San Ramon Valley Fire Protection District

Standards of Cover

Resource deployment planning and risk analysis for the communities of Alamo, Blackhawk, the Town of Danville, Diablo, the City of San Ramon, the southern area of Morgan Territory and the Tassajara Valley

August, 2010

ONE TEAM, ONE MISSION

In the spirit of our tradition, we strive for excellence,

respectfully serving all with pride, honor and compassion

Board of Directors

Roxanne W. Lindsay, President

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The Role of the Board

The Board of Directors is the elected policy-making body for the San Ramon Valley Fire Protection District. The Directors provide financial oversight and strategic policy direction to maximize the public value of District services.

Fire Chief/Treasurer

Richard Price

The Role of the Chief

The Fire Chief is the Chief Executive Officer of the District. In collaboration with the Board of Directors and in partnership with all members of the organization, the Chief provides direction, protection and order to the District.

SAN RAMON VALLEY FIRE PROTECTION DISTRICT

Standards of Cover Deployment Analysis

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MAP ATLAS

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Standards of Cover Deployment Analysis Executive Summary

1.1 Overview of Research Methodology, Key Findings, and Policy Direction

1.1.1 Background

This study reviews the adequacy of the existing deployment system from the current and planned fire station locations, and based on that analysis and possible service area growth, proposes what deployment enhancements the District could consider as funds allow. This deployment report is presented in three sections and two volumes, including this Executive Summary summarizing the most important findings and recommendations, a Standards of Cover Technical Report, and a Map Atlas (Volume 2) with supporting geographic maps.

This planning study is part of the District's efforts to develop information needed to move forward with planned station relocations, achieve CFAI accreditation through the Center for Public Safety Excellence and to enhance its services through progressive planning as the communities it serves continue to evolve. At this point in a slow economy, it is an ideal time to take stock of fire services and place fire defense planning on the forefront before the pace of growth again becomes fast and the communities the District serves finds themselves behind the planning timeline to match a desire for additional services to serve growth.

The District retained Citygate Associates, LLC to provide third party methodology oversight and data validation services throughout all aspects of this study.

1.1.2 Policy Choice Framework

First, as the District Board understands, there are no mandatory federal or state regulations directing the level of fire service response times and outcomes. The body of regulations on the fire service provides that if fire services are provided at all, they must be done so with the safety of the firefighters and citizens in mind. Historically, the District has made significant investments in its services, and as a result, has good fire, EMS, hazardous materials and technical rescue response coverage.

1.1.3 State of the District's Fire Services

In brief, the study finds that the challenge of providing fire services in the District is similar to that found in many moderate sized communities: providing an adequate level of fire services within the context of limited fiscal resources, competing needs, growing and aging populations plus uncertainty surrounding the exact timing of future development. The District today is handling the area's needs through its own local resources and on occasions through the use of partnerships with its neighbors in the mutual aid system. The deployment system meets the District's current needs and can grow commensurate with additional development and revenue to provide increased fire services over time as the communities in its service area approach build-out of their Comprehensive General Plans. This report made twelve key findings resulting in the adoption of seven specific performance measures. These performance

measures, or *response time benchmark goals* were adopted by the Board of Directors on December 17, 2009.

1.1.4 Field Operations Deployment

Fire department deployment, simply stated, is about the speed and weight of the attack. Speed calls for first-due, all risk intervention units (engines, ladder trucks and ambulances) strategically located across a community. These units are tasked with controlling everyday average emergencies without the incident escalating in size, which then unnecessarily depletes the department's resources as multiple requests for service occur. Weight is about multiple-unit response for significant emergencies like a *room and contents structure fire*, a *multiple-patient incident*, a *vehicle accident with extrication* required, or a *complex rescue* incident. In these situations, the District must assemble enough firefighters in a reasonable period in order to control the emergency safely without it escalating to greater alarms.

Analysis of prior response statistics and use of geographic mapping tools reveal that the District has good fire station coverage for most of the completely developed neighborhoods. However, given the large area included in the jurisdiction, insufficient roadway circulation, and mix of urban, suburban and rural population densities, the District is challenged to provide a desirable level of service to the outer edge areas from the existing fire stations. The maps provided and the corresponding text explanations describe in detail the District's current deployment system performance.

For effective outcomes on serious medical emergencies and to keep serious, but still-emerging fires small, best practices recommend that the first-due fire unit should arrive within 7 minutes of the 911-call receipt, 90 percent of the time. In the District, the current fire station system provides the following unit coverage, in different population density/risk areas for emergency medical and fire incident types as shown in the table below.

Performance Summary	*Urban*	*Suburban*	*Rural*
90% point from call received in fire dispatch to first unit on-scene	7:34	8:12	12:35

The District is staffed adequately to handle two simultaneous structure fires and two to three medical emergencies before relying on mutual aid. The regional mutual aid response system delivers greater alarm and multiple-incident support, when needed, although with longer response times.

The key findings detailed in the following section led to the adoption of seven response time benchmark goals.

1.1.5 Research Findings

Finding 1

The District does not have a fire deployment measure adopted by the Board of Directors that includes the beginning time measure starting from the point of fire dispatch receiving the 911 phone call, and a goal statement tied to risks and outcome expectations. The deployment measure should have a second measurement statement to define multiple-unit response coverage for serious emergencies. Making these deployment goal changes will meet the best practice recommendations of the Commission on Fire Accreditation International.

Finding 2

The District has a *standard response dispatching plan* that considers the risk of different types of emergencies and pre-plans the response. Each type of call for service receives the combination of engine companies, truck companies and command officers customarily needed to handle that type of incident based on District experience.

Finding 3

Overall apparatus staffing for the entire District is adequate for a District of this size. The use of volunteers in the rural area is very valuable.

Finding 4

Most of the District's urban/suburban density developed areas are within 4 minutes travel time of a fire station. Where this does not occur they are small areas at the end of the street network, in most cases at upper elevations in the hillside areas.

Finding 5

The District's urban/suburban density core areas are largely within 8 minutes travel time of the full first alarm assignment of 3 engines, 2 ladder trucks, 1 chief and 1 rescue medic unit. The outer areas of the District do receive an initial effective response force of at least 3 engines within 8 minutes above 70% of the time. The District should adopt performance measures based on the differing risks found in each of the three population density categories.

Finding 6

The types of properties that generate the most calls for service are typical for western states suburban departments. The District's staffing, equipment and response plans are properly designed for these types of calls.

Finding 7

The District's time of day, day of week and month of year calls for service demands are very consistent. This means the District needs to operate a fairly consistent 24/7/365 response system. Peak activity units would only be cost effective when high call volumes can be reasonably predicted such as during extreme wildland fire weather conditions or high quantity people visitation events.

Finding 8

The District's 90 percent performance point for total response time when measured district-wide (disregarding population categories) for fire/EMS incidents is 9 minutes.

Finding 9

The District's total response time measured district-wide (disregarding population categories) for fire/EMS incidents, is longer than 7 minutes due to all three-response time components being past a best practices recommendation:

Dispatch @ 1:30 instead of 1:00

Turnout @ 3:00 instead of 2:00

Travel @ 5:30 instead of 4:00

If the District, with training and crew performance tuning, could save 30 seconds at dispatch and 1 minute at turnout, then the 90 percent performance measure becomes 7:30 without adding any companies.

Achieving 4 minute travel 90 percent of the time will be impossible measured district-wide given the road network design and outer hilly area topography of the District. However, this is achieved in the core business and higher density residential areas in the I-680 corridor.

Given the population density diversity in the District a single district-wide deployment goal is not appropriate. The District needs to adopt deployment measures based on population density, risk assessment and desired outcomes for each population density area.

Finding 10

The District's simultaneous call rate of 50 percent is not of particular concern due to the District's total daily deployment system depth as evidenced by the fact the District gives more mutual aid than it receives from its partner agencies. Also the District does have strong mutual aid agreements that help it maintain performance during times of resource strain or depletion.

Finding 11

The District's initial three unit first alarm 90 percent performance at 16:00 minutes/seconds measured district-wide is misleading as there are very few full working structure fires and many of these are in homes in the outer edge hilly terrain areas. The mapping model is a more accurate indicator of what the first alarm performance will be in the more developed core of the District in the I-680 corridor.

Finding 12

At this time, given the predicted coverage from the mapping models and the good response time performance in most areas, the District is not in immediate need of adding fire stations.

1.1.6 Board Policy Adoption

The following *response time benchmark goals* were adopted by the Board of Directors on December 17, 2009.

Goal 1

Distribution of Fire Stations for Built-up Urban Areas of Greater than 2,000 People per Square Mile

To treat and transport medical patients and control small fires, the first-due unit should arrive within 7 minutes total response time, 90 percent of the time from the receipt of the call in fire dispatch. Total response time equates to 1 minute dispatch time, 2 minute crew turnout time and 4 minutes travel time spacing for single units.

Goal 2

Distribution of Fire Stations for Suburban Areas of 1,000 to 2,000 People per Square Mile

The first-due fire unit should arrive within 8 minutes total response time, 90 percent of the time.

Goal 3

Distribution of Fire Stations for Rural Areas of Less than 1,000 People per Square Mile

The first-due fire unit should arrive within 15 minutes total response time, 90 percent of the time.

Goal 4

Effective Response Force (First Alarm) for Urban Areas of Greater than 2,000 People per Square Mile

To confine fires near the room of origin, to stop wildfires less than 5 acres in size when noticed promptly, and to treat up to 5 medical patients at once, a multiple-unit response of at least 18 personnel should arrive within 11 minutes total response time from the time of 911 call receipt, 90 percent of the

time. This equates to 1 minute dispatch time, 2 minutes crew turnout time and 8 minutes travel time spacing for multiple units.

Suburban areas should receive the full first alarm within 12 minutes total response time, 90 percent of the time with the goal to limit the fire spread to the area already involved upon the arrival of the effective response force.

For rural areas, this should be 21 minutes, 90 percent of the time. Outcome goals in these areas would be to confine fires to the building of origin, to care for medical patients upon arrival, and to initiate operations on serious wildland fires.

Goal 5

Hazardous Materials Response

Respond to hazardous materials emergencies with enough trained personnel to protect the community from the hazards associated with the release of hazardous and toxic materials. Achieve a total response time consistent with Goal 1, Goal 2 and Goal 3 with the first company capable of operating at the California OSHA First Responder Operations (FRO) level. After size-up and scene evaluation is complete a determination will be made whether to request the on-duty District Hazardous Materials Team and/or other appropriate resources.

Goal 6

Technical Rescue

Respond to technical rescue emergencies with enough trained personnel to facilitate a successful rescue. Achieve a total response time consistent with Goal 1, Goal 2 and Goal 3 with the first company capable of operating at the California Rescue System 1 (RS1) level. After size-up and scene evaluation is complete a determination will be made whether to request the on-duty District Rescue Team and/or other appropriate resources.

Goal 7

Call processing and turnout times

A concentrated focus will be placed on systems, training and feedback measures to crews to lower dispatch and turnout time reflex measures to national best practices of 1 minute for dispatch and 2 minutes for fire crew turnout, 90 percent of the time.

1.1.7 Annual Compliance Reporting

This Standards of Cover document and associated Map Atlas should be reviewed and amended as required each year as part of routine annual compliance reporting to the Board of Directors and other

interested parties to evaluate adopted goal progress and foster integration with District budget and strategic planning processes.

1.2 Performance Improvement Plan

The Standards of Cover process provided the framework and analysis to understand current deployment performance and assisted the Board of Directors in establishing meaningful performance benchmarks. The Performance Improvement Plan identifies purposeful process change to improve the reliability of achieving desired outcomes. To this end, below are the key focus areas area identified by the management team.

Forensic review of response time metrics

The District has performed a comprehensive technical review of system clock and time stamp processes to ensure a complete and thorough understanding of all aspects of response time measures of the computer-aided dispatch process. This review looked for patterns and anomalies that led to a better understanding of system deficiencies and responsibility areas.

Enhancement of Computer-aided Dispatch system and Telephone System integration

The FY 10/11 budget contains $335,500 for enhancements to the District's Computer-aided Dispatch System and for telephony integration. In January, 2011 the District also plans to use $155,000 from the 911 Fund to completely replace the current Positron telephone system. These enhancements include:

- Provides a new and automatic timestamp when the dispatcher answers the phone. Currently the District uses a slightly later *call entry* time in its response time calculations. This time does not provide for full call processing accountability and is susceptible to dispatcher manipulation. A new telephone procedures policy has been put in place that clearly establishes expected workflows and should improve the reliability of call entry times until the automatic timestamp is implemented with the planned enhancements.
- Provides for more accurate delineation between call processing and turnout time. Current response time calculations use a *queued for dispatch* timestamp as the dispatched time. The actual dispatch occurs later. Actual crew notification time, or true dispatch time, cannot be captured with the current configuration of the dispatch system software and station alerting technology. Although this does not affect the total response time as currently reported, it does artificially report reduced call processing times and increased crew turnout time. The enhancements will provide for the use of actual crew notification times consistent with the expectations of a dispatched timestamp.

Dispatcher work schedule

On July 1, 2010 the District revised the dispatcher work schedule as a method of improving call processing performance. By increasing minimum staffing requirements in the communication center to two dispatchers at all times, it is believed that calls for service can be processed more efficiently and

within the Board adopted performance goals. Prior to this change, center staffing allowed for one dispatcher.

New station alerting technology

To improve crew turnout time, the FY 10/11 budget contains $235,000 for a new station alerting system that will simultaneously alert fire stations during multi-station dispatches. The District currently uses a legacy station alerting system that notifies the fire stations in a serial (consecutive) manner.

The District is also in the process of reviewing all dispatcher workflows and practices looking for opportunities to alert stations faster through automating manual steps, adding visual time-based performance cues, and possibly through the use of automated pre-alerting technologies.

Response time focused Information-Led Management (ILM) reporting

The District has develop real-time reporting methods within its ILM framework to provide performance surveillance monitoring of all response time components to quickly recognize and address system failures. These reports are now provided to the Board of Directors on a monthly basis.

Mobile Data Computer (MDC) deployment and reliability

The District's current iteration of Mobile Data Computers possess advanced mapping and routing capabilities. It is believed that these devices, once fully deployed and deemed reliable, will improve turnout time by eliminating current manual map reading and verification practices. On April 1, 2010 the District also implemented the pushbutton status change capabilities of the MDCs to further improve the reliability and accuracy of unit status changes. The District completed deployment of these units in all front line apparatus on June 30, 2010.

Communications Center Oversight

In FY 09/10 the District added a new position of Communications Center Manager. This manager is responsible for auditing all dispatch center operations and for implementing all changes required to provide service consistent with District policy. Prior to the creation of this position the communication center was managed by the Support Services Assistant Chief. This more focused management hierarchy is expected to significantly improve communication center performance.

Standards of Cover Deployment Analysis Technical Report

2.1 Background

The scope of work and corresponding work plan was developed consistent with the project team members' experience in fire administration, records management and geographical information systems. District staff and consultant Citygate Associates, LLC utilized various National Fire Protection Association (NFPA) publications as best practice guidelines, along with the self-assessment criteria of the Commission on Fire Accreditation International (CFAI) and the Insurance Services Office (ISO).

2.1.1 Standard of Response Cover Review Components

The scope of this project included the elements indicated below.

- As necessary, the study reviewed and updated the existing Standards of Coverage Plans for the District.
- The study modeled the need and effects of the current station locations and the need, if any, for future additional fire stations.
- While this is not a study of fire departments adjacent to the District, the study considered the impacts of the District's existing or potential automatic and mutual aid agreements on the District's needs.
- The performance goals are consistent with national guidelines from the National Fire Protection Association (NFPA), the Commission of Fire Accreditation International and the Insurance Services Office (ISO).
- The project team used a software program called Network Analyst from ESRI Corporation for the mapping analysis of this project to analyze current and future fire station locations by driving time.

2.1.2 SOC Study Processes

The core methodology used by the project team in the scope of its deployment analysis work is the "Standards of Response Coverage" 5th Edition, which is a systems approach to fire department deployment, as published by the Center for Public Safety Excellence. This methodology uses local risk and demographics to evaluate deployment as part of the self-assessment process of a fire agency.

This approach uses risk and community expectations on outcomes to assist elected officials in making informed decisions on fire and EMS deployment levels. The District has adopted this systems-based approach as a comprehensive tool to evaluate fire station locations.

Such a systems approach to deployment, rather than a one-size-fits-all prescriptive formula, allows for local determination. Using this approach, an agency can match local need (risks and expectations) with the costs of various levels of service. In an informed public policy debate, a governing board "purchases" the fire and EMS service levels (insurance) the community needs and can afford.

While working with multiple components to conduct a deployment analysis is admittedly more work, it yields a much better result than any singular component can. If we only look to travel time for instance, and not look at the frequency of multiple calls, the analysis could miss over-worked companies. If we do not use risk assessment for deployment, and just base deployment on travel time, a community could under-deploy to incidents.

The Standard of Response Cover process consists of eight parts:

1. Existing Deployment – each agency has something in place today.
2. Community Outcome Expectations – what is expected of the response agency?
3. Community Risk Assessment – what assets are at risk in the community?
4. Critical Task Time Study – what must be done over what timeframe to achieve the stated outcome expectation?
5. Distribution Study – the locating of first-due resources (typically engines).
6. Concentration Study – First alarm assignment or the effective response force.
7. Reliability and Historical Response Effectiveness Studies – using prior response statistics to determine what percent of compliance the existing system delivers.
8. Overall Evaluation – proposed standard of cover statements by risk type.

Fire department deployment, simply stated, is about the speed and weight of the attack. Speed calls for first-due, all risk intervention units (engines, trucks and or rescue companies) strategically located across the jurisdiction. These units are tasked with controlling every day, moderate emergencies without the incident escalating in size, which then unnecessarily depletes District resources as multiple requests for service occur. Weight is about multiple-unit response for serious emergencies like a room and contents structure fire, a multiple-patient incident, a vehicle accident with extrication required, or a heavy rescue incident. In these situations, enough firefighters must be assembled in a reasonable time frame in order to control the emergency safely without it escalating to greater alarms.

Thus, small fires and medical emergencies require a single or two-unit response (engine and specialty unit) with a quick response time. Larger incidents require more crews. In either case, if the crews arrive too late or the total personnel sent to the emergency are too few for the emergency type, they are drawn into a losing and more dangerous battle. The art of fire crew deployment is to spread crews out across a community for quick response to keep emergencies small with positive outcomes, without spreading the crews so far apart that they cannot amass together quickly enough to be effective in major emergencies.

2.2 SOC Study Questions

To understand current and future deployment needs, this study addressed the following questions:

1. For the current service demands, how many fire stations should the District have and where should the stations be located or relocated for the most effective and efficient service?
2. For future service demands, how many fire stations should the District have and where should the stations be located or relocated for most efficient service?

3. If the recommendation is for more than the current number of stations, what are the specific benefits of each additional location (response time, increase in percent of fire containment, decrease of station alarm volume, and other cost/service benefits)?
4. Is the equipment adequate (quantity, size, location) for the current service demands?
5. What other fire response options and strategies might be suitable for the District?

2.3 District Overview

A five-member Board of Directors, elected by their constituents and each serving a four-year term, govern the District. The Fire Chief oversees the general operations of the District in accordance with the policy direction prescribed by the Board of Directors. The Fire Chief also serves as the Treasurer for the District.

In 2008, the District employed nearly 200 personnel, in addition to approximately 50 volunteers serving in four separate volunteer programs. The District maintains ten fire stations, three annex buildings, a training site, and one administrative office building, all strategically located throughout the District. The District staffs fifteen companies, including structure and wildland engines, ladder trucks, ALS ambulances and specialized Haz Mat, Rescue, Communications and other support units. The District also operates its own 911 communications center staffed daily with three dispatchers.

The District's service area encompasses approximately 155 square miles, covering the communities of Alamo, Blackhawk, the Town of Danville, Diablo, the City of San Ramon, the southern area of Morgan Territory and the Tassajara Valley. Within the boundaries of the District are expansive wildland areas, large single-family homes and multi-family residential complexes, hotels, a regional hospital, numerous convalescent/assisted living facilities, equestrian areas, hiking trails, rock climbing areas, Interstate 680, and a facility housing a low-level nuclear reactor.

The total population served by the District in 2009 exceeded 167,500. On business days, this figure grows by another 30,000 to include the personnel employed in the Bishop Ranch Business Park. Bishop Ranch is a 585-acre development with nine million square feet of office space located in San Ramon. Since its inception in 1984, the Business Park has evolved into a nationally recognized premier business center, comprised of over 300 diverse companies, ranging from established Global 500 companies such as the corporate headquarters of Chevron Corporation to innovative start-ups in high-growth fields.

2.3.1 Legal Basis for Agency

The San Ramon Valley Fire Protection District is an autonomous Special District as defined under the Fire Protection District Law of 1987, Health and Safety Code, Section 13800, of the State of California.

2.3.2 History Relating to Development of Resources

The San Ramon Valley Fire Protection District is an outgrowth of many years of maturation. Its early beginning took place during a meeting on March 19, 1912 of the Danville Improvement Club. This meeting included the leading ladies and men of Danville. At this meeting it was decided that a volunteer fire department needed to be organized. The idea was unanimously approved, and the name Danville Farm Defense Fire District was established. In 1921, a state law permitted the organization of special fire districts and empowered them with the authority to levy a tax for their support. Thus, on September 6,

1921, the Danville Farm Defense Fire District became the Danville Fire Protection District, an independent fire district and a political subdivision of the State of California. The official boundaries were re-designated to encompass Danville, Sycamore and Green Valley School District, an area of approximately fifty (50) square miles.

In 1963, Contra Costa County reorganized its East County Fire Protection District into the San Ramon Fire Protection District, an independent district. In December 1979, the Local Agency Formation Commission (LAFCO) initiated the consolidation of the Danville Fire Protection District and the San Ramon Fire Protection District. On July 1, 1980, with the merger complete, the two Districts were renamed the San Ramon Valley Fire Protection District (SRVFPD). The new District served the communities of Alamo, Blackhawk, Danville, Diablo and San Ramon - a 70 square mile area. The organization comprised four fire stations, 27 emergency vehicles and 71 employees. With the reorganization of these two districts the newly formed District became governed by five locally elected directors, independent of the County Board of Supervisors. Some ten years later, the San Ramon Valley Fire Protection District and the Tassajara Fire Protection District initiated a merger process. In January 1991, LAFCO completed the annexation of all territories of the Tassajara Fire Protection District and transferred them to the San Ramon Valley Fire Protection District, which included Tassajara Valley and the southern boundary of Morgan Territory. Simultaneously, the Tassajara Fire Protection District was dissolved.

In July 1997, the San Ramon Valley Fire Protection District and the City of San Ramon moved forward with an annexation of the Dougherty Regional Fire Authority to the SRVFPD. With this annexation, the District extended its fire service boundary to the Contra Costa/Alameda County line.

The San Ramon Valley Fire Protection District's evolution is notable. Below is a summary of key milestones and accomplishments since its inception.

Milestones

March, 1912

A "Fireman's Ball" was held to finance the Danville Farm Fire Defense District. The net proceeds of $100.00 realized at the event were deposited into the first bank account.

April, 1922

The Danville Fire Protection District (DFPD) purchased its first fire truck for $4,140.The new truck was a Reo-American La France, which replaced a trailer-equipped with ten 10-gallon milk cans full of water. The volunteer who got to the trailer first hitched it to their vehicle and pulled it to the fire. Gunnysacks were soaked in the water and then used to beat out the fire.

July, 1925

The DFPD purchased for $600 the site of the first firehouse at 150 N. Hartz Avenue, Danville. The firehouse was completed and accepted on December 2, 1925.

1928

A donated Dodge truck was converted into fire truck #2.

October, 1936

The DFPD volunteers began receiving 50 cents to answer a call and 50 cents per hour thereafter.

1941

A two-way radio was installed between the firehouse and the County Sheriff, linking Danville with the rest of Contra Costa County.

May, 1942

At the height of the war years, government defense funds were provided to have a man sleep in the firehouse.

October, 1942

The DFPD entered the County Mutual Aid plan.

January, 1958

A second firehouse was completed and located in Alamo.

January, 1966

The DFPD established its first training program with the objective of developing new recruits with the ability to properly, safely and efficiently use the tools and equipment normally carried on fire apparatus.

July, 1969

The DFPD purchased land to relocate and construct Station 1 at 800 San Ramon Valley Boulevard in Danville to be renamed Station 31.

February, 1975

The DFPD completely modernized its communications system.

May, 1975

The DFPD received its first ambulance donated through the "Helen Howell Fundraiser."

January, 1977

The DFPD received an improved Class Rate from that of 5, issued in 1962, to a Class 4 rating, which illustrates an adequate level of fire protection facilities is being provided and maintained within the rapidly growing communities protected.

January, 1978

As a result of population growth, emergency medical response service for the DFPD increased 42% over those in 1976.

February, 1984

The San Ramon Valley Fire Protection District (SRVFPD) began staffing its ambulance units with the delivery of paramedic service through a public/private partnership with John Muir Hospital.

July, 1989

Issued $13,100,000 Certificates of Participation for the acquisition and construction of certain land, equipment and capital improvements within the District. The primary projects included the construction of Station 36, Station 38 and the Administrative Office building and the remodeling of Station 31 and Station 33.

April, 1992

Station 36, located in Tassajara Valley was staffed to provide 24-hour protection, formerly a volunteer-staffed station under the former Tassajara Fire Protection District.

May, 1993

Refinanced Certificates of Participation issued in 1989 in an aggregated principal amount of $10,500,000.

February, 1995

A public safety trailer called the "Safe House" was added to the District's fleet, allowing the Fire Prevention Division to teach home fire safety to school age children.

September, 1997

The SRVFPD's Communication Center became accredited for pre-arrival medical instructions and call triaging. The District has consistently maintained this accreditation.

July, 1997

The SRVFPD published its first community newsletter, serving 38,000 households in the area. The newsletter provides timely information on seasonal fire prevention issues.

February, 1999

As a result of a rating review, the Insurance Services Office (ISO) granted the SRVFPD an upgrade from Class 3 to Class 2 in the urban/suburban area. This improved rating tremendously impacts the community the District serves. Commercial buildings can now save from 2.5% to 4.5% on their base fire insurance rates. Nationally, only 5% or fewer agencies hold this prestigious achievement. The District is a Class 5 in the rural areas and a Class 8 in the very remote rural areas.

July, 1999

The Board of Directors designated the Fire Chief as the first Treasurer for the District.

October, 1999

The SRVFPD gained "fiscal management" independence from Contra Costa County for financial reporting services. With the hiring of the District's first Chief Finance Officer in March of 1999, an "in-house" payroll, accounting and cash management system commences, terminating its contractual agreement with Contra Costa County.

July, 2000

The SRVFPD entered into a seven-year contract with Local 3546, a Memorandum of Understanding covering July 1, 2000 through June 30, 2007.

September, 2000

A Chaplaincy program, operating in a non-denominational setting, was instituted with its primary purpose to assist District personnel and their families for life needs. During the year, the program has begun "outreach" assistance into the community.

January, 2001

The District formed an official Honor Guard with the mission to provide honor and respect to firefighters who have fallen in the line of duty serving their community and country and to instill respect for national, state and local flags.

February, 2001

Reclassified two Fire Prevention Inspector positions to Deputy Fire Marshal, reorganizing the internal structure of the Division to better service the customer.

June, 2001

The SRVFPD broke ground for Station 30, located in Dougherty Valley. This turnkey facility, built and equipped by local developers, opened on June 1, 2002.

November, 2001

The District began staffing every first run unit with one Paramedic for every emergency call.

December, 2001

The District prepares its first Comprehensive Annual Financial Report (CAFR) for evaluation and award consideration by the Government Finance Officers Association and the California Society of Municipal Finance Officers Association.

November, 2002

The District holds its first annual Employee Recognition Dinner and Awards Ceremony to acknowledge all the efforts put forth by each and every employee.

June, 2003

The Board of Directors adopts a new "mission" statement as a result of the strategic planning process. Refinanced Certificates of Participation issued 1993 in an aggregated principal amount of $8,910,000.

August, 2003

The District's Rescue Division was awarded the Certification as an Office of Emergency Services (OES) "Medium Rescue Unit." This certification is an important acknowledgement of the District's ongoing effort to provide emergency services during major disaster incidents.

March, 2004

The District instituted the Citizen's Emergency Response Team (CERT) in coordination with the Town of Danville, City of San Ramon, San Ramon Valley Unified School District and Contra Costa County Office of Emergency Services.

July, 2004

The District placed into service a Type 1 Communication Support Unit, the first totally self-contained mobile communications post in Contra Costa County.

March, 2005

The SRVFPD, along with the American Heart Association, Contra Costa County Emergency Medical Service Agency and the San Ramon Regional Medical Center, started the Public Access Defibrillation (PAD) Program. The program places Automatic External Defibrillators (AEDs) in schools, public buildings and businesses.

June, 2006

Issued $9,485,000 Certificates of Participation for the acquisition and construction of certain land, equipment and capital improvements within the District. The primary projects included the relocation and construction of Station 36, two new stations in Alamo (east and west) that will replace the current Station 32 and the construction of an apparatus storage building at Station 31.

June, 2007

The District hired its first full-time Technology Manager, and conducted a complete reassessment of the District's Intergraph Computer-aided Dispatch System. This reconfiguration of the matrix, deployment plan and dispatch workflow was the most significant enhancement to the District's Computer-aided Dispatch System since its installation in 1993. Going live with the new model was the culmination of months of planning, training and implementation, streamlining and improving the reliability of many dispatch operations.

July, 2007

The District staffed an additional two person ambulance to its' emergency response fleet. This ambulance and two person crew are stationed at Station 31.

October,2007

The Fire Prevention Division prepared and adopted an ordinance for implementation of the new 2007 California Fire Code. This involved many months of review as the new code differed greatly in many ways from the prior code. The resulting draft document was subjected to public hearings and meetings of directly impacted home builders and other stakeholders. After several meetings and in consideration of other laws impacting application of certain provisions the document was presented for adoption by the Fire District Board of Directors in October 2007. The most significant element contained in the ordinance, for this Fire District, was the lowering from 5,000 sq. ft. to 3,600 sq. ft. the threshold for installation of residential sprinkler systems. This requirement became effective July 1, 2008.

December, 2007

Three new Tractor-Drawn Ladder trucks (Tiller-trucks) are placed in service.

February, 2008

The District began construction of the new fire Station 36, an apparatus storage building at Station 31, and design of the new Fire Station 32.

January, 2009

The District purchased land at 2100 Stone Valley Road for the replacement and relocation of Fire Station 32.

February, 2009

The Board of Directors adopted a new five-year Strategic Plan for the period of 2008-2013.

February, 2009

The District published the first complete Pre-Incident Aerial Survey manual containing 271 targeted locations.

February, 2009

A new public safety trailer called the "Fire Safety House" was added to the District's fleet, allowing the Fire Prevention Division to teach home fire safety to school age children.

March 2009

The District published the first complete Company Performance Standards manual for training and incident use.

April 2009

The District launched its new web content management system and domain (www.firedepartment.org) to provide information and services that the community needed to effectively interact with the District online.

June 2009

The Board of Directors authorized the establishment of a GASB compliant IRS Section 115 Trust through CalPERS dedicated to the purpose of pre-funding Other Post Employment Benefit obligations. The Trust was established with a $3,500,000 contribution from the General Fund.

August, 2009

The District's hazardous materials response vehicle and personnel were certified by the California Emergency Management Agency (CALEMA) as a "Type II Haz-Mat Team." This certification was an important acknowledgement of the District's efforts to develop specialized emergency services capabilities for use during routine and major hazardous materials incidents.

2.3.3 Funding Sources and Restrictions

The major revenue sources of the District are property taxes (92 percent), ambulance service fees and interest income. Total income for the year ending June 30, 2009 was $55,967,884. The *Comprehensive Annual Financial Report* (CAFR) provides complete financial statements for the District.

2.3.4 District Description

Topography

The topography of the District varies from the relatively flat valley floor to gentle rolling hills that transition to the steep Mt. Diablo State Park on the east side, and hills that exceed 1400 feet on its western boundary.

Climate

Average daily temperatures in the San Ramon Valley range from a low of approximately 40 degrees in January to a daily high of 85 degrees in July. Rainfall is generally light to moderate during the winter months and uncommon during the summer.

Population

According to the U.S. Census Bureau, the 2009 population in the District's service area was approximately 167,500. This number represents an increase of over 25 percent in some areas of the District and a decrease of approximately 2 percent in other areas of the District. The District service area as a whole has seen "above average" population growth during the last decade, with certain areas within the District's service area projected to grow at "above average" rates.

Given the current slowdown of the national economy and in particular new housing in California, the District does not expect to see significant new dwelling unit construction for a period of two to four years.

Land Use

As can be seen with Map 2a and Map 2b *Population Density, Fire Hazard Severity Zones and Target Hazards*, the District has a mix of land uses that impact District services. Summarized on these maps are the overall classifications of open space, commercial, industrial and residential uses. The bulk of the developed area of the District follows a significant valley floor running north/south that is flanked by ridges. Other developments are located in side canyons and hilltops running easterly from the main valley.

This topography presents two significant challenges to fire service deployment planning:

1. The valley floor area is what was most easily developed, but being long and narrow, there are few east-west roads. As such, efficient fire station location is much more constrained than would be possible on a "grid" type street network design.
2. The uphill slope areas present wildfire challenges from a mix of combustible native vegetation located close to buildings as well as access problems for fire apparatus on narrow, steep private and public roads.

The District's population base varies from dense in the urban core to sparse in its rural areas. Along the core corridor the population is denser than in either the suburban or rural areas. Because of these differences the District's historic response capability planning placed a response emphasis on the densely located urban core as it was seen as a higher vulnerability. Current planning further evaluates population density and response capability by identifying three basic density categories.

Population Category	*Population Density*
Urban	Population > 2,000 people per square mile
Suburban	Population = 1,000-2,000 people per square mile
Rural	Population < 1,000 people per square mile

Agencies and Areas within Jurisdiction Boundaries

Alamo

Alamo is an unincorporated community and census-designated place (CDP) in Contra Costa County. Alamo is governed by the County Board of Supervisors, with the Alamo Municipal Advisory Council (MAC) advising on parks and recreation, lighting and landscaping, land-use and code enforcement, public safety, transportation and other county services.

Blackhawk

Blackhawk is a 4,800 acre unincorporated master planned community located east of Danville.

Town of Danville

Danville is known for its small-town atmosphere and its outstanding quality of life.

Diablo

Diablo is an unincorporated community and census-designated place (CDP) in Contra Costa County. Diablo is governed by the County Board of Supervisors.

City of San Ramon

San Ramon has long been considered one of the most desirable living areas in the Bay Area because of its scenic beauty, good climate, suburban charm, and proximity to the Bay Area's major employment centers.

Morgan Territory

Morgan Territory is on the east side of Mount Diablo in Contra Costa County. Morgan Territory Road stretches from Manning Road north of Livermore to Marsh Creek Road east of Clayton with no intersecting through roads. The northern slope of the road largely follows Marsh Creek.

Tassajara Valley

The Tassajara Valley, located east of Danville and San Ramon, consist primarily of agricultural land and open space.

2.4 Previous Deployment Studies of the District

The District was formed through a number of mergers over the years. The primary methodologies used for station locations have been growth predictions, some geographic response mapping, and some locations were driven by the availability of land that could be acquired. There have not been previous formal deployment studies or adopted Board of Directors' policy goals for deployment.

2.4.1 General Plan Descriptions and Policies for the District's Communities

The District serves a diverse mix of land uses from open space to urban-suburban density developments. The General Plan Safety Elements for the two incorporated towns the District serves – Danville and San Ramon – call for a 5-minute "total response time" to 90 percent of emergency calls for service in urban/suburban areas, or that a fire station be located within 1.5 miles of all development.

The Contra Costa General Plan Public Facilities and Services element states a goal to "reach a maximum running time of 3 minutes and/or 1.5 miles from the first-due station, and a minimum of 3 firefighters to be maintained in all central business districts, urban and suburban areas (Policy 7-62). Fire protection policy 7-68 states that response times and distance, call volume and type, population, fire flow requirements, land use, development density and valuation, and access shall be considered when evaluating proposed station locations.

2.4.2 Training and Equipment Standardization

The operational philosophy of the District is that every firefighter will be crossed-trained to perform specific government-mandated skill sets and specialized District-identified skills in the safest method possible. Training, equipment, station location and resources are designed with standardization in mind to enable any engine, truck and/or wildland vehicle to aid in facilitating emergency response and emergency incident mitigation. In addition, each station and/or suppression crew is able to operate independently during multiple incidents or major disasters.

2.5 Newer Legal Challenges to the Provision of Fire Services

There are a number of new state and federal laws, regulations, and court cases that affect the flexibility of cities and Special Districts in determining their staffing levels, training, and methods of operation. Three of the most significant requirements are summarized below.

1999 OSHA Staffing Policies

Federal OSHA applied the confined space safety regulations for work inside tanks and underground spaces to America's firefighters. This requires in atmospheres that are "IDLH" (Immediately Dangerous to Life and Health) that there be teams of two inside and two outside in constant communication, and with the outside pair equipped and ready to rescue the inside pair. This situation occurs in building fires where the fire and smoke conditions are serious enough to require the wearing of self-contained breathing apparatus (SCBA). This is commonly called the "2-in/2-out" policy. This policy requires that firefighters enter serious building fires in teams of two, while two more firefighters are outside and *immediately* ready to rescue them should trouble arise.

While under OSHA policy one of the outside "two-out" personnel can also be the incident commander (typically a chief officer) or fire apparatus operator, this person must be fully suited-up in protective clothing, have a breathing apparatus donned except for the face piece, meet all physical requirements to enter IDLH atmospheres and thus be ready to immediately help with the rescue of interior firefighters in trouble.

May 2001 National Staffing Guidelines

The National Fire Protection Association (NFPA) Standard on Career Fire Service Deployment was issued five years ago. While *advisory* to local governments, as it starts to become locally adopted and used, it develops momentum, forcing adoption by neighboring communities. NFPA 1710 calls for four-person fire crew staffing, arriving on one or two apparatus as a "company." The initial attack crew should arrive at the emergency within four minutes travel time, 90 percent of the time, and the total effective response force (first alarm assignment) shall arrive within eight minutes travel time, 90 percent of the time. These guidelines will be explained and compared to the District in the deployment measures section of this document.

OSHA Liability Changes

Many state OSHA's have added rules over the last decade making all of the OSHA regulations applicable to local government, including fines and a huge increase in criminal penalties. Individual managers and supervisors (Fire Chiefs, Incident Commanders) may now be fined and be imprisoned for failure to take appropriate safety precautions. This has been the response to improve safety in the fire service and general government operations.

This "sea change" in personal and agency liability means that not just any firefighter can, or should, be an Incident Commander on significant, sustained incidents. Along with increasing firefighter deaths nationally with Federal OSHA citations to fire commanders, the trend starts for significant training and certification of Incident Commanders (Battalion Chiefs and above).

Further, the on-scene Incident Commanders (Battalion Chiefs) at Hazardous Materials Incidents must have certification compliant with NFPA 472, *Standard for Emergency Response to Hazardous Materials Incidents*. This is also now an OSHA requirement.

2.6 Negative Pressures on Volunteer-based Services

While the District operates a small volunteer force in a rural area, community leaders may ask, why not expand the District's fire staffing with volunteers? To pre-address this question, here is a brief overview of the state of depending on volunteer firefighters.

All volunteer-based fire departments are under great pressure today to maintain an adequate roster. The reasons for this are not unique to any one type of community and are placing pressure on small community volunteer systems across the state and nation.

- Economic pressures result in more two-income families and less time to volunteer.
- In a commuter economy, more jobs are clustered in metropolitan and dense suburban areas. Communities like the District's increasingly have residents who work elsewhere.
- Due to the growth in society of complex systems and technology, the fire service was given more missions, like emergency medical services, hazardous materials response, and technical rescue. This dramatically increased the legally mandated training hours for volunteers, causing many to drop out as the time commitments became unbearable.
- Early in this decade, due to rising firefighter injuries and deaths, especially in the volunteer ranks, more safety regulations and training minimums were placed on all firefighters. Typically, to comply with safety regulations today, training for volunteers has to meet the same requirements set forth for regular firefighters.

This change, coupled with all the other factors, means that volunteer firefighter programs dry up due to lack of members. Additional training and additional responses mean a significant time commitment for *true* volunteers, who are serving for love of community and to give something back. Most departments feel that it takes 100-120 hours of training per year to meet safety minimums, and this time is before a volunteer goes on a single incident.

In addition, most employers today are unwilling to allow volunteers to leave their jobs to respond to an emergency dispatch. Across the fire service, volunteer programs have been changing and adapting to a different model. The current model understands the commitment needed, and usually includes two types of volunteers: the first is the usual community-based person; the second is a younger person who desires to be a career firefighter. While the younger person is going through community college fire science classes, after obtaining basic firefighter certification, they work "part-time" for shift stipend or for an hourly wage, without benefits. These personnel are used successfully to increase daily station staffing and are called "reserve" firefighters or part-time firefighters. They do not need to live in the community they serve, as they are often not needed to respond from home with quick travel times. Community-based volunteers can be used from home for major emergencies, within their limited training, as they gain certifications and experience. Once they meet department minimum requirements, they also can be used for per diem shifts.

2.7 Community Expectations and Existing Response Performance Measures

Based on input received during the development of the 2008-2013 Strategic Plan, the citizens and other agency stakeholders have strong expectations of their fire department. The five principle vision statements from the Strategic Plan adopted on February 25, 2009 are restated below.

- Financial sustainability to provide the highest level of service possible in the present while planning and acting for the ability to maintain these ideals indefinitely.
- Personnel development through mentoring, training and supportive policy to assure the District has well qualified personnel to meet current and future needs.

- Provide organizational clarity by fully understanding the District's role in providing public value for our communities, continually evaluating our programs and practices, and commitment to individual responsibility toward the success of our goals.
- Information-led Management (ILM) that emphasizes high accountability at all levels of the organization, strategic response to organizational challenges that rapidly remove impediments to high performance, and capitalization of the expertise and input of all District personnel.
- Achieve Commission on Fire Accreditation International (CFAI) Accreditation by thoroughly assessing District practices and comparing our effectiveness next to the best practices in the industry.

The *Standards of Response Cover Process* begins by reviewing existing fire and emergency medical outcome expectations. This can be restated as follows: for what purpose does the response system exist? Has the governing body adopted any response performance measures? If so, the time measures used need to be understood and good data collected.

Current best practice nationally, as well as in the District, is to measure percent completion of a goal (e.g., 90 percent of responses) instead of an average measure. Mathematically this is called a "fractile" measure[1]. This is because the measure of average just identifies the central or middle point of response time performance for all calls for service in the data set. From an average statement it is impossible to know how many incidents had response times that were way over the average or just over. For example, if a department had an average response time of 5 minutes for 5,000 calls for service, it cannot be determined how many calls past the average point of 5 minutes were answered in the 6th minute or way out at 10 minutes. This is a significant issue if hundreds or thousands of calls are answered far beyond the average point.

The Insurance Services Office (ISO) Fire Department Grading Schedule would like to see fire stations spaced 1.5 miles apart, which given travel speeds on surface streets, is a 3- to 4-minute travel time. The newer NFPA 1710 *Standard for the Organization and Deployment of Fire Suppression Operations*, *Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* on fire services deployment, suggests a 4-minute travel time for the initial fire apparatus response and 8 minutes maximum for the follow-on units.

More importantly within the *Standards of Response Coverage Process*, positive outcomes are the goal and from that crew size and response time can be calculated to allow efficient fire station spacing. Emergency medical incidents have situations with the most severe time constraint. In a heart attack that stops the heart, a trauma that causes severe blood loss, or in a respiratory emergency, the brain can only live 8 to 10 minutes maximum without oxygen. Not only heart attacks, but also other events can cause oxygen deprivation to the brain. Heart attacks make up a small percentage; drowning, choking, trauma constrictions, or other similar events have the same effect. In a building fire, a small incipient fire

[1] *Fractile* - In a set of observations of a variable, the fractile is the number for a fraction of the observations. The fraction is often given in percent; the term percentile may then be used.

can grow to involve the entire room in an 8 to 10 minute timeframe. If fire service response is to achieve positive outcomes in severe EMS situations and incipient fire situations, *all* the crews must arrive, size-up the situation and deploy effective measures before brain death occurs or the fire leaves the room of origin.

Given that the emergency started before or as it was noticed and continues to escalate through the steps of calling 911, dispatch notification of the crews, their response and equipment setup once on scene, there are three "clocks" that fire and emergency medical crews must work against to achieve successful outcomes.

1. The time it takes an incipient room fire to fully engulf a room thus substantially damaging the building and most probably injuring or killing occupants.
2. When the heart stops in a heart attack, the brain starts to die from lack of oxygen in 4 to 6 minutes and brain damage becomes irreversible at about the 10-minute point.
3. In a trauma patient, severe blood loss and organ damage becomes so great after the first hour that survival is difficult if not impossible. The goal of trauma medicine is to stabilize the patient in the field and get them to the trauma surgeon inside of one-hour. This goal rests on the fire and ambulance responders quickly taking care of the patient and getting them quickly to the surgeons. Pre-hospital care as well as more definitive hospital care, must both occur within the first hour.

Somewhat coincidently, in all three situations above, the first responder emergency crew must arrive on scene within 5 to 7 minutes of the 911 call to have a chance at a successful resolution. Further, the follow-on (additional) crews for serious emergencies must arrive within the 10 minute point.

The three event timelines above start with the emergency happening. It is important to note the fire or medical emergency continues to deteriorate from the time of inception, not the time the fire engine actually starts to drive the response route. It is hoped that the emergency is noticed immediately and the 911 system is activated. This step of awareness – calling 911 and giving the dispatcher accurate information – takes, in the best of circumstances, 1 minute. Then crew notification and travel take additional minutes. Once arrived, the crew must walk to the patient or emergency, size-up the problem and deploy their skills and tools. Even in easy to access situations, this step can take 2 or more minutes. It is considerably longer up long driveways, apartment buildings with limited access, multi-storied apartments or office complexes or shopping center buildings such as those found in many parts of the District.

Thus, from the time of 911 receiving the call, an effective deployment system is *beginning* to manage the problem within 7 to 8 minutes total response time. This is right at the point that brain death is becoming irreversible and the fire has grown to the point to leave the room of origin and become very serious. Thus, the District needs a *first-due* response goal that is within the range to give the situation hope for a positive outcome. Yes, sometimes the emergency is too severe even before the District is called in for the responding crew to reverse; however, given an appropriate response time policy and if the system is well designed, then only issues like bad weather, poor traffic conditions or multiple

emergencies will slow the response system down. Consequently, a properly designed system will give a citizen the hope of a positive outcome for their tax dollar expenditure.

For this report, *total response time* is the sum of the fire dispatch, crew turnout and road travel time steps. This is consistent with the recommendations of NFPA 1710 and the Commission on Fire Accreditation International.

Finding 1

The District does not have a fire deployment measure adopted by the Board of Directors that includes the beginning time measure starting from the point of fire dispatch receiving the 911 phone call, and a goal statement tied to risks and outcome expectations. The deployment measure should have a second measurement statement to define multiple-unit response coverage for serious emergencies. Making these deployment goal changes will meet the best practice recommendations of the Commission on Fire Accreditation International.

2.7.1 Risk Assessment

The District has conducted a process to assess its risks for serious fires in buildings and wildland areas. Separately the District's paramedic program is driven by patient care directives and system standards issued by the County Emergency Medical Services Authority and the State of California EMS Authority. Floods, earthquakes, and other natural disasters expected to overwhelm District response capabilities are addressed in the SRVFPD Disaster Plan.

For building fires, the District looked at three types of information available to it:

1. A District driven Hazard Assessment and Vulnerability rating process
2. Wildland Fire Severity Zones
3. Population Density, which drives call for service volumes and increases the risk of fire in more populated areas of the District.

The District's Hazard Assessment and Vulnerability rating process was put together by the District, the Town of Danville Emergency Manager, and the City of San Ramon's Emergency Manager. The outcomes are also used to drive disaster preparedness assessment; response and recovery priorities during times of declared major disasters and one or more Emergency Operations Centers are activated.

This risk assessment team went through 271 fire department pre-plans (also referred to as Pre-Incident Aerial Surveys by the District) and established the *Vulnerability Rating* (VR) for each plan. The following criterion was used to determine a VR of High, Medium and Low for each plan.

Hazards

- Potential hazards
- Known hazards

Probability

- Likelihood of a significant event involving a significant number of casualties
- Likelihood of a significant event that threatens a significant number of people

Severity

- Potential hazards were evaluated on their potential severity and potential to cause large life loss or casualty

Occupancy Type

- The occupancy classification as described by the building and fire codes
- Included in its classification consideration was construction type as a key component (its ability to withstand a significant hazardous event)

Occupant Load

- Number of occupants during operating hours
- Population at risk (elderly, non ambulatory, child and day care, hospitals, etc.)
- Occupant's ability to react to an emergency and manage the initial stage(s) on their own

The District has comprehensive pre-plans on all target hazards within the jurisdiction.

When population density is aggregated with area, roads, housing, population and incident data the following demographic picture of the District emerges.

Population Density	*Area of the District*	*Paved Road Miles*	*Housing Units*	*Population Percent*	*Incidents (2006-2008)*
Urban	28%	59%	70%	71%	70%
Suburban	22%	30%	28%	26%	28%
Rural	50%	11%	2%	3%	2%

When population density is aggregated with the Vulnerability Rating of High, Medium, or Low, the following demographic picture of risk emerges:

Risk	*Urban*	*Suburban*	*Rural*
High	69%	30%	1%
Medium	73%	27%	0%
Low	67%	28%	5%

The table below shows incident frequency and Vulnerability Rating for each planning zone. A geographical representation of the planning zones can be seen in Map 17b.

Risk Assessment by Planning Zone

July 1, 2008 to June 30, 2009

Planning Zone	*Incident Count*	*Risk*
31003	302	High
31004	286	High
33005	283	High
38002	241	High
39003	228	High
35004	223	High
32001	220	High
34003	204	High
34001	203	High
30004	161	High
38001	128	High
32002	124	High
31001	122	High
39002	105	High
39006	90	High
33001	84	High
33004	78	High
32503	74	High
30002	60	High
36004	60	High
35001	42	High
33002	41	High
35011	40	High

Planning Zone	*Incident Count*	*Risk*
34011	32	High
39500	32	High
35006	21	High
31005	19	High
39005	19	High
39001	18	High
30008	9	High
35007	7	High
30007	1	High
35002	60	Moderate
34008	44	Moderate
30001	30	Moderate
34012	22	Moderate
38004	11	Moderate
34005	102	Low
35003	53	Low
3216	46	Low
3426	45	Low
35010	43	Low
426	42	Low
34004	40	Low
35008	38	Low
3916	36	Low
39004	31	Low
39501	30	Low
3126	27	Low
35005	27	Low

Planning Zone	*Incident Count*	*Risk*
3226	26	Low
3236	24	Low
34002	24	Low
16500	22	Low
32004	22	Low
31002	21	Low
34007	21	Low
3136	20	Low
34006	19	Low
33003	17	Low
36002	13	Low
3956	12	Low
36001	12	Low
3936	10	Low
38003	10	Low
30003	9	Low
35013	9	Low
3816	8	Low
36006	7	Low
3116	6	Low
34009	6	Low
3836	4	Low
6500	4	Low
30006	4	Low
31006	4	Low
34010	4	Low
36005	4	Low

Planning Zone	*Incident Count*	*Risk*
36007	4	Low
36003	3	Low
35014	2	Low
39502	2	Low
4500	1	Low
8500	1	Low
10000	1	Low
18500	1	Low
20051	1	Low
40001	1	Low
40500	1	Low
322	0	Low
393	0	Low
396	0	Low
3256	0	Low
3611	0	Low
4501	0	Low
30009	0	Low
32500	0	Low
33006	0	Low
35009	0	Low
36500	0	Low
37001	0	Low

To add value to the observations contained in the Vulnerability Rating system discussed above, the District obtained the data file from the ISO of local properties the ISO had reviewed on-site for underwriting purposes. One of the measures the ISO collects is called fire flow, or the amount of water that would need to be applied if the building were seriously involved in fire. The measure of fire flow is

expressed in gallons per minute (GPM). In the District, the ISO has data on 289 commercial buildings. Of these, 57 buildings have required fire flows of 2,500 GPM or higher. There are a total of 15 buildings with fire flows in excess of 4,000 GPM and two buildings at 8,000 GPM. This is a significant amount of firefighting water to deploy, and a major fire at any one of these buildings would outstrip the on-duty District firefighting force. Using the generally accepted figure of fifty gallons per minute per firefighter on large building fires, a fire in a building requiring 2,500 gallons per minute would require 50 firefighters, or *more than* the on-duty staffing of forty-four (44) firefighters in the District.

Finally the District obtained and mapped the wildfire threat zones as identified by CALFIRE. These areas are indentified based on fuel type, density and percent of slope, and range from moderate to high to very high. Many of these areas abut buildings. As such, the District's response plan is designed to deliver the right mix of structural and wildland fire apparatus to each area. Water supply tenders are sent to remote areas without hydrants.

In rural areas, the District requires homeowners to annually remove flammable vegetation material from 100 feet around structures to create a "defensible space" between vegetation and buildings. On larger parcels homeowners are also required to provide fire breaks along property lines to prevent fire spread from parcel to parcel. In addition, ignition-resistant construction methods and materials are enforced to prevent burning embers from igniting a building. Regulating both defensible space and fire-resistive construction methods has proven to greatly increase building survivability.

2.7.2 Risk Assessment Result

Upon review of the risk assessment data, the District has:

- Urban to suburban population density areas to serve with different outcome needs
- The vast majority of the District's risk in buildings and population is in the Urban and Suburban areas
- Almost 300 major commercial, industrial and multi-unit residential buildings that pose serious challenges should a fire extend beyond the incipient to small stage
- Much of the District's residential areas are bordered by steep slopes containing high quantities of wildland fire fuel types
- The District serves a major freeway corridor
- Due to topography and road network, the District can realistically only receive timely mutual aid units from the northern and southern ends

Based on the these factors, the District has staffed and designed its response system to field an "Effective Response Force" to reported serious fires in buildings and wildland areas.

This multi-unit force (First Alarm) is designed to stop the escalation of the emergency and keep it from spreading to greater alarms. This "informal" goal will be the foundation of updated deployment measures as part of this Standard of Response Cover process.

2.8 Existing District Deployment

2.8.1 Existing Deployment Situation

For this study, the response time benchmarks are those found in National Fire Protection Association (NFPA) Deployment Guideline Standard 1710 for career departments in urban/suburban areas. Later in this study, separate findings are made for wildland/rural areas which will be adapted from NFPA 1720 for combination (volunteer) departments. The benchmarks in 1710 are that an all-risk initial intervention unit (engine company or ladder truck company) will arrive at the scene of a *critical* emergency in 6 minutes or less from the time of call receipt in fire dispatch, 90 percent of the time. All the companies that make up the first alarm should arrive at critical emergencies within 10 minutes. In these two measures, the travel time is 4-minutes for the first unit and 8-minutes for the effective response force (First Alarm) units.

These travel time measures are consistent with the District's current informal response system staffed and deployed as outlined on the following pages.

Critical emergencies are those immediately threatening to life or likely to cause severe property damage from fire. Crew turnout time is longer in critical emergencies because more protective clothing must be donned before the fire apparatus can respond. Thus, the NFPA recommended total response time includes:

1. 60 seconds or less dispatcher processing time, when pre-arrival medical directions are not given to the caller
2. 60 seconds or less fire crew turnout time
3. 4 or 8 minutes road travel time

The District's *staff* policy is to provide an emergency response time of five (5) minutes or less, ninety percent (90 percent) of the time. The start and end points of this measure were *not* stated in writing in prior District documents. The District does have mutual aid response agreements with its neighbors.

Unit Type	*Assigned*	*Minimum*		*Extended Minimum*
8 Engines @	3	3	Firefighters/day	24
5 Rescue/Medic Units @	5	2		10
3 Trucks @	3	3		9
Subtotal firefighters				*43*
Battalion Chief	1	1	Chief/day	1
Total minimum 24-hour personnel				**44**

This daily staffing is adequate for the immediate response fire risk needs presented in the more built-up urban and suburban areas of the District, as will be discussed later in the risk and outcomes section of this report. However, for this staffing statement to be accurate for a building fire, the assumption is that the closest crews are available and not already operating on another emergency medical call or fire, which can and does happen. For example, if one engine and one rescue-medic unit is committed to an EMS call, then an adjacent engine company or truck company must respond. This situation will be evaluated separately in the statistical section of this report where simultaneous incident workload is analyzed.

Services Provided

The District is an "all-risk" fire department providing the people it protects with services that include structure firefighting, wildland firefighting, paramedic ambulance, technical rescue and hazardous materials response as well as other services.

The Standard Response Plan shown below is based upon critical tasking and lists the response services the District provides and the typical units that would be assigned to such an incident.

Structure Fire (any report of fire or smoke inside a structure)

1st Alarm	(3) Type 1 Engines, (2) Trucks, (1) Paramedic (PM) unit, Battalion Chief (BC); PM unit responds Code 2 unless expected to be first or second to arrive.
2nd Alarm	(3) Type 1 Engines
3rd Alarm	(2) Type 1 Engines, (1) Truck
Exceptions (areas not served by a public water supply system)	
	Mt. Diablo
1st Alarm	(3) Type 1 Engines, (1) Water Tender (WT), (1) Paramedic (PM) unit, Battalion Chief (BC), CALFIRE; No Trucks due to access issues.
2nd Alarm	(2) Type 1 Engines, (1) WT
3rd Alarm	(2) Type 1 Engines, (1) WT
	Station 37's Zone
1st Alarm	(3) Type 1 Engines, (1) Water Tender (WT), (1) Paramedic (PM) unit, Battalion Chief (BC), CALFIRE, any available Station 37/40 volunteers; No Trucks due to access issues.
2nd Alarm	(2) Type 1 Engines, (1) WT
3rd Alarm	(2) Type 1 Engines, (1) WT
	Station 36 and 38 Rural Areas
1st Alarm	(3) Type 1 Engines, (1) Truck, (1) Water Tender (WT), (1) Paramedic (PM) unit, Battalion Chief (BC)
2nd Alarm	(2) Type 1 Engines, (1) WT
3rd Alarm	(2) Type 1 Engines, (1) WT

Vegetation Fire

1st Alarm	Closest Type 1 Engine, (3) Type 3 Engines), (1) Paramedic (PM) unit, Battalion Chief (BC)
2nd Alarm	(2) Type 3 Engines, (1) Water Tender (WT), CALFIRE

3rd Alarm	(3) closest Engines with preference given to Type 3
Exceptions	
	Mt. Diablo
1st Alarm	(3) Type 3 Engines, (1) Water Tender (WT), Battalion Chief (BC), CALFIRE; Type 3 vehicles are preferred due to access issues and the lack of structures on the mountain.
	Station 37's Zone
1st Alarm	(3) Type 3 Engines, (1) Water Tender (WT), Battalion Chief (BC), CALFIRE; any available Station 37/40 volunteers; Type 3 vehicles and a Water Tender are preferred due to access issues and increased water supply needs.

Medical Emergency

	(1) Rescue Medic (RM) unit, if first-due area, or (1) Type 1 Engine and (1) RM or (1) Paramedic (PM) unit for stations with no RM unit assigned.
Exceptions	
	Freeway
	(2) Engines, from north and south, and (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit from the station with quickest direction of travel access, unless a single station can access both directions. *This response keeps the number of units responding to or committed to the freeway at a minimum. Emergency crews get to the scene, regardless of any confusion about direction of travel by the reporting party.*
	Mt. Diablo
	(1) Type 3 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, and an Air Ambulance. *Due to long response times and types of injuries, an Air Ambulance is included on the initial dispatch. Many patients are air lifted, with the aid of Mt Diablo's Rangers, prior to SRVFPD personnel arriving on scene.*
	Station 37's Zone[2]
	(1) Type 1 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, an Air Ambulance, and any available Station 37/40 volunteers. *An Air Ambulance is added due to long response times.*
	Station 36's Zone containing Highland/Victorine/Carneal
	(1) Type 1 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, an Air Ambulance, and any available Station 40 volunteers. *An Air Ambulance is added due to long response times.*[3]
	Echo Level or CPR Calls
	(1) Engine and (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit. *This ensures two paramedics are available, along with a sufficient number of personnel, to handle these critical calls.*

[2] Any calls for service in 37's zone requires a corresponding dispatch of the appropriate paid personnel along with Station 37 and 40 volunteers. Station 37/40 volunteers have faster response times, but their availability cannot always be assured.

[3] An Air Ambulance automatically activated for a Medical or Vehicle Accident can be cancelled, at the IC's discretion, based upon further information received about the type of injuries.

5150 Patients (Mental Impairment/Illness Issues)

	If no drugs, alcohol, illness or injury is involved the transport is by private ambulance if possible. The private ambulance must have a 40-minute or less ETA. If a private ambulance is requested after the patient is medically cleared by SRVFPD personnel, SRVFPD personnel must remain on scene until the private ambulance arrives. Refer to Operations Policy "*Transport of 5150 Patients*" for additional information on the transport of patients on a 5150 hold.
Exceptions	
	Drugs, Alcohol, Illness or Injury
	If drugs, alcohol, illness or injury involved, dispatch as Medical Emergency.

Vehicle Accidents

	Surface Street
	(1) Type 1 Engine/or Truck and (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit
	Expanded
	(1) Type 1 Engine and (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, (1) Truck, Battalion Chief (BC)
Exceptions	
	Freeway
	Expanded response with the Truck and RM or PM unit responding from the direction reported and the Engine from the opposite direction, whenever possible.
	Mt. Diablo
	(1) Type 3 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, and an Air Ambulance. *Due to long response times and types of injuries, an Air Ambulance is included on the initial dispatch. Many patients are air lifted, with the aid of Mt Diablo's Rangers, prior to SRVFPD personnel arriving on scene.*
	Station 37's Zone
	(1) Type 1 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, Air Ambulance, and any available Station 37/40 volunteers. *Most injuries from vehicle accidents in 37's zone are serious enough to require air transportation. Due to the long response times and the inability to ensure a volunteer response, the Air Ambulance could arrive first at the accident site.*
	Station 36's Zone containing Highland/Victorine/Carneal
	(1) Type 1 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, Air Ambulance, and any available Station 40 volunteers. *Due to long response times and types of injuries, an Air Ambulance is included on the initial dispatch.*

Hazardous Condition, Lift Assist, Lockout, Extinguished Fire, Alarm

	Type 1 Engine, Type 3 Engine, or Truck

Public Service Call

	Requests for public service related calls should be fielded by the Communications Center dispatchers. Depending on the urgency of the request, dispatchers will either dispatch the call immediately for a code 2 response (Type 1 Engine, Type 3 Engine or Truck) or contact the appropriate station Captain and pass on the request and contact information. If the Captain decides the nature of the response is such that the call can be responded to at a later time, that information should be relayed to the Communications Center dispatcher. The dispatcher will then place the call in the "pending" queue for a later response. The Captain should contact the reporting party (when necessary) and set an appointment time or provide an approximate time in which the call will be responded to. Water leaking (slowly) from a hydrant, and a low battery alarm from a smoke detector are examples of when a call could be placed in pending for a later response.

Outside Fire, Refuse Fire, Smoke Investigation, Vehicle Fire

	Type 1 Engine or Type 3 Engine

Hazardous Materials

	Hazardous Materials (HM35) unit, (1) Type 1 Engine, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, (1) Truck, Battalion Chief (BC)

Confined Space

	Rescue (USAR134) unit, (1) Type 1 Engine, (1) Truck, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, Haz Mat (HM35) unit , Breathing Support (BS31) unit, Battalion Chief (BC)

Trench Rescue

	Rescue (USAR134) unit, (1) Type 1 Engine, (1) Truck, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, Haz Mat (HM35) unit , Breathing Support (BS31) unit, Battalion Chief (BC), Moraga/Orinda Trench Rescue Team

Technical Rescue

	Rescue (USAR134) unit, (1) Type 1 Engine, (1) Truck, (1) Rescue Medic (RM) unit or (1) Paramedic (PM) unit, Breathing Support (BS31) unit, Battalion Chief (BC)

Finding 2

The District has a Standard Response dispatching plan that considers the risk of different types of emergencies and pre-plans the response. Each type of call for service receives the combination of engine companies, truck companies and command officers customarily needed to handle that type of incident based on District experience.

Fire

The District provides typical structural fire protection services utilizing eight engine companies, three truck companies and five medic rescue units out of ten stations. One of the stations is rural and staffed additionally by 30 volunteers. In addition, the District has the capability to handle wildland fires and vegetation fires with twelve wildland units and three water tenders.

The District has seven reserve engines, one reserve ladder truck along with specialty apparatus and trailers for hazardous materials and technical rescue responses.

Rescue

The District operates an OES Type II technical rescue team and unit, cross-staffed by an engine company. All District suppression personnel are trained to the level of California Rescue Systems 1 (RS1) or higher.

Medical

The District operates a paramedic program using both rescue ambulances staffed with two paramedics and single paramedics assigned to all engine companies. All firefighters maintain a minimum of an Emergency Medical Technician Basic status. Medical response is per the type of incident in the District's dispatch matrix.

Hazardous Materials

The District operates an OES Type II hazardous materials team and unit. The apparatus is cross-staffed by an engine company. Per day the District maintains approximately eleven hazardous materials technicians and/or specialists on duty.

Stations and Facilities

Facility	*Address*	*Minimum Daily Staffing*
Station 30	11445 Windemere Parkway, San Ramon, 94582	3
Station 31	800 San Ramon Valley Blvd., Danville, 94526	8
Station 31 Annex	800 San Ramon Valley Blvd., Danville, 94526	N/A

Facility	*Address*	*Minimum Daily Staffing*
Station 32[4]	1101 Stone Valley Road, Alamo, 94507	6
Station 32	2100 Stone Valley Road, Alamo, 94507	6
Station 33	1051 Diablo Road, Danville, 94526	6
Station 34	12599 Alcosta Blvd., San Ramon, 94583	6
Station 35	505 Silver Oak Lane, Danville, 94506	6
Station 36	2001 Lusitano Street, Danville, 94506	3
Station 36 Annex	2001 Lusitano Street, Danville, 94506	N/A
Station 37	10207 Morgan Territory Road, Livermore, 94550	Volunteer Staffed
Station 38	1600 Bollinger Canyon Road, San Ramon, 94583	3
Station 39	9399 Fircrest Lane, San Ramon, 94583	5
Administration	1500 Bollinger Canyon Road, San Ramon, 94583	N/A
Training Site	6100 Camino Tassajara, Pleasanton, 94588	N/A

Staffing

The eight engine companies are staffed on a daily basis with a minimum staffing of three firefighters. The three ladder trucks have the same staffing requirements as the engine companies. The daily minimum shift staffing count is 43 firefighters plus one battalion chief. Normally, 15 firefighters plus a command chief are required for a typical room and contents fire in a home in a suburban area per NFPA 1710; one company for most medical emergencies. Given that, the daily staffing depth of the District is adequate to handle two simultaneous fires and two to three medical emergencies before relying on mutual aid.

Finding 3

Overall apparatus staffing for the entire District is adequate for a District of this size. The use of volunteers in the rural area is very valuable.

[4] Planned to be declared surplus after relocation in 2012

2.9 Critical Time Task Measure

In order to understand the time it takes to complete all the needed tasks on a moderate residential fire and a modest emergency medical rescue, the District staff evaluated information based on Standard Operating Procedures to determine how long each operation takes to be successfully performed. The following tables start with the time of fire dispatch notification and finish with the outcome achieved. There are several important themes contained in these tables.

1. These results were obtained under best conditions, in that the day was sunny and moderate in temperature. The structure fire response times are from actual events, showing how units arrive at staggered intervals.
2. It is noticeable how much time it takes after arrival or after the event is ordered by command to actually accomplish key tasks to arrive at the actual outcome. This is because it requires firefighters to carry out the ordered tasks. The fewer the firefighters, the longer some task completion times will be.
3. The time for task completion is usually a function of how many personnel are simultaneously available so that firefighters can complete some tasks simultaneously.
4. Some tasks have to be assigned to a minimum of two firefighters to comply with safety regulations. An example is that two firefighters would be required for searching a smoke filled room for a victim.

The following tables of unit and individual duties are required at a first alarm fire scene at a typical single-family dwelling fire. This set of duties is taken from District operational procedures. This set of needed duties is entirely consistent with the usual and customary findings of other agencies using the Standards of Response Cover process and that found in NFPA 1710. No conditions existed to override the OSHA 2-in/2-out safety policy.

Shown below are the critical tasks for the District's response to structure fires in built-up urban areas with three engines, two ladder trucks, one rescue medic unit and one battalion chief for a total of 18 personnel.

Scenario

This was a simulated residential structure fire with no rescue situation. Responding companies to receive dispatch information as typical for witnessed fire.

First Alarm Structure Fire (18 Firefighters)

Task Description	*Running Clock Time*	*Elapsed from Time of Call*
Time of Call	00:00	00:00
Dispatch	00:52	
Crew Turnout	02:02	
Travel to on Scene	05:00	07.54

Task Description	*Running Clock Time*	*Elapsed from Time of Call*
First-Due Engine on scene		07:54
Secure Utilities	01:12	
First unit walk around size up	01:39	
2-in, 2-out	02:00	
Attack team entry pre-connect	02:23	
Medical group established	03:35	
Attack line to seat of fire	05:00	12:54
Attack line fire knock-down	05:05	12:59
Secure water supply	06:32	
RIC established	07:15	
Primary search started	08:45	
Vertical ventilation	09:48	
Primary search completed	12:16	20:10
Secondary search complete	12:24	
Fire under control	12:34	20:28

The above duties, grouped together to form an essential task list, require an *effective response force or first alarm assignment* for successful completion. Remember that the above discrete tasks must be performed simultaneously and effectively to achieve the desired outcome. Just arriving on-scene does not stop the escalation of the emergency. Firefighters accomplishing the above tasks do, but as they are being performed, the clock is still running, and has been since the emergency first started.

Fire spread in a structure can double in size during its free burn period. Many studies have shown that a small fire can spread to engulf the entire room in less than 4 to 5 minutes after open burning has started. Once the room is completely superheated and involved in fire (known as flashover), then the fire will spread quickly throughout the structure and into the attic and walls. For this reason, it is imperative that fire attack and search commence before the flashover point occurs, if the outcome goal is to keep the fire damage in or near the room of origin. In addition, flashover presents a serious danger to both firefighters and any occupants of the building.

For comparison purposes, the critical task table below reviews the tasks needed on a typical auto accident rescue. The situation modeled was a *single vehicle accident, one occupant*. Extrication requires

total removal of the driver's door. One engine, a ladder truck, rescue ambulance and battalion chief responded with a total of 9 personnel.

Multi-Casualty Traffic Collision (9 Firefighters)

Task Description	*Running Clock Time*	*Elapsed from Time of Call*
Dispatch		00:52
Crew turnout		02:02
Travel to on scene		05:00
First-due engine on scene	0:00	07:54
Protection line in place	0:50	8:43
Initial report on conditions	0:57	8:50
Patient contact/manual c-spine established	1:00	8:54
Extrication need determined and assigned to ladder truck	2:30	10:24
Vehicle stabilized	5:14	13:08
Patient care assigned to PM crew	5:29	13:23
Extrication team w/tools ready to begin	5:44	13:38
Door removed	8:21	16:15
Patient removed and in full c-spine	9:52	17:06

2.9.1 Critical Task Analysis and Effective Response Force Size

What does a deployment study derive from a response time and company task time analysis? The total completion times to stop the escalation of the emergency have to be compared to outcomes. We know from nationally published fire service *time vs. temperature* tables that after about 4 to 5 minutes of free burning a room fire will grow to the point of flashover where the entire room is engulfed, the structure becomes threatened and human survival near or in the fire room becomes impossible. We know that brain death begins to occur within 4 to 6 minutes of the heart having stopped. Thus, the effective response force must arrive in time to stop these catastrophic events from occurring.

The response and task completion times discussed above show that the residents of the District located in the urban and suburban density areas are able to expect positive outcomes and have a good chance of survival in a *modest* fire or medical emergency, when the first responding units are available in 7 minutes or less total response time and that the follow-on units for serious emergencies, the *Effective Response Force or First Alarm,* arrives on-scene within 11 minutes total response time.

The point of the tables above is that mitigating an emergency event is a *team* effort once the units have arrived. This refers back to the "weight" of response analogy. If too few personnel arrive too slowly, then the emergency will get worse, not better. Control of the structure fire incident still took 5:05 minutes after the time of the first unit's arrival, or 12:59 minutes from fire dispatch notification. The outcome times, of course, will be longer, with less desirable results, if the arriving force is later or smaller.

In the District, the quantity of staffing, and the time frame it arrives in, can be critical in a serious fire. Fires in older and/or multi-story buildings could well require the initial firefighters needing to rescue trapped or immobile occupants. If a lightly staffed force arrives, they cannot simultaneously conduct rescue *and* firefighting operations.

Fires and complex medical incidents require that the other needed units arrive in time to complete an effective intervention. Time is one factor that comes from *proper station placement*. Good performance also comes from *adequate staffing*. In the critical task measures above, the District can do a good job, in terms of time. However, major fires and medical emergencies where the closest unit is not available to respond still can challenge the District response system to deliver good outcomes. This factor must be taken into account when we look at fire station locations.

Previous critical task studies conducted by Citygate Associates, LLC, the Standard of Response Cover documents reviewed from accredited fire departments, and NFPA 1710 recommendations all arrive at the need for 15+ firefighters arriving within 11 minutes (from the time of call) at a room and contents structure fire to be able to *simultaneously and effectively* perform the tasks of rescue, fire attack and ventilation. Given that the District sends 18 personnel to a working first alarm building fire incident, the District understands that a number of firefighters arriving closely together is needed to deliver an outcome that protects lives and property.

If fewer firefighters arrive, what from the list of tasks mentioned would not be done? Most likely, the search team will be delayed, as well as ventilation activities. The attack lines only have two firefighters, which does not allow for rapid movement above the first-floor deployment. Rescue is done with only two-person teams; thus, when rescue is essential, other tasks are not done in a simultaneous, timely manner. Remember what this report stated in the beginning—effective deployment is about the *speed* (travel time) and the *weight* (firefighters) of the attack.

Yes, 18 initial firefighters (3 engines, 2 ladder trucks, 1 rescue medic unit and 1 battalion chief) can handle a moderate risk house fire (especially on the first-floor). An effective response force of even 18 will be seriously slowed if the fire is above the first-floor in a low-rise apartment building or commercial/industrial building. This is where the capability to add alarms to the standard response becomes important.

The challenge in adopting response time measures was that the District is not comprised of population and building densities that are the same throughout. Where this occurs, the Standard of Response Cover methodology recommends as a best practice, that agencies adopt outcome goals compatible with the realities of population density and the resultant risks. While ideally, a house fire in a rural area would

receive service to keep the fire from destroying the building, that level of service is not cost-effective given the low risk of building to building fire spread (conflagration), the low calls for service in a rural area and the limited ability to generate enough fire services revenues in lightly developed areas.

Thus the District adopted service level deployment goals by population density zone and type of emergency. These measures reflect the diversity of risk in the District and the need for appropriate outcomes in each population density area.

Population Category	*Population Density*
Urban	Population > 2,000 people per square mile
Suburban	Population = 1,000-2,000 people per square mile
Rural	Population < 1,000 people per square mile

The current first alarm (effective response force) of 18 personnel to a building fire reflects the District's goal to confine serious building fires to near the room of origin and to prevent the spread of fire to adjoining buildings. This is a typical outcome in built-up areas and requires more firefighters, more quickly, than does a typical rural outcome of keeping the fire to the building, not room of origin.

Given the District's current response to building fires, it is in effect the District's de-facto deployment measure to built-up urban areas. Thus this becomes the baseline deployment of firefighters and fewer firefighters over slightly longer timeframes can be deployed to suburban and rural areas.

2.10 Distribution and Concentration Studies

The District is served today by ten fire stations. As part of this deployment study, it is appropriate to understand what the existing stations do and do not cover, if there are any coverage gaps needing one or more stations, and what, if anything, to do about them as the District continues to evolve. In brief, there are two geographic perspectives to fire station deployment.

- ***Distribution***
  The spreading out or spacing of first-due fire units to stop routine emergencies.
- ***Concentration***
  The clustering of fire stations close enough together so that building fires can receive enough resources from multiple fire stations quickly enough. This is known as the effective response force or commonly the first alarm assignment – the collection of a sufficient number of firefighters on scene delivered within the concentration time goal to stop the escalation of the problem.

To analyze first-due fire unit travel time coverage for this study, the District used a geographic mapping tool from ESRI Corporation called Network Analyst that can measure travel time over the street network. For this next portion of the study, the project team used the base map and street travel speeds

programmed by the District to simulate real world fire truck travel times. Using these tools, the team ran several deployment tests and measured their impact on various parts of the District. The time measure used was 4 minutes travel over the road network, which is consistent with the "benchmark" recommendation in NFPA 1710 and desirable outcomes in critical emergencies. When a minute is added for dispatch time and two minutes for crew turnout times, then the maps effectively show the area covered within 7 minutes for first-due and 11 minutes for a first alarm assignment. For this analysis Fire Station 32 was assumed to be located at its planned location of 2100 Stone Valley Road (approximately 2200 feet east of its current location).

2.10.1 Community Baselines

Map 1—Station Locations

This map shows the existing District fire station locations with District boundaries. This is a reference map view for the other map displays that follow. Also displayed are the community and city/town boundaries in the District's service area.

Map 2a—Population Density, Fire Hazard Severity Zones and Target Hazards

Risk assessment is an effort by the District to classify properties by potential impact on service demand levels. In this study, risk was examined from several aspects – population density, Wildland Fire Severity Zones , and target hazards.

It is apparent upon review that the core of the developed District along the valley floor and the I-680 corridor contains the highest population densities, which then decrease in the upslope and rural areas where dense development is restricted.

District personnel pre-plan all key target hazard buildings such as those housing significant numbers of people and or hazardous business processes. Using a well-developed and tested process, the method produces detailed vicinity maps and aerial photography-based surveys for each building. These *pre-incident plans* are carried on all apparatus in printed and electronic form. Located on Map 2a are all of the identified target hazard buildings tiered into three categories.

Finally this map displays the wildland fire hazard severity zones as identified by CALFIRE and District staff. These areas are categorized *moderate to high to very high* based on fuel type, density and percent of slope. Many of these areas are directly adjacent to structures. As such, the District's response plan is designed to deliver the right mix of structural and wildland fire apparatus to each area. Water supply tenders are sent to remote areas without hydrants.

Map 2b—Population Density, Fire Hazard Severity Zones and Target Hazards

This map is a scaled version of Map 2a for a tighter focus at the center of the District's more populated and commercial areas along the I-680 corridor. For the District, this map shows the value of the community's commitment to a strong fire response system. With its current mix of engines and ladder trucks, the District should be able to mount a strong, rapid attack on fires in these facilities.

Map 3—First-Due Unit Distribution

This map shows in green highlighted street segments the *distribution* or first-due response time for each station per a best practice recommended response goal of 4 minutes *travel time*. Therefore, the edge of color per station area is the distance an engine could reach within this time, assuming they are in-station and encounter no unusual delays. In addition, the computer uses mean speed limits per roadway type. Thus, the projection is optimal or *perfect world*. Real dispatch data shows response times to be a little slower in some edge areas. Most likely, this is due to the effects of the non-grid street design layout and the up slope hilly areas. The purpose of computer response mapping is to determine and balance station locations. This geo-mapping design is then checked in the study against actual dispatch time data, which reflects the real world. There should also be some overlap between station areas so that a second-due unit can have a chance of an adequate response time when they cover a call in another company's first-due area.

It is not possible to serve every road segment out to the edge of the District's urban/suburban areas in 4 travel minutes; however, these maps show most of the District is covered. It is also not necessary to cover the rural and open space areas in 4 minutes travel time. These areas will be discussed separately. The percentage of road miles covered by the first-due engine in each population category is indicated below.

Population Category	*Road Miles Covered by First-due Unit within 4 Minutes*
Urban	90%
Suburban	83%
Rural	45%

Finding 4

Most of the District's urban/suburban density developed areas are within 4 minutes travel time of a fire station. Where this does not occur they are small areas at the end of the street network, in most cases at upper elevations in the hillside areas.

Map 4—ISO Coverage Areas

This map exhibit displays the Insurance Service Office (ISO) requirement that stations cover a 1.5-mile distance response area, but without the 4-minute travel streets shown. This makes it easier to see what the traditional 1.5-mile measure covers. Depending on the road network in a jurisdiction, the 1.5-mile measure usually equates to a 3.5 to 4.5-minute travel time. However, a 1.5-mile measure is a reasonable indicator of station spacing and overlap. As can be seen, the ISO coverage is similar but less forgiving than the 4-minute travel time measure. This is due to the fact that a "distance" based measure cannot

account for higher speeds on freeways and primary arterial streets that feed out into the neighborhoods.

This map shows there is adequate overlap in the maximum risk core areas of the District. The other gaps are similar to Map 3, but larger. This map shows that for the most part the District's stations are generally properly located to provide the District with the needed distribution of resources to provide rapid response by the first-due company consistent with ISO guidelines.

Maps 5a—Concentration (First Alarm) With Two Ladder Trucks

This map exhibit shows the concentration or massing of fire crews for serious fire or rescue calls. Building fires in particular require 15+ firefighters (NFPA 1710) arriving within a reasonable time frame to work together and effectively to stop the escalation of the emergency. Otherwise, if too few firefighters arrive, or arrive too late in the fire's progress, the result is a greater alarm fire, which is more dangerous to the public and the firefighters.

The concentration map exhibits look at the District's ability to deploy three of its engine companies, *two* truck companies, one rescue medic and one chief officer to building fires within 8 minutes travel time (11 minutes total response time). This measure ensures that a minimum of 18 firefighters (3 firefighters/engine, 3 firefighters/truck staffing, 2 firefighter/medics per rescue) and one chief officer deployed can arrive on scene to work simultaneously and effectively to stop the spread of a modest fire.

The green road network highlight in the map indicates where the District's current fire deployment system should deliver the initial effective response force with two trucks.

At first appearance, the existing station system cannot deploy all of the first alarm resources to the outer edges and more rural areas of the District. However, the effective response force coverage is complete in the commercial core areas of the District along the I-680 corridor where the target hazards and higher fire flow ISO buildings are located.

The limiting factor to district-wide coverage of the first alarm is the District policy to dispatch *two* ladder trucks immediately to building fires. Another limiting factor is having only one battalion chief responding.

Maps 5b—Concentration (First Alarm) With One Ladder Truck

Given that the existing District response policy is to send two ladder trucks to structures in the more built-up areas of the District, this map shows the first alarm coverage with one ladder truck. As can be seen, this coverage is much larger and protects most of the built up areas including the residential housing areas. The percentage of road miles covered by 3 engines, 1 ladder truck, 1 battalion chief and 1 rescue medic unit in each population category is shown below.

Population Category	*Road Miles Covered by First Alarm (w/1 Truck) in 8 Minutes*
Urban	49%
Suburban	53%
Rural	9%

The next series of maps "take apart" the first alarm unit coverage by apparatus type to see which units do or do not limit the full first alarm coverage.

Map 6—8-Minute Engines Only

This map shows a different view of concentration by only showing the 8-minute coverage of engine companies. Here, the green road network highlight shows the areas receiving three engines in 8 minutes travel time. This coverage is better than in Map 5 because the battalion chief, medic unit and ladder trucks are removed, since there are more engines overall in the District. The important finding in this map is that all but the very edge and rural areas of the District receive very high 3 engine coverage.

Using the minimum staffing level of 3 firefighters as the benchmark, this map also shows where 9 firefighters from the three engines would be available. The percentage of road miles covered by three engines in each population category is shown below.

Population Category	*Road Miles Covered by 3 Engines in 8 Minutes*
Urban	88%
Suburban	72%
Rural	10%

Map 7a—Two Ladder Truck Coverage

This map set displays the 8 minute travel time coverage for the closest two District ladder trucks. It shows that two truck companies at 8 minutes travel can only provide coverage to the core areas of the District. With only three ladder truck locations, it is not possible to deliver two of them to the northern, southern and eastern first-due station areas of the District in this time frame.

Map 7b—Single Ladder Truck Coverage

This map set displays the 8 minute travel time coverage for the closest District ladder truck. Here the coverage is much more complete at 8 minutes travel time. All but the most distant ends of the developed road network receive one ladder truck in 8 minutes travel time. The percentage of road miles covered by one ladder truck in each population class is shown below.

Population Category	*Road Miles Covered by 1 Truck in 8 Minutes*
Urban	89%
Suburban	92%
Rural[5]	33%

Map 8a—Paramedic Rescue Unit Coverage

This map shows the 8 minute travel time coverage for the medic units. Given the multiple locations of the medic units, one of the medic units can provide coverage to most areas of the District except for the very edge of District 36 and rural areas.

Map 8b—Battalion Chief Unit Coverage

This map displays the battalion chief coverage from Station 31. At 8 minutes travel time it is not possible to cover the southern, southeast and eastern edges of the District. Along with the two ladder truck coverage area, the chief officer coverage becomes the limiting factor to the first alarm coverage to the outer areas of the District. The percentage of road miles covered by one battalion chief in each population category is shown below.

Population Category	*Road Miles Covered by 1 BC in 8 Minutes*
Urban	64%
Suburban	66%
Rural[6]	13%

Road Miles (Summary)

Population Category	*4-Minute Travel 1 Engine*	*8-Minute Travel ERF w/1T*	*8-Minute Travel 3 Engines*	*8-Minute Travel 1 Truck*	*8-Minute Travel 1 BC*
Urban	90%	49%	88%	89%	64%
Suburban	83%	53%	72%	92%	66%
Rural	45%	9%	10%	33%	13%

[5] The coverage within the rural area jumps to 42% if the Mount Diablo area is considered as wilderness area rather than part of the rural area.

[6] The coverage within the rural area jumps to 17% if the Mount Diablo area is considered as wilderness area rather than part of the rural area.

Road Miles (Summary cont.)

Population Category	*14-Minute Travel 1 Engine*	*18-Minute Travel 3 Engines*
Rural	75%[7]	64%[8]

Finding 5

The District's urban/suburban density core areas are largely within 8 minutes travel time of the full first alarm assignment of 3 engines, 2 ladder trucks, 1 chief and 1 rescue medic unit. The outer areas of the District do receive an initial effective response force of at least 3 engines within 8 minutes above 70% of the time. The District should adopt performance measures based on the differing risks found in each of the three population density categories.

Map 9—All Incident Locations

This is an overlay of the exact location for all incident types for the 22-month data set. It is apparent that there is a need for District services on almost every street segment of the jurisdiction. The greatest concentration of calls is also where the greatest concentration of District resources are available.

Map 10—EMS Incident Locations

This map set further breaks out only the emergency medical and rescue call locations. Again, with the majority of the calls for service being medical emergencies, virtually all areas of District need such coverage.

Map 11—All Fire Type Locations

This map set identifies the location of all fires in the District over the previous 22 months. All fires include any type of fire call from vehicle to dumpster to building. There are obviously fewer fires than medical or rescue calls. Even given this, it is evident that all first-due engine districts experience fires and are more concentrated where District resources are more concentrated. This also happens to be the area where the building stock is older and less likely to be in compliance with current codes.

Map 12—Structure Fire Locations

This map is similar to the previous map, but only displays structure fires for the 22-month data set. While the structure fire count is a smaller subset of the total fire count, there are two meaningful findings to this map. There are still structure fires in every first-due fire company district. The location of many of the building fires parallels the higher risk building type commercial areas of the District where we find more of the significant risk and the ISO evaluated buildings. These areas and buildings are of

[7] 98% excluding wilderness areas.
[8] 87% excluding wilderness areas.

significant fire and life loss risk to the District. Fires in the more complicated building types must be controlled quickly or the losses will be very large. Fortunately, concentration (first alarm) coverage is good in these areas of the District, particularly in the I-680 corridor.

Map 13—All Incident Location Densities

This map set examines by mathematical density where clusters of incident activity have occurred. In this set, the darker density color plots the highest concentration of all incidents. This type of map makes the location of frequent workload more meaningful than just mapping the dots of all locations as done in Map 9.

Why is this perspective important? Overlap of units and ensuring the delivery of a good concentration for the effective response force. When we compare this type of map with the concentration map, we want the best concentration to be where the greatest density of calls for service occurs. For the District, this mostly occurs in the I-680 corridor and along the other primary arterial road areas all of which is where development density is the greatest, which is where the current effective response force concentration is best.

Map 14—EMS Incident Location Densities

This map set is similar to Map 13, but only the medical and rescue hot spots of activity are plotted. The clusters of activity look very similar to the all-incident set in Map 13 because medical calls are such a large part of the total.

Map 15—All Fire Location Densities

This map sets shows the hot spot activity for all fires. In this case, the call for service density is scattered. Not unexpectedly, the higher population density areas of the District have more occurrences of fires.

Map 16a—First Due Unit Coverage with Population Density

Displayed here is how the current station system delivers 4 minute travel time coverage across the various population density areas of the District. This map helps to visualize the data measures of road miles covered per density zone.

Map 16b—First Alarm Coverage with Population Density

The first alarm coverage with one ladder truck does not cover as much of the non-rural areas, but does cover more than 50% of the combined urban and suburban road miles.

While the mapping analysis shows the single battalion chief is the most limiting factor in the first alarm coverage areas, the actual occurrence of working fires is very low in the District due to newer buildings, effective long-term fire prevention measures, and positive socio-economic factors. Given this the addition of a second battalion chief from just an emergency responder basis can wait until the economy recovers and the District sees what the eastern growth areas do to generate need.

Map 17a—Planning Zones

This map depicts the District's geographic planning zones. All fire station first due zones have been subdivided into more precise areas based on transportation networks, station distribution, resource

concentration and historical incident data in order to organize the jurisdiction for efficient and effective service delivery.

Map 17b—Risk Assessment by Planning Zone

This map illustrates the level of risk distributed across the District's planning zones. The risk classification for every planning zone is determined by the maximum or worst risk identified within each zone. There are three risk categories: High, Medium, and Low.

2.11 Historical Effectiveness and Reliability of Response

The map sets described above show the ideal situation for response times and how responses might look under perfect conditions of no competing calls, traffic conditions, units all in place and simultaneous notification. Examination of the actual response time data concerning responses provides a picture of how response times are in the real world of simultaneous calls, rush hour traffic conditions, units out of position, and delayed dispatches.

2.11.1 Dataset Identification

This section describes the sources and quality of data used in this study.

The District used *National Fire Information Reporting System* version 5 (NFIRS 5) transaction files for incidents occurring from 7/1/05 to 3/31/09. 472,192 Computer-aided Dispatch (CAD) *change* records were submitted for the dates of 1/1/2006 – 12/31/2008. A change record is a CAD timestamp for a unit status change. Custom programming was utilized to assemble the change records into 38,058 apparatus response records. Those apparatus response records were merged into the 47,179 apparatus response records created from NFIRS 5 transactions for an extended date range.

The merged NFIRS 5 / CAD dataset was trimmed to the three years where both NFIRS 5 and CAD data was available, 1/1/2006 – 12/31/2008. In this time period there were 22,314 incidents and 38,356 apparatus operation records.

Data Quality

The District uses the current NFIRS 5 reporting standard.

Dataset strengths include the following:

1. Use of seconds in all time fields
2. Use of NFIRS 5 Apparatus module
3. Good use of District field
4. Latitude / Longitude made available in CAD data
5. Multiple years of data were available.

The NFIRS 5 dataset could be improved slightly by adding optional Census tract data to each incident record.

CAD change data had to be assembled into discreet company responses by custom programming. While outliers are typical in any set of CAD data, the District did seem to have a very small but significant

number of negative times, zeros and timestamp reversals. Some quality assurance monitoring of CAD data may help improve accuracy in the future.

2.11.2 Analysis Period

Three calendar years of data was used for *trend* analysis (2006, 2007 and 2008). Detailed operational analysis was performed using 2008 data, the most recent calendar year.

Service Demand

Service demands are broken-down into specific incident types and property types. Dollar losses are also outlined in this section.

In 2008, the District responded to an average of 20.25 incidents per day. 2.53 percent of incident responses were to fire, 67.45 percent to EMS and 30.02 percent to other types of incidents.

2.11.3 Breakdown by Incident Type and Property Type

Below is a list of the top incident types occurring in the District for FY 07-08. Incident types with less than twenty responses were eliminated from the list. Notice the second most numerous incident type is "611 Dispatched & canceled en route".

Incident Type	*Count*
321 EMS call, excluding vehicle accident with injury	4,522
611 Dispatched & canceled en route	538
322 Vehicle accident with injuries	273
554 Assist invalid	142
651 Smoke scare, odor of smoke	133
745 Alarm system sounded, no fire - unintentional	110
553 Public service	90
700 False alarm or false call, other	86
324 Motor vehicle accident no injuries	81
735 Alarm system sounded due to malfunction	71
743 Smoke detector activation, no fire - unintentional	62
400 Hazardous condition, other	54
511 Lock-out	54
500 Service Call, other	52
600 Good intent call, other	50

Incident Type	*Count*
733 Smoke detector activation due to malfunction	46
740 Unintentional transmission of alarm, other	46
744 Detector activation, no fire - unintentional	45
520 Water problem, other	44
550 Public service assistance, other	41
622 No incident found on arrival of incident address	40
531 Smoke or odor removal	39
323 Motor vehicle/pedestrian accident (MV Ped)	37
522 Water or steam leak	32
412 Gas leak (natural gas or LPG)	31
510 Person in distress, other	31
111 Building fire	28
440 Electrical wiring/equipment problem, other	27
300 Rescue, emergency medical call (EMS) call, other	26
311 Medical assist, assist EMS crew	21
542 Animal rescue	21
113 Cooking fire, confined to container	20
463 Vehicle accident, general cleanup	20
551 Assist police or other governmental agency	20
131 Passenger vehicle fire	18
900 Special type of incident, other	18
444 Power line down	17
711 Municipal alarm system, malicious false alarm	17
730 System malfunction, other	17
118 Trash or rubbish fire, contained	16
150 Outside rubbish fire, other	14
151 Outside rubbish, trash or waste fire	14

Incident Type	*Count*
445 Arcing, shorted electrical equipment	13
911 Citizen complaint	13
552 Police matter	12
100 Fire, other	10
141 Forest, woods or wildland fire	10
331 Lock-in (if lock out , use 511)	10
641 Vicinity alarm (incident in other location)	10

The ranking of the top ten incident types change when viewing incident types by staff hours instead of the number of incidents. Not surprisingly, building fires moved from the 27th position to second place. Structure fires, although rare by comparison, require a lot of work, whereas medical emergencies require a lot less time per call.

Incident Type	*Hours*
321 EMS call, excluding vehicle accident with injury	18,868.53
111 Building fire	2,159.76
322 Vehicle accident with injuries	1,758.84
141 Forest, woods or wildland fire	662.88
611 Dispatched & canceled en route	335.69
651 Smoke scare, odor of smoke	293.71
110 Structure fire, other (conversion only)	254.00
324 Motor vehicle accident no injuries	231.14
444 Power line down	191.54
553 Public service	182.40

This chart shows the top types of property receiving services from the District during FY 07-08. Property types with fewer than 20 responses were not included.

Property Type	*Count*
419 1 or 2 family dwelling	3,313
311 24-hour care Nursing homes, 4 or more persons	418
429 Multifamily dwellings	408
459 Residential board and care	340
962 Residential street, road or residential driveway	306
961 Highway or divided highway	219
960 Street, other	166
599 Business office	162
965 Vehicle parking area	152
215 High school/junior high school/middle school	134
963 Street or road in commercial area	113
UUU Undetermined	89
161 Restaurant or cafeteria	76
500 Mercantile, business, other	70
519 Food and beverage sales, grocery store	70
340 Clinics, Doctors offices, hemodialysis centers	68
400 Residential, other	68
213 Elementary school, including kindergarten	67
449 Hotel/motel, commercial	57
439 Boarding/rooming house, residential hotels	54
931 Open land or field	52
131 Church, mosque, synagogue, temple, chapel	37
124 Playground	35
115 Roller rink: indoor or outdoor	34
110 Fixed use recreation places, other	28

Property Type	*Count*
141 Athletic/health club	28
160 Eating, drinking places	27
111 Bowling alley	26
342 Doctor, dentist or oral surgeon's office	26
900 Outside or special property, other	24
580 General retail, other	22
888 Fire station	20

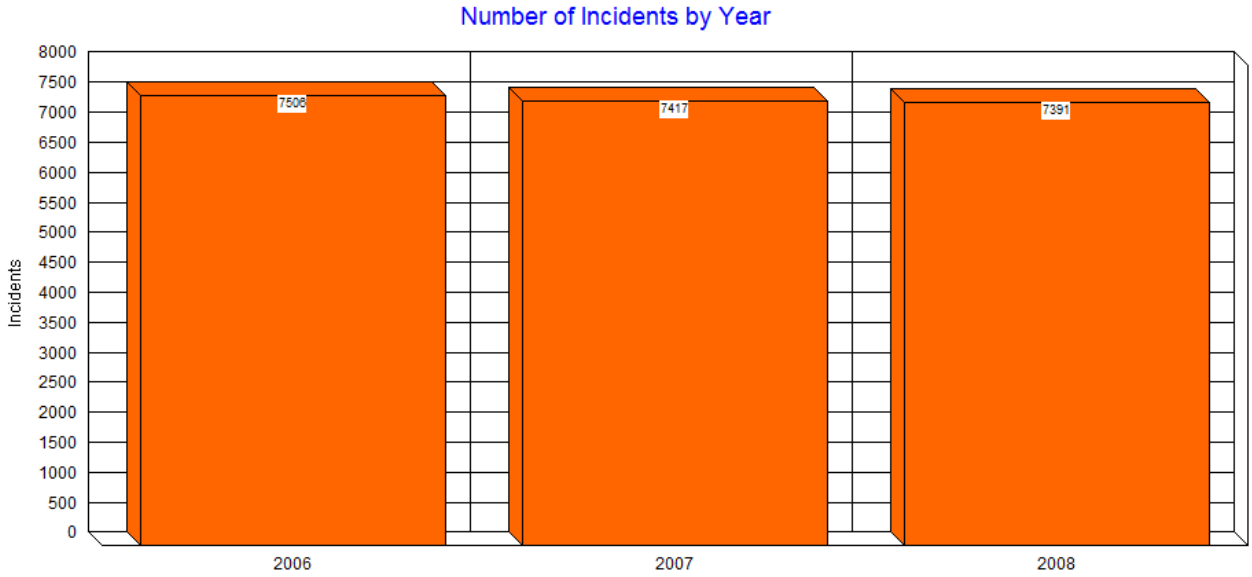
The table below contains the top ten property types by staff hours. Notice this ranking more closely resembles the property type ranking by incident count.

Property Type	*Count*
419 1 or 2 family dwelling	13,127.34
429 Multifamily dwellings	1,836.98
311 24-hour care Nursing homes, 4 or more persons	1,833.04
459 Residential board and care	1,413.96
961 Highway or divided highway	1,174.36
962 Residential street, road or residential driveway	953.8
960 Street, other	888.27
965 Vehicle parking area	452.69
931 Open land or field	393.77
215 High school/junior high school/middle school	382.14

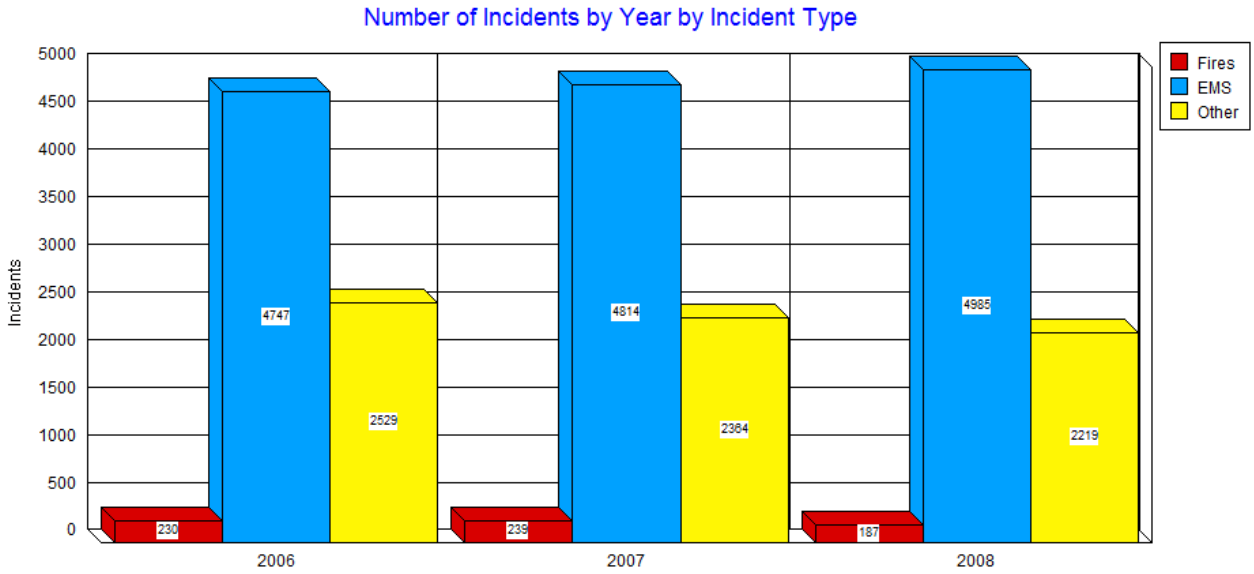
Finding 6

The types of properties that generate the most calls for service are typical for western states suburban departments. The District's staffing, equipment and response plans are properly designed for these types of calls.

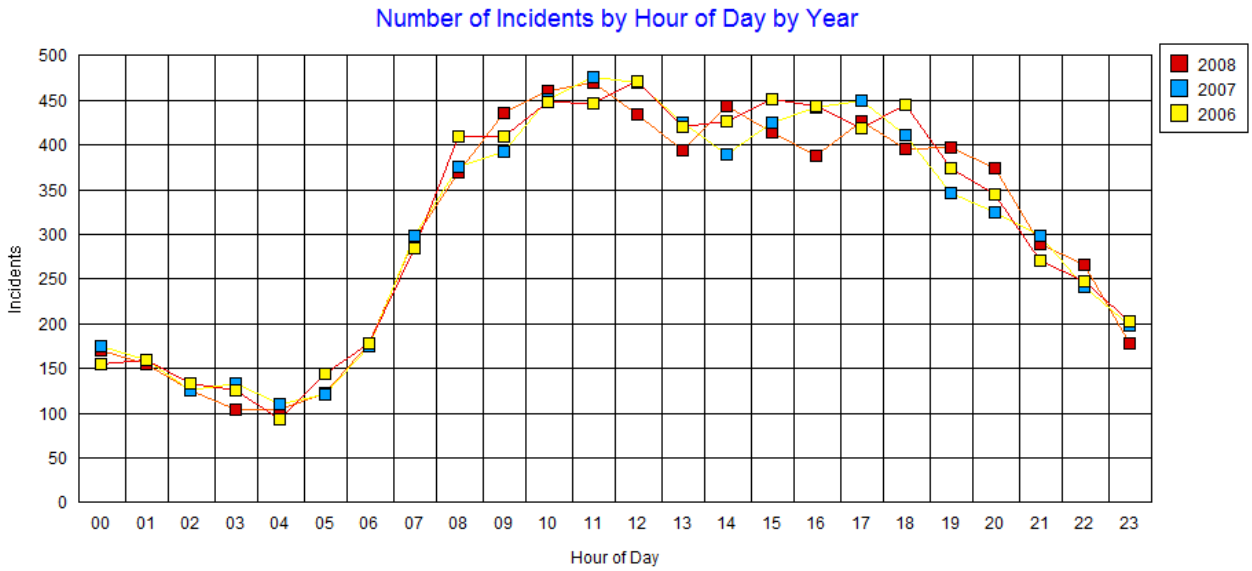
The three-year trend indicates a very slight decrease in the number of incidents. The number of incidents has fallen from 7,506 to 7,391. That is an average decrease of 38 incidents a year over 3 years, which is small enough to not be a trend, but could be due to just a few less weather related incidents.



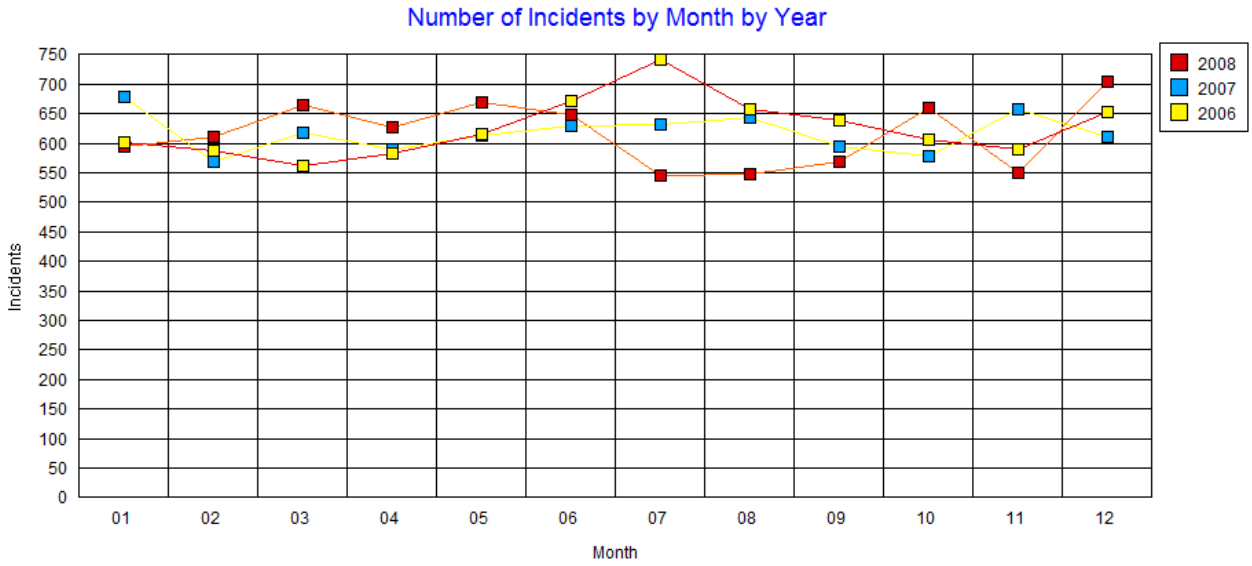
Below is the breakdown by incident type. Notice the number of fires declined in 2008 while EMS incident types have risen steadily. “Other” types of incidents have also declined over three years.



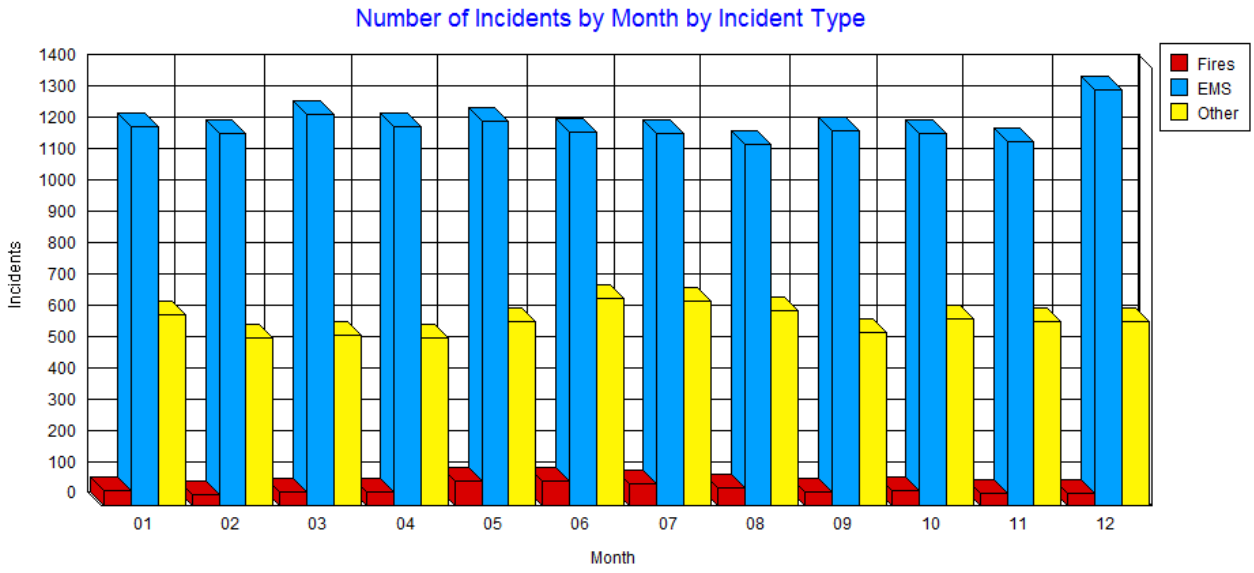
The graph below compares incident activity by hour of day by year. Notice peak activity hours are from 08:00 – 19:00 which are typical for a suburban department.



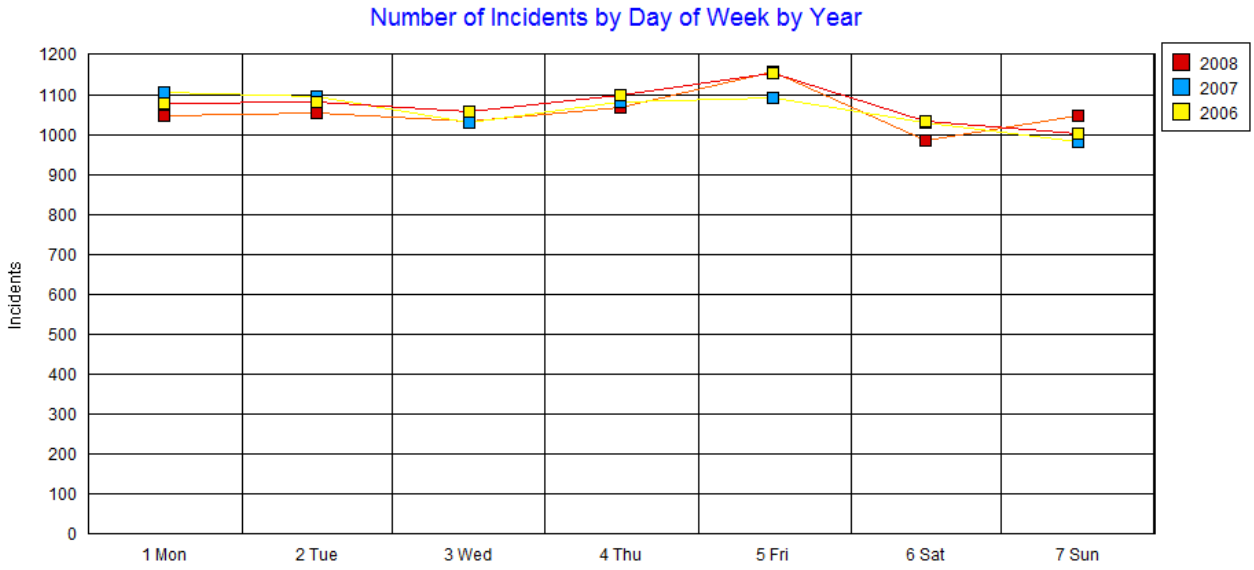
The graph below illustrates the number of incidents by month in the last three calendar years.



The graph below illustrates monthly trends by incident type.



While incident activity is relatively stable by day of week there is a small increase in activity on Friday and a trend for slightly fewer incidents on weekends.

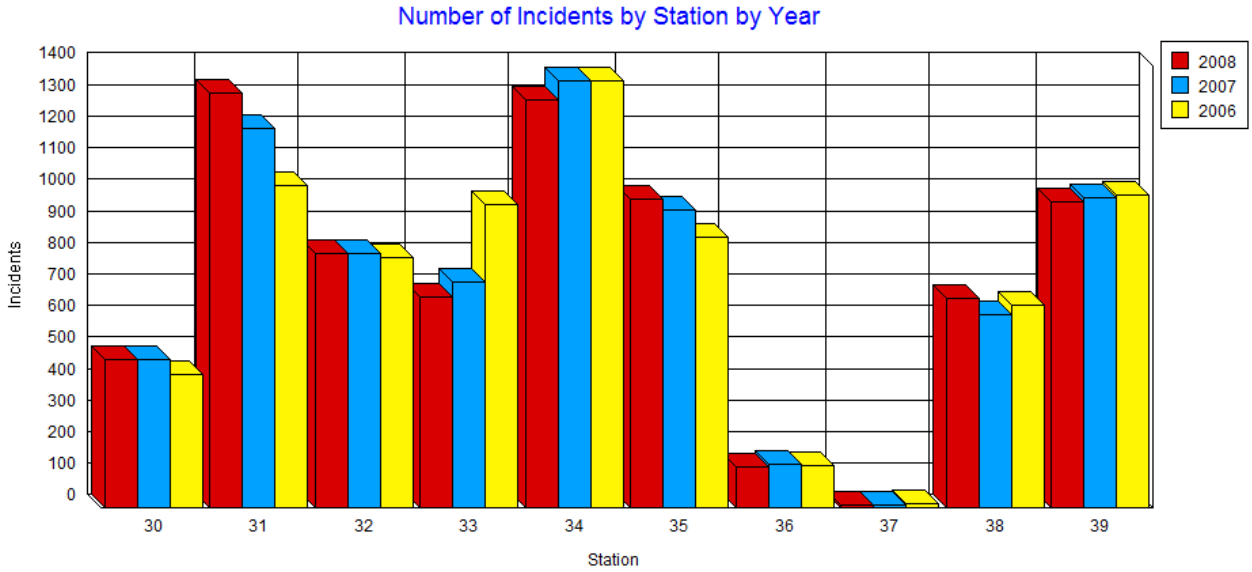


Finding 7

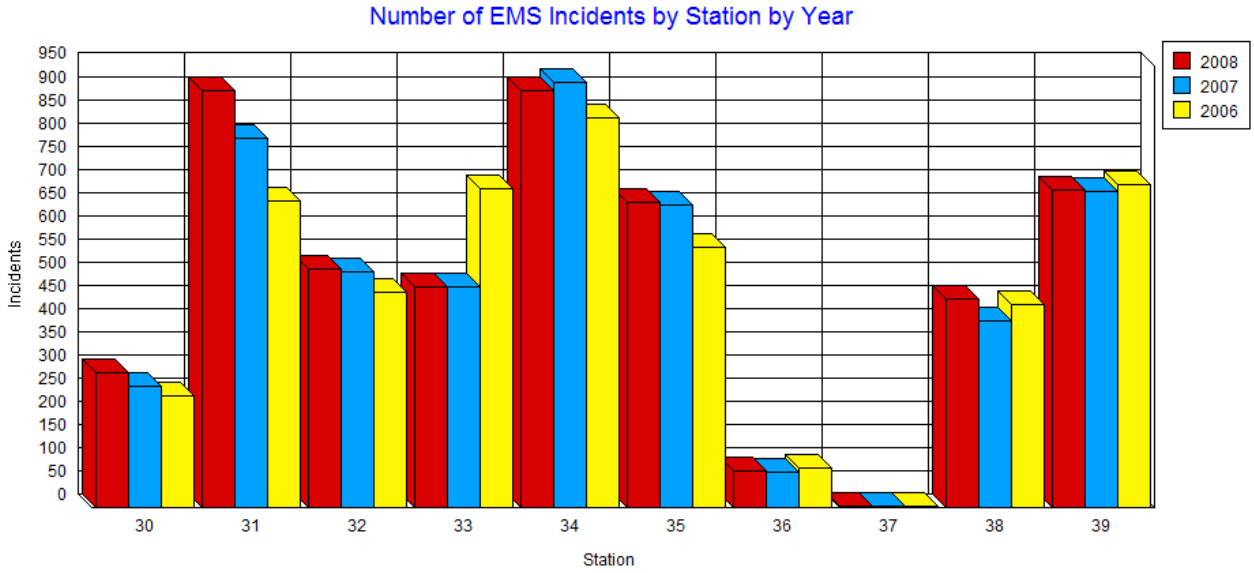
The District's time of day, day of week and month of year calls for service demands are very consistent. This means the District needs to operate a fairly consistent 24/7/365 response system. Peak activity units would only be cost effective when high call volumes can be reasonably predicted such as during extreme wildland fire weather conditions or high quantity people visitation events.

2.11.4 Demand by Station Area

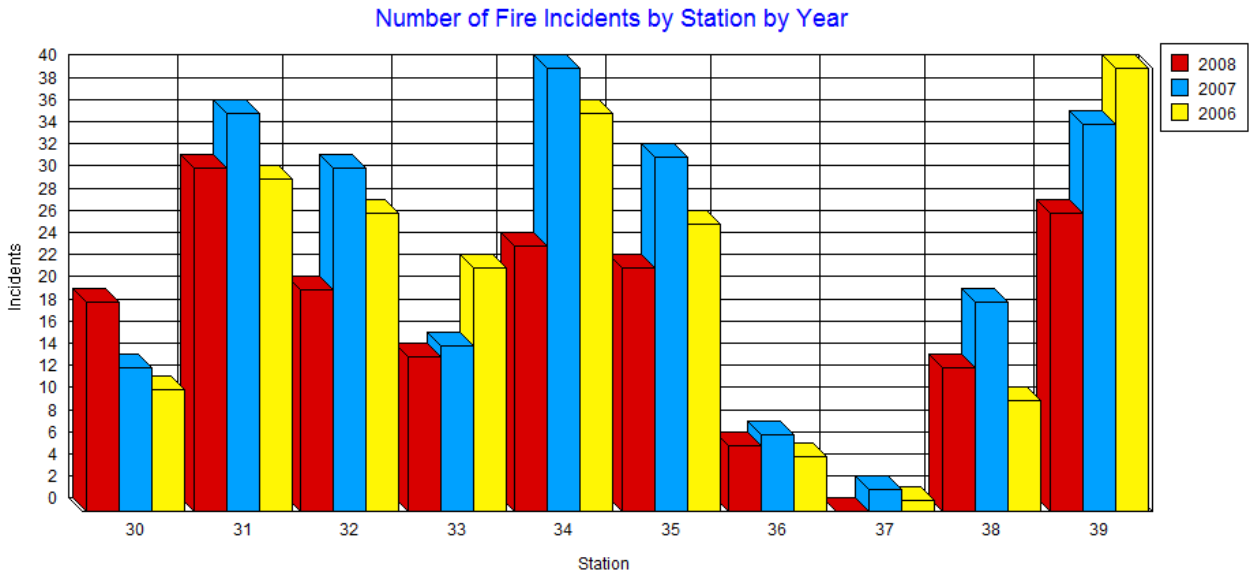
Below is an incident count by station by year. There is steady increase in activity in station areas 31 and 35 while activity is dropping a bit each year in station area 33.



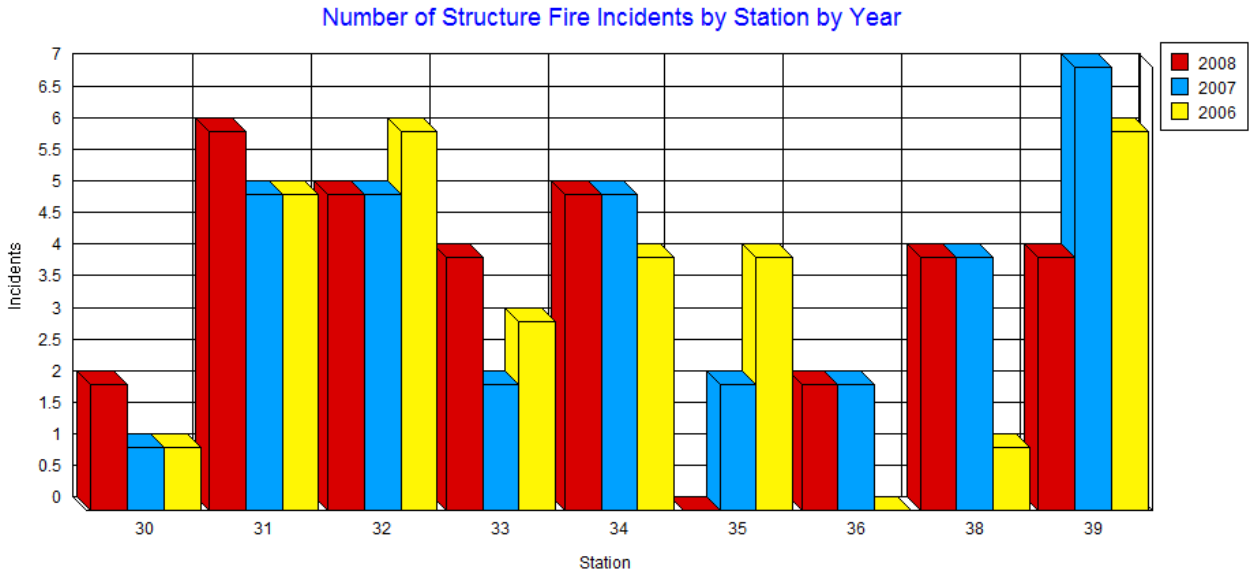
The following graph shows the distribution of EMS incidents by station area by year. There is a strong increase in EMS incidents in Station 31.



Below is a breakdown of the number of fires by station area by year. Station 39 has experienced a decrease in fire activity while Station 30 is experiencing an increase in fire activity.



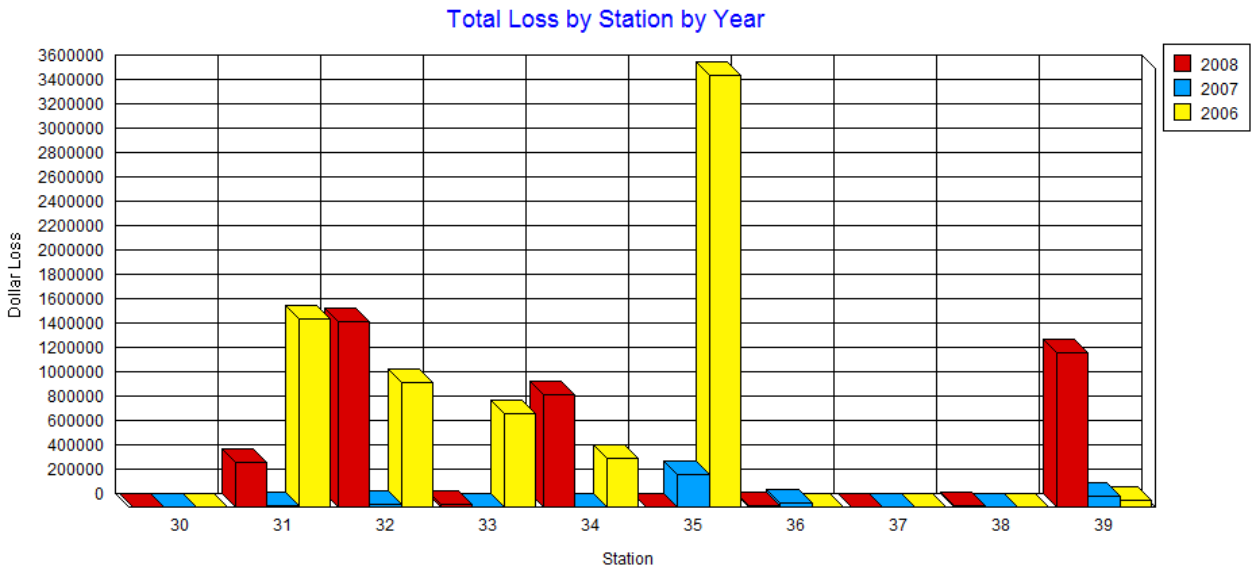
The graph below shows the number of structure fires by station area. Here trends are more difficult to spot given the low number of structure fire incidents.



The chart below summarizes response statistics by station area. These stats are for all incidents in the District during 2008. Stations are listed in order of overall incident activity.

Station	*Responses*	*% Fire*	*% EMS*	*% Other*	*Per Day*
31	1,316	2.36%	68.31%	29.33%	3.60
34	1,295	1.85%	69.50%	28.65%	3.54
35	980	2.24%	67.04%	30.71%	2.68
39	970	2.78%	70.52%	26.70%	2.65
32	806	2.48%	63.77%	33.75%	2.20
33	669	2.09%	71.30%	26.61%	1.83
38	665	1.95%	67.82%	30.23%	1.82
30	470	4.04%	62.34%	33.62%	1.28
36	132	4.55%	61.36%	34.09%	0.36
37	10	0.00%	40.00%	60.00%	0.03

The following graph illustrates total dollar loss by station area. This measurement is likely very volatile as one large loss can skew the pattern.



The following tables break down total fire incident dollar loss by month by station area for 2008.

Station	*January*	*February*	*March*	*April*	*May*	*June*
30	0	0	0	0	0	2,620
31	15,000	30,000	0	0	125,000	1,000
32	160,000	1,100,000	35,000	0	205,000	25,000
33	0	0	2,000	1,500	4,000	0
34	0	276,500	0	0	575,000	10,500
35	0	0	2,300	1,150	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	4,000	0	0	0
39	0	0	0	0	215000	0
Totals	**175,000**	**1,406,500**	**43,300**	**2,650**	**1,124,000**	**39,120**

July	*August*	*September*	*October*	*November*	*December*	*Total*
0	0	1,870	0	0	0	4,490
25,000	160,000	11,000	0	0	7,500	374,500
0	0	0	0	0	0	1,525,000
21,000	0	0	25	0	0	28,525
65,600	5,000	0	0	0	0	932,600
0	0	0	0	0	0	3,450
0	0	0	0	0	15,000	15,000
0	0	0	0	0	0	0
0	0	0	3,000	0	6,000	13,000
0	1,060,000	1100	0	0	1,500	1,277,600
111,600	**1,225,000**	**13,970**	**3,025**	**0**	**30,000**	**4,174,165**

2.11.5 Overall Response Time

Once the types of incidents and losses are quantified, analysis shifts to the time required to respond to those incidents. Fractile breakdowns track the percentage (and count the number) of incidents meeting defined criteria such as the first apparatus to reach the scene within progressive time segments.

Here is a fractile breakdown for District responses for 2008. To focus these calculations, only responses to District areas were considered. Also, aid given incidents were *not* included in this calculation. Incidents exceeding 20 minutes response time also were eliminated.

2.11.6 First Apparatus on Scene

There are 7,004 incident records being analyzed. Values include call processing, turnout, and travel time.

Note: In all of the response time data tables to follow, the last number per row in parenthesis is the count of calls that were arrived at cumulatively for that minute and all of the preceding minutes.

1st Apparatus on Scene <= 00:01:00 2.8% (194)
1st Apparatus on Scene <= 00:02:00 4.5% (315)
1st Apparatus on Scene <= 00:03:00 9.3% (651)
1st Apparatus on Scene <= 00:04:00 18.1% (1,262)
1st Apparatus on Scene <= 00:05:00 32.2% (2,243)
1st Apparatus on Scene <= 00:06:00 49.3% (3,430)
1st Apparatus on Scene <= 00:07:00 65.5% (4,559) – *SRVFPD Board policy goal point (Urban)*
1st Apparatus on Scene <= 00:08:00 78.0% (5,431) – *SRVFPD Board policy goal point (Suburban)*
1st Apparatus on Scene <= 00:09:00 86.2% (5,999)
1st Apparatus on Scene <= 00:09:45 90.2% (6,278) – *Actual district-wide performance @ 90%*
1st Apparatus on Scene <= 00:10:00 91.1% (6,341)
1st Apparatus on Scene <= 00:11:00 94.3% (6,563)
1st Apparatus on Scene <= 00:12:00 96.3% (6,703)
1st Apparatus on Scene <= 00:13:00 97.5% (6,788)
1st Apparatus on Scene <= 00:14:00 98.3% (6,844)
1st Apparatus on Scene <= 00:15:00 98.7% (6,873)
1st Apparatus on Scene <= 00:16:00 99.2% (6,904)
1st Apparatus on Scene <= 00:17:00 99.4% (6,923) – *SRVFPD Board policy goal point (Rural)*
1st Apparatus on Scene <= 00:18:00 99.7% (6,940)
1st Apparatus on Scene <= 00:19:00 99.8% (6,952)
1st Apparatus on Scene <= 00:20:00 100.0% (6,963)

Overall Call Processing Time – Call to Dispatch

Call processing times greater than 5 minutes were eliminated from this analysis.

6,880 incident records were analyzed.

Call Processing <= 00:01:00 70.6% (4,723) – *SRVFPD Board policy goal point*
Call Processing <= 00:01:45 89.6% (5,993) – *Actual performance @ 90%*
Call Processing <= 00:02:00 92.2% (6,163)
Call Processing <= 00:03:00 97.2% (6,504)
Call Processing <= 00:04:00 99.1% (6,627)
Call Processing <= 00:05:00 100.0% (6,688)

Overall call processing performance slightly lags NFPA expectations of 1 minute, 90 percent of the time. While this can occur due to the dispatchers issuing emergency medical self-help care pre-arrival instructions to callers, software, procedures and staffing should be designed to simultaneously assist the caller while also getting the responding units promptly notified.

Overall Turnout Time – Dispatch to Enroute

Turnout times greater than 5 minutes were eliminated from this analysis.

6,941 incident records were analyzed.

Turnout <= 00:01:00 9.5% (539)
Turnout <= 00:02:00 49.3% (2,804) – *SRVFPD Board policy goal point*
Turnout <= 00:03:00 86.9% (4,945)
Turnout <= 00:03:15 91.5% (5,202) – *Actual performance @ 90%*
Turnout <= 00:04:00 97.9% (5,571)
Turnout <= 00:04:45 99.7% (5,671)
Turnout <= 00:05:00 100.0% (5,688)

Overall turnout time performance is below the target of 2 minutes at 90 percent of the time due to the additional time to don mandated safety clothing. The older NFPA recommendation of 1 minute at 90 percent found in NFPA 1710 is largely unattainable. However, with training, focus and crew measures feedback, it is possible to perform at the 90 second to 2-minute point, 90 percent of the time.

Overall Travel Time – Enroute to Arrival

Travel times greater than 20 minutes were eliminated from this analysis.

6,961 incident records were analyzed.

Travel <= 00:01:00 6.3% (372)
Travel <= 00:02:00 19.9% (1,181)
Travel <= 00:03:00 41.9% (2,489)
Travel <= 00:04:00 65.2% (3,877) – *SRVFPD Board policy goal point (Urban)*
Travel <= 00:05:00 81.3% (4,833) – *SRVFPD Board policy goal point (Suburban)*
Travel <= 00:06:00 90.2% (5,365) – *Actual district-wide performance @ 90%*
Travel <= 00:07:00 94.8% (5,637)
Travel <= 00:08:00 96.9% (5,761)
Travel <= 00:09:00 98.2% (5,841)
Travel <= 00:10:00 98.9% (5,878)
Travel <= 00:11:00 99.2% (5,901)
Travel <= 00:12:00 99.4% (5,911)
Travel <= 00:13:00 99.7% (5,926)
Travel <= 00:14:00 99.8% (5,937) – *SRVFPD Board policy goal point (Rural)*
Travel <= 00:15:00 99.9% (5,942)
Travel <= 00:16:00 100.0% (5,945)

2.11.7 Fire and EMS Incidents Only

Response times greater than 20 minutes have been eliminated.

4,981 incident records were analyzed.

1st Apparatus on Scene <= 00:01:00 1.8% (91)
1st Apparatus on Scene <= 00:02:00 2.8% (137)
1st Apparatus on Scene <= 00:03:00 7.5% (372)
1st Apparatus on Scene <= 00:03:15 9.2% (460)
1st Apparatus on Scene <= 00:04:00 17.0% (847)
1st Apparatus on Scene <= 00:05:00 33.0% (1,645)
1st Apparatus on Scene <= 00:06:00 53.0% (2,641)
1st Apparatus on Scene <= 00:07:00 70.6% (3,517) – *SRVFPD Board policy goal point (Urban)*
1st Apparatus on Scene <= 00:08:00 83.6% (4,163) – *SRVFPD Board policy goal point (Suburban)*
1st Apparatus on Scene <= 00:09:00 90.5% (4,508) – *Actual district-wide performance @ 90%*
1st Apparatus on Scene <= 00:10:00 94.0% (4,682)
1st Apparatus on Scene <= 00:11:00 96.4% (4,802)
1st Apparatus on Scene <= 00:12:00 97.8% (4,867)
1st Apparatus on Scene <= 00:13:00 98.5% (4,902)
1st Apparatus on Scene <= 00:14:00 98.9% (4,924)
1st Apparatus on Scene <= 00:19:45 100.0% (4,977)

Fire and EMS Call Processing – Call to Dispatch

Call processing times greater than 20 minutes were eliminated from this analysis.

4,222 incident records were analyzed.

Call Processing <= 00:01:00 79.0% (3,306) – *SRVFPD Board policy goal point*
Call Processing <= 00:01:30 89.9% (3,761) – *Actual performance @ 90%*
Call Processing <= 00:01:45 92.2% (3,858)

Fire and EMS Turnout Time – Dispatch to Enroute

Turnout times greater than 5 minutes were eliminated from this analysis.

4,950 incident records were analyzed.

Turnout <= 00:01:00 9.1% (411)
Turnout <= 00:02:00 51.6% (2,322) – *SRVFPD Board policy goal point*
Turnout <= 00:03:00 88.1% (3,966) – *Actual performance @ 90%*
Turnout <= 00:04:00 98.1% (4,417)
Turnout <= 00:05:00 100.0% (4,502)

Fire and EMS Travel Time – Enroute to Arrival

Travel times greater than 20 minutes were eliminated from this analysis.

4,948 incident records were analyzed.

Travel <= 00:01:00 6.8% (314)
Travel <= 00:02:00 20.9% (959)

Travel <= 00:03:00 44.2% (2,027)
Travel <= 00:04:00 68.2% (3,127) – *SRVFPD Board policy goal point (Urban)*
Travel <= 00:05:00 84.2% (3,862) – *SRVFPD Board policy goal point (Suburban)*
Travel <= 00:05:30 89.0% (4,083) – *Actual district-wide performance @ 90%*
Travel <= 00:05:45 90.7% (4,162)
Travel <= 00:16:00 100.0% (4,587)

The following table compares district-wide performance for all 2008 incidents in general and fire and EMS only responses for 2008.

2008 Incident Response Time Measures

All Incidents		*Time to 90%*	*Fire and EMS Incidents*		*Time to 90%*
Call to Arrival	65.5% @ 7:00	9:45	Call to Arrival	70.6% @ 7:00	9:00
Call Processing	70.6% @ 1:00	1:45	Call Processing	79.0% @ 1:00	1:30
Turnout Time	49.3% @ 2:00	3:15	Turnout Time	51.6% @ 2:00	3:00
Travel Time	65.2% @ 4:00	6:00	Travel Time	68.2% @ 4:00	5:30

Most measurements improve for fire and EMS emergencies but turnout and travel times do not show as much improvement as other measurements.

Below is the district-wide review for fire and EMS incidents in 2008. This review illustrates performance by time of day. Since this is a general review, only broad outliers have been eliminated. For this reason performance may vary slightly from the more detailed performance numbers above.

2008 District-Wide Response Times by Time-of-Day

Performance Summary	*Standard*	*00:00-05:59*	*06:00-11:59*	*12:00-17:59*	*18:00-23:59*	*Zero Values*	*Overall*
Incidents	Count	582	1,455	1,693	1,251		4,981
Apparatus	Count	1,041	2,968	3,428	2,436		9,873
Call Processing	% @ 1.00	71.30%	80.60%	77.90%	80.30%	10	78.50%
Turnout[9]	% @ 2.00	07.10%	51.30%	66.70%	51.70%	439	51.30%
Travel	% @ 4.00	57.00%	67.90%	69.30%	70.10%	360	67.70%
Dispatch to Arrival	% @ 6.00	35.20%	68.10%	73.90%	69.30%	178	66.50%
Call to Arrival	% @ 7.00	40.30%	73.30%	76.20%	74.20%	2	70.60%

[9] Compliance with a 2-minute turnout time standard is just 7.1 percent between 00:00 and 05:59.

Total Response Times by Population Density Zones

The response times listed above are averaged district-wide. In the table below the same data set was analyzed by population density area.

2008 Response Times by Time-of-Day

Performance Summary	*Urban*	*Suburban*	*Rural*
Mean	5:18	5:51	7:59
90%	7:34	8:12	12:35
District wide 90% = 9:00			

This data correlates to the overall district-wide measures which while longer at the 90% point, reflect the fact that outer area suburban, rural and freeway calls with poor initial locations are dragging the overall average down. However, the mapping analysis showed good predicated coverage in the urban and suburban areas, which this data table confirms.

The bottom line is the District has very hard to serve outer edge topography and road networks. To vastly improve coverage in these areas would likely not be cost-effective given the relatively modest call for service rates.

2008 District-Wide Response Times by Time-of-Day

Performance Summary	*Standard*	*00:00-05:59*	*06:00-11:59*	*12:00-17:59*	*18:00-23:59*	*Zero Values*	*Overall*
Station 31							
Incidents	Count	92	278	338	209		917
Apparatus	Count	191	615	816	471		2,093
Turnout	% @ 2.00	2.30%	63.50%	72.50%	58.80%	61	59.50%
Travel	% @ 4.00	67.40%	73.50%	71.30%	72.10%	49	71.80%
Dispatch to Arrival	% @ 6.00	40.20%	73.70%	78.70%	71.80%	25	71.60%
Call to Arrival	% @ 7.00	46.70%	79.10%	78.30%	77.50%	1	75.20%
Station 34							
Incidents	Count	105	264	338	209		916
Apparatus	Count	162	493	578	348		1,581
Turnout	% @ 2.00	15.50%	55.10%	77.90%	62.40%	123	60.20%

Performance Summary	*Standard*	*00:00-05:59*	*06:00-11:59*	*12:00-17:59*	*18:00-23:59*	*Zero Values*	*Overall*
Travel	% @ 4.00	49.00%	59.50%	65.40%	62.70%	73	61.10%
Dispatch to Arrival	% @ 6.00	30.30%	64.80%	74.70%	66.80%	76	64.80%
Call to Arrival	% @ 7.00	37.10%	70.10%	76.00%	70.80%		68.70%
Station 35							
Incidents	Count	103	178	214	177		672
Apparatus	Count	130	263	347	265		1,005
Turnout	% @ 2.00	6.70%	36.20%	53.10%	38.70%	72	37.80%
Travel	% @ 4.00	41.10%	44.80%	50.00%	52.80%	60	48.00%
Dispatch to Arrival	% @ 6.00	18.20%	41.60%	51.00%	45.60%	42	41.90%
Call to Arrival	% @ 7.00	19.60%	48.90%	58.90%	53.70%	1	48.90%
Station 39							
Incidents	Count	76	194	190	160		620
Apparatus	Count	166	449	412	337		1,364
Turnout	% @ 2.00	5.70%	49.40%	74.10%	55.30%	48	53.10%
Travel	% @ 4.00	71.40%	73.30%	75.90%	85.00%	47	77.00%
Dispatch to Arrival	% @ 6.00	51.40%	76.30%	80.50%	84.20%	13	76.60%
Call to Arrival	% @ 7.00	57.90%	80.90%	83.20%	87.50%		80.50%
Station 32							
Incidents	Count	66	154	176	133		529
Apparatus	Count	99	281	281	236		897
Turnout	% @ 2.00	4.90%	55.10%	65.00%	49.60%	38	50.70%
Travel	% @ 4.00	57.40%	77.70%	79.10%	77.50%	37	75.60%
Dispatch to Arrival	% @ 6.00	35.90%	75.00%	83.20%	73.50%	12	72.50%
Call to Arrival	% @ 7.00	40.90%	81.20%	85.20%	81.20%		77.50%
Station 33							
Incidents	Count	43	162	157	110		472
Apparatus	Count	94	363	368	229		1,054

Performance Summary	*Standard*	*00:00-05:59*	*06:00-11:59*	*12:00-17:59*	*18:00-23:59*	*Zero Values*	*Overall*
Turnout	% @ 2.00	0.00%	44.40%	61.60%	49.50%	52	46.90%
Travel	% @ 4.00	56.10%	79.70%	76.80%	76.00%	50	75.60%
Dispatch to Arrival	% @ 6.00	37.20%	78.10%	78.80%	73.10%	5	73.40%
Call to Arrival	% @ 7.00	39.50%	83.30%	80.90%	77.30%		77.10%
Station 38							
Incidents	Count	43	120	155	139		457
Apparatus	Count	91	255	351	302		999
Turnout	% @ 2.00	7.10%	61.80%	72.90%	62.10%	29	60.30%
Travel	% @ 4.00	61.90%	77.30%	77.80%	75.20%	28	75.30%
Dispatch to Arrival	% @ 6.00	44.20%	79.20%	81.20%	77.20%	4	75.90%
Call to Arrival	% @ 7.00	53.50%	82.50%	83.20%	82.00%		79.90%
Station 30							
Incidents	Count	48	74	95	95		312
Apparatus	Count	95	155	196	204		650
Turnout	% @ 2.00	10.90%	33.80%	43.50%	27.80%	10	31.50%
Travel	% @ 4.00	67.40%	75.70%	71.70%	71.10%	10	71.90%
Dispatch to Arrival	% @ 6.00	39.60%	63.50%	64.20%	69.50%		61.90%
Call to Arrival	% @ 7.00	43.80%	70.30%	71.60%	72.60%		67.30%
Station 36							
Incidents	Count	6	31	29	18		84
Apparatus	Count	13	94	73	36		216
Turnout	% @ 2.00	0.00%	28.60%	14.80%	16.70%	5	19.00%
Travel	% @ 4.00	0.00%	25.00%	37.00%	33.30%	5	29.10%
Dispatch to Arrival	% @ 6.00	0.00%	26.70%	34.50%	33.30%	1	28.90%
Call to Arrival	% @ 7.00	0.00%	19.40%	34.50%	38.90%		27.40%

Finding 8

The District's 90 percent performance point for total response time when measured district-wide (disregarding population categories) for fire/EMS incidents is 9 minutes.

Finding 9

The District's total response time measured district-wide (disregarding population categories) for fire/EMS incidents, is longer than 7 minutes due to all three-response time components being past a best practices recommendation:

Dispatch @ 1:30 instead of 1:00

Turnout @ 3:00 instead of 2:00

Travel @ 5:30 instead of 4:00

If the District, with training and crew performance tuning, could save 30 seconds at dispatch and 1 minute at turnout, then the 90 percent performance measure becomes 7:30 without adding any companies.

Achieving 4 minute travel 90 percent of the time will be impossible measured district-wide given the road network design and outer hilly area topography of the District. However, this is achieved in the core business and higher density residential areas in the I-680 corridor.

Given the population density diversity in the District a single district-wide deployment goal is not appropriate. The District needs to adopt deployment measures based on population density, risk assessment and desired outcomes for each population density area.

2.11.8 Simultaneous Incident Activity

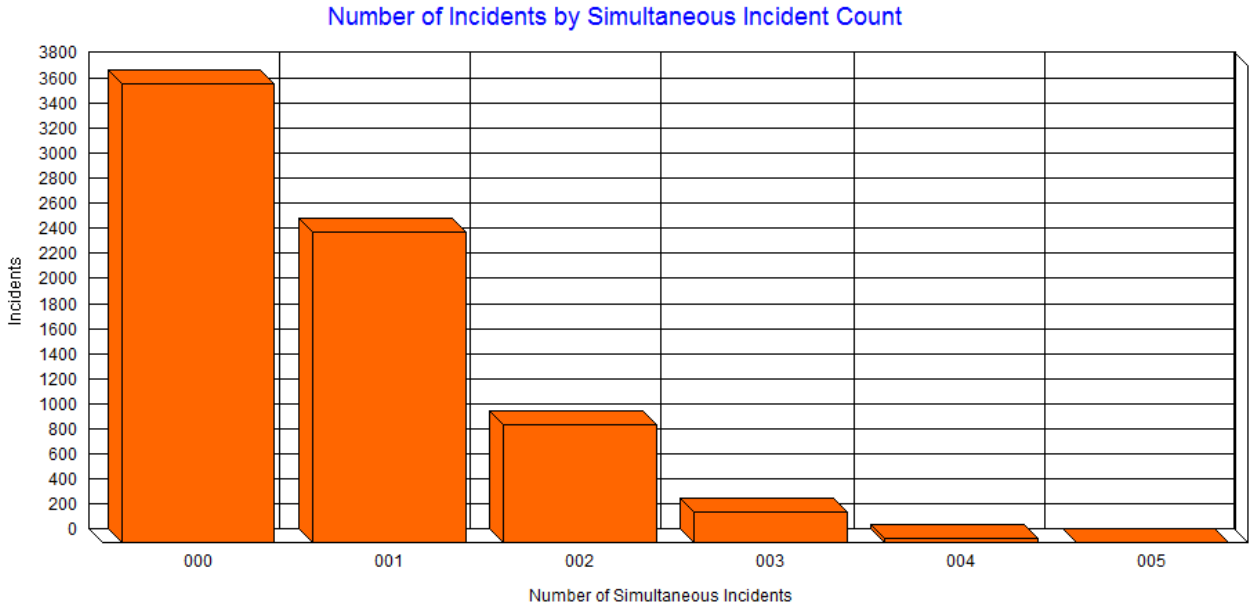
A simultaneous alarm occurs when an incident originates before a prior incident has terminated. This section quantifies simultaneous or overlapping incidents.

When overlapping incidents occur District resources are taxed. Examining incident data for 2008 shows 50.34 percent of incidents occurred when the District was already engaged in other response activity.

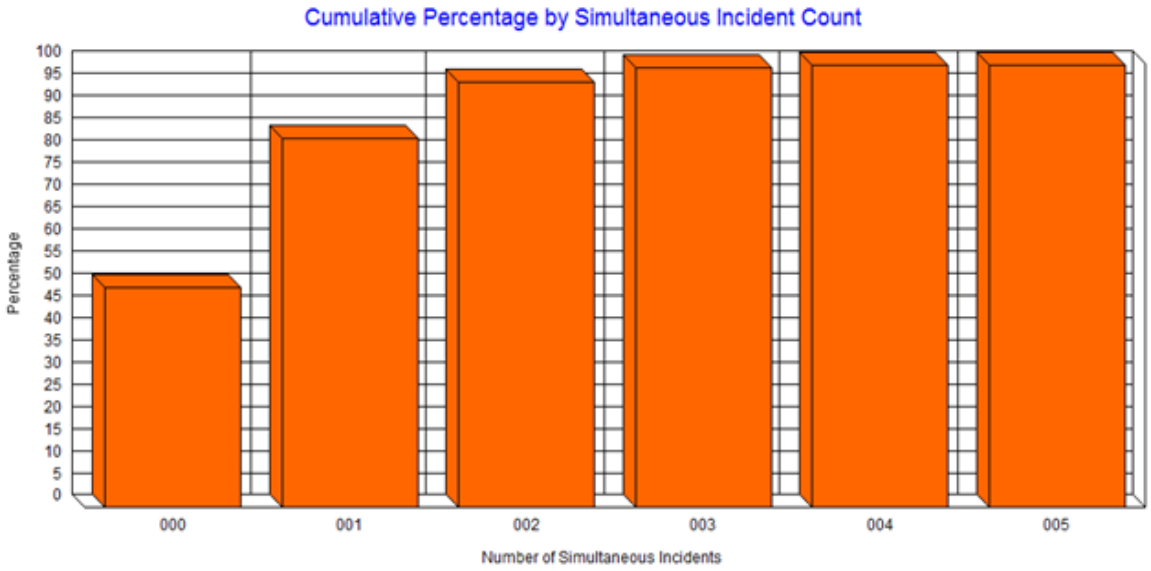
Below is the breakdown by number of incidents.

At least 2 incidents occurring at the same time	50.34%
At least 3 incidents occurring at the same time	16.72%
At least 4 incidents occurring at the same time	4.01%
At least 5 incidents occurring at the same time	.68%

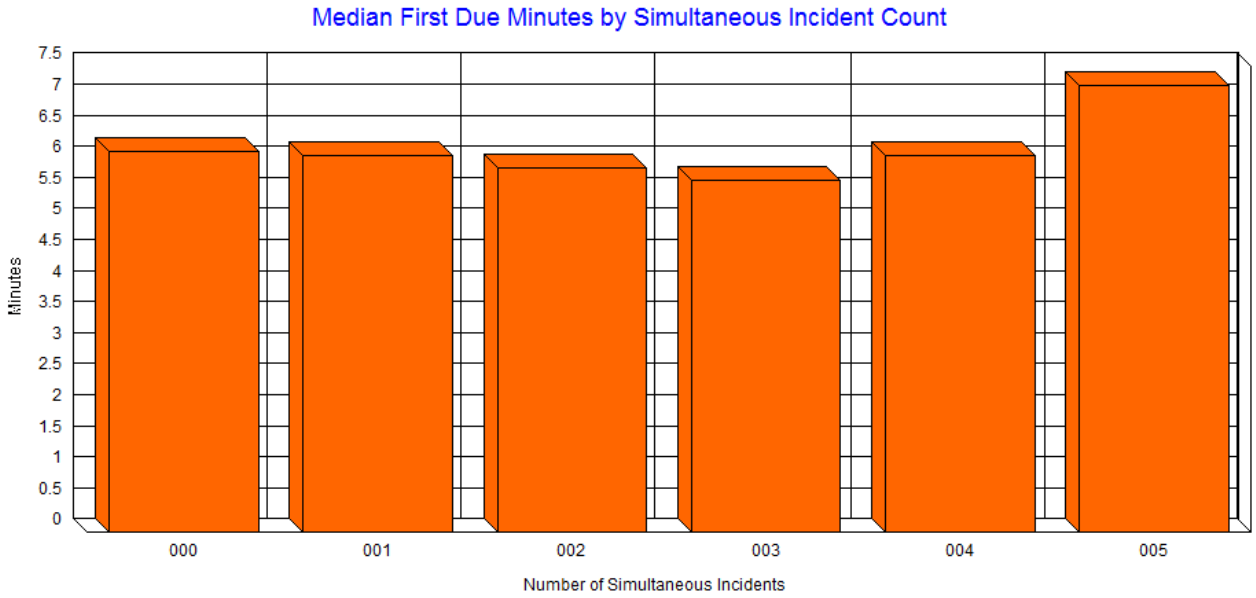
This graph below illustrates the number of simultaneous incidents. “000”, “001”, “002”, etc. indicate the number of incidents underway when a new incident originated.



The cumulative percentage of incidents by simultaneous incident count provides another model of simultaneous incident activity. Here we see approximately 50 percent of incidents take place when no other incidents are underway.

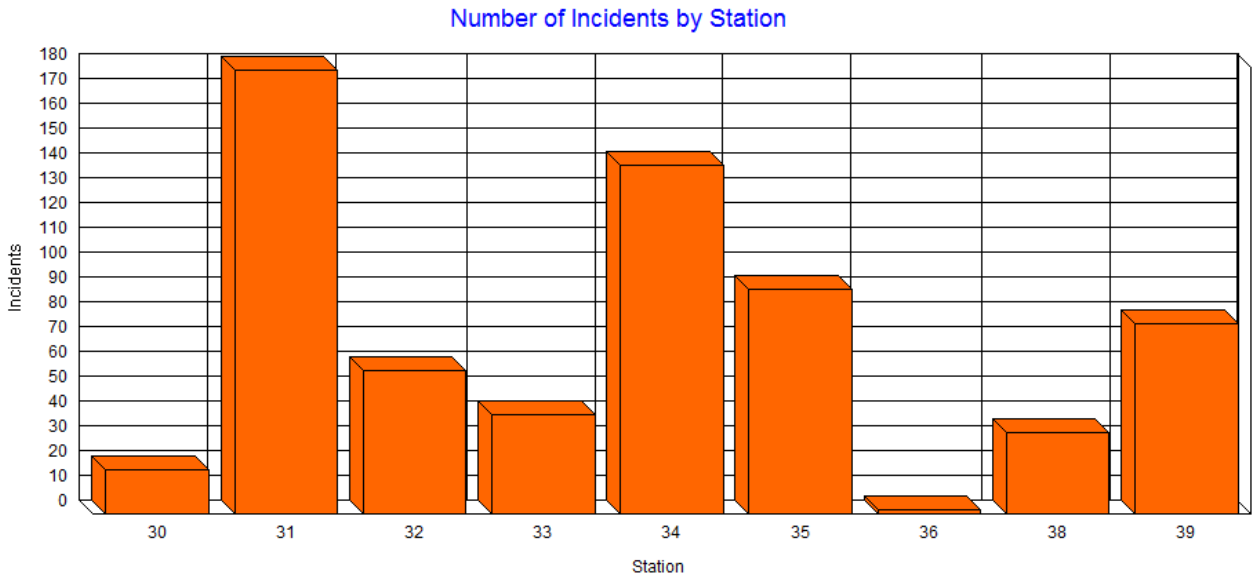


The following graph illustrates the affect of multiple simultaneous incidents on a first apparatus arrival compliance goal of 7 minutes. This data is for 2008. Notice compliance generally declines as the number of simultaneous incidents increase. Incidents occurring during four or five or more simultaneous incidents are very rare and subject to volatility.



2.11.9 Simultaneous Incidents by Station Area

Another way to measure simultaneous responses is when simultaneous incidents occur within the same station area. The District experienced simultaneous incidents within a single station area 639 times in 2008 (8.64 percent).



Station 31 is the most likely station area to experience overlapping incidents.

2.11.10 Interdepartmental Aid

Interdepartmental aid quantifies the number of incidents in which the District received tactical assistance from other fire departments or provided assistance to other fire departments.

Only a small percentage of District incidents involve aid. During 2008, aid types breakdown as shown below.

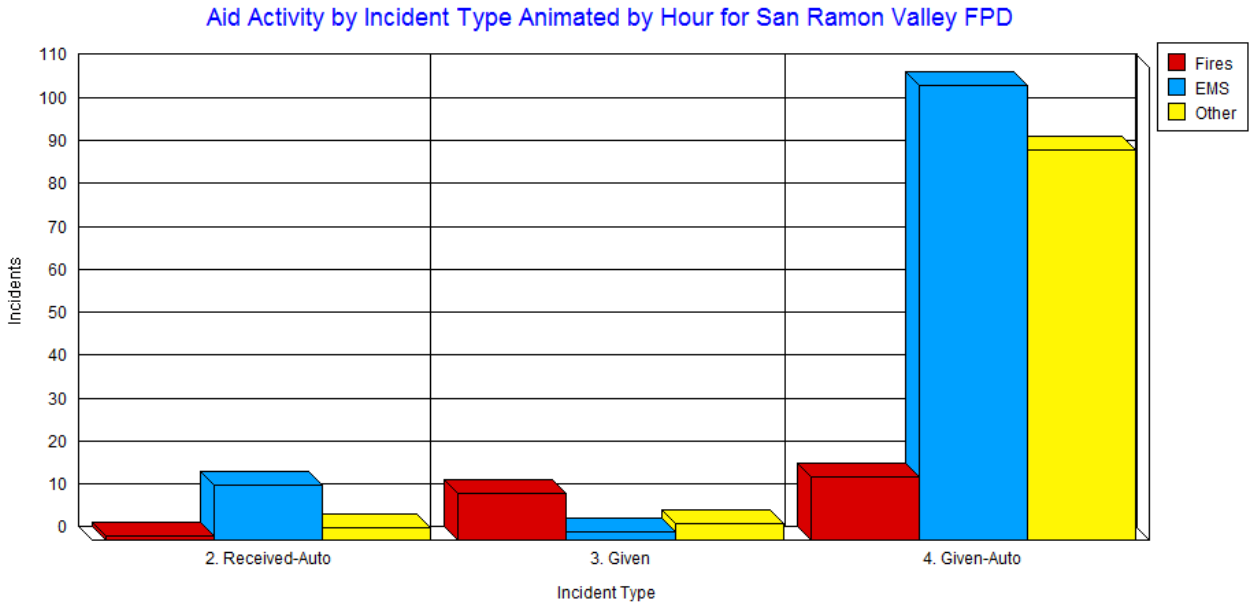
Aid Type	*Count*
1 Received	0
2 Auto Aid Received	17
3 Given	17
4 Automatic Aid Given	212
5 Other Aid Given	0
N None	7,145

The District is far more likely to give interdepartmental aid than to receive. Below is a summary.

Mutual/Auto Aid Report for All Incidents

Incident Type	*Count*	*Percent*
Incidents Involving Mutual/Auto Aid	246	3.33%
Aid Incidents for Fires	27	10.98%
Aid Incidents for EMS	121	49.19%
Aid Incidents for Others	98	39.84%
Incidents Involving Mutual/Auto Aid Received	17	6.91%
Incidents Involving Requested Aid Received		.00%
Incidents Involving Automatic Aid Received	17	6.91%
Incidents Involving Aid Given	229	93.09%
Incidents Involving Requested Aid Given	17	6.91%
Incidents Involving Automatic Aid Given	212	86.18%
Incidents Involving Other Types of Aid Given		.00%

Below is a graphical representation of District interdepartmental aid by aid type and incident type. The highest activity is in the category of automatic aid given.



Finding 10

The District's simultaneous call rate of 50 percent is not of particular concern due to the District's total daily deployment system depth as evidenced by the fact the District gives more mutual aid than it receives from its partner agencies. Also the District does have strong mutual aid agreements that help it maintain performance during times of resource strain or depletion.

2.11.11 First Alarm Fractile Compliance

Measuring the time it takes the first apparatus to arrive on the scene is very important. Equally important is the amount of time it takes a full first alarm assignment to reach the scene of structure requiring an organized multi-company response.

In three years the District responded to 105 building fires, 87 of which were not aid given. Of those 87 local building fires, 51 had more than a minor dollar loss. Here is a breakdown for those 51 structure fires.

First Apparatus Arrival Times

One record with a response time greater than 20 minutes was eliminated.

50 incident records were analyzed.

1st Apparatus on Scene <= 00:04:00 12.0% (6)
1st Apparatus on Scene <= 00:06:00 34.0% (17)
1st Apparatus on Scene <= 00:07:00 60.0% (30) – *SRVFPD Board policy goal point (Urban)*
1st Apparatus on Scene <= 00:08:00 72.0% (36) – *SRVFPD Board policy goal point (Suburban)*
1st Apparatus on Scene <= 00:09:00 88.0% (44)
1st Apparatus on Scene <= 00:09:15 90.0% (45) – *Actual district-wide performance @ 90%*
1st Apparatus on Scene <= 00:12:15 100.0% (50)

First Alarm on Scene – 3 Engines 1 Ladder

Given that some of the structure fires were handled with fewer than the full set of first alarm resources, below is the time performance of a minimum first alarm of 3 engines and 1 ladder.

6 records with a first alarm arrival greater than 30 minutes were eliminated.

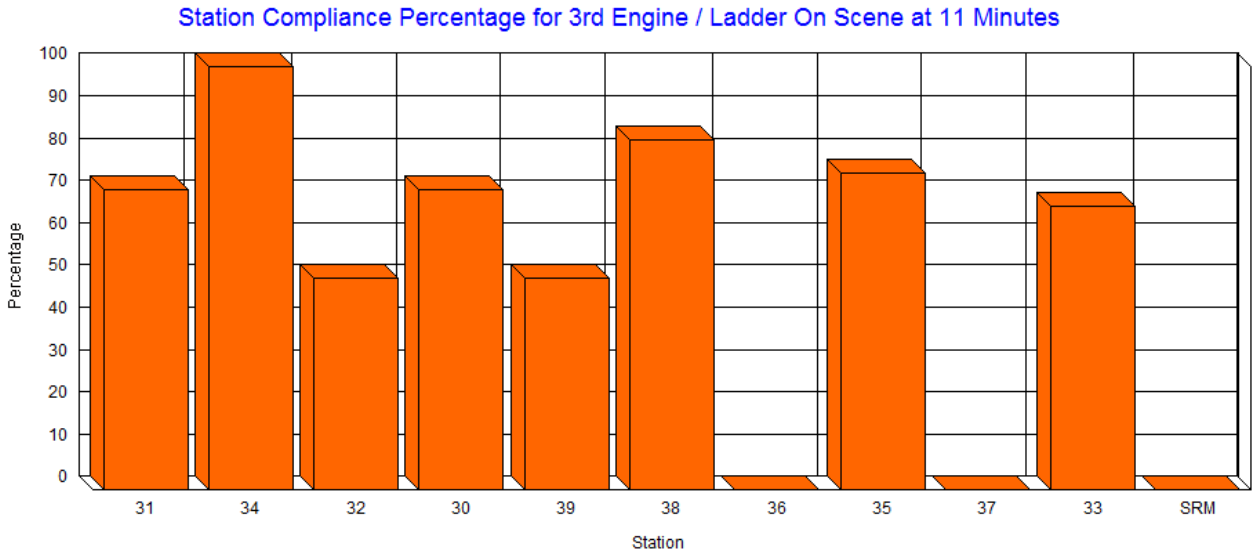
45 incident records were analyzed.

1st Alarm on Scene <= 00:04:00 .0% (0)
1st Alarm on Scene <= 00:05:00 .0% (0)
1st Alarm on Scene <= 00:06:00 .0% (0)
1st Alarm on Scene <= 00:07:00 .0% (0)
1st Alarm on Scene <= 00:08:00 8.0% (2)
1st Alarm on Scene <= 00:09:00 16.0% (4)
1st Alarm on Scene <= 00:10:00 28.0% (7)

1st Alarm on Scene <= 00:11:00 36.0% (9) – *SRVFPD Board policy goal point (Urban)*
1st Alarm on Scene <= 00:12:00 40.0% (10) – *SRVFPD Board policy goal point (Suburban)*
1st Alarm on Scene <= 00:13:00 48.0% (12)
1st Alarm on Scene <= 00:14:00 68.0% (17)
1st Alarm on Scene <= 00:15:00 72.0% (18)
1st Alarm on Scene <= 00:16:00 84.0% (21)
1st Alarm on Scene <= 00:17:00 84.0% (21)
1st Alarm on Scene <= 00:17:15 88.0% (22)
1st Alarm on Scene <= 00:18:00 88.0% (22)
1st Alarm on Scene <= 00:19:00 88.0% (22) – *Actual district-wide performance @ 90%*
1st Alarm on Scene <= 00:20:00 92.0% (23)
1st Alarm on Scene <= 00:23:30 100.0% (25)

Concentration Percentage

In the graph below, 2008 apparatus responses were filtered to engine and ladder responses and isolated to the third arriving engine or ladder company. The graph below was constructed for these 71 incidents showing the percentage of compliance for the third arriving engine / ladder by station. The station with the most third arrivals is listed first.



In the table above there are a total of only 70 responses in 2008 that saw three units – either engines or two engines and a ladder – arrive on scene after being dispatched together. The time performance is:

Last Apparatus on Scene <= 00:16:30 88.6%
Last Apparatus on Scene <= 00:16:45 91.4%

If only structure fires are measured for the arrival of the first three engines or two engines and one ladder in 2008 there are only 21 occurrences:

Last Apparatus on Scene <= 00:15:45 85.7%
Last Apparatus on Scene <= 00:16:00 90.5%

These measures are better than the complete first alarm shown above at about 19:30 min/sec. So while the ladder, battalion chief and or medic unit being single resources, do slow down the 90% performance point. This measure is slower than the mapping model suggests, as the reality is that with so few incidents in only one year, a quantity of structure fire incidents at the outer edges of the suburban population density areas, or the effect of simultaneous calls for service at peak hours, can really slow the first alarm last unit on scene performance.

Going forward with its revised deployment measures, the District can review this data over a longer time period to determine the actual situation and what other factors may be at play to cause this data to diverge from the mapping predications.

Finding 11

The District's initial three unit first alarm 90 percent performance at 16:00 minutes/seconds averaged district-wide is misleading as there are very few full working structure fires and many of these are in homes in the outer edge hilly terrain areas. The mapping model is a more accurate indicator of what the first alarm performance will be in the more developed core of the District in the I-680 corridor.

2.12 Performance Measures

The District serves a very diverse and geographically challenging area. Population drives service demand and development brings population. Most of the underserved areas have low population densities. For accurate deployment service level goals, the District has been divided into urban, suburban, and rural population densities. The District has adopted performance goals based on population densities so it can monitor its performance in each unique area and add resources once an area exceeds the target population and call for service volumes.

Adopting such performance measures also help the District explain to both development interests and new residents what service levels are planned for in an area and that costly services are not added before they are warranted.

Finding 12

At this time, given the predicted coverage from the mapping models and the good response time performance in most areas, the District is not in immediate need of adding fire stations.

2.12.1 Response Time Benchmark Goals

On December 17, 2009 the Board of Directors adopted fire deployment measures for different service areas based on population density per square mile and its risk assessment data consistent with national best practices from the CFAI Standards of Response Cover 5th Edition, NFPA 1710, NFPA 1720 and desired District service delivery outcome goals.

The District revised fire unit deployment performance measures based on population density area to direct fire station location and crew size planning. The measures take into account a 1 minute dispatch time, a crew turnout time of 2 minutes, and are designed to deliver outcomes that will save patients medically treatable upon arrival; and to keep small, and serious fires from becoming greater alarm fires.

Goal 1

Distribution of Fire Stations for Built-up Urban Areas of Greater than 2,000 People per Square Mile

To treat and transport medical patients and control small fires, the first-due unit should arrive within 7 minutes total response time, 90 percent of the time from the receipt of the call in fire dispatch. Total response time equates to 1 minute dispatch time, 2 minute crew turnout time and 4 minutes travel time spacing for single units.

Goal 2

Distribution of Fire Stations for Suburban Areas of 1,000 to 2,000 People per Square Mile

The first-due fire unit should arrive within 8 minutes total response time, 90 percent of the time.

Goal 3

Distribution of Fire Stations for Rural Areas of Less than 1,000 People per Square Mile

The first-due fire unit should arrive within 15 minutes total response time, 90 percent of the time.

Goal 4

Effective Response Force (First Alarm) for Urban Areas of Greater than 2,000 People per Square Mile

To confine fires near the room of origin, to stop wildfires less than 5 acres in size when noticed promptly, and to treat up to 5 medical patients at once, a multiple-unit response of at least 18 personnel should arrive within 11 minutes total response time from the time of 911 call receipt, 90 percent of the time. This equates to 1 minute dispatch time, 2 minutes crew turnout time and 8 minutes travel time spacing for multiple units.

Suburban areas should receive the full first alarm within 12 minutes total response time, 90 percent of the time with the goal to limit the fire spread to the area already involved upon the arrival of the effective response force.

For rural areas, this should be 21 minutes, 90 percent of the time. Outcome goals in these areas would be to confine fires to the building of origin, to care for medical patients upon arrival, and to initiate operations on serious wildