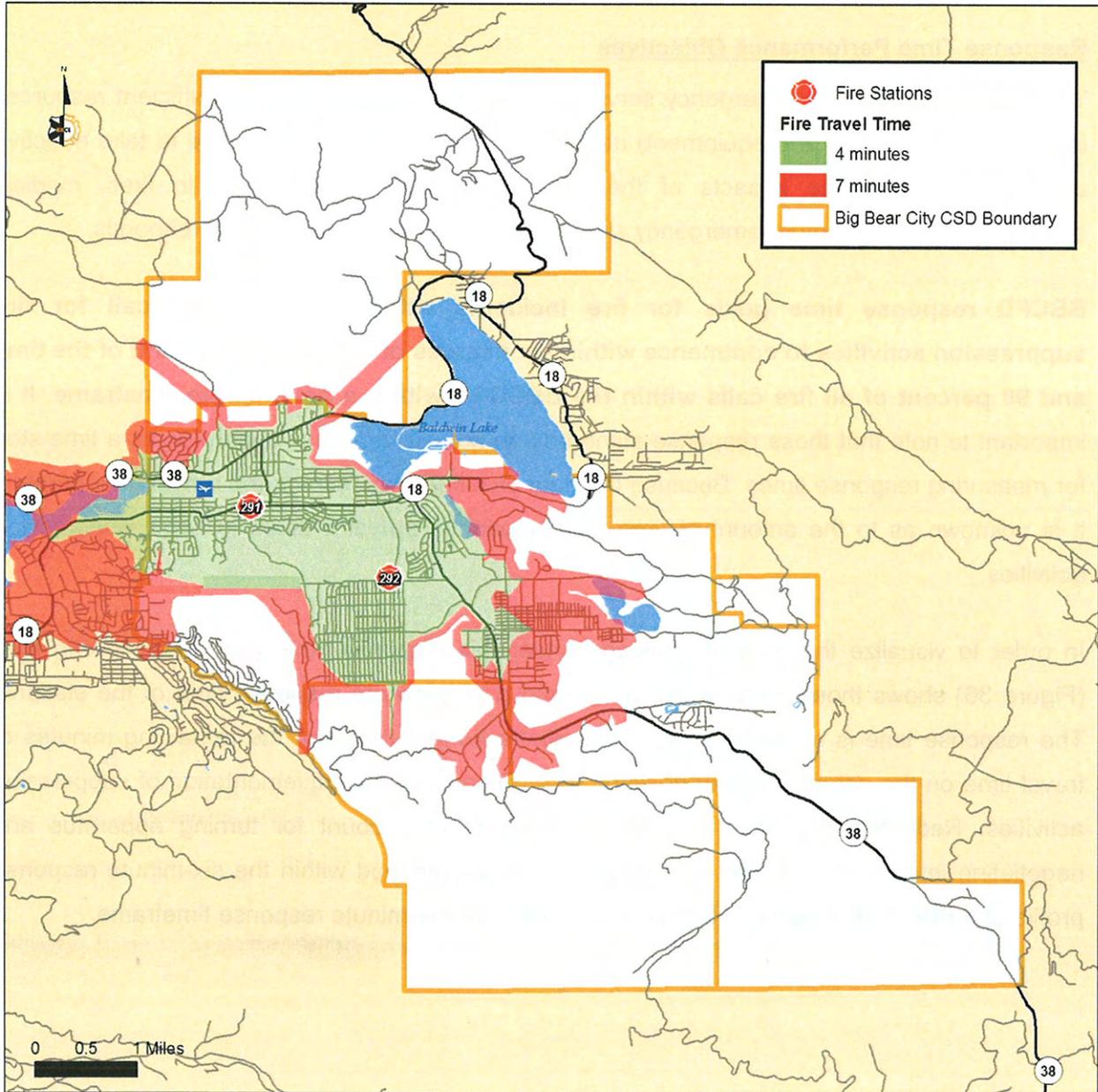
### **Response Time Performance Objectives**

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) at the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situation to which the fire department responds.

**BBCFD response time goals for fire incidents within the BBCCSD call for fire suppression activities to commence within six minutes of dispatch 73 percent of the time and 90 percent of all fire calls within the BBCCSD within a nine-minute timeframe.** It is important to note that these response standards do not use arrival of apparatus as a time stop for measuring response times. Because the data provided only records the arrival of apparatus, it is unknown as to the amount of time after apparatus arrival it takes to begin suppression activities.

In order to visualize the area of coverage under this response time goal, the following map (Figure 36) shows those areas within a six- and a nine-minute response time of the stations. The response time is modeled using a 1.5-minute turnout time and the remaining minutes of travel time on the actual roadway network, less 30 seconds for implementation of suppression activities. Reduction of speed has been calculated to account for turning apparatus and negotiating intersections. Areas shaded green can be reached within the six-minute response profile of a BBCFD fire station. Red areas are within a nine-minute response timeframe.

Figure 36: Current Response Time Capability From a BBCFD Station

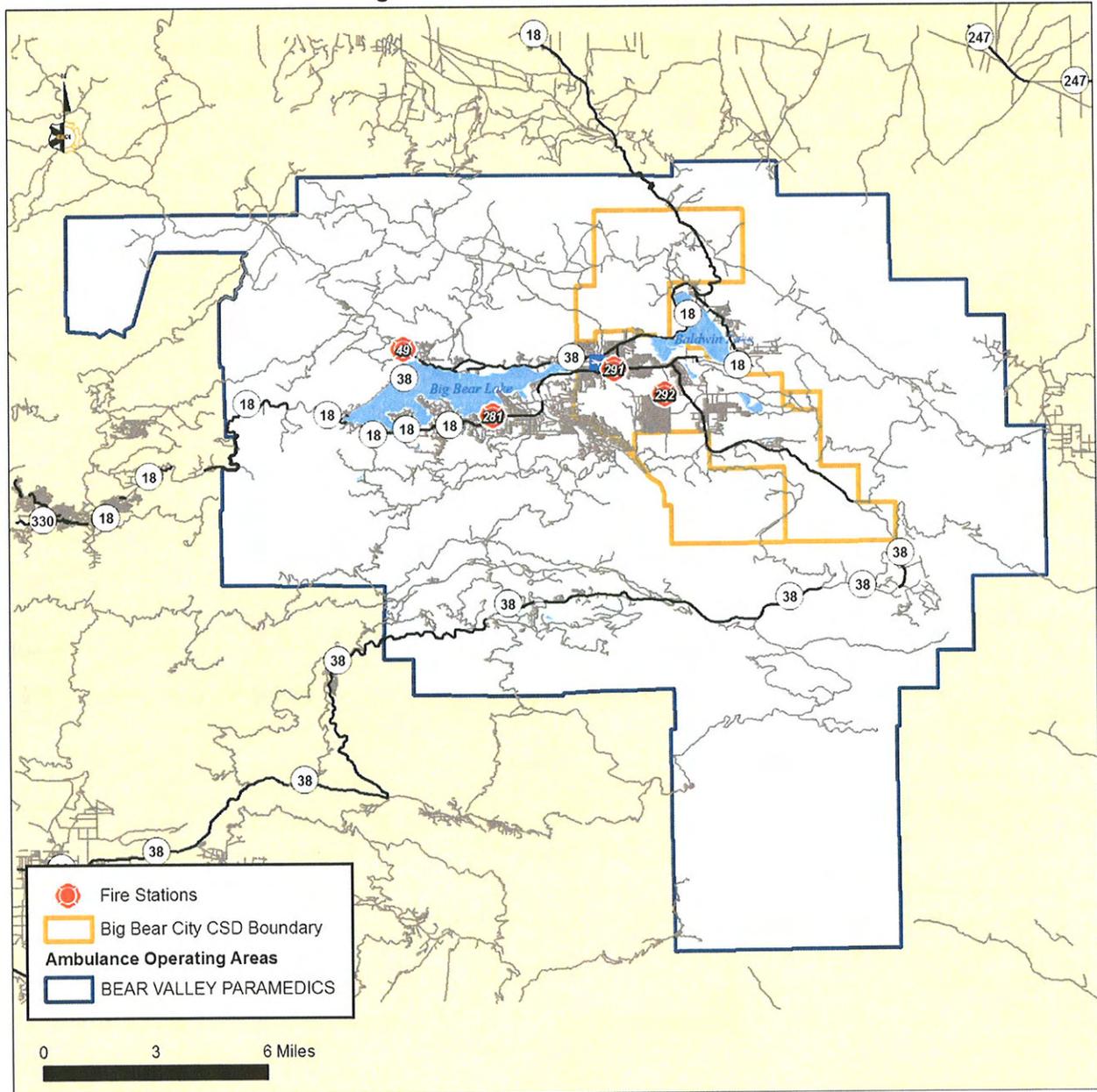


The map illustrates that the majority of the currently developed areas are within a nine-minute response time from a fire station.

The BBCFD also provides emergency medical services (EMS) not only within the BBCSD but also to a larger geographic area shown in the following Figure 37. The medical units respond only from the BBCFD stations numbered 291 and 292. The station marked 281 is the Big Bear Lake Fire Station and Station 49 is a San Bernardino County Fire Department (SBCFD) station.

These stations are independent of BBCFD but are shown for reference purposes. Big Bear Lake station 283 is not shown since it is staffed by volunteer firefighters only.

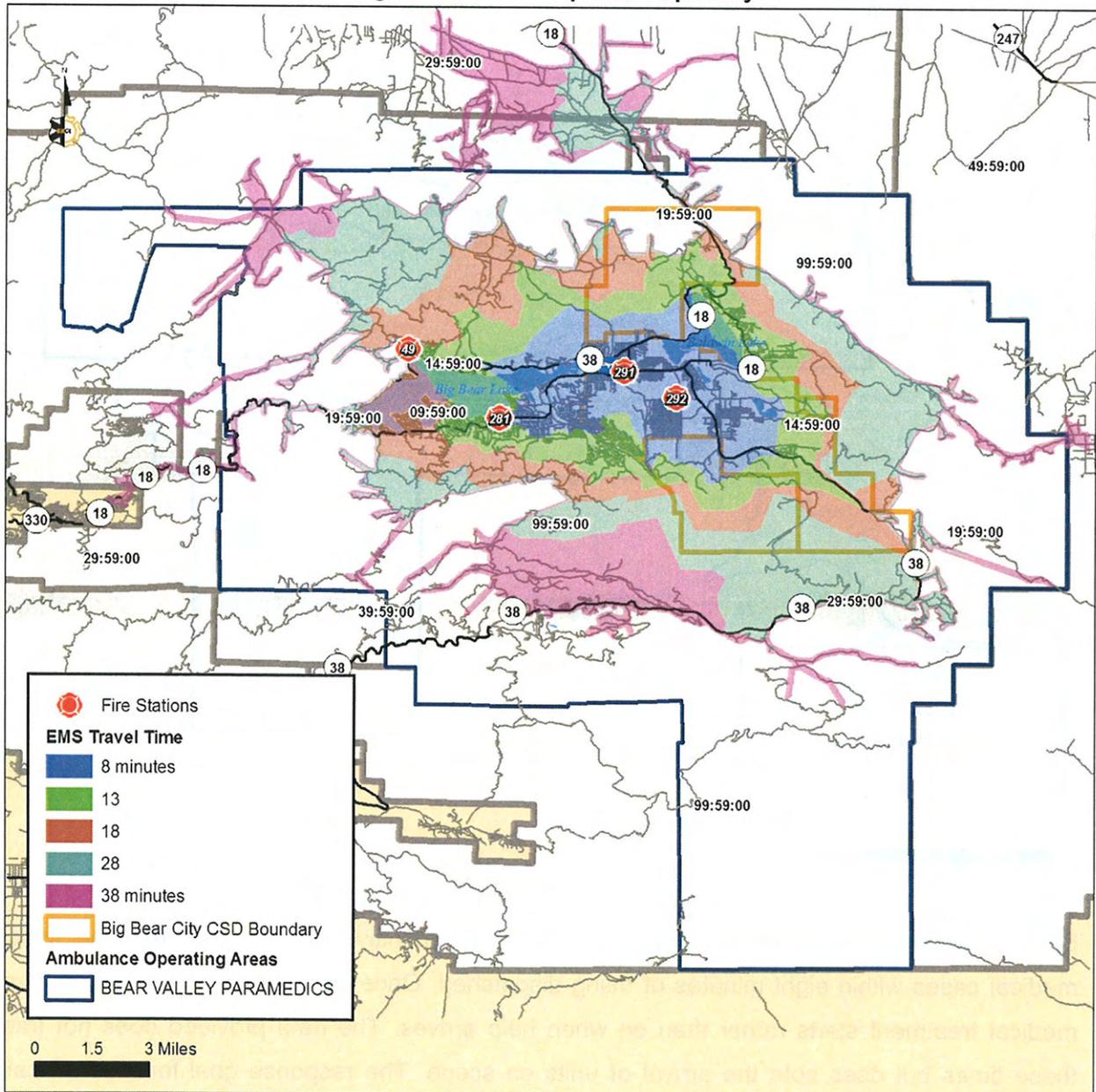
Figure 37: Ambulance Service Area



BBCFD response standards call for the initiation of definitive medical treatment on critical medical cases within eight minutes of being dispatched. Once again, this is based upon when medical treatment starts rather than on when help arrives. The data provided does not track these times but does note the arrival of units on scene. The response goal for medical calls further state that the maximum acceptable response time is ten minutes for 95 percent of all

medical calls within the district. Outside the district but within the ambulance operating area various response goals range from 9 minutes and 59 seconds to 99 minutes and 59 seconds. These response time goals are established by San Bernardino County. The following map (Figure 38) identifies these response zones along with their respective response time goals. The color shaded areas show the response time capability from the BBCFD stations. Once again, 1.5 minutes for turnout and 30 seconds for intervention initiation activities are subtracted to derive the travel time modeled.

Figure 38: EMS Response Capability



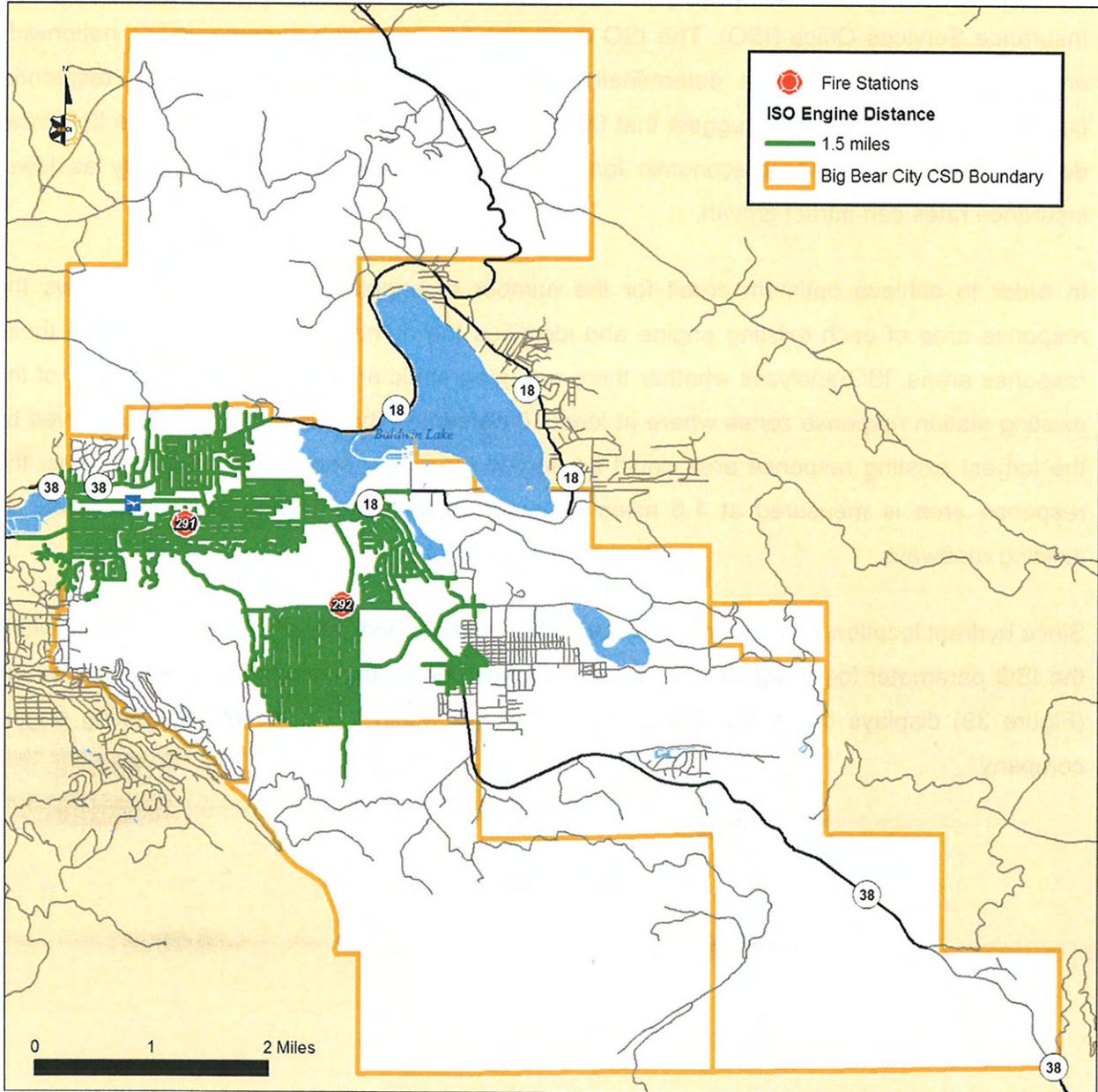
The next set of maps examines the BBCFD's coverage based upon credentialing criteria for the Insurance Services Office (ISO). The ISO evaluates fire protection in communities nationwide and is influential in the rate determination that insurers charge business and residential customers. While it is not to suggest that facility deployment be dependant upon the ISO-rated distance, it is an important economic factor to be considered by the community as lower insurance rates can attract growth.

In order to achieve optimum credit for the number of engine companies, ISO reviews the response area of each existing engine and identifies the number of fire hydrants within those response areas. ISO analyzes whether there are geographic areas of the district outside of the existing station response zones where at least 50 percent of the number of hydrants served by the largest existing response area could be served by a new engine. For ISO purposes, the response area is measured at 1.5 miles of travel distance from each engine company on existing roadways.

Since hydrant location data was not provided, an analysis to indicate areas which may fall within the ISO parameter for an additional engine company cannot be completed. The following map (Figure 39) displays the areas of the district that are within 1.5 miles of an existing engine company.



Figure 39: 1.5 Mile-Engine Coverage (ISO)



Two of the larger development areas are within the ISO recommended engine company distance, including the airport facility. The area most covered by the ISO engine travel distance is within the water service area, which presumably has hydrants.

In similar fashion, to achieve optimum credit for the number of truck companies, ISO reviews the response area of each existing truck and identifies the number of fire hydrants within those response areas. ISO analyzes whether there are additional geographic areas of the district outside of the existing truck response areas where at least 50 percent of the number of hydrants

served by the largest existing response area could be served by a new truck were one to be added. For ISO purposes, the response area is measured at 2.5 miles of travel distance from each engine company on existing roadways.

A truck company is not required to have an elevating ladder or aerial device unless there are a sufficient number of buildings that would meet the three-story height and square footage limits. Other areas can receive credit for a truck company without the requirement of an elevated device and can even receive partial credit for a truck company if other apparatus, such as an engine, carries a complement of truck company equipment. Truck company services come from the Big Bear Lake Fire Department to the west and is farther than 2.5 miles in distance.

It is possible that additional apparatus in reserve status may provide some increase in credit for reserve companies, but it is not likely to affect the overall community insurance rating. This may not be the case in all areas of the district; and, therefore, truck company coverage will be further evaluated by ESCi in light of fire and life risk factors within the Big Bear City Fire District in a subsequent section.

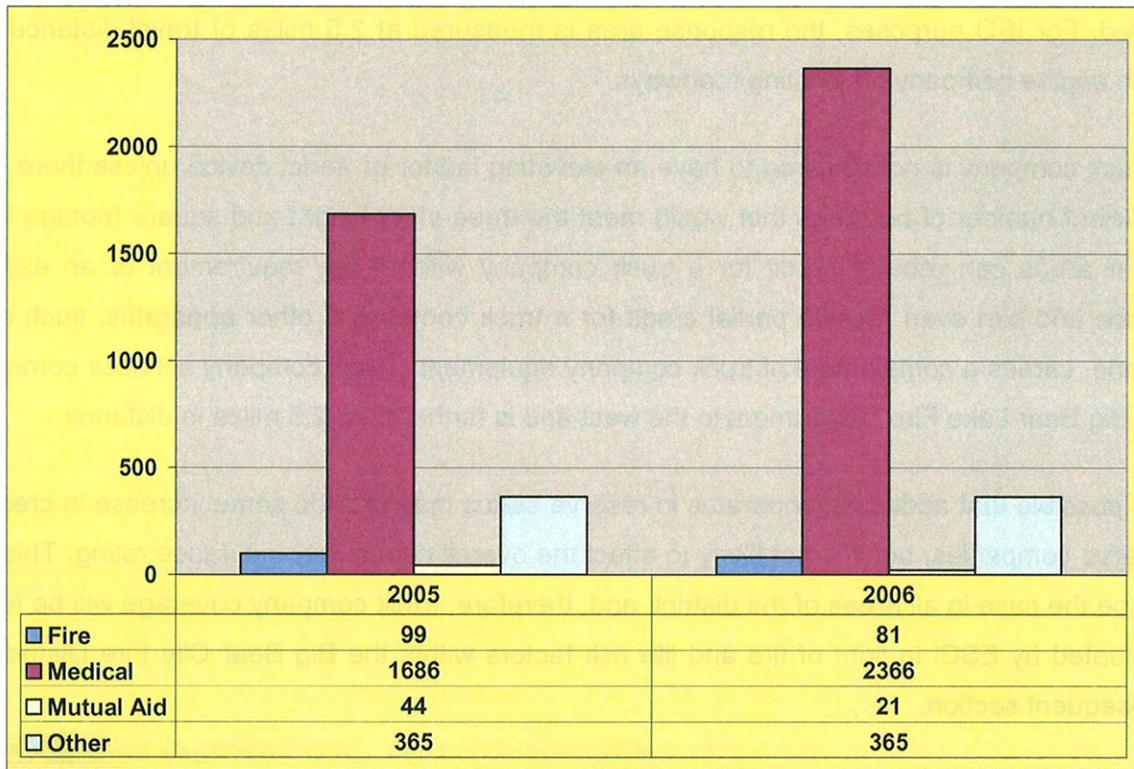
### **Demand Analysis**

The BBCFD has experienced a stable number of fire responses and other non-medical responses. Emergency medical responses, however, have increased. Prior to 2006, Big Bear Lake Fire Department (BBLFD) ran one ambulance. A large part of the 40 percent increase in medical calls from 2005 to 2006 is the result of the BBLFD discontinuing this service and the BBCFD assuming the responsibility. Figure 40 shows how 9-1-1 emergency response volume has changed over the last two years worth of data provided.<sup>21</sup> This chart, along with the following charts in this demand analysis section, addresses the emergency response workload of the District. The non-emergency EMS transport workload is discussed in the section on Response Reliability starting on page 112.

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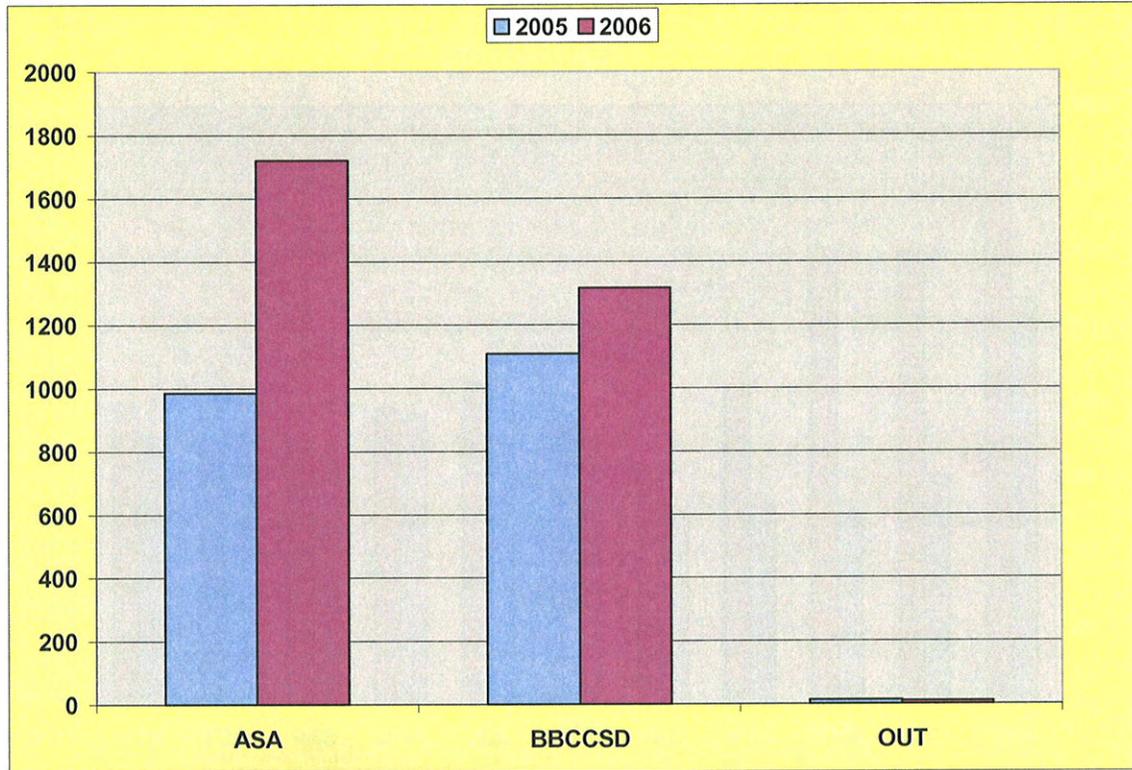
<sup>21</sup> Note that the chart includes mutual aid responses provided to areas outside the city limits of Big Bear City. Burn Permits and Test Calls within the data were removed.

**Figure 40: Workload Historical Data**



Interestingly, the majority of the workload has become incidents within the ASA but outside of the BBCCSD boundaries. This is a reversal from the previous year.

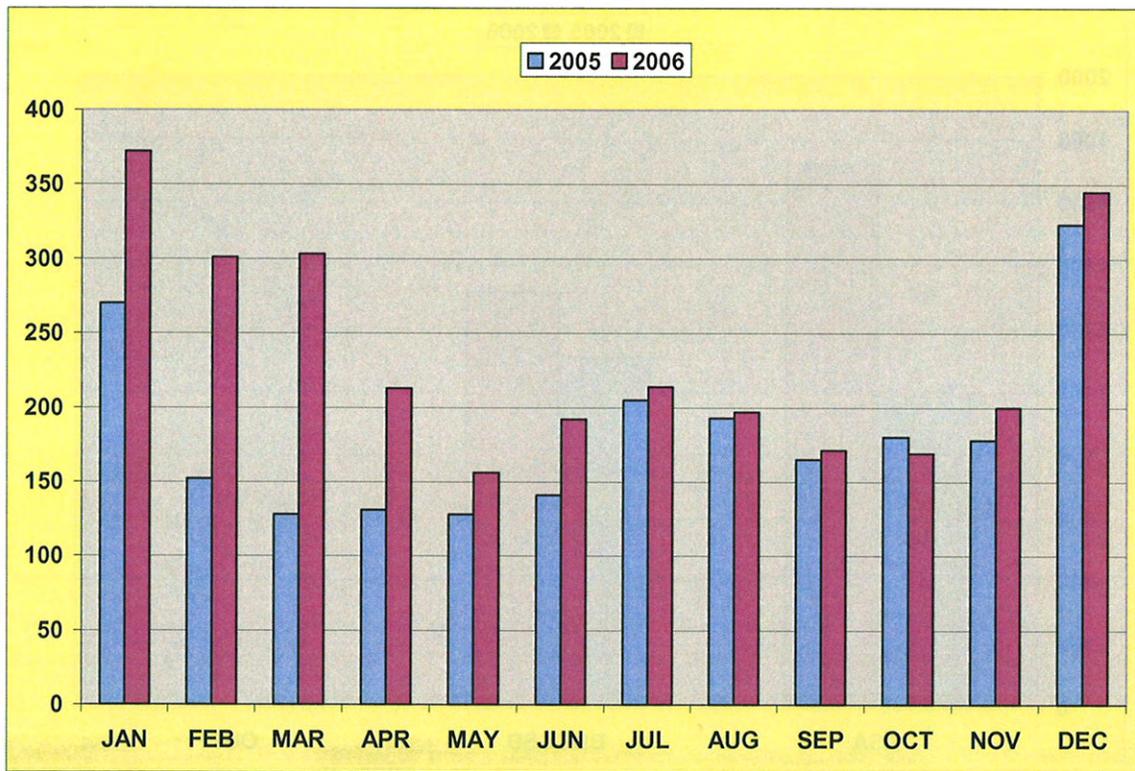
Figure 41: Workload by District



The bulk of the workload for BBCFD is handling requests for emergency medical aid. This is not unusual for fire districts that provide either first responder and/or transport services. In the analysis to follow, ESCi considered structure fires, emergency medical incidents, and all other fire and service calls separately to permit closer analysis of trends affecting a particular type of response.

A review of incidents by time of occurrence also reveals when the greatest response demand is occurring. The following charts show how activity and demand changes for BBCFD based on various measures of time. ESCi began by breaking down yearly workload into monthly increments (Figure 42).

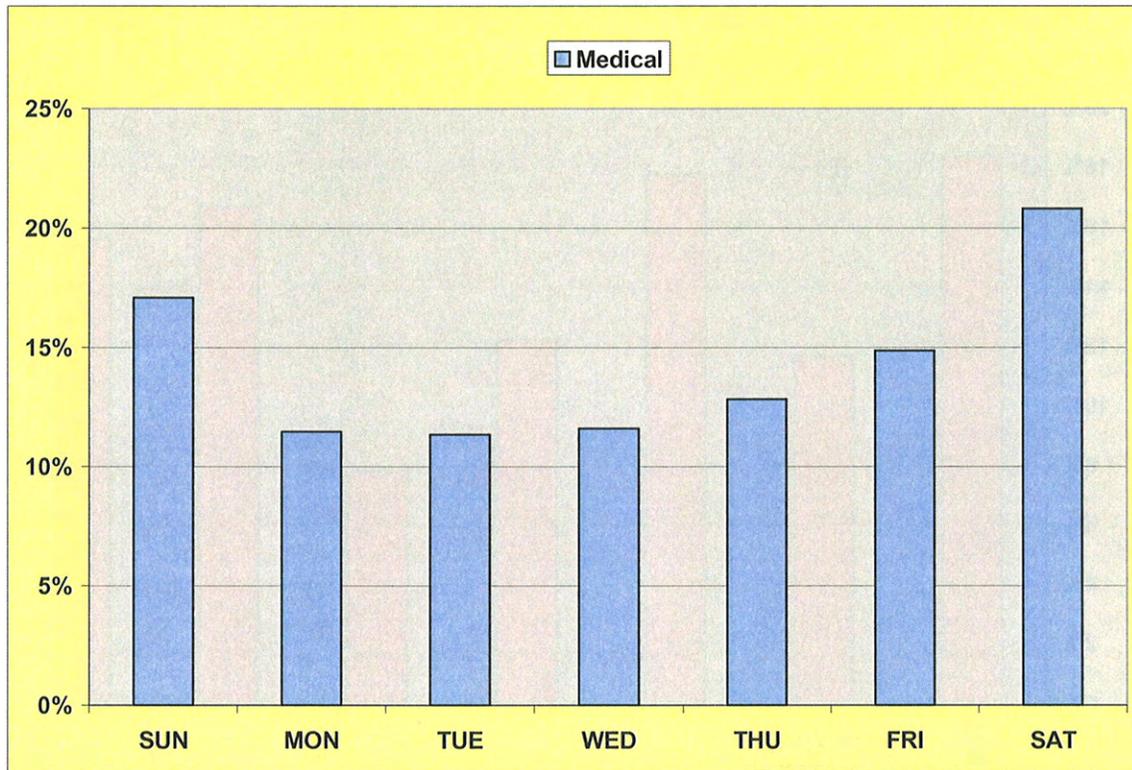
Figure 42: Monthly Workload



Monthly workload for all types of calls within the district appears to have increased for the winter months in 2006 while the remainder of the year is consistent with the previous year's trend.

In further analysis, workload is examined by day of the week. Because the majority of calls are categorized as medical, it is important to analyze call types separately to evaluate any unique patterns that exist. The following graph (Figure 43) depicts the department's workload by day of week for medical calls.

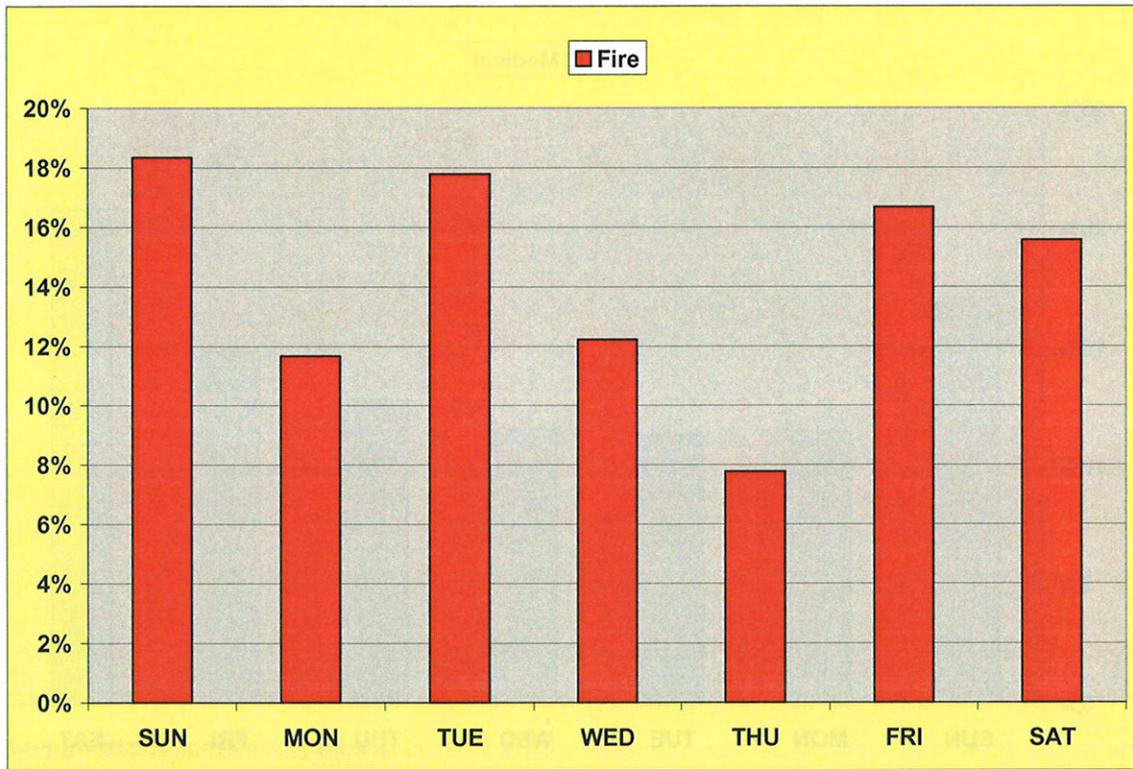
Figure 43: Medical Workload by Day of Week



It can be seen that medical calls exhibit a generally rising workload as the weekend approaches; reducing sharply during the early part of the week. This may reflect that many visitors come to recreate in the area on the weekends.

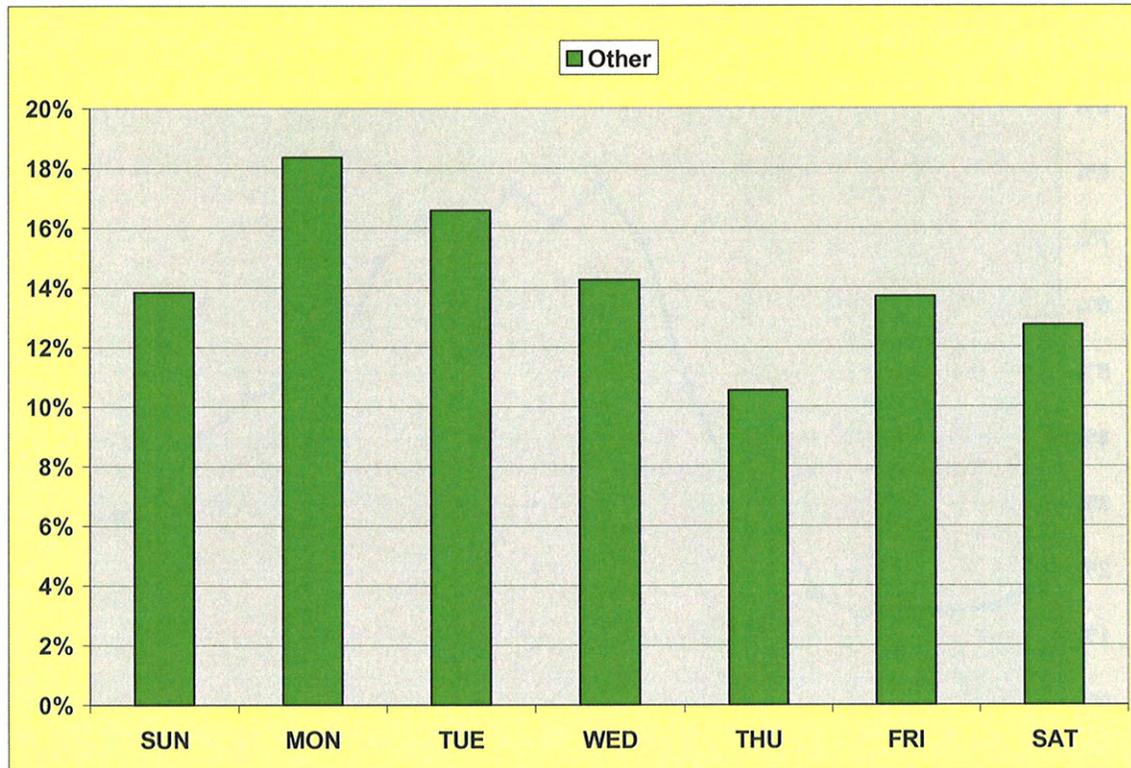
Similarly, fire incidents are higher on weekends, spiking briefly again on Tuesdays. Figure 44 details fire incidents by the day of the week.

Figure 44: Fire Call Workload by Day of Week



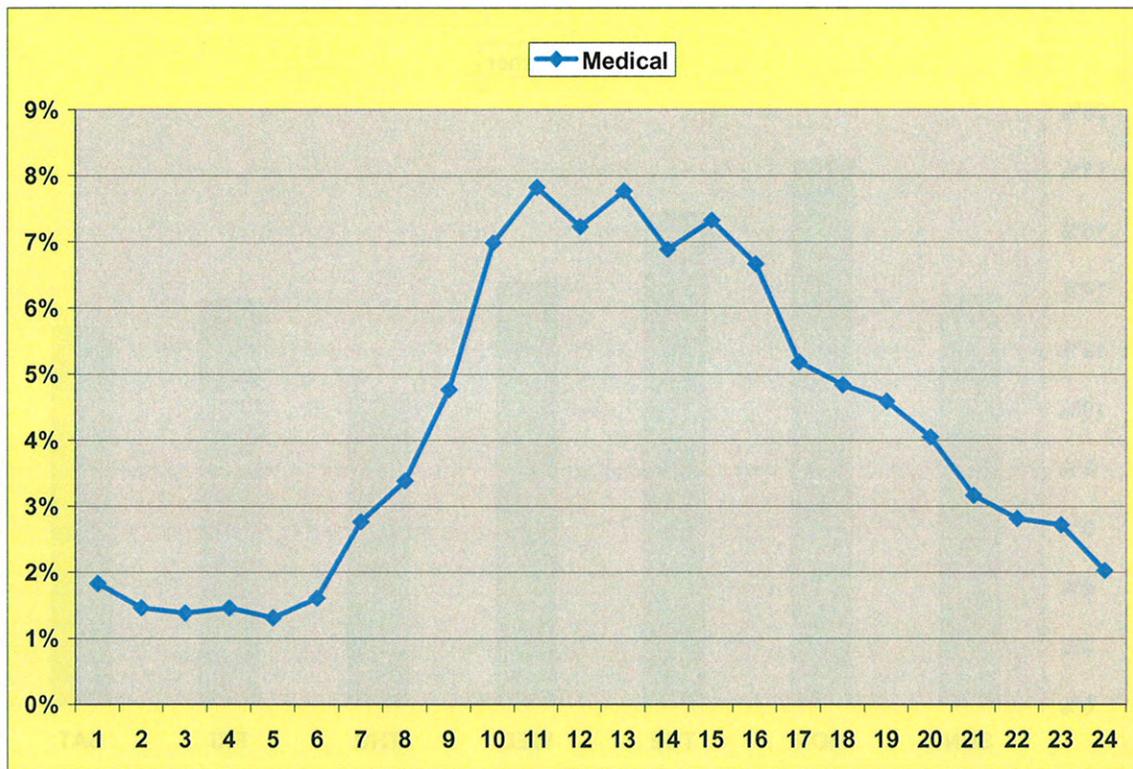
Requests for services not categorized as fire or medical follow a different pattern in that the number of these types of calls is higher during the first part of the week. Figure 45 illustrates the workload for calls other than fire or medical by day of the week.

Figure 45: Calls Other than Fire or Medical Workload by Day of Week



The final analysis of historical workload concludes with an examination of call types by hour of day. The hours of peak activity can strain an under-equipped or under-staffed fire department. Understanding when peak activity occurs is the beginning of the needs assessment process and the development of deployment strategies. ESCi will examine each call type so that medical workload does not overshadow unique patterns of fire and miscellaneous call types. As such, ESCi begins with medical calls in Figure 46 as this type of call is most abundantly recorded.

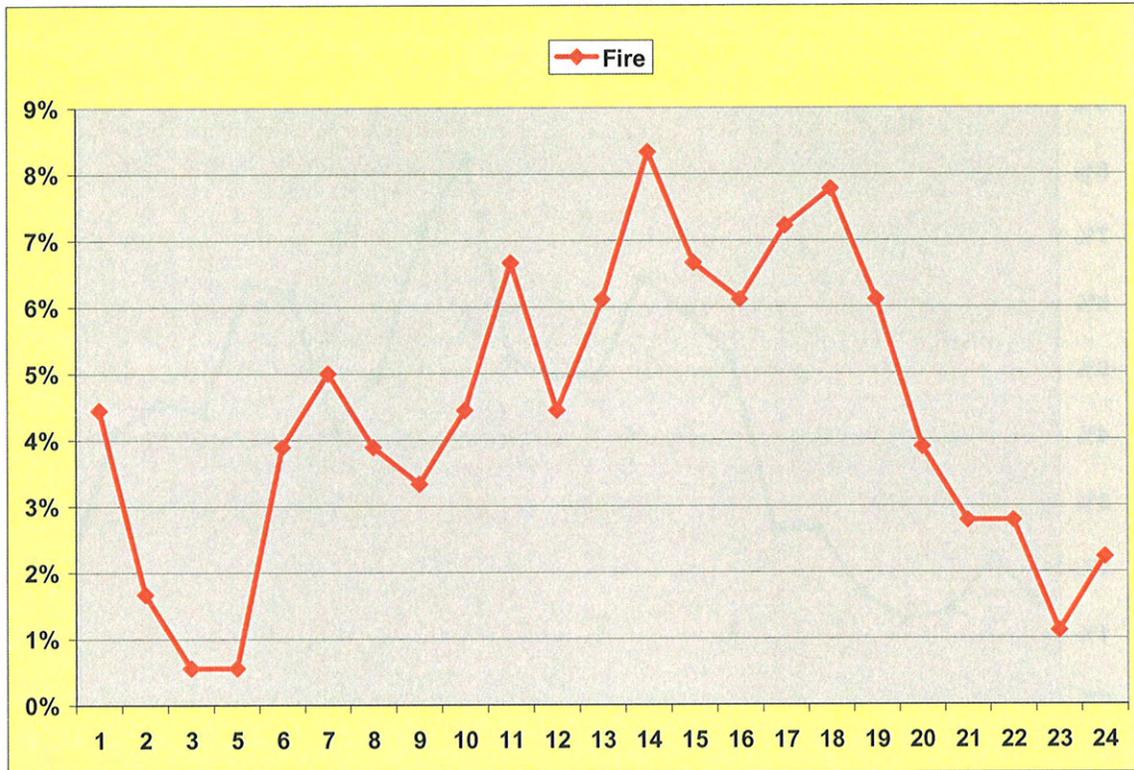
Figure 46: Medical Workload by Hour of Day



Activity for medical calls begins to climb by 6:00 AM, reaching peak by 11:00 AM when it begins to decrease gradually. This pattern follows the typical active hours of most people's daily lives.

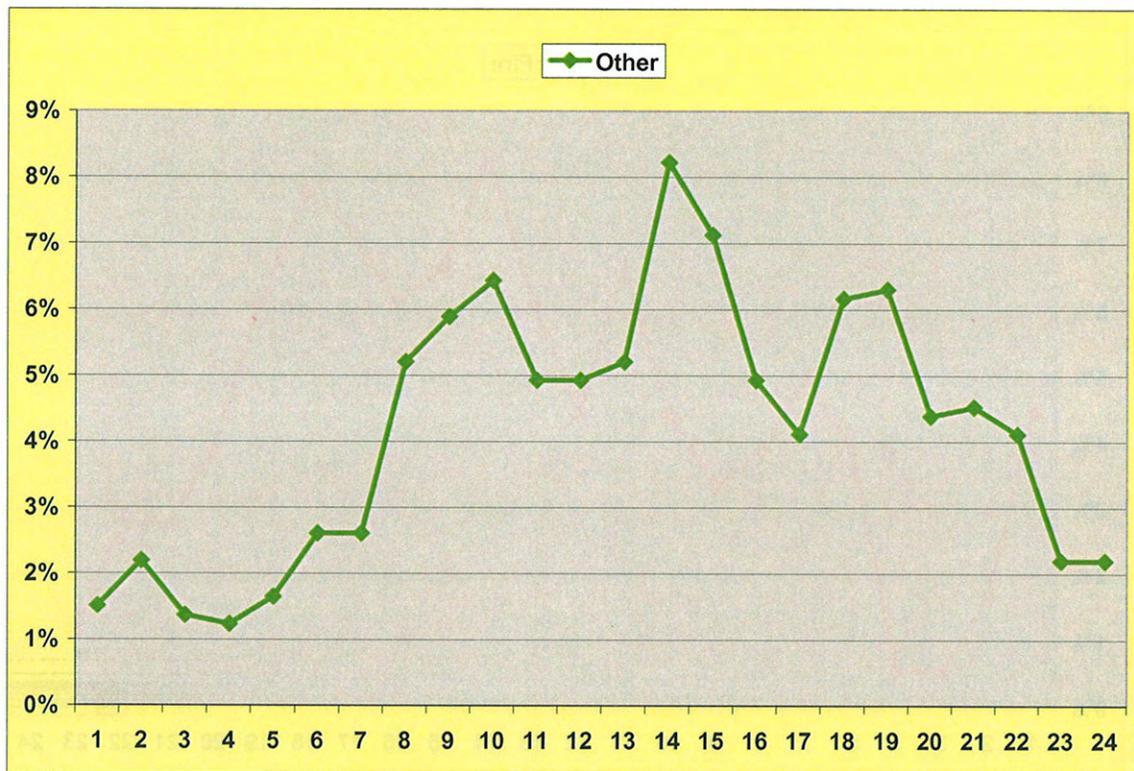
Fire incidents (Figure 47) demonstrate a different pattern in relation to the hour of day. Beginning early in the day at 5:00 AM, fire incidents tend to increase during the day and then rapidly decrease in frequency through the evening hours.

Figure 47: Fire Calls Workload by Hour of Day



Miscellaneous calls, (Figure 48) follows a similar hourly pattern to that of fire, with activity increasing at 5:00 AM, rising gradually to peak later in the day until a general decrease begins at 8:00 PM.

Figure 48: Calls Other than Fire or Medical Workload by Hour of Day



Peak activity times can be reflected in response time performance in certain cases. The impact of response time on the outcome of emergency incidents has been exhaustively studied, both in the laboratory and in historical data, with predictable correlation between the two. Though seemingly intuitive, it is still useful to review how longer response times can have a negative effect on the ability to suppress fires, particularly in structures, or to successfully intervene in a life-threatening medical emergency. Response time performance is examined later in this report.

In addition to the temporal analysis of the current service demand, it is useful to examine geographic distribution of service demand. Later in this study, this will allow for assessing the location of stations in comparison to the actual service demand within the area. The following maps indicate the distribution of emergency incidents responded to by the department in 2006.

Figure 49: Service Demand - ASA Incident Density

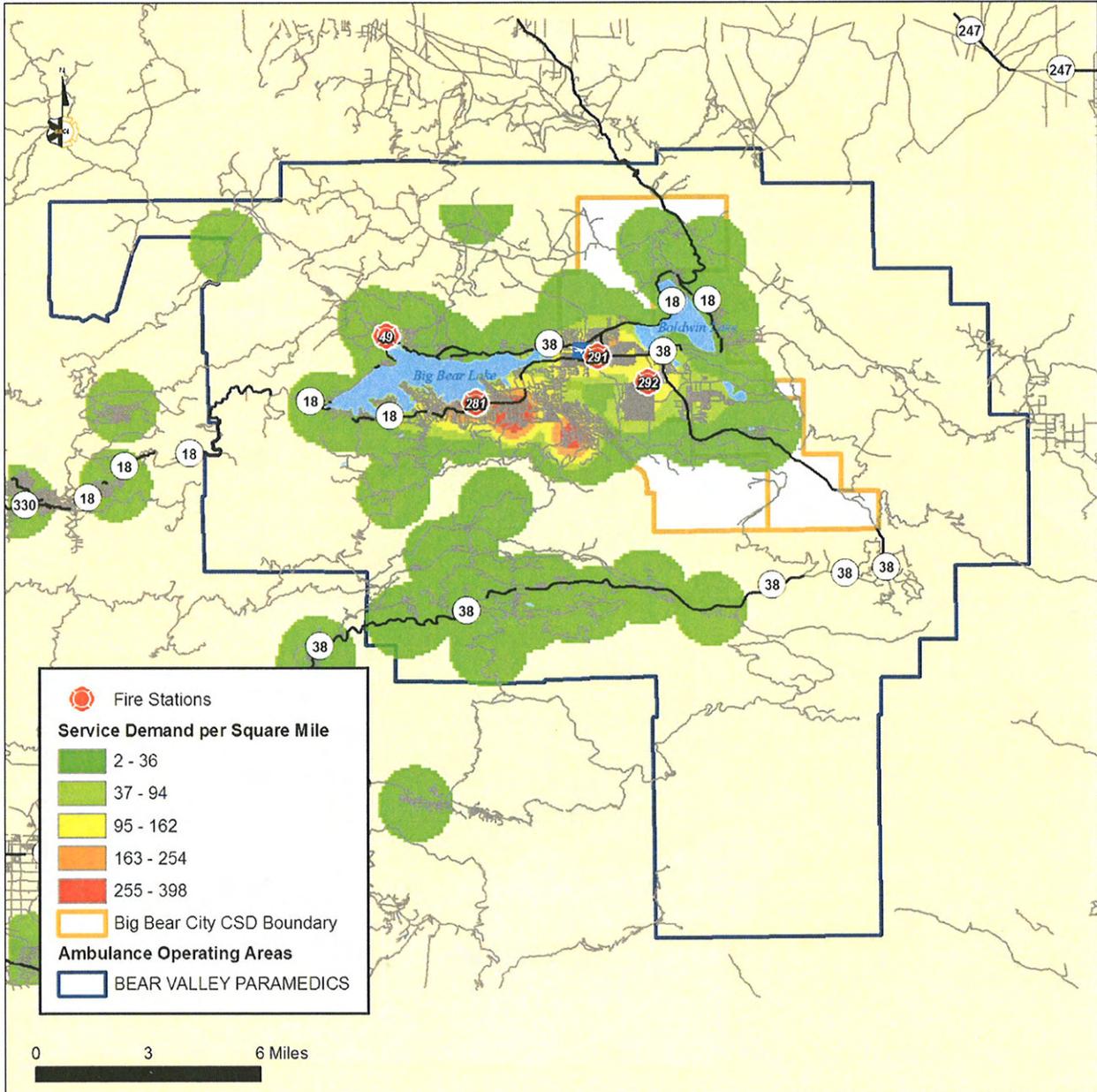
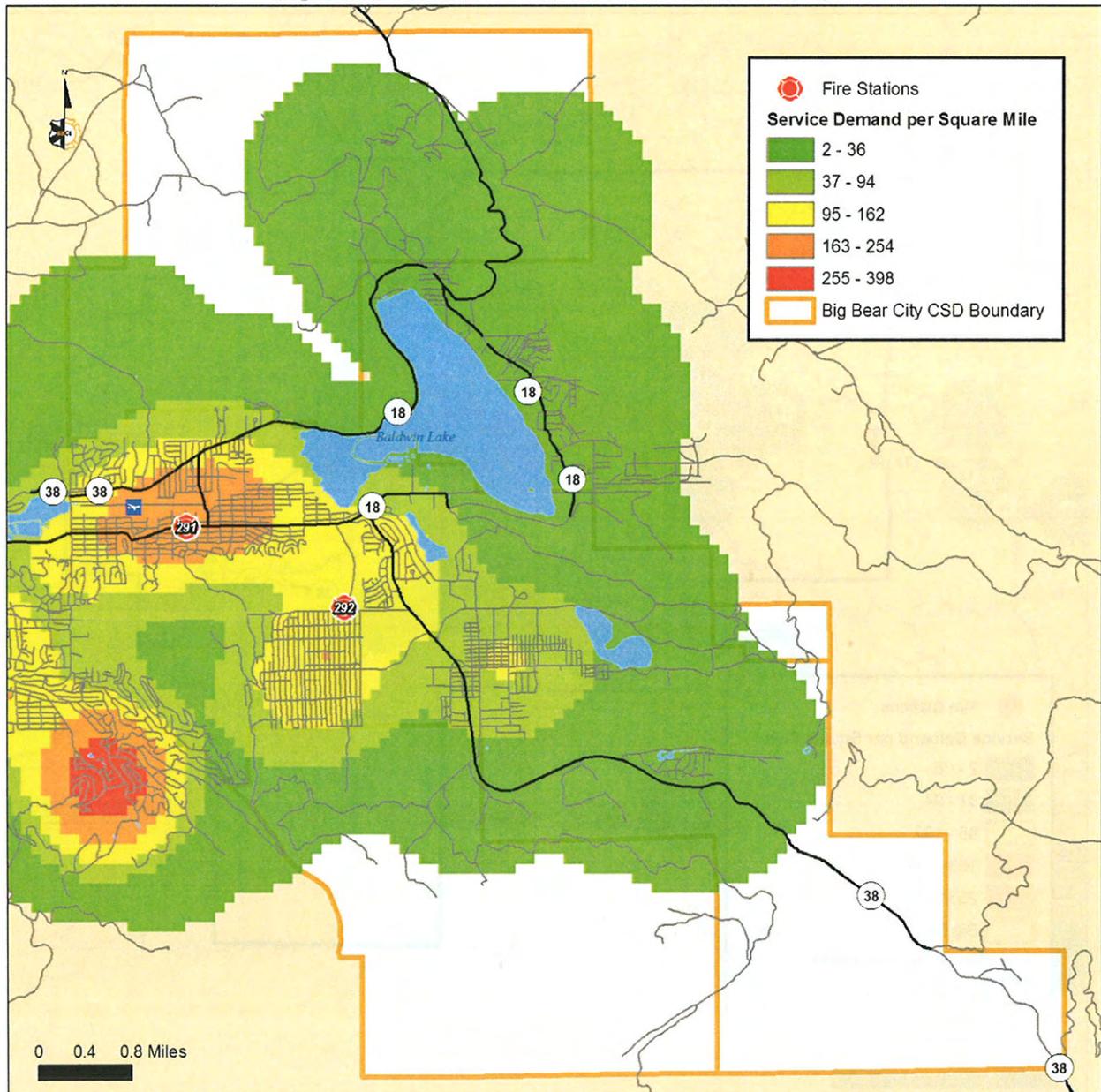


Figure 49 shows that most of the areas of highest service demand are located in areas of high residential population density and near the fire stations.

Figure 50 provides a closer view of the areas of higher density within and surrounding the BBCCSD.

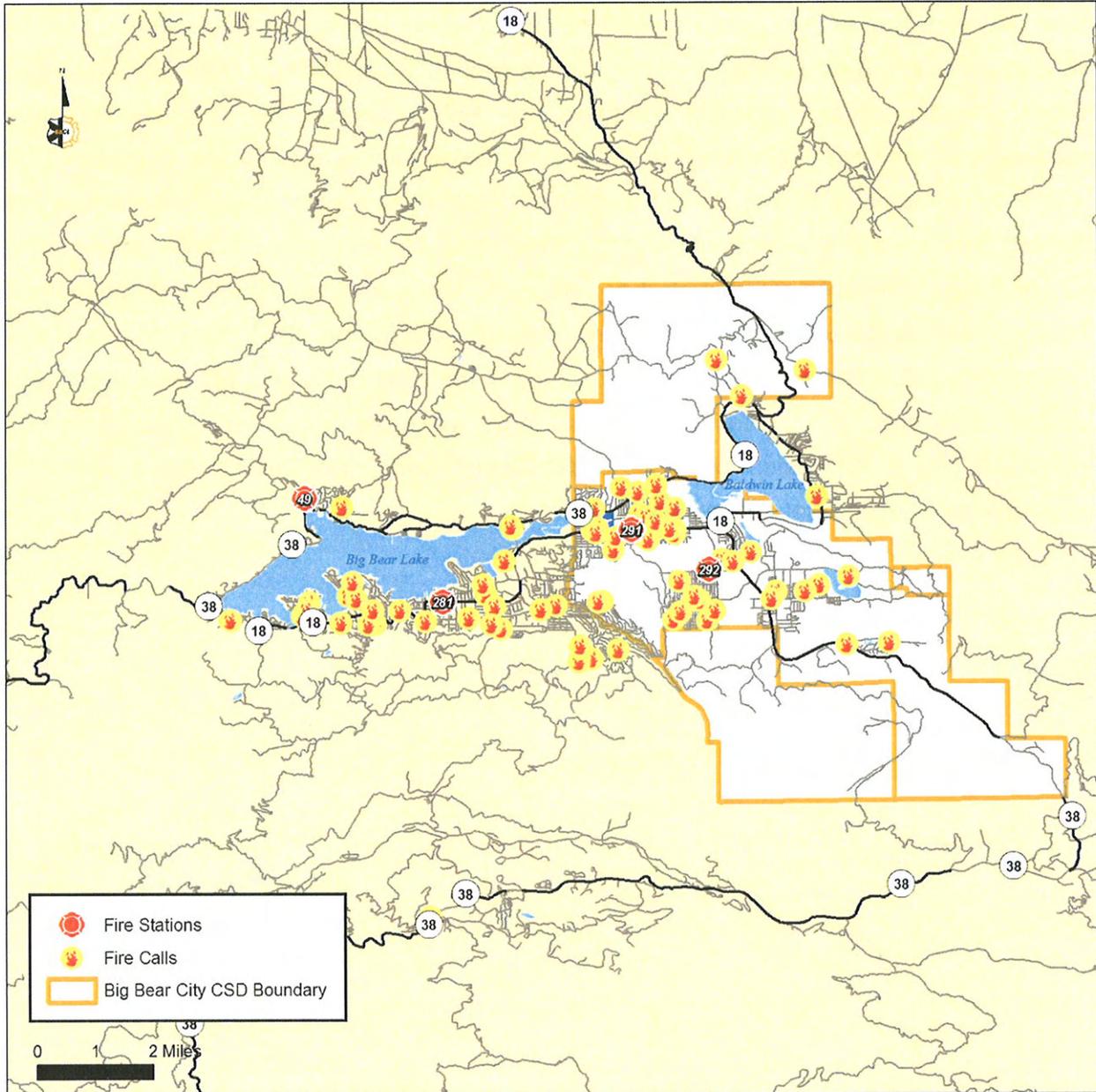
Figure 50: Service Demand - CSD Incident Density



While the above map reflects all calls for service, it can be influenced by the prevalence of medical requests.

Figure 51 illustrates the location of structure fires within the BBCCSD that were handled by the BBCFD and nearby mutual aid fires handled over the same time period. It illustrates that the majority of structure fire incidents occur near the populated areas and within proximity of the fire stations.

Figure 51: Service Demand - BBCFD Fire Incidents



## Concentration Analysis

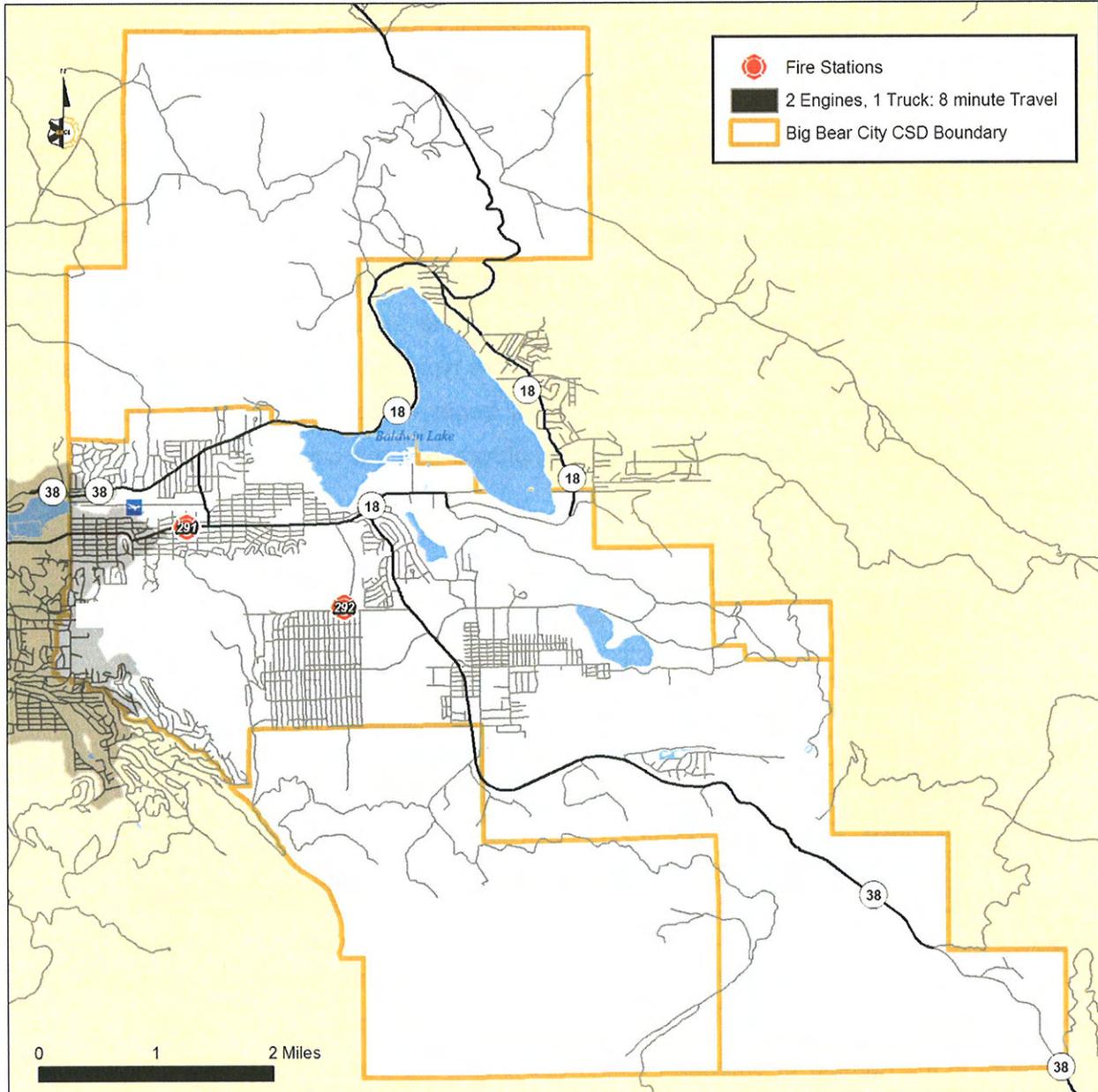
Standard firefighting procedures call for the arrival of the entire initial assignment (sufficient apparatus and personnel to effectively combat a fire based on its level of risk) within a certain amount of time. This is to ensure that sufficient people and equipment arrive soon enough to

effectively control a fire before substantial damage occurs.<sup>22</sup> A full alarm assignment for the Big Bear City Fire Department consists of 11 to 12 personnel with an on scene arrival objective within 10 minutes. Based upon reported minimum staffing of apparatus, a collective response of two engine companies, one truck company, one ambulance unit; and a chief would likely respond to a commercial structure fire. For a residential fire, three engines, one ambulance, and a chief would respond. Due to minimal staffing of BBCFD, the additional apparatus comes from the Big Bear Lake Fire Department and SBCFD Station 49. Additional BBCFD apparatus may respond depending upon recall of off-duty personnel. The area shaded in black in the following Figure 52 shows the extent of an effective firefighting force for the BBCCSD. The area is most dependent upon a staffed truck or engine company from Big Bear Lake FD utilizing an eight-minute travel time. A full effective response force within the target response time goal is obtainable only in the western perimeter of the District. Once again this allows 1.5 minutes for turnout and 30 seconds for suppression initiation.

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<sup>22</sup> See supplemental discussion about time/temperature curve and the effects of flashover.

Figure 52: Effective Firefighting Force



## Reliability Analysis

### Workload and Failure Rates

The workload on emergency response units can be a factor in response time performance. The busier a given unit, the less available it is for the next emergency. If a response unit is unavailable, then a unit from a more distant station must respond, increasing overall response time. A cushion of surplus response capacity above average values must be maintained due to

less frequent but very critical times when atypical demand patterns appear in the system. Multiple medical calls, simultaneous fires, multi-casualty events, or multiple alarm fires are all examples.

Utilizing 9-1-1 CAD unit dispatch data, a projected Unit Hour Utilization (UHU) was calculated using the total time on assignment for each primary apparatus. Unit hour utilization is an important workload indicator because it describes the amount of time a unit is not available for response since it's already committed to an incident. The larger the number, the greater its utilization and the less available it is for assignment to an incident. The highest unit hour utilization (UHU) figures for fire suppression units are typically around 0.20, with some studies indicating that unit failure rates at this workload will begin at about 10 percent.<sup>23</sup> Studies of fire-based medical units indicate that significant employee burnout can occur with 0.30 unit hour utilization.

**Figure 53: 2006 Unit Hour Utilization**

Unit ID	911 Calls	Time	UHU	NET Calls	Time	UHU
BCALL	98	5:48:25	0.00			
BE291	25	39:00:13	0.00			
E291	713	288:16:30	0.03			
E291A	38	36:44:11	0.00			
E292	22	9:38:31	0.00			
MA291	954	655:22:51	0.07	136	572:51:48	0.07
MA291A	1198	701:29:45	0.08	120	475:15:14	0.05
MA291B	398	315:24:21	0.04	59	313:28:54	0.04
MA292	627	540:24:46	0.06	125	477:45:48	0.05
ME291	473	189:41:25	0.02			

Included along with this analysis is a UHU analysis for non-emergent transports (NET) conducted by the ambulances.<sup>24</sup> Note that while the number of non-emergent transports compared to the number of emergent responses is low, the commit time is significantly longer, averaging over four hours per transport versus an average of about 42 minutes for emergent calls. Overall, BBCFD unit utilization is currently below critical stages, indicating unit workload is not likely a major factor in achieving improved response times (Figure 53). It may however be a

<sup>23</sup> The unit failure rate is the percentage of calls for which a unit is unavailable due to handling an existing call where it otherwise would have been dispatched as the primary unit.

<sup>24</sup> The NET figures include inter-facility hospital transports and resort to hospital transports. These are transports that are not handled or dispatched through the 9-1-1 system although they do represent additional workload carried by the ambulances.

factor in terms of response reliability noting that the ambulance, MA-292, and the engine, E292 are cross-staffed with the same personnel.

**Call Concurrency and Resource Drawdown**

Another way to look at resource workload is to examine the amount of time multiple calls occur within the same time frame on the same day. ESCi examined the 9-1-1 calls during 2006 to find the frequency that BBCFD apparatus is handling multiple calls within any given time frame (Figure 54). This is important because the more calls occurring at any one time can stretch available resources and extend response times from distant responding available apparatus.

**Figure 54: Call Concurrency Table**

<b>Big Bear City Fire Dept. Table of Concurrent Calls</b>										
<b>2006</b>	<b>Single</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>All Calls</b>	80.17%	15.17%	3.71%	0.73%	0.07%	0.07%	0.04%	0.00%	0.00%	0.00%
<b>Fire</b>	96.34%	3.66%								
<b>EMS</b>	80.98%	14.58%	3.76%	0.55%	0.04%	0.04%	0.04%			
<b>Other</b>	96.42%	3.58%								

As in most communities, the majority of calls happen singularly. However, as communities grow, the propensity for concurrent calls increase. When the concurrency reaches a level at which it stretches resources to near capacity, response times begin to extend. Although multiple medical calls will cause drawdown especially as concurrency increases, they usually occupy one unit at a time. As noted in the previous discussion on unit hour utilization, the non-emergent workload of the District raises the amount of time a unit is unavailable therefore increasing the potential for overlapping requests for service. Due to staffing limitations, recall personnel would need to be called in when a third call occurs concurrently; which happened less than 4 percent of the time in 2006. Concurrent fire related calls are of more concern as they may require multiple unit responses for each call depending upon the dispatch criteria. Fortunately, this only occurred 3.66 percent of the time in 2006.

**Recorded System Response Performance**

Throughout this document, certain descriptive statistical measures are utilized which may not be familiar to all readers. In an effort to reduce confusion or the drawing of inaccurate conclusions, this section seeks to provide a brief explanation of these measures. The measures most often used which require clarification are the use of “average” and “percentile” measures.

## **Average**

The 'average' measure is a commonly used descriptive statistic also called the mean of a data set. It is a measure which is a way to describe the central tendency, or the center of a data set. The average is the sum of all the points of data in a set divided by the total number of data points. In this measurement, each data point is counted and the value of each data point has an impact on the overall performance. Averages should be viewed with a certain amount of caution because the average measure can be skewed if an unusual data point, known as an outlier, is present within the data set. Depending on the sample size of the data set, the skewness may be either very large or very small.

As an example, assume that a particular fire station with a response time objective of six minutes or less had five calls on a particular day. If four of the calls had a response time of eight minutes while the other call was across the street and only a few seconds away, the average would indicate the station was achieving its performance goal. However, four of the five calls, or 80 percent, were beyond the stated response time performance objective.

The opposite can also be true where one call with an unusually long response time can make otherwise satisfactory performance appear unacceptable. These calls with unusually short or long response time have a direct impact on the total performance measurements and the farther they are from the desired performance, the greater the impact.

The reason we compute averages is because of its common use and ease of understanding associated with it. The most important reason for not using averages for performance standards is that it does not accurately reflect the performance for the entire data set. As illustrated above, one extremely good or bad call skewed the entire average. While it does reflect all values, it does not really speak to the level of accomplishment in a strong manner.

## **Percentile**

With the average measure, some data points are below the average and some are above the average. The same is true for a median measure which simply arranges the data set in order and finds the value in which 50 percent of the data points are below the median and the other half are above the median value. This is also called the 50<sup>th</sup> percentile.

When you deal with percentages, the actual value of the individual data does not have the same impact as it did in the average. The reason for this is that the fractal is nothing more than the

ranking of the data set. The 90th percentile means that 10 percent of the data points are greater than the value stated and all other data are at or below this level.

Higher percentiles measurements are normally used for performance objectives and performance measurement because they show that the large majority of the data set has achieved a particular level of performance. This can then be compared to the desired performance objective to determine the degree of success in achieving the goal.

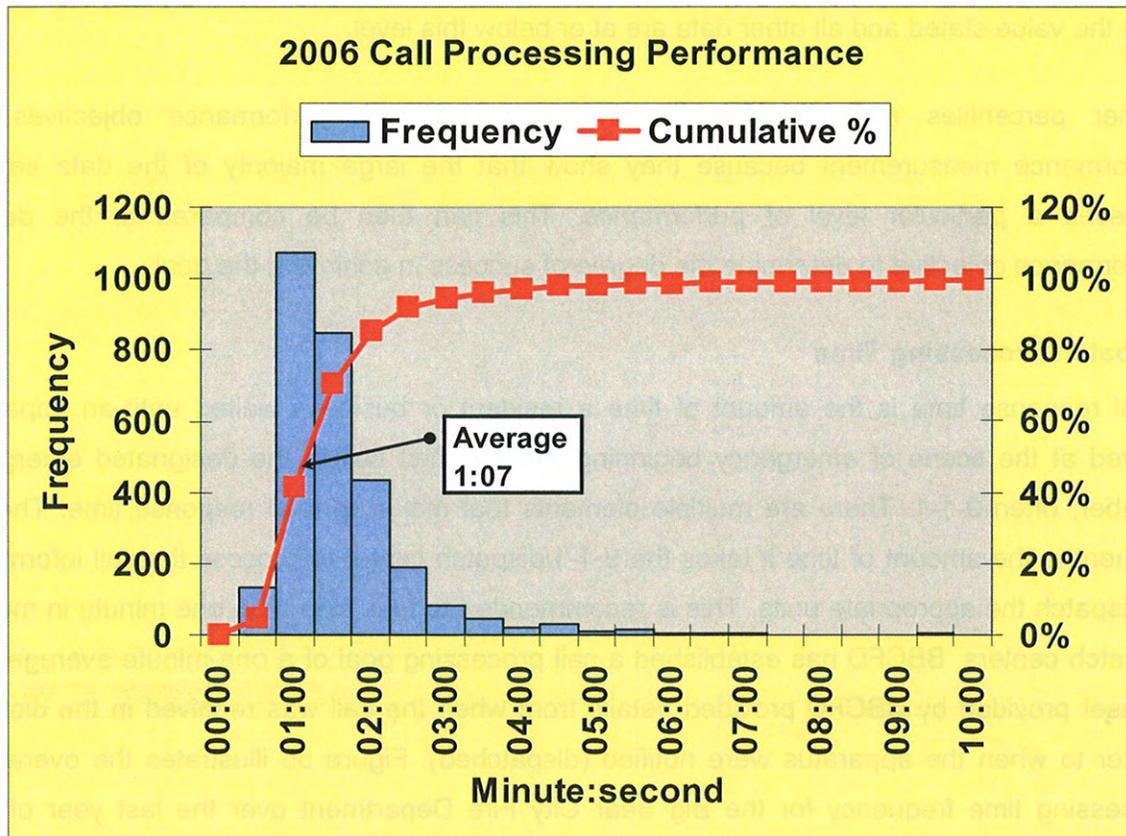
### **Dispatch Processing Time**

Total response time is the amount of time a resident or business waited until an apparatus arrived at the scene of emergency beginning with the first call to the designated emergency number, often 9-1-1. There are multiple elements that make up total response time. The first element is the amount of time it takes the 9-1-1/dispatch center to process the call information to dispatch the appropriate units. This is recommended to take less than one minute in modern dispatch centers. BBCFD has established a call processing goal of a one-minute average. The dataset provided by BBCFD provided details from when the call was received in the dispatch center to when the apparatus were notified (dispatched). Figure 55 illustrates the overall call processing time frequency for the Big Bear City Fire Department over the last year of data provided.<sup>25</sup>

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<sup>25</sup> Mutual aid calls and non-emergent calls such as those coded as delayed response, fireworks investigations move-up assignments, and public service calls were removed from response time analyses. Response times in excess of 60 minutes were considered anomalous and also removed from the analyses.

Figure 55: Call Processing Performance History

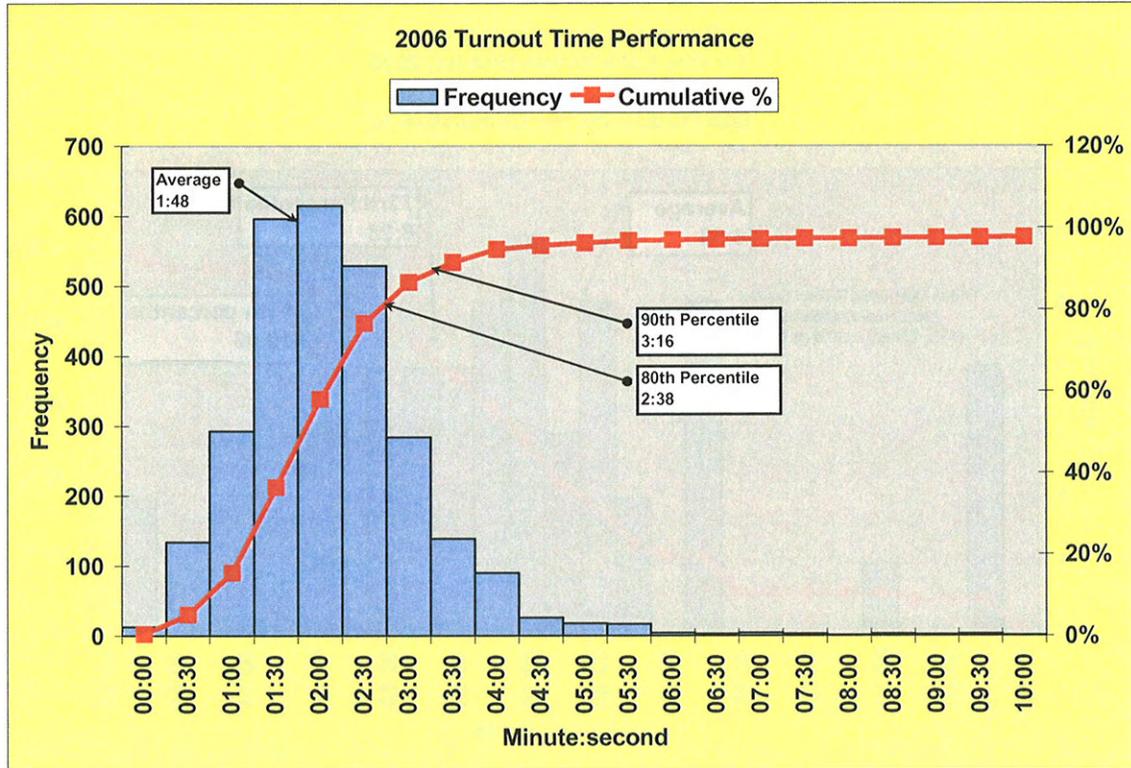


The performance of the dispatchers has come within seven seconds of the stated goal for call processing by the department.

**Turnout Time**

The second element that factors into total response time performance is turnout time. Turnout time is the amount of time it takes after being notified of the alarm for firefighters to assemble, don equipment, and initiate response to the alarm. While national standards call for a one minute goal, there is debate as to whether this is practical considering the activities involved. BBCFD has not established a turnout time goal but includes this time element within its response goals as they are measured from time of dispatch. According to data provided by Desert Com for the 2006 calendar year, turnout times for the BBCFD averaged 1 minute and 48 seconds. The time at the 90<sup>th</sup> percentile was 3 minutes and 16 seconds (Figure 56).

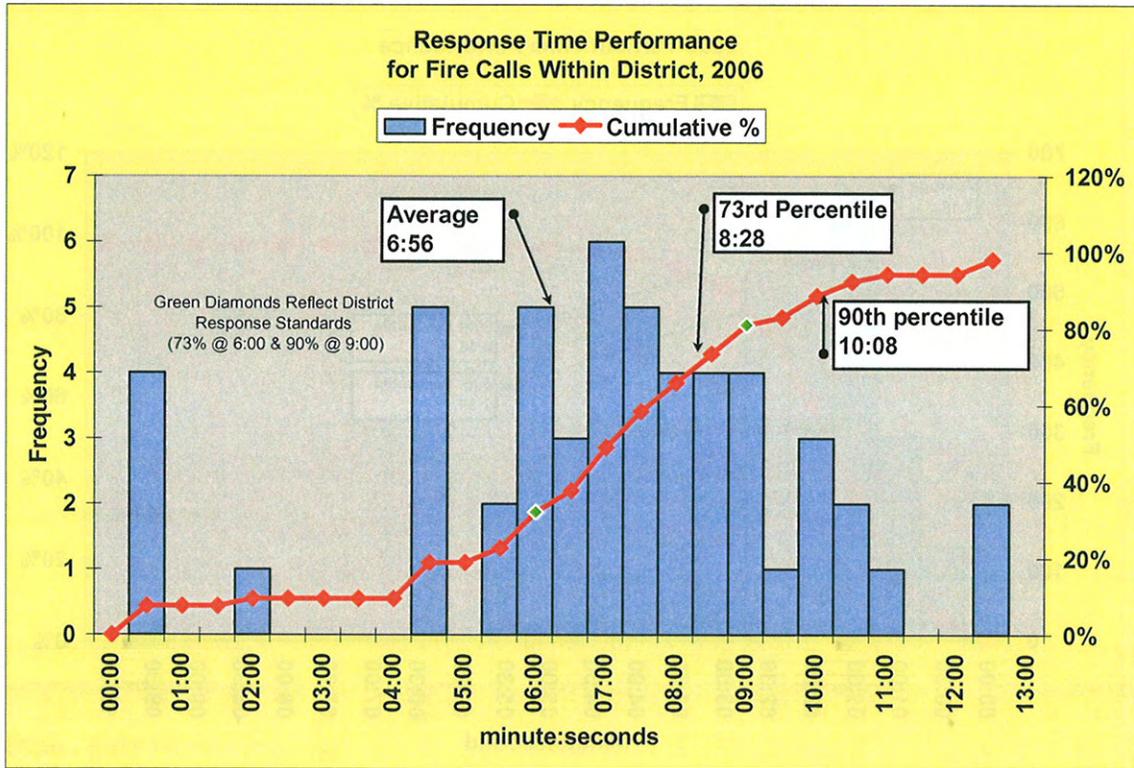
Figure 56: Turnout Time Performance



**Response Time**

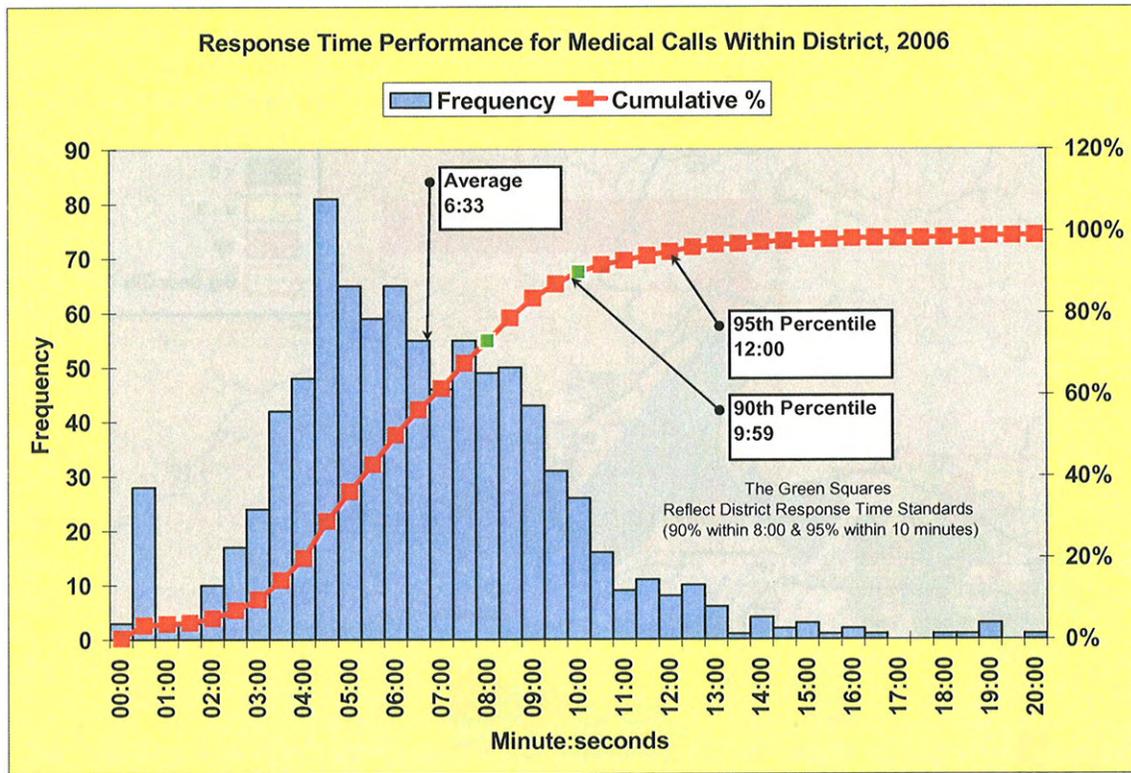
Response time is the sum of the turnout time and the time it takes to travel to the scene. Response times can vary by time of day, in reflection of service demand workload and when the firefighters are at rest. In addition, many factors can inhibit emergency response, such as weather, traffic, and distance to the assignment. Figure 57 compares the 2006 actual response performance to BBCFD response objectives. While the response objectives utilize time stops related to fire suppression or medical intervention activities, these exact times were not captured in the dataset provided. Instead, we will compare the department standards to the arrival of the first apparatus as this is the closest time to these activities. Any residual remaining time from the objectives set can be evaluated for sufficiency to begin definitive activity.

Figure 57: Response Time Performance for Fire Calls within the BBCSD



The most frequently recorded fire response time was in the seven7minute range, but the calls recorded at a 30 second response time skew the average lower. It can be seen that the department has missed its 73<sup>rd</sup> percentile goal by 1 minute and 28 seconds, while the 90<sup>th</sup> percentile goal has been surpassed by one minute and eight seconds. This can be partially caused by the 90<sup>th</sup> percentile turnout time performance in Figure 56. As for medical calls, Figure 58 details the performance within the BBCSD when compared to stated medical response objectives.

Figure 58: Medical Response Time Performance within BBCSD

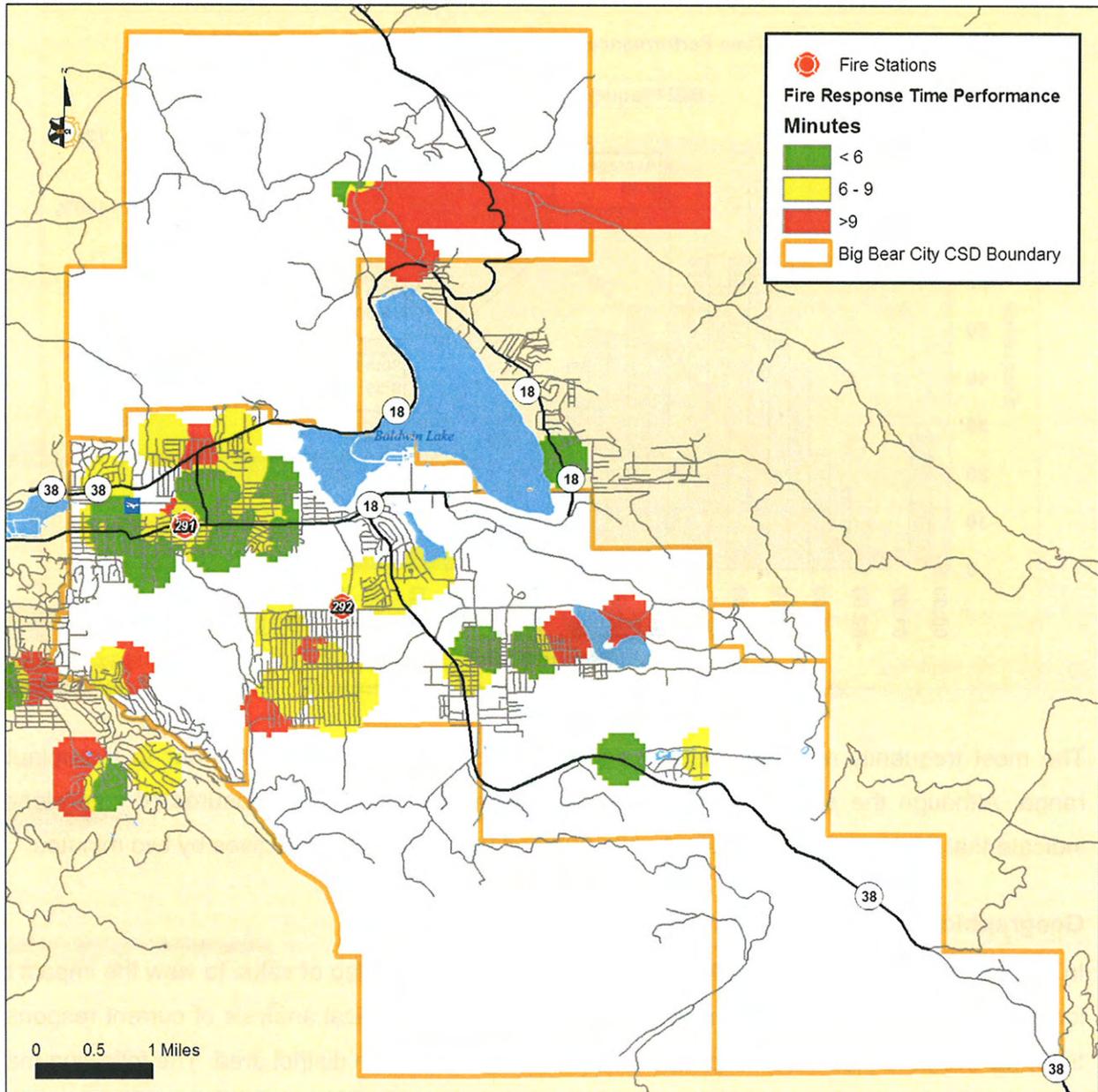


The most frequently recorded response time for medical calls was in the four to five minute range. Although the average response time is admirable, stronger measures of consistency indicate that the department fell short of its 90<sup>th</sup> and 95<sup>th</sup> percentile objectives by two minutes.

### Geographic Response Performance

In addition to viewing temporal changes in response time, it is also of value to view the impact of location on response times. In order to accomplish a geographical analysis of current response time, we evaluate the actual response time performance in each district area. The following map (Figure 59) illustrates the amount of time it has taken from the initial dispatch for an apparatus to arrive to actual incidents. It examines the response times of incidents within a quarter mile radius to determine the shading for increasing response time levels. We will begin by examining the call types within the BBCSD.

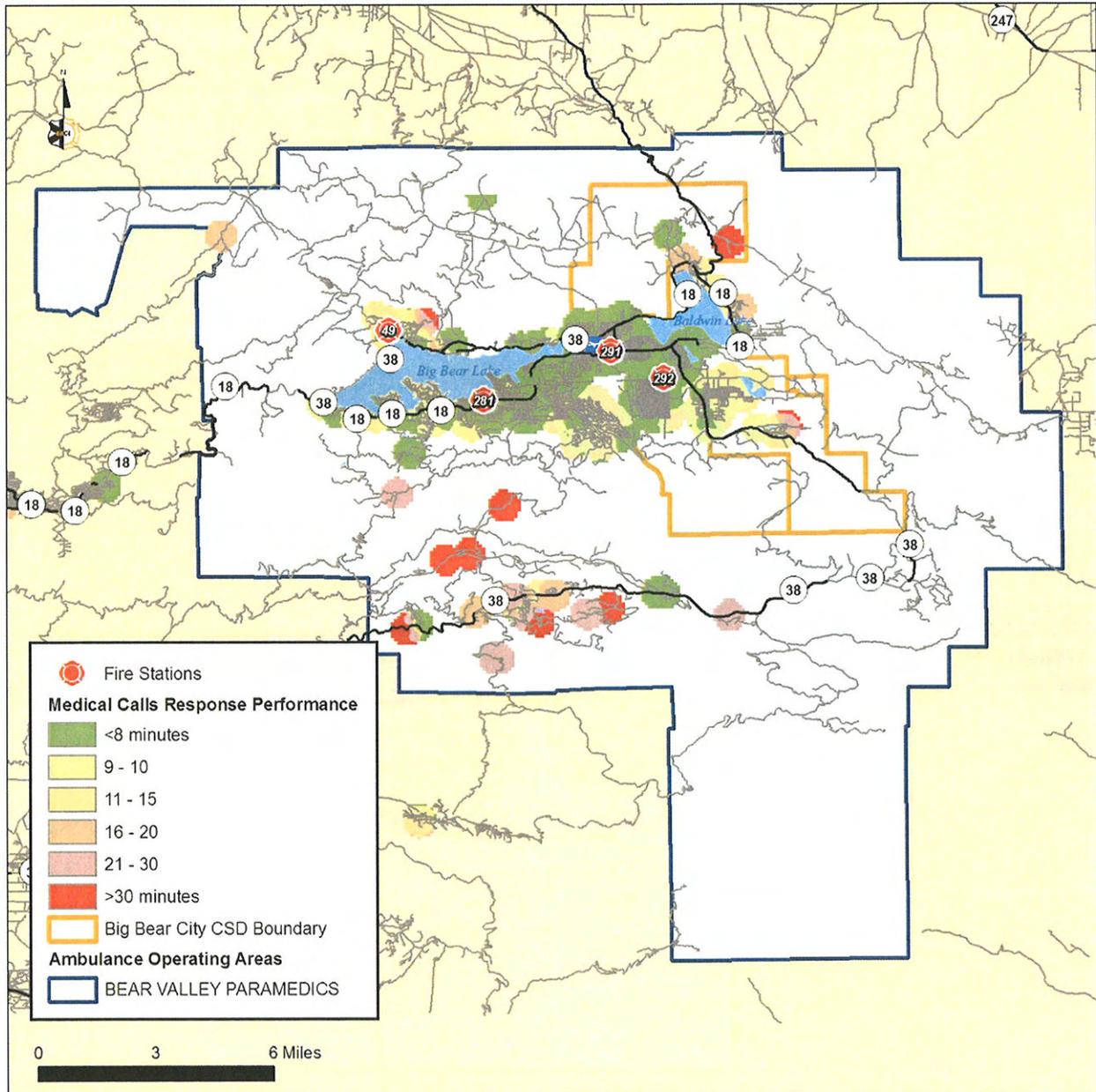
Figure 59: Response Performance of Fire Calls within the BBCCSD



The best response times are generally located near Station 291. Occasionally longer response times have occurred in this area, but overall longer times are farther from fire station locations.

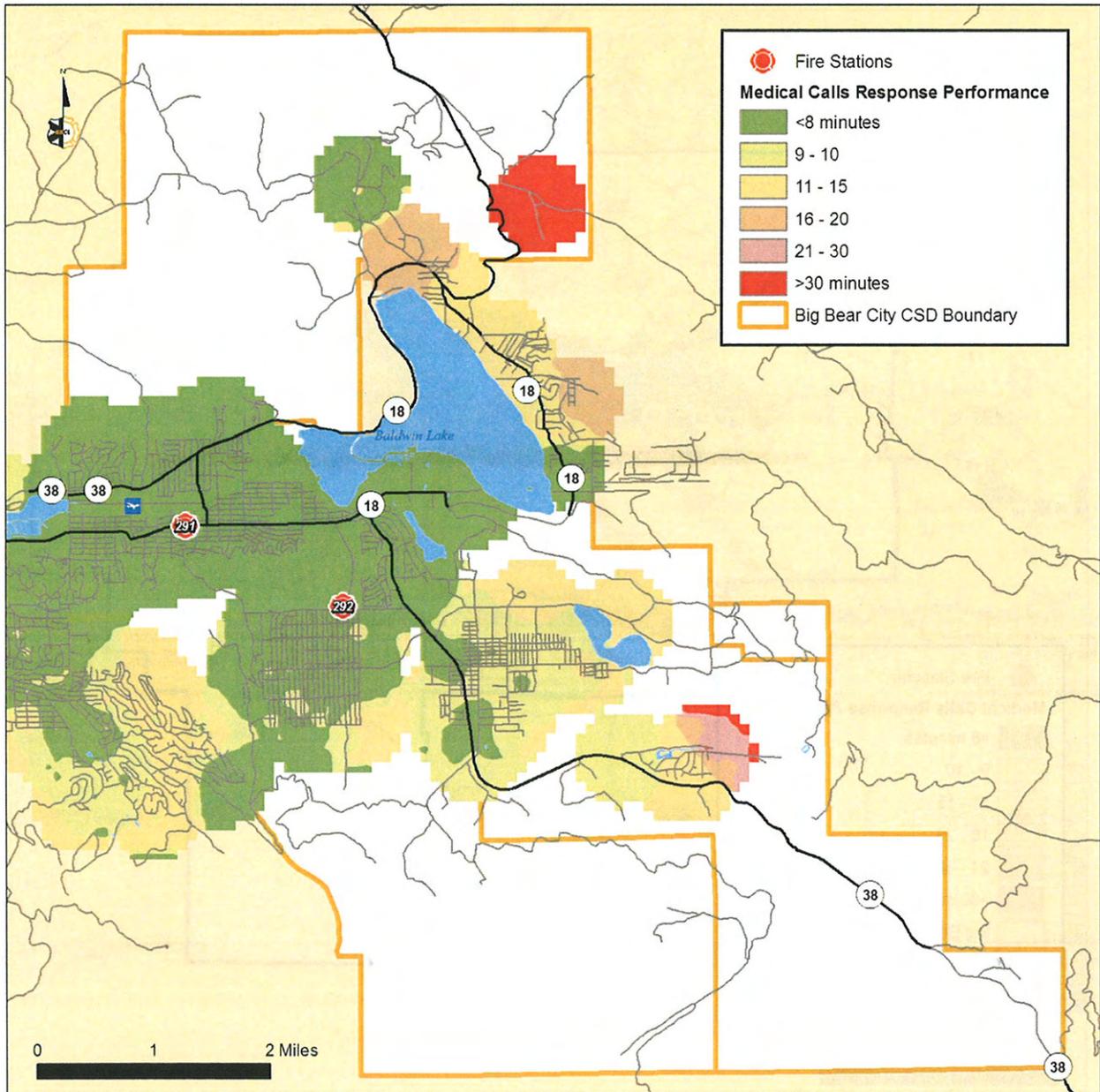
Geographic response performance for medical calls is based upon response goals within the ASA. The response performance within the city of Big Bear Lake is generally within the response objectives, possibly due to ambulances responding from the hospital at times rather than from the station locations within the BBCCSD. This is illustrated in the Figure 60.

Figure 60: Response Time Performance for Medical Calls within the ASA



A closer examination of response time performance for medical calls within the BBCCSD is offered in the following map (Figure 61). The areas of longest response time are clearly visible through this map and, as expected, the actual response time performance is best in areas closest to the fire stations.

Figure 61: Response Time Performance for Medical Calls within the BBCCSD



## **Section III – Recommended Long-Term Strategies**

The agency evaluation contained in this study provides a comprehensive analysis of the Big Bear Community Services District fire department and its delivery of emergency services. In Section I, the evaluation section, we described our findings and provided a review of conditions or issues that require the attention of the department. In many cases, these issues require relatively short-term effort or corrective action. Those suggested initiatives are included in Appendix A: Summary Table of Short- and Mid-Term Recommendations.

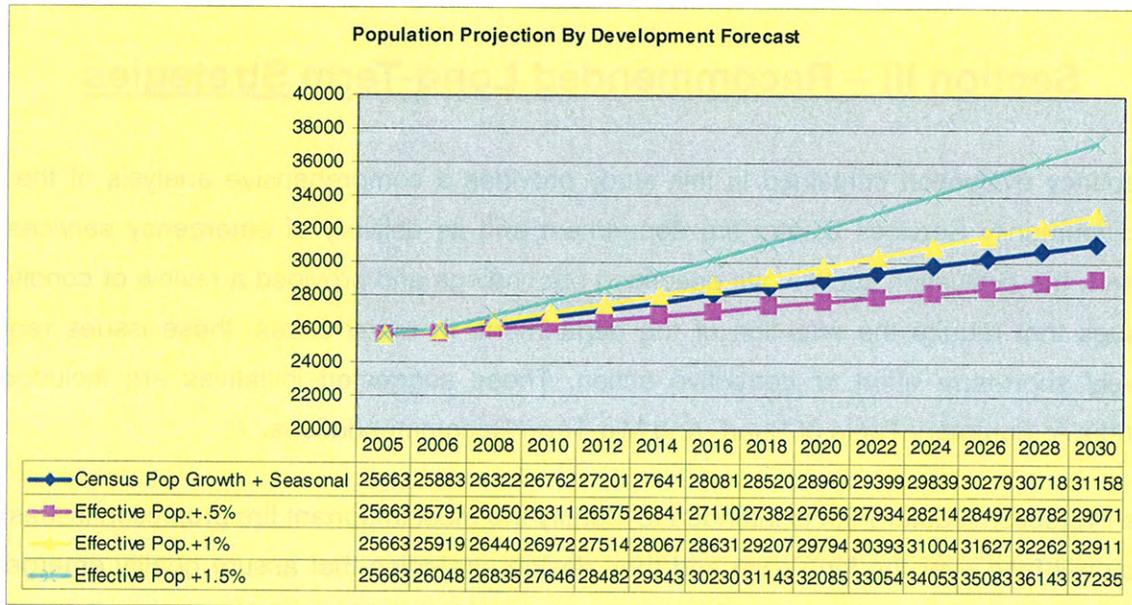
A Fire Protection Master Plan is intended to identify the most important fire protection issues the agency will face over the long term and then design strategies that assure quality emergency service for as many as 20 years into the future. The preceding section of this report (Section II – System Demand Projections) reviews community growth, identifies risk, and evaluates service demand. Section III uses that information, adds an evaluation of future service demand, and then identifies several alternative deployment options to enable a decision on a long-term growth strategy for the BBCFD.

### **Population Growth Projections**

In developing forecasts for population growth, we typically develop a forecast based on several decades of census experience. In the case of Big Bear City, we used census figures from 2000 in relation to its growth to the estimated 2006 level. A mathematical forecast is created through the year 2030. Several scenarios can be developed with regard to the seasonal population and its effect upon overall population projections (Figure 62).

One scenario is that seasonal population remains stable as the residential population continues to grow. Other scenarios project population growth of both the residential and seasonal population linearly at similar rates.

**Figure 62: Population Projection by Development Forecast**



It is not the intent of this study to be a definitive authority for the projection of future population in the service area but rather to base our recommendations for future fire protection needs on a reasonable association with projected service demand. Since we know that the service demand for emergency agencies is based almost entirely on human activity, it is important to have a population-based projection of the future size of the community. While we can see variation in the population projections presented here, one thing that is certain is that Big Bear City Fire Department will continue to serve a growing population, likely reaching over 30,000 by 2030. Planning should begin now to maintain the resources needed to meet the continuing demand for services.

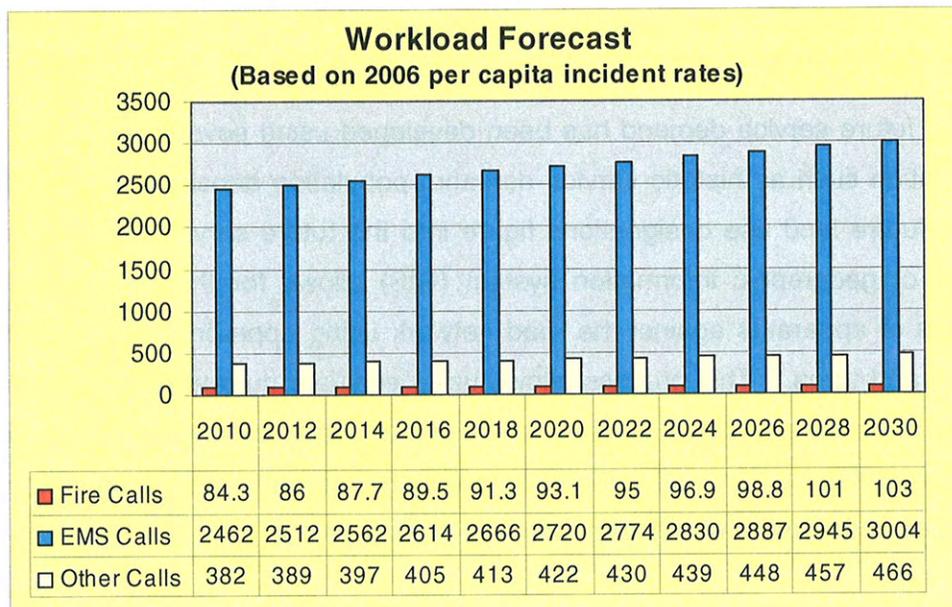
## Service Demand Projections

In evaluating the deployment of facilities, resources, and staffing, it is imperative that consideration be given to potential changes in workload that directly affect such deployment. Changes in service demand can require changes and adjustments in the deployment of staff and resources in order to maintain acceptable levels of performance.

For purposes of this study, we utilized the effective population with 1 percent growth population projection and multiplied these by a forecasted incident rate derived from the 2006 incident per

capita rates to identify workload potential through the year 2030. The results of this analysis are shown, by year and type of call, in Figure 63.<sup>26</sup>

**Figure 63: Workload Projection by Type and Year**



The increase in actual fire incidents is forecasted to be relatively low during the study period, a reflection of national trends for fire incident rates per capita, and is believed to be a result of improvements made in building codes and public fire education during the last three decades. EMS and other emergency service calls not involving actual fires is expected to continue to rise as well.

## Future Deployment Analysis

The following long-term resource deployment strategies are intended to allow the BBCFD to maintain its existing level of service as community growth continues and where possible, to improve the level of service toward the District's target performance objectives. For the purposes of this analysis we use a **four-minute and seven-minute travel time model** to be

<sup>26</sup> Note that this forecast projects workload based on 9-1-1 emergency call volume. It does not include the approximately 400 additional scheduled and non-scheduled transports that are generated within the ambulance service area but not documented through the 9-1-1 system.

consistent with nationally recognized travel time benchmarks.<sup>27</sup> This four and seven-minute travel objective applies with the boundaries of the BBCCSD. Response time goals within the ambulance service area are established by San Bernardino County and ranging from 9 minutes and 59 seconds in the core of the District to 59 minutes and 59 seconds in the most remote areas of the ASA.

A projection of future service demand has been developed using several measures discussed earlier. Information such as historic service demand, population density growth, traffic pattern changes, and future land use designations figure into the future service demand model. The extensive use of geographic information system (GIS) allows for the scientific modeling of response times of apparatus against the road network using appropriate speed levels during straight-aways and turns.<sup>28</sup> This process allows us to evaluate current deployment and future strategies with accuracy and detail. Recommendations to construct new fire stations or relocate existing ones are based on an evaluation of how well the current locations serve the projected service demands of the future within response time objectives.

### **Alternative Deployment Strategies**

We proceed by evaluating five different possible deployment strategies as outlined in Figure 64. It should be noted that these specific locations provide the point at which the performance projection data was achieved and represent our recommended "best case" locations. It is understood that additional factors such as land availability, zoning, traffic patterns, etc. will also impact any decision on a specific fire station site. For these reasons, we suggest that variations to the listed locations are acceptable within a range equivalent to two or three city blocks. Any such variations will impact the performance projection of the strategy but not significantly to render it inaccurate.

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<sup>27</sup> The four and seven minute travel model also represents the actual area covered under the BBCCFD's current response time goals allowing two minutes for dispatch processing time and unit reflex time. See the Response Time Performance Objectives discussion on page 91 in Section II for further explanation.

<sup>28</sup> Road networks and other related data files for this purpose were obtained from San Bernardino County. The reader should be aware that changes and/or additions to the street network in the future could benefit and in some cases actually hinder fire department response. New proposed street networks should be built into future modeling efforts.

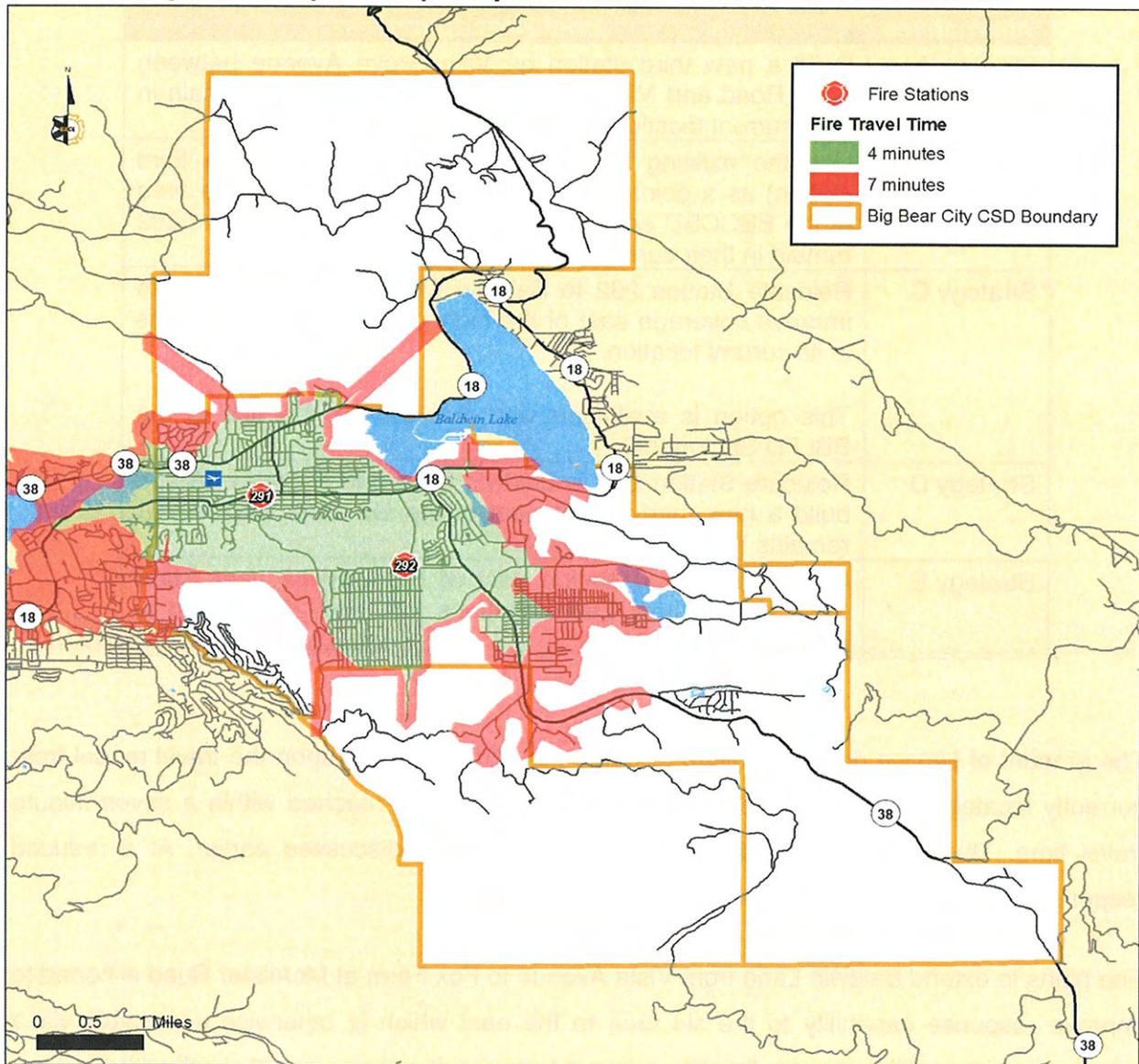
**Figure 64: Future Alternative Deployment Strategies**

<b>Alternatives</b>	<b>Brief Description</b>
Strategy A	Build a new third station on Villa Grove Avenue between Luna Road and Mira Lane. Stations 291 and 292 remain in their current locations.
Strategy B	Use the existing Big Bear Lake Station 283 (as a third station) as a point of departure for apparatus into this area of the BBCCSD east of the ski areas. Stations 291 and 292 remain in their current locations.
Strategy C	Relocate Station 292 to Baldwin Lane and Highway 38 to improve coverage east of the highway. Station 291 remains in its current location.  This option is evaluated with and without the use of the BBLFD Station 283.
Strategy D	Relocate Station 292 to Baldwin Lane and Highway 38 and build a new third station east of the ski area. Station 291 remains in its current location.
Strategy E	Build a new third station east of Highway 38 near <b>State Lane and Willow Lane</b> . Stations 291 and 292 remain in their current locations.

The amount of service demand coverage within the BBCSD based upon the travel model from currently located stations indicates that 95.87 percent can be reached within a seven-minute travel time. This does not include turnout time, which was discussed earlier. At a reduced response time of four minutes, coverage is 82.14 percent.

The plans to extend Baldwin Lane from Vista Avenue to Fox Farm at McAlister Road is hoped to improve response capability to the ski area to the east which is otherwise accessible via a circuitous route on Highway 18. Despite improved access, it remains out of reach with the four- and seven-minute travel model (Figure 65).

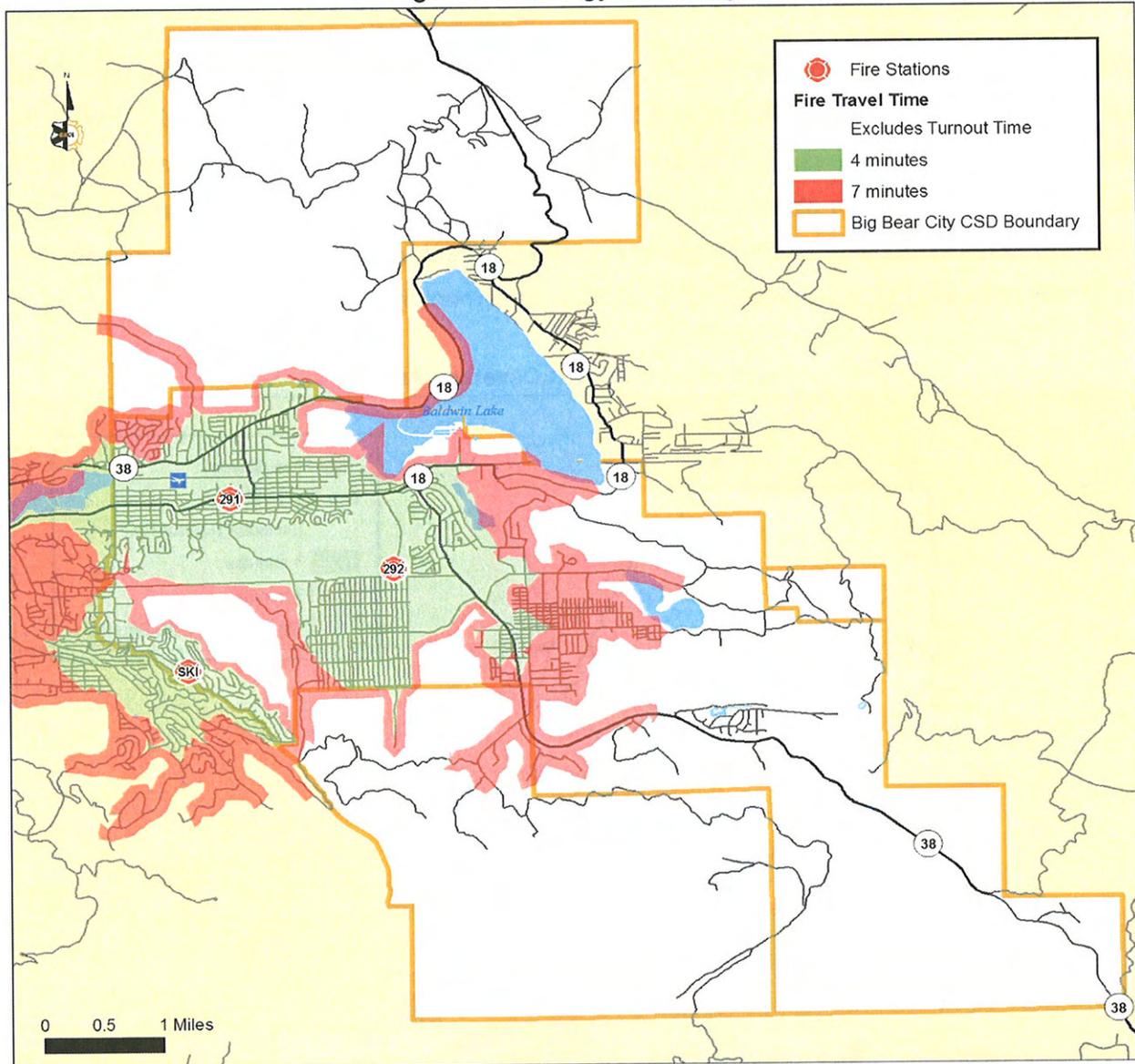
Figure 65: Response Capability from Stations with Baldwin Lane Extension



### Strategy A

Strategy A addresses improved coverage to BBCCSD territory near the ski areas. It would require the construction of a new fire station on Villa Grove Avenue between Luna Road and Mira Lane. Stations 291 and 292 remain in their present locations. Figure 66 illustrates the expanded coverage with a new station on Villa Grove Avenue.

Figure 66: Strategy A Coverage



This facility would add 2.69 percent to the seven-minute service demand coverage and 2.96 percent to the four-minute service demand coverage compared to the current coverage (Figure 67).

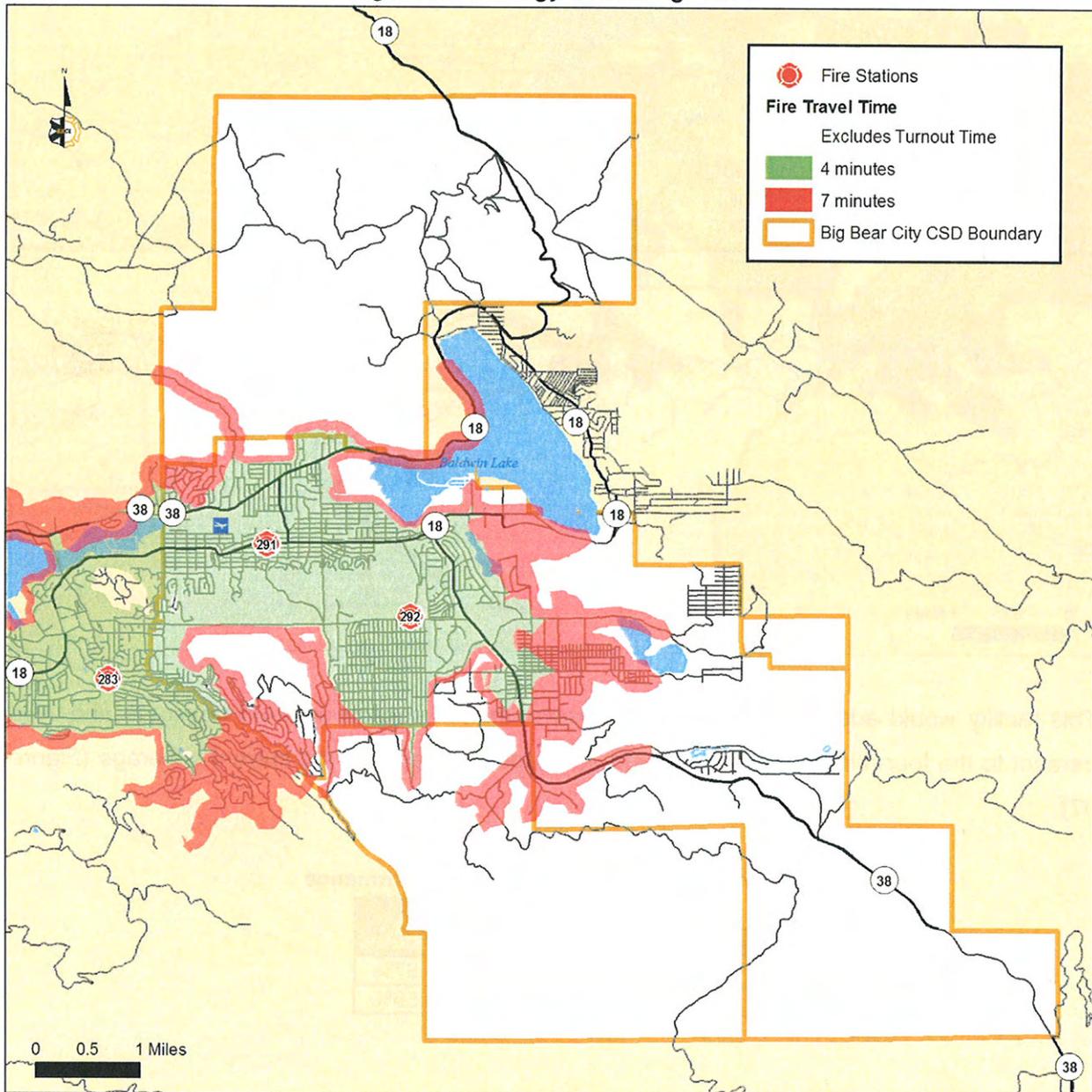
Figure 67: Strategy A Projected Performance

Strategy	Travel Time	
	4 minutes	7 minutes
Current	82.14%	95.87%
A	85.10%	98.56%

## Strategy B

While Strategy A required the construction of a new station, Strategy B considers the use of Big Bear Lake Fire Department (BBLFD) Station 283 as a point of departure into the BBCCSD territory east of the ski areas. Station 291 and 292 remain in their present locations. Figure 68 depicts the location of this station and the resulting area of coverage. This station is currently used only to house BBLFD reserve apparatus and equipment. An operating agreement between the BBLFD and the BBCCSD would be required to implement this alternative.

Figure 68: Strategy B Coverage Area



The projected performance figures for this strategy are lower than for Strategy A since this station is geographically distant to the area of intended coverage compared to a new station as described in Strategy A (Figure 69).

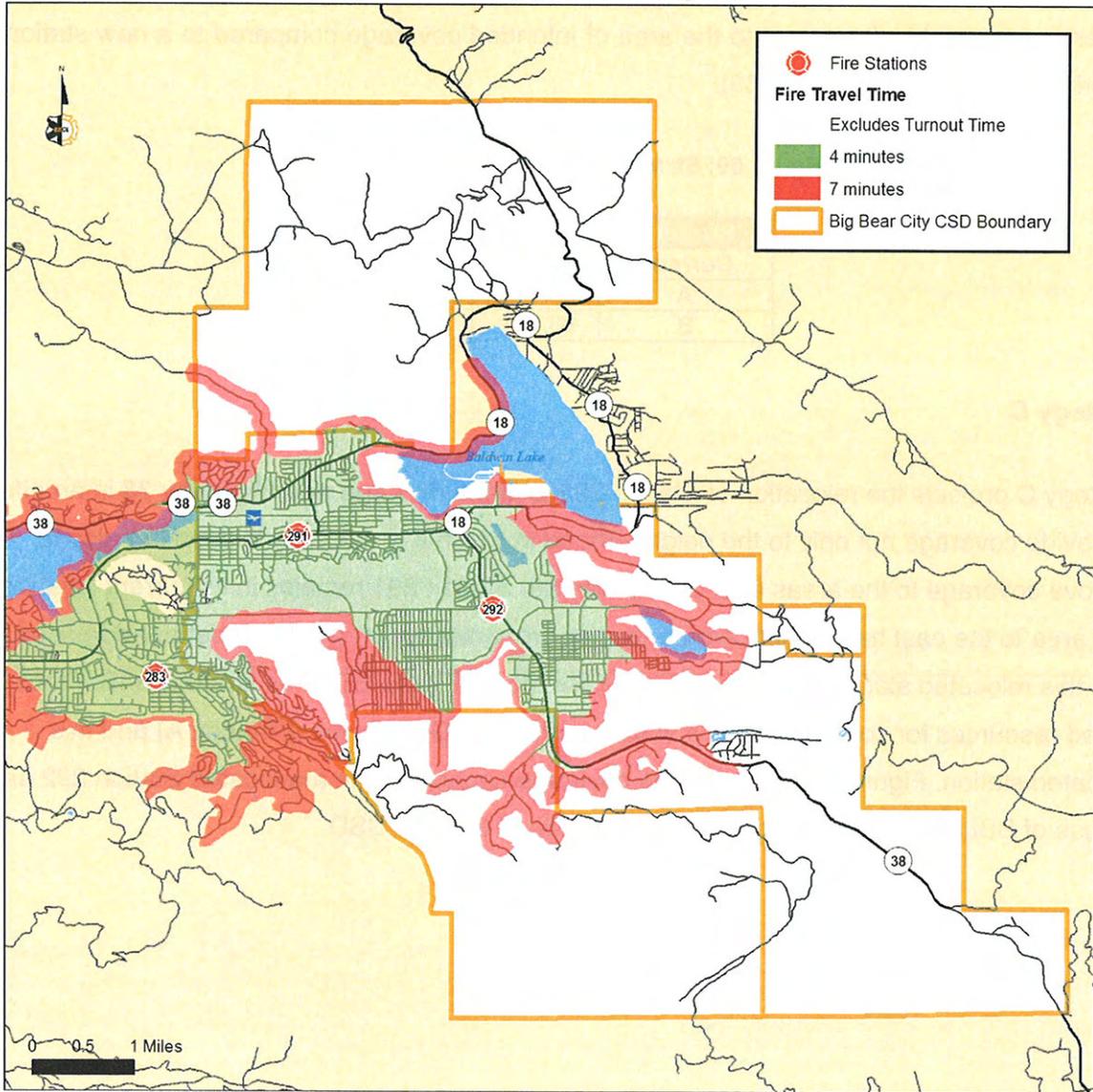
**Figure 69: Strategy B Projected Performance**

Strategy	Travel Time	
	4 minutes	7 minutes
Current	82.14%	95.87%
A	85.10%	98.56%
B	83.84%	98.56%

### Strategy C

Strategy C projects the relocation of Station 292 to **Baldwin Lane and Highway 38** in an effort to provide coverage not only to the neighborhood in which it is currently located but also to improve coverage to the areas east of Highway 38. Station 291 remains in its current location. This area to the east has higher community risk properties which would be better addressed from this relocated station (See Community Risk Map – Figure 25). This strategy anticipates limited resources for construction of a station in the Villa Grove area (Strategy A) and this relocated station. Figure 70 illustrates the coverage capability with a relocated Station 292 and the use of BBLFD Station 283 on the ski area side of the BBCCSD.

Figure 70: Strategy C Coverage Area



A loss of coverage in the southwest corner of the current Station 292 site is offset by gains in coverage in the neighborhoods east of the Highway. An improvement of service demand coverage of 5.65 percent over the current deployment strategy is projected (Figure 71). If response from the BBLFD Station 283 were not available, the performance improvement projections would be 2.78 percent for the four-minute travel model and 0.00 percent for the seven-minute travel model.

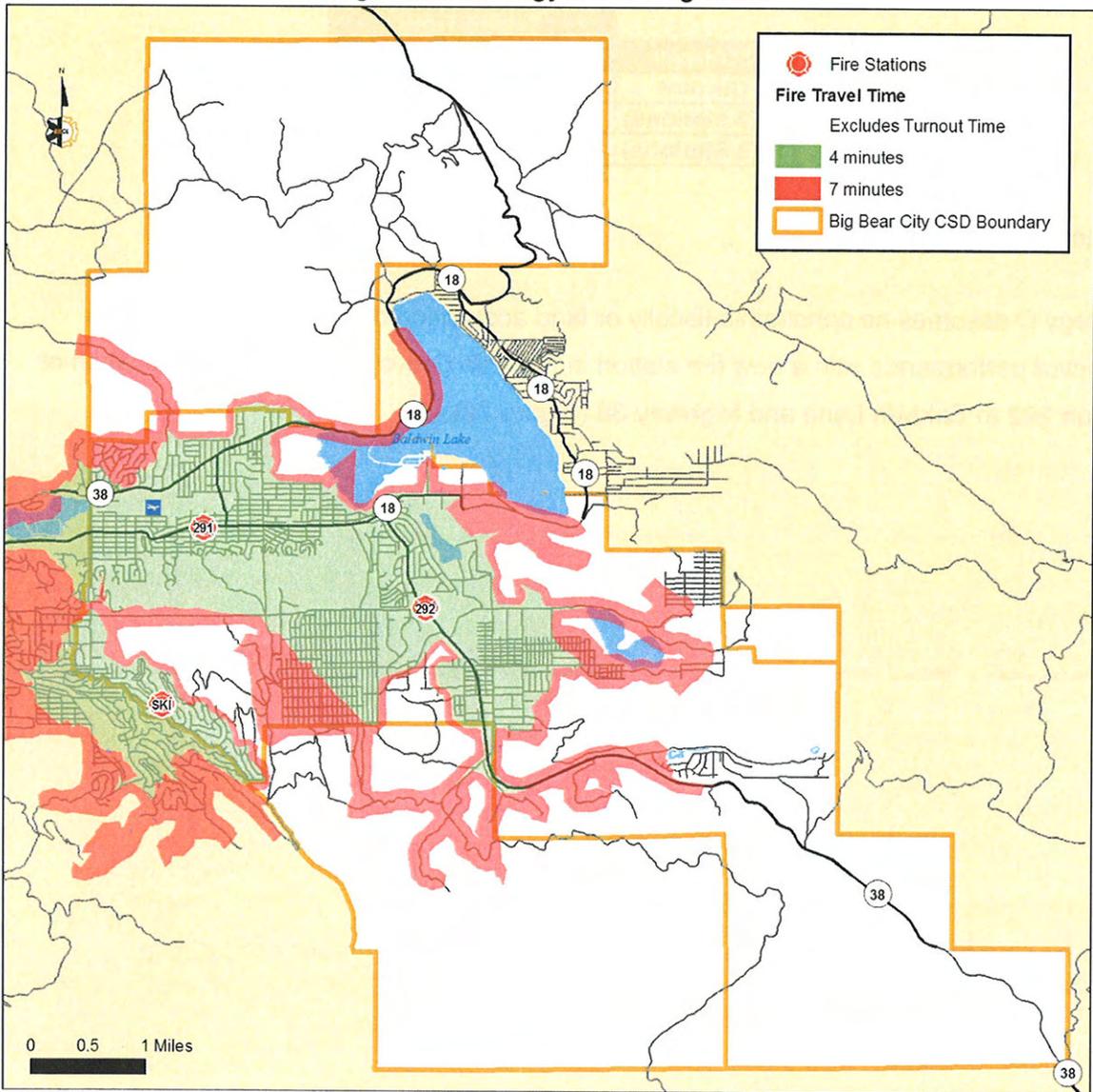
**Figure 71: Strategy C Projected Performance**

Strategy	Travel Time	
	4 minutes	7 minutes
Current	82.13%	95.87%
C (3 stations)	87.79%	98.56%
C (2 Stations)	84.92%	95.87%

### Strategy D

Strategy D assumes no constraints fiscally or land acquisition difficulties and evaluates projected performance with a new fire station in the Villa Grove areas and the relocation of Station 292 to Baldwin Lane and Highway 38 (Figure 72).

**Figure 72: Strategy D Coverage Area**



As expected, there is only a slight improvement in projected service demand performance (1.98 percent) between this strategy and Strategy C. It is, however, a 7.63 percent improvement in coverage when compared to the current deployment.

**Figure 73: Strategy D Projected Performance**

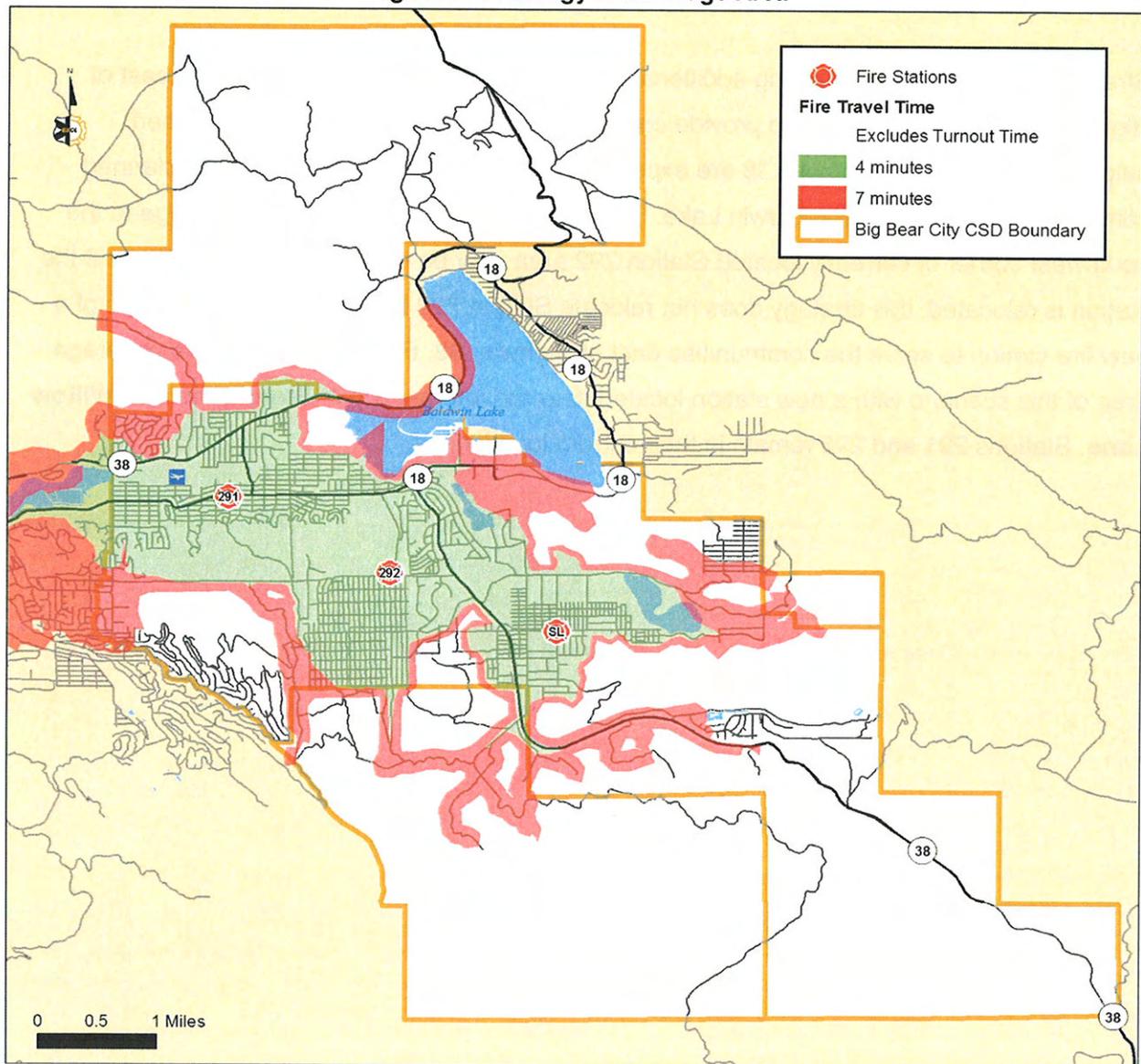
Strategy	Travel Time	
	4 minutes	7 minutes
Current	82.13%	95.87%
D	89.77%	98.56%

## Strategy E

Strategy E focuses upon directing additional resources in the Sugarloaf community east of Highway 38 instead of striving to provide coverage to the Villa Grove area. Established neighborhoods east of Highway 38 are expected to continue to develop along with planned communities further east past Erwin Lake. Since the loss of service demand coverage to the southwest corner of currently located Station 292 area may be met with public resistance if the station is relocated, this strategy does not relocate Station 292 but evaluates the addition of a new fire station to serve the communities east of Highway 38. Figure 74 depicts the coverage area of this scenario with a new station located near the intersection of **State Lane and Willow Lane**. Stations 291 and 292 remain in their current locations.



Figure 74: Strategy E Coverage Area



The projected service demand coverage with this strategy exceeds 90 percent using the four-minute travel time model and improves coverage 9.6 percent when compared to the current two-station deployment (Figure 75).

Figure 75: Strategy E Projected Performance

Strategy	Travel Time	
	4 minutes	7 minutes
Current	82.14%	95.87%
E	91.74%	96.23%

**Deployment Strategy Recommendations**

The decision to relocate or build additional stations is a complex one. Fiscal constraints and land acquisition can be defining parameters to how the department will move forward. Placing an additional station in service also increases apparatus, staffing, and operating costs. The input of public stakeholders to help frame future target response time standards should be made before a final determination of which strategy a department should pursue.

The following table (Figure 76) consolidates the performance projections of each of the strategies presented for comparison purposes.

**Figure 76: Performance Summary of Strategy Options**

Strategy	Station Locations			Modeled Coverage			
	291	292	New 3rd St	4-min	% change	7-min	% change
Current	Present	Present	---	82.14	---	95.87	---
A	Present	Present	Villa Grove	85.1	2.96	98.56	2.69
B	Present	Present	St 283	83.84	1.70	98.56	2.69
C (3 St)	Present	Baldwin/Hwy 38	St 283	87.79	5.65	98.56	2.69
C (2 St)	Present	Baldwin/Hwy 38	---	84.92	2.78	95.87	---
D	Present	Baldwin/Hwy 38	Villa Grove	89.77	7.63	98.56	2.69
E	Present	Present	State/Willow	91.74	9.60	96.23	0.36

This deployment analysis indicates the most effective two-station model would be to relocate Station 292 to Baldwin Lane and Highway 38 (Strategy C). While it offers an improved coverage of 2.78 percent, the downside is that it simply shifts coverage to the east leaving some currently covered areas outside the target response time goals (Figure 69). It would also place the station in a less than ideal position in a future three-station arrangement as described next.

Maintaining the two current station sites and building a new fire station east of Highway 38 near the intersection of State Street and Willow Lane (Strategy E) represents the best projected overall performance improvement (9.6 percent) compared to the present deployment. Strategy E also represents a 6.82 percent improvement in overall performance when compared to relocating Station 292 to Baldwin Lane and Highway 38 in a two-station arrangement. Overall, Strategy E represents the best long-range deployment strategy for the District. It should also be noted that the future possible staffing of the Big Bear Lake Station 283 would further improve the performance of either option.

## Fire Department Staffing

### Emergency Response Staffing

The BBCFD currently operates each engine with two to four personnel consisting of paid and paid on-call personnel. Ambulances respond with a minimum of two medically trained firefighters, with at least one being a certified paramedic. The department maintains a constant staffing plan that consists of eight operational personnel on duty at all times; six at Station 291 and two at Station 292 (See Figure 10 on page 35 for detail). The six personnel at Station 291 staff the engines, tenders, and/or ambulances depending on the type of calls and the availability of staffing. The ambulance at Station 292 is cross-staffed with the two personnel from the engine. The department uses callback of off-duty and/or paid on-call personnel to cover vacation, illness, injury time, and/or periods when alarm activity reduces available on-duty staffing to an unacceptable level.

We have evaluated five different deployment strategies to maximize the distribution of resources (location of stations) within the District. Strategy E, with the addition of a new station, offers the best arrangement for the future overall coverage of the District. We now consider the amount of staffing necessary to ensure an adequate number of personnel are available for response as the District continues to grow. Figure 63 illustrated a slow but steady increase in the number of calls in the future. Medical calls represented the vast majority of calls as well as the fastest growing category of calls. Nevertheless, fire and other miscellaneous types of incidents cannot be ignored. The workload analysis, unit hour utilization, and call concurrency presented in Section II of this report indicates that current system demand appears to be within the capacity of the Department. Increasing alarm activity, while predicted to increase slowly, will place greater demands on the department in the future. New development (towards the east and south) will cause a shift in the community risk in that direction. Ambulance transport requirements throughout the ASA are expected to increase as well.

Figure 77 details the minimum and maximum number of FTEs necessary to staff and support the recommended long-range deployment Strategy E, the strategy with the highest potential performance. A total of between 33 and 63 operational personnel will be required to staff three stations. The minimum staffing range (columns 3 and 4) would maintain the current staffing levels at Stations 291 and 292, add one additional engine at a third station, one extra relief

firefighter per shift, and one on-duty Battalion Chief to provide 24-hour command and control supervision for the department.

The maximum range (columns 5 and 6) increases the staffing of the three engines to four, provides for dedicated staffing of two for three ambulances (two at Station 291 and one at 292), two extra relief firefighters per shift, and an on-duty Battalion Chief. While this level of staffing is not initially necessary, it would be consistent with national standard staffing benchmarks; and, most importantly, improve response capability and reliability (See Concentration Analysis in Section II on page 111). The maximum staffing levels represent the ideal for the future.

**Figure 77: Long-Term Staffing Strategy, Year 2025**

Station	Unit	Minimum On-Duty	Min FTEs Required	Maximum On-Duty	Max FTEs Required
Station 291	Engine	2	6	4	12
	Ambulance	2	6	2	6
	Ambulance	2	6	2	6
	Battalion Chief	1	3	1	3
Station 292	Engine	2	6	4	12
	Ambulance	0	0	2	6
Station (New)	Engine	2	6	4	12
<b>Staffing Total</b>		<b>11</b>	<b>33</b>	<b>19</b>	<b>57</b>
Vacation, Ill, Injury		<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>Total Personnel</b>		<b>11</b>	<b>33</b>	<b>21</b>	<b>63</b>

Considering the current workload analysis however, an incremental buildup of staffing is indicated. Depending on unit utilization, concurrent calls, and the district's ability to maintain response time goals, a maximum buildup of staff may or may not be necessary in the future. The following Figure 78 describes an incremental approach to increasing operational staffing. The first step is the addition of one Battalion Chief per shift. The next incremental improvement may be additional staffing for the ambulance at Station 292 followed by the addition of a third staffed engine at the new eastside station and one or two relief firefighters per shift (these two steps could be reversed depending on EMS workload and/or pace at which the areas to the east of Highway 38 develop). Ultimately, depending on need, the minimum staffing on each engine could be increased from two to three and finally to four.

**Figure 78: Staffing Ranges by Position**

	Min	Max	Current	Step 1	Step 2	Step 3	Step 4
<b>Station 291</b>							
<b>Battalion Chief</b>	1	1	0	1	1	1	1
<b>Engine 291</b>	2	4	2	2	2	2	4
<b>Ambulance 291</b>	2	2	2	2	2	2	2
<b>Ambulance 291A</b>	2	2	2	2	2	2	2
<b>Relief Firefighter</b>	0	2	0	0	0	1	2
<b>Station 292</b>							
<b>Engine 292</b>	2	4	0	2	2	2	4
<b>Ambulance 292</b>	0	2	2	0	2	2	2
<b>New Station</b>							
<b>Engine (New)</b>	2	4	0	0	0	2	4
<b>Total Positions</b>	<b>11</b>	<b>21</b>	<b>8</b>	<b>9</b>	<b>11</b>	<b>14</b>	<b>21</b>

As indicated, the decision to make each incremental staffing improvement is dependent on a number of factors including:

- Response time performance
- Unit utilization (emergent and non-emergent transports)
- Call concurrency
- Overall workload; call volume by type and location of incident
- Adequacy of Station 292 to house additional personnel
- Completion of a third station
- Financial feasibility

Appendix B provides a general discussion on thresholds and triggers that can be applied as a means to evaluate the need for each new incremental improvement. The discussion in Appendix B could assist the BBCFD in identifying the appropriate factors for its jurisdiction. As always, the financial ability to implement and sustain each incremental improvement must be considered.

### **Administrative and Support Staffing**

At present, the department maintains seven non-emergency employees to handle administrative, clerical, and support functions. Principles of management require that a department assure the proper administration and support of the emergency mission by maintaining a cadre on non-emergency managers and technicians, both uniformed and civilian. A ratio of between 10 and 20 percent is common. Ratios in departments with fully functioning EMS, fire prevention, emergency management, and training programs may be as high as 25

percent. The current ratio for the BBCFD is 14.58 percent of administrative and support positions compared to the total number of paid and on-call employees.

The department has an active administrative and support staff providing administrative, clerical, prevention, EMS supervision, and EMS billing services. Using the operational staffing models outlined in Figure 77, a total of between 8 and 14 administrative/support positions would be required to maintain approximately the same administrative staffing ratio. The additional one to seven positions would presumably be assigned to training, clerical, EMS billing, and/or technical support functions. The Battalion Chief position, although included in the operational staffing, also provides necessary administrative support in emergency response.

## **Emergency Apparatus**

The future implementation of the recommended Strategy E requires that one additional engine is placed in front-line service. As indicated earlier, the addition of a station east of Highway 38 is intended to target response in an area of increasing development and community risk. The timing on the purchase of an additional engine should be coordinated to coincide with opening of the new station. Most departments recognize that it may take between three to four months to get a new unit in service once it is received. The current annual replacement cost of an engine with a 20-year life expectancy is around \$18,000 (See page 67 for additional discussion on apparatus replacement costs). This increased cost is not added to the following operating budget projections since it is unknown when may be required.

## **Projecting Operational Costs**

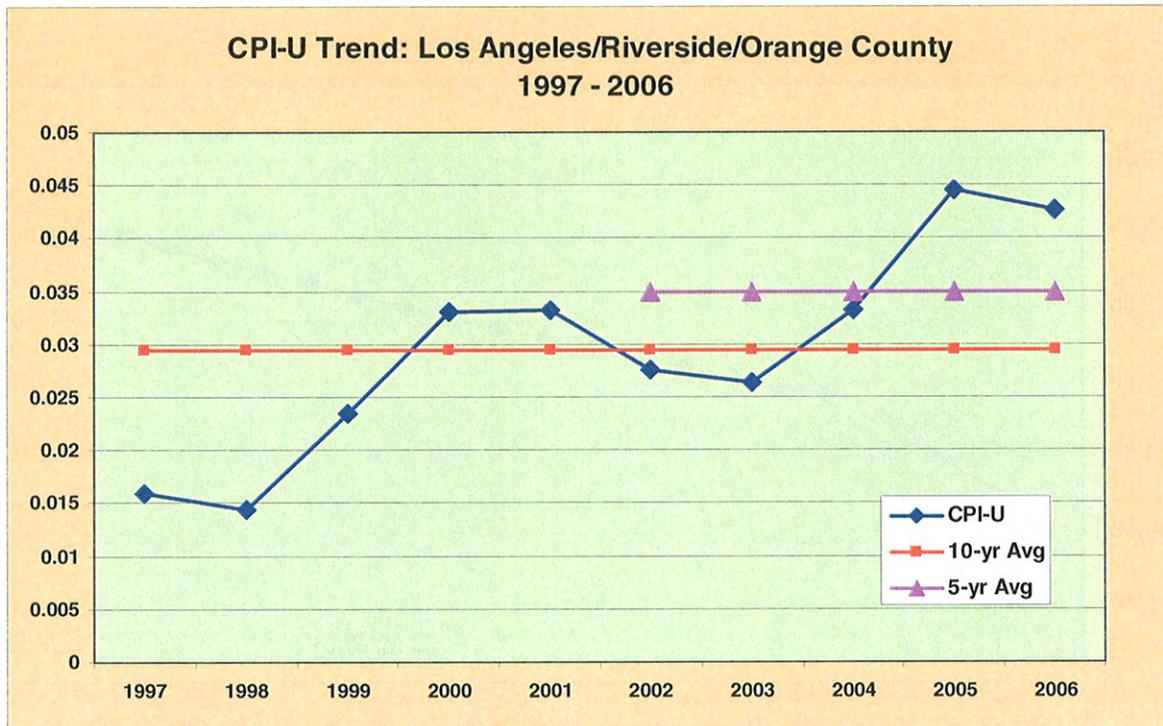
The preferred long-term deployment plan (Strategy E) calls for an additional staffed engine at a new station, separate staffing for the engine and ambulance at Station 292, and at least one relief firefighter and a Battalion Chief per shift. These actions result in a total staffing increase of 9 to 39 additional emergency personnel and up to seven additional administrative/support positions (to maintain a 15 percent ratio). Of course, increasing the number of stations, staffing, and equipment of the fire department equates to a direct increase in operating costs.

To estimate the fiscal impact of this long-term deployment strategy, we use the same ESCi financial methodology described earlier in this report. This process provides a means by which the existing operating budget of the department is adapted through a computer-driven model

that adjusts allocation relative to the proposed changes in personnel, equipment, facilities, and programs. For example, the addition of staff directly changes budgeted expenditures for salaries, overtime, and benefits; but adding staff also indirectly affects budget line items like uniforms, career development, and professional services. Changes made to the quantity of emergency equipment or the number of facilities and apparatus will influence budgetary line items such as fuel, utilities, and maintenance. In addition, certain system changes (like population and demand for emergency assistance) have a bearing on the fire department's operational budget. Consequently, each line item of the reformatted BBCFD model operating budget is assigned a contingency modifier designed to adjust that account based on changes to budgetary inputs (such as personnel, stations, and equipment). The resulting modeled operational budget reflects the estimated financial impact as if the recommended long-term deployment strategy was in effect today.

Inflation is another important consideration when forecasting long-term operational cost. For the purpose of this analysis, we use the consumer price index for all urban consumers (CPI-U) from 1997 through 2006 in the Western Region as compiled by the U.S. Department of Labor to compute an average rate. Figure 79 summarizes the CPI-U during this period and shows the average rate of inflation for the area.

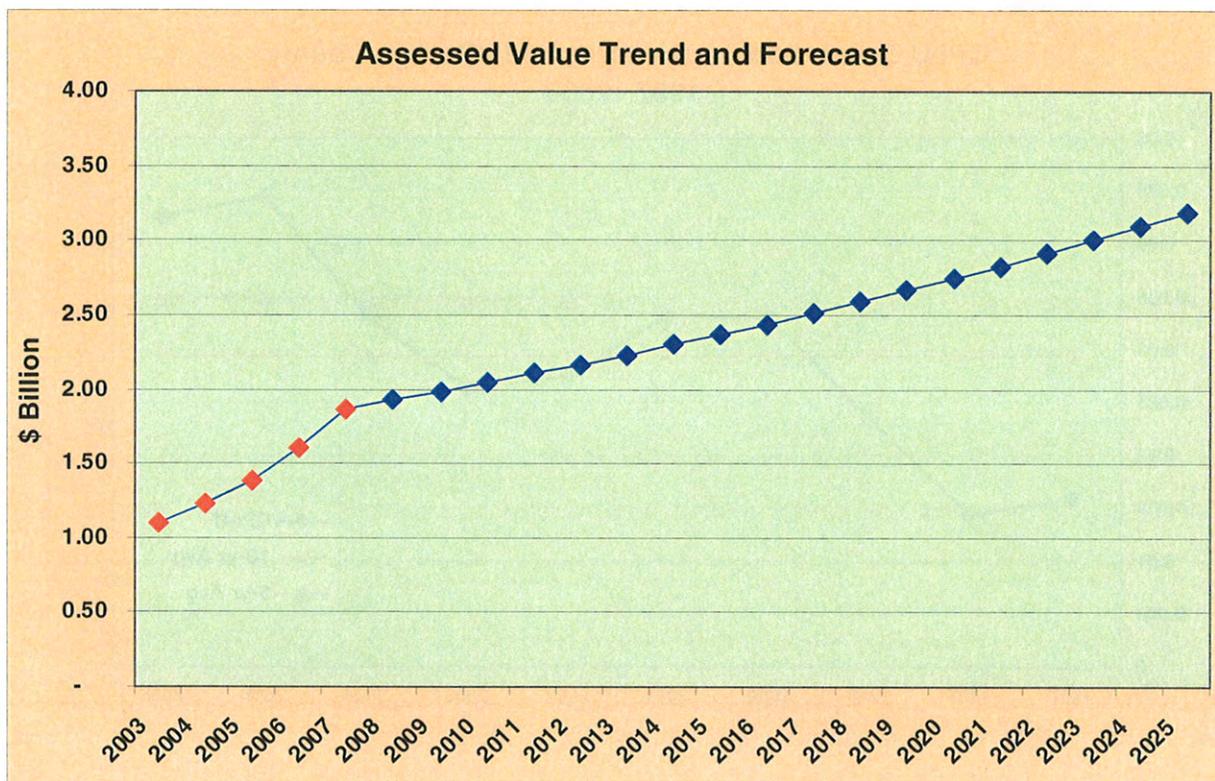
Figure 79: CPI-U Trend: Los Angeles/Riverside/Orange County 1997 - 2006



Inflation averaged 2.94 percent over the ten-year period and 3.49 percent over the last five-year period. The cumulative affect of these averages will increase operating costs somewhere between 71 and 89 percent by the year 2025. The ten-year average (2.94 percent) is used as an inflationary adjustment in our calculation of future operational costs.

The value of the property protected by the BBCFD is another important consideration in forecasting future budgets and revenues. The five-year history of assessed value (AV) between 2003 and 2007 is plotted in red in the following graph (Figure 80). The District has experienced double digit annual growth (14.08 percent) in its AV over the last five years. Expecting the continuation of such a high growth rate is perhaps unrealistic for the future. The overall average over the last 15 years has been 6.58 percent. Based on discussions with the District General Manager, it was decided to use an even more conservative growth rate for future projections. A 3.0 percent growth rate is used to project future assessed values through the year 2025 (plotted in blue in Figure 80). This projection, when continued through the 2025 planning horizon, results in a District assessed value of \$3,182,659,452. We initially use this amount to compute and compare the projected public cost (required income from property tax alone) for fire and emergency medical services in the year 2025.

Figure 80: BBCCSD Assessed Value Trend and Forecast



The following table (Figure 81) summarizes the minimum and maximum staffed modeled budgets in the year 2025 with the full implementation of the targeted three-station Strategy E. The amounts indicated for expenditures, revenues, and assessed value includes the cumulative affect of inflation along with the operational modifiers discussed earlier. In Section I of this report, the current public cost (revenue derived from property tax) of fire and emergency medical services was estimated to equal a property tax levy of \$0.0790 per \$100 of assessed value (See Calculating the Public Cost of Protection starting on page 17).

Based on the expenditures and revenue projections used in this model, the projected future cost of the minimum staffed model represents a higher demand for financial support than currently being provided; an increase of 0.0304 per \$100 of assessed value. The maximum staffed model represents a significantly higher demand.

**Figure 81: Modeled Budgets, Year 2025**

	Minimum	Maximum
Salary	5,114,649	8,447,300
Overtime	989,173	1,633,708
Benefits	2,881,615	4,759,244
<b>Total Salary &amp; Benefits</b>	<b>8,985,437</b>	<b>14,840,252</b>
Material & Services	662,519	686,781
Capital Outlay	135,197	135,197
Capital Reserve	200,157	200,157
<b>Total GF Expenditures</b>	<b>9,983,310</b>	<b>15,862,386</b>
Less Non-Tax Revenues	2,626,672	2,626,672
Less FP*P Tax	2,274,318	2,274,318
Less CFD Receipts	1,599,564	1,599,564
<b>Operating Cost Estimate</b>	<b>3,482,756</b>	<b>9,361,832</b>
<b>Av Projections</b>	<b>3,182,659,452</b>	<b>3,182,659,452</b>
<b>Projected Rate per \$100</b>	<b>0.1094</b>	<b>0.2942</b>

There are several assumptions that must be made in making long term forecasts. Assessed values have been calculated at only a 3.0 percent annual rate for year 2008 through 2025. The actual average assessed value growth between 2003 and 2007 averaged 14.08 percent. If the assessed value grew at an annual rate of just 5.0 percent, the projected tax rate for the minimum staffing model would remain consistent with the current rate. The assessed value growth rate would have to equal approximately 11.3 percent to sustain the current tax rate with the maximum staffing model.

Another revenue factor that could vary is the new Community Facilities District (CFD) Assessment. In this model, 100 parcels are projected to come under assessment in the first five years starting in 2010 with the remaining estimated 1,000 parcels coming under assessment evenly over the course of the remaining years through 2025. The annual CFD rate is scheduled to increase 3.0 percent or the average of the last ten-year CPI, whichever is greater. Three percent has been used in this model since the current average ten-year CPI is 2.94 percent. While the rate increase will not drop below 3.0 percent, it could increase over time.

The two other large revenue sources, ambulance transport fees, and the Fire Prevention and Protection tax could also vary from the average CPI-U rate used in this model.

On the expenditure side of the budget, the ten-year CPI factor has been applied to salary and benefits, materials, services, maintenance, and routine capital expenses. An additional factor has been applied to the materials, maintenance, and capital expense categories in recognition of the increased operating cost of a third station and increase staffing. As mentioned, a flat rate

of \$210,000, based on the calculated cost of apparatus replacement over a 10-year period (with inflation), has been used.

While the current retiree benefit cost is built into the modeled projections, the cost for future retirees is not. Such a projection requires an actuarial calculation that has not yet been determined by the BBCSD. This requirement represents an additional cost that will have to be added to the budget and future projections once it becomes available.

## **Capital Facilities**

The preferred strategy in this study requires the construction of one new station and the possible remodeling of Station 292. These capital improvement costs are not included in the above modeled operating budgets. Projecting the cost of these types of capital projects is dependent on many factors including size and type of building, timing of construction, nature of the development site, local codes and ordinances, and type of financing.

The District has indicated that the possible remodel of Station 292 could include the addition of approximately 2,500 square feet to the existing 4,500 square feet. Since the parcel is leased and not owned by the District, it may be necessary to negotiate a new agreement. Construction costs for wood frame/brick veneer type building in San Bernardino County runs about \$192.60 per square foot. The remoteness and unique construction requirements of the Big Bear Lake area can push the per square foot cost as high as \$300.00. Other costs include demolition, site work, architect fees, permits, and furnishings. Based on the \$300.00 per square foot cost, we estimate the cost to add on and remodel Station 292 to be approximately \$1,600,000. Financing the full price of the project plus fees over 20 years at 5.0 percent interest would result in an annual commitment of approximately \$133,200.

The square foot cost of a new fire station is also estimated at \$300.00. Although this study addresses a potential new station with only a single engine, we recommend that for long-term versatility and usability a double bay drive through suburban-style station of about 6,500 to 7,000 square feet be considered. The station living quarters, support areas, and apparatus bays should be designed with the idea that at some point in the future a staffed ambulance could be assigned to the station. Additionally, the BBCFD, like most other fire departments, has a current need for apparatus and equipment storage. We estimate the cost of this type of facility to be in the range of \$2,380,000 to \$2,560,000, not including land acquisition. Financing, under the

same terms as discussed above would result in an annual commitment of approximately \$190,800 to \$205,100.

## Overall Recommendations

The distribution deployment analysis discussed in this section clearly points to the need for a third station east of Highway 38 at some point in the future to provide timely response to the area. The workload analysis indicates a slow but steady growth in activity. It also indicates that the workload is within the capacity of the department at this time. However, as emergency call volume and non-emergent transports increase; the need for additional staffing will become more important in order to keep up with the workload.

The financial projections, indicate that implementation of these strategies may be too costly, at least with the revenue and expenditure assumptions use in the analysis. However, if the assessed value growth equals the past 16-year average of 6.53 percent, the District may well be in a position to move forward. District revenue sources, those based on assessed value, development, and/or ambulance transport are all subject to fluctuations that can either negatively or positively affect the District's overall ability to fund the desired level of service. Revenues and expenditures, especially the impact of funding future retiree benefits, will have to be monitored year by year.

It may be tempting to simply abandon the recommended strategy and drop back to the most effective two-station strategy. The problem with this approach is that the next most effective model involves moving the current Station 292 from its present location to the east (Strategy C). But by so doing, coverage in an already established neighborhood is diminished to improve coverage in a developing area. It also places the station in a less desirable location for a potential three-station deployment in the future.

We therefore recommend that the long-term strategy of the District should be to move towards the three-station model described in Strategy E. Implementation (of the third station) can only proceed incrementally as funding becomes available. In the short term, steps can be taken to improve Station 292 in preparation for additional staffing for the ambulance. Staffing the ambulance and the engine separately at Station 292 will in itself have a positive effect on response times and response reliability for the District overall and on the eastside more specifically. Property for the future construction of a third station in the State Street and Willow

Lane area could be secured. Other steps could include incrementally increasing funds set aside for the future construction of a new station and/or slightly increasing the annual funding for apparatus purchase. A series of recommendations to improve the overall effectiveness and efficiency of the department have also been offered in Section I and summarized in Appendix A of this report. These recommendations, offered as topics for consideration, will assist the department improve its operational procedures, reduce potential areas of liability, and improve human resource management.



## Appendix A: Summary Table of Short- and Mid-Term Recommendations

What follows is a compilation of recommendations and strategies designed to improve the efficiency and /or effectiveness of the fire department during the short to mid-term. The suggestions offered by ESCi associates are derived from our analysis of the existing emergency system as detailed in Section I of this report. Recommendations and comments are based on experience with similar fire and emergency medical agencies, and categorized in accordance with the objectives of Section I. This appendix is intended as a management reference to be used by the leaders of the District and fire department to aid in forthcoming planning and management activities. Because of that, the discussion and rationale behind each recommendation is not included here; that information may be found in the appropriate chapter of Section I as referenced. In keeping with the advisory nature of most of these comments, none is listed in order of importance or priority.

Summary Table of Short and Mid-Term Organizational Recommendations		
Objective Reference	Context Reference	Recommendation
Objective 1 - Organizational Governance	Agency Overview, page 9	Due to the length of time from the 1991 rating and subsequent filing of ISO mail-in questionnaire in November 2003, a re-rating should be requested from ISO to determine if the department and other factors reviewed in the overall rating structure have improved, thus effecting the overall community ISO grade.
Objective 1 - Organizational Governance	Standard Operating Guidelines , page 10	The rules and regulations of the BBCCSD should be reviewed and revised routinely and systematically to assure they remain current, practical, and relevant.
Objective 1 - Organizational Governance	Standard Operating Guidelines , page 11	SOGs should be compiled and maintained in a single manual. Copies should be provided in all workplaces, and training should be provided on the intent and application of all SOGs.
Objective 1 - Organizational Governance	Standard Operating Guidelines , page 11	The BBCFD should consider creating an administrative policy manual separate from a standard operating guideline manual. Both manuals should be reviewed for completeness. A list of needed policies/SOGs should be created and appropriately assigned to departmental personnel for development. The SOG manual should be considered for publication in a pocket-sized field guide format

<b>Summary Table of Short and Mid-Term Organizational Recommendations</b>		
<b>Objective Reference</b>	<b>Context Reference</b>	<b>Recommendation</b>
		and issued to all department personnel.
Objective 1 - Organizational Governance	Organization Structure, page 13	A reorganization of the span of control and functions should be considered. As the department grows, organizational divisions should be considered that will provide a clear span of control by divisional responsibilities (operational and administrative).
Objective 2 - Finance Management	Revenue and Expenditures, page 15	Consider including the administrative department allocation as part of the fire department budget to fully disclose the full cost of the fire department within the BBCCSD budget.
Objective 3 – Organizational Management	Internal and External Communications, page 23	Consider the development of a formal complaint process. Develop and adopt an appropriate administrative manual policy and/or SOG manual guidelines. Provided training for all personnel on receiving and resolving complaints.
Objective 3 – Organizational Management	Internal and External Communications, page 23	Consider the establishment of a citizens' advisory group to obtain citizen input.
Objective 3 – Organizational Management	Document Control and Security, page 24	BBCFD should continue working directly with the BBCCSD to update or develop a comprehensive information technology policy that includes security and other important features of information technology management.
Objective 4 – Human Resource Management	Personnel Policies and Rules, page 26	Ensure that personnel topics with unique application to the fire department are addressed and/or cross referenced to the appropriate BBCCSD personnel policies.
Objective 4 – Human Resource Management	Personnel Policies and Rules, page 26	Coordinate the development, review, and approval processes of fire department human resource and safety related policies with the District's review and approval processes.
Objective 4 – Human Resource Management	Personnel Policies and Rules, page 26	Develop and approve an official method for review and updating of District and fire department policies and SOGs.
Objective 4 – Human Resource Management	Personnel Policies and Rules, page 26	Complete the organization of all fire department policies and standard operating guidelines into a desk and/or computerized manual for easy reference by all fire department personnel.
Objective 4 – Human Resource Management	Records and Reports, page 28	Conduct an assessment of fire department documentation and recordkeeping processes to improve efficiency and coordination with the District human resource and risk management

Summary Table of Short and Mid-Term Organizational Recommendations		
Objective Reference	Context Reference	Recommendation
		efforts.
Objective 4 – Human Resource Management	Disciplinary Process, page 28	Review, update, and coordinate the disciplinary policies of the District and fire department.
Objective 4 – Human Resource Management	Disciplinary Process, page 289	Provide formal training for all fire department supervisory personnel on District and fire department disciplinary policies and practices.
Objective 4 – Human Resource Management	Application, Recruitment and Testing Processes, page 30	Evaluate the current recruiting and hiring practices of the fire department. Ensure District and fire departments practices are coordinated and result in attracting and selecting the best candidates possible.
Objective 4 – Human Resource Management	Application, Recruitment and Testing Processes, page 30	Provide formal training for all fire department supervisory personnel on District performance appraisal policies and procedures.
Objective 4 – Human Resource Management	Ongoing Competency Evaluations, page 31	Establish a formal system within the fire department training program for routine individual and company technical and manipulative skills assessment. Document and provide feed back on results. Use results in formation of goals for the training program.
Objective 4 – Human Resource Management	Health and Safety, page 32	Stress testing should be provided for all fire department personnel with emergency response duties on a two- to five-year cycle depending on age and other physician-identified risk factors. Stress testing is not currently provided for paid on-call firefighters largely due to cost and availability of personnel. Consider expanding the stress testing program for paid on-call personnel on a two- to five-year interval.
Objective 4 – Human Resource Management	Health and Safety, page 32	Consider using the expertise and resources of the Cal OSHA Consultation Services Section to assess and evaluate District facilities and safety related policies and procedures.
Objective 5 – Organizational Staffing	Organizational Structure, page 33	Review all District and fire department documentation and procedures to ensure that the recent change in organization structure is adequately represented and that the reporting and working relationships between the fire department and the various BBCCSD Departments are clearly defined.

<b>Summary Table of Short and Mid-Term Organizational Recommendations</b>		
<b>Objective Reference</b>	<b>Context Reference</b>	<b>Recommendation</b>
Objective 6 – Emergency Service Delivery System	Risk Analysis, page 43	Pre-incident surveys should be reviewed and used routinely in training. They should be shared with automatic aid companies as well. The value of the surveys will be greatly enhanced by on-site visits.
Objective 7 – Emergency Services Training Program	General Training Competency, page 46	Consider developing a cadre of personnel from within their department and surrounding departments, who are qualified through training to fill Incident Command positions.
Objective 7 – Emergency Services Training Program	General Training Competency, page 46	Review the accountability system and procedures for applicability to all incidents regardless of type or size.
Objective 7 – Emergency Services Training Program	General Training Competency, page 47	Training consistency between the shifts should be a high priority in the planning and delivery of all training programs.
Objective 7 – Emergency Services Training Program	General Training Competency, page 47	Evaluate options to improve the quality of defensive driver training for all emergency vehicle drivers on a routine basis.
Objective 7 – Emergency Services Training Program	General Training Competency, page 48	Develop an official SOP manual since SOP's are a secondary source of training.
Objective 7 – Emergency Services Training Program	General Training Competency, page 48	Consider the development of performance based criteria to evaluate their training program as well as all fire company performance.
Objective 7 – Emergency Services Training Program	General Training Competency, page 48	Consider establishing annual training hours as per ISO recommendations of 20 hours per month or 240 hours per year for each member.
Objective 7 – Emergency Services Training Program	General Training Competency, page 49	Establish a written policy delineating when post-incident reviews will be conducted, both informal and formal, including who should conduct the critique and how the information will be disseminated to department members.
Objective 7 – Emergency Services Training Program	General Training Competency, page 50	Consider including training goals and objectives along with performance measurements or outcome statements in the department's annual budget documentation.
Objective 7 – Emergency Services Training Program	General Training Competency, page 50	Establish a policy and SOG providing direction and guidance related to physical fitness and physical fitness training.
Objective 7 – Emergency Services Training Program	Training Facilities, page 52	Continue to financially support and pursue various options to develop and expand the Paradise training site and facilities to support on going technical and specialized emergency response training.
Objective 7 –	Training Staff, page	Consider establishing a full-time training officer

<b>Summary Table of Short and Mid-Term Organizational Recommendations</b>		
<b>Objective Reference</b>	<b>Context Reference</b>	<b>Recommendation</b>
Emergency Services Training Program	54	position and adequate clerical support services to strengthen overall competency and performance.
Objective 7 – Emergency Services Training Program	Entry Level Training, page 54	Consider working with other area fire departments to establish a regional approach to basic recruit training.
Objective 7 – Emergency Services Training Program	Competency Based Training, page 56	Initiate a competency based approach to training.
Objective 7 – Emergency Services Training Program	Career Development Training, page 56	Although the potential student pool may be too low in the Big Bear valley area to support college-level education in the traditional methods, the use of grants or other means should be evaluated in an effort to make such education more accessible.
Objective 7 – Emergency Services Training Program	Training Records and Reports, page 58	Use monthly reports to prepare an annual training report for the BBCCSD Board of Directors that summarizes the overall training program for the year.
Objective 8 – Fire Prevention Programs	Overview, page 59	Continue to utilize operational personnel in their fire prevention programs.
Objective 8 – Fire Prevention Programs	New Construction Review, page 61	Consider revising the present fire department fee schedule to more accurately reflect the full cost of plan reviews.
Objective 8 – Fire Prevention Programs	New Construction Review, page 62	Consider establishing a written policy/SOG specifying which types of occupancies are required to install Knox Boxes.
Objective 8 – Fire Prevention Programs	Fire Safety Inspections, page 64	Commit to an annual company inspection that reflects workload, hazard classification, and occupancy fire loss history. Data collection should allow for accurate reporting of program activity and compliance rates.
Objective 8 – Fire Prevention Programs	Incident Information Analysis, page 66	The delivery of emergency, non-emergency, and transport services is the core activity of the department. Work to coordinate and centralize all incident data collection and reporting processes (fire, EMS, and routine transports) to allow for complete analysis.
Objective 9 – Facilities, Apparatus, and Capital Improvements	Station 291, page 72	Install preemption of traffic signals or other warning device at Big Bear Boulevard and Sawmill, which would expedite response times and increase firefighter safety.  Install a security alarm system for the station.  Facilitate the development of a Joint

Summary Table of Short and Mid-Term Organizational Recommendations		
Objective Reference	Context Reference	Recommendation
		<p>Emergency Operating Center (EOC) servicing the entire Valley supported by all fire agencies, local disaster organizations, and sheriff's office.</p> <p>Consider installation of a department-wide washing machine with extractor for decontamination of protection clothing.</p> <p>Consider future plans for station upgrade to meet service demands.</p> <p>Evaluate the adequacy of the number of spare SCBA cylinders it has immediately available. Protocols and interagency agreements should be developed to ensure Incident Commanders can request and obtain sufficient cylinders on the emergence scene in a timely manner.</p>
Objective 9 – Facilities, Apparatus, and Capital Improvements	Station 292, page 74	<p>Install station security system to protect its assets and deter any unauthorized entry.</p> <p>Consider installation of emergency generator.</p> <p>Install emergency notification system for the public if the crew is not in the station.</p> <p>Consider future plans to enlarge station to accommodate service demand.</p>
Objective 9 – Facilities, Apparatus, and Capital Improvements	Apparatus Replacement, page 78	Evaluate the Equipment Replacement Schedule to ensure that sufficient funds are being allocated to match the escalating cost of replacing fire apparatus.

## **Appendix B: Response Time Thresholds and Triggers**

### **Introduction**

When a community creates a fire department and builds its first fire station, a response time criterion is usually established. This response time anticipates that it applies to 100 percent of the area covered by the boundaries of that fire station. This is especially true when there is only one fire station and a small area to cover. As the community grows away from that station in incremental steps, the expectation is that the original fire station will still provide adequate coverage.

However, that expectation is fraught with problems. In the simplest of terms, the total area covered by a fire department may or may not be highly developed initially; and even if a crew from the fire station responds, it may not do so in a timely manner. Most fire departments begin as totally volunteer. They usually operate with this staffing pattern for economic reasons. When population and service area increases, there is often pressure to add full time staff and to consider adding additional stations.

There are many variations on this theme. Older, established cities tended to be denser and smaller in dimension, but they often annexed new areas. Newer communities may include a much larger area than the first fire station can cover. Urban sprawl, which is a current public policy discussion, has resulted in the timing of adding new fire stations and staffing being a topic of concern.

### **Station Siting**

Usually when a fire department constructs its first fire station, the values at risk and hazards to be protected are within a close driving distance. In effect, the first fire station in a community is a centroid. That is, the local fire station is the center of the response capacity of the jurisdiction. Earlier in the 20th century, fire station coverage was often characterized on maps by drawing a circle with an 1.5 mile radius around the station. This approach was sometimes used to describe the area of coverage. However, fire apparatus response is dependent on roads that extend at angles and distances that do not result in a circle being the true description of the area coverage. Not only that, but fire stations cannot be located exactly three miles apart and have

two overlapped circles. When they are placed closer than the 1.5 radius, there is not only overlap, but also gaps where there is no coverage.

Later, the circle was replaced by diamond-shaped templates that could be overlaid over the station and rotated to estimate the relative advantage of road distances. The contemporary method used to evaluate fire stations is based on using the actual road-network in computer models. This system uses time and distance to create a network that more closely represents how far a company can respond from its fire station, within an adopted time standard.

From the time the first station is built, an expectation is established that the facility can and will provide a timely response to calls for service in the area surrounding that facility. The station provides a response to a given area within a reasonable time in a pattern that essentially is an overlay on the streets and highways that radiate outward from the station. The street-network and the topographical attributes of the community create a dynamic segmentation allowing fire professionals to reasonably predict which areas can be covered and those that will not be covered within a specific time frame even before any incidents actually occur. The preferred tool for conducting this type of analysis in today's world is geographical information systems (GIS) software.

There are many infrastructure components that affect the location allocation concept. Among these are road and highways networks, impedance factors such as traffic patterns and processes (stoplights and signs), and turn impedance, i.e.: roadbed configuration and elevation impedance (slope). It is axiomatic that there is an inverse distance-weighting factor that results in longer response times to areas further away from the station. In short, the further away from the location of an incident and the higher the impedance for response, the less effective any specific resource is in dealing with the initial stages of an emergency event.

The use of the concept of travel time itself is not exactly new. However, for many years the basic criterion was road mileage only. The standard that was normally applied was that a fire station was expected to be able to reach any incident within 1.5 miles of the station within five-minutes of driving time. Time was a secondary consideration. That standard was based upon data from the 1940s with respect to road conditions and traffic patterns. A lot has changed since then. For decades, the Insurance Services Office (ISO) has based fire station locations on a 1.5-mile separation. In general, this has served as rule of thumb, but it does not deal with the vagaries of physical response (such as geography, transportation, and weather). Secondarily, it

does not place any emphasis on response needed for emergency medical service (EMS) incidents, such as basic life support (BLS) or advanced life support (ALS).

The concept of using actual travel time today is based on a more accurate representation of the level of service for an all-risk approach. It is more performance-based. Today most fire agencies set a time standard that includes three elements, two of which were missing from the strict use of mileage for station location; specifically, alarm processing time and turnout time. The actual time of road travel has often been used to set the communities expectation of performance.

Using this approach, stations are seldom located in a linear fashion. This concept is based on the time intervals identified in the Standards of Response Coverage section of the Self Assessment Manual published by the Commission on Fire Accreditation International. This process leads to the development of a standard of response cover, or a time and level of staffing designed to control an emergency at a minimum level of loss. The process is however, a policy choice based on risk and local conditions.

The basic performance standards for time goals are based on the rapid speed of fire growth and consequences of emergency medical situations over a short time frame. It has been determined that both fires and medical emergencies can gain a foothold that result in excessive losses when response times are excessive. The most common benchmark time standards used today are:

- Alarm processing time — 60 seconds
- Turnout time — 60 seconds
- Travel time
  - Fire response — five minutes, 90 percent of the time
  - ALS response — eight minutes, 90 percent of the time

The contemporary method of measuring performance looks at response time as a level of service indicator. This is accomplished through a two-fold process. The first step measures response time performance on actual emergencies; the second step monitors the system to determine when the system fails to achieve the performance goals.

Response time criterion should only be applied to calls that are emergency calls. When incidents are analyzed, the data should be reviewed to assure that non-emergency calls are not used when calculating performance. There are many calls for service that fire departments log

as incidents that are non-threatening scenarios and the responding companies will handle them on an as-needed basis. To include these times in the analysis of emergency services tends to skew the outcome, leading to a false service indicator.

### **Response Failure**

To understand when response coverage failure occurs, we must first define what is being measured and how it will be measured. For example, a basic question is whether to measure protection of the geographic area or to base it on the occurrence of actual incidents. Another question is whether to measure performance first-due station area or department wide. It is generally economically impractical to cover 100 percent of the jurisdictional territory equally. Generally, fire protection practitioners try to position stations to cover 90 percent of the ground in each first-due area, to provide overlap for concentration, redundancy for multiple calls, and for equity of access for customer service. Response time measurements based on actual call loading are commonly set at 80 to 90 percent of the calls within the first-due and concentration areas.

Once a performance target is set, the next question is to determine how many calls outside the targets is acceptable. Is it acceptable, for example, if historical measurements show an 85 percent compliance rate with a 90 percent target, but the next five percent of calls are covered in just one additional minute? If the five percent deficiency amounts to only 25 calls (out of 500) the gap may or may not be significant. What if the deficiency amounted to 250 calls (out of 5000)?

It should be noted that this criterion approach allows for ten percent of the calls to be beyond a five minutes travel time over a given reporting period. This provides flexibility in the assessment of coverage to cope with anomalies such as extra-ordinary response conditions such responding from out of district, or for delays caused by simultaneous alarms.

The first indication of a problem in providing service is when a number of alarms that exceed the performance standard are documented. This may or may not be function of new growth. It could be the result of in-fill that causes a higher number of alarms for the company than it can service. This is especially true when alarms occur simultaneously.

Moreover, when new areas develop that extend travel times they do not automatically become the source of new alarms. In fact, new construction often has a period of several years before

adding to fire service demand. The same is not necessarily true from the perspective of emergency medical service.

### **When is a New Station Needed?**

The decision many communities face is determining when additional stations are required to meet adopted response time goals. The problem comes in finding a quantifiable threshold to determine that point for each specific situation because it varies from community to community and even within a specific jurisdiction. The overall answer is part analytical, part professional judgment and part financial. The literature of the fire service today contains little definitive guidance on how this should be accomplished.

Three general steps can be identified.

- Identifying areas with minimum coverage
- Identifying feasible locations for a new facility
- Evaluating those locations using specific criterion

The criterion offered in this document is based upon a growing body of knowledge aimed at quantifying this process. It is unfortunate that there is no universally acceptable algorithm. The fire protection planning process does allow for an evaluation of potential loss as a result of deteriorating response times.

One form of measurement is to assess the road and transportation network to ascertain the percentage of road mileage theoretically covered within a set time criterion. This is done using computer-based modeling that creates a polygon describing the *areas of coverage*. Areas outside the polygons represent areas where calculated response time is not adequate.

As growth and development extends beyond the range of travel time of one station, the percentage of calls that exceed the performance requirement begins to increase. It should be noted that growth, in and of itself, does not create an instantaneous demand. New construction has the advantage of better codes, a higher level of owner interest, and limited deterioration of fire-breeding conditions.

A more subtle difference is the fact that community demand for medical services is almost from day one of occupancy. In short, this means that new construction may place more values and lives at risk, but the demand for service will increase incrementally. When demand for service

does begin, it will be based on two factors - nature of the occupancy and hazards that are present.

Incident increase may first appear as a change in the performance of an existing company in the annual analysis of emergency calls. For example, if a station has 1,000 alarms and a 90 percent compliance rate with the response standard, there would be about 100 alarms per year that were beyond the goal. This would be the baseline for existing response performance. If in the following year, the number of alarms was 1,200 and percentage dropped to 85 percent, the statistics would be an indicator that the department was losing ground on response performance. If the change in the number of alarms had merely increased because of more calls in the same area and the response time percentage remained the same, the statistics would be an indicator the department had the capacity to handle the increased load. (An exception to this rule occurs when a single company has such a high call volume that it cannot handle its calls without call queuing.).

When the alarm rate goes up and the performance goes down, the failure threshold may be approaching. As stated earlier, analysis needs to be performed on the deficiency to determine how many of those incidents were handled in the first 60 seconds increment beyond the performance time.

Based on actual response time analysis, one threshold that needs to be considered is the increase in alarms and the percent of calls handled under the adopted criterion. Anything more than a ten percent increase in calls and a ten percent reduction in performance is a strong signal to evaluate the level of service being provided.

In larger departments, most practitioners are factoring out non-emergency calls and for actual incident performance, only looking at *core emergencies*. The definition of core can be made locally based on risk and importance to the community, but they are usually structure fires and moderate to severe status EMS calls.

In general, if more than one measure is slipping, an evaluation of all Standards of Cover factors, along with the reason why the data is slipping, is required. A one-year snap-shot may not be valid *if* the agency had a big storm event, a major wildland fire, and stacked a bunch of calls for just a single month or the year. What is almost always clear is that being slightly out of the response standard range does not necessarily trigger a new facility.

An historical incident analysis approach does not necessarily address what is actually at risk in terms of life and property. As new buildings are constructed different types of fire and life safety risks develop they may deserve equity in protection. New properties are usually safer than the older part of the community because they are constructed to a higher standard. Modern mapping technology can assist in identifying community risk and values independent from historical incident analysis.

One threshold that must be carefully monitored is the revenue stream that accrues from development. One function of government is to control land use and to create mechanisms for collecting taxes. New property owners are paying taxes, fees, and permits with an expectation for the level of service being provided. The revenue stream should provide a threshold when different elements of future fire stations can be determined. As the revenue stream in an area develops funds should become available for site acquisition, treatment, and construction. This may be a multi-year process.

The threshold for construction should be to provide a new fire station into any zone in the city or jurisdiction that has more than 35 to 50 percent of its parcels developed. Some of the secondary measures currently being used are 300 to 500 calls for service for any individual fire company or a service population of 10,000 to justify a full-time paid company. The following criterion grid illustrates a series of measures that may be useful deciding when a new fire station should be deployed within a city. Similar grids could be developed to help establish triggers for the deployment of additional emergency equipment and personnel.



**Figure 82: Criterion for a New Station**

Action Choices	Travel Distance	Criterion		
		Response Time Parameter	Out of Area Calls	Building/Risk Inventory
Maintain status quo	<i>Enter local information</i>	<b>1<sup>st</sup> due company</b> <i>Enter local response time</i>	<i>Enter existing out of area calls</i>	<i>Enter local building/risk inventory</i>
Temporary facilities and minimal staffing	Risks 1.5 to 3.0 miles from existing station	<b>1<sup>st</sup> due company</b> Exceeds 5-minutes travel time 10 percent of the time, but never exceeds 8 minutes.	More than 10 percent of calls are in adjacent area	New area has 25 percent of same risk distribution as in initial area
Permanent station needed	Risk locations exceeding 4.0 miles from the station	<b>1<sup>st</sup> due company</b> Exceeds 5-minutes travel time 20-25 percent of the time. Some calls greater than 8:00 Minutes.	More than 20-25 percent of calls are in outlying area	New area has 35 percent of same risk distribution as in initial area of coverage
Permanent station essential	Outlying risk locations exceeding 5.0 miles from the 1st station	<b>1<sup>st</sup> due company</b> Exceeds 5-minutes travel time 30 percent of the time. Some calls greater than 10 minutes.	More than 30 percent of calls are in outlying area	New area has 50 percent of same risk distribution as in initial area

The decision process has to be placed into the context of staffing pattern decisions. It is not uncommon to have a station constructed, and have the staffing pattern evolve over years from one system to another. In the case of a station under consideration, it should be anticipated that a policy decision needs to be made with respect to the staffing system to be used as soon as possible. It is anticipated that a completely volunteer system would not be viable for this type of facility. Conversely, a fully staffed paid company has a significant price tag to it. A combination staffing system would seem to be the most practical for the first five years of consideration. These are the staffing configurations used in the matrices developed to describe thresholds and triggers that should be evaluated in the future.

It generally takes multiple elements of the standards of coverage to be out-of-balance along with available economic resources to justify an additional paid company or increasing staffing of one or more companies.

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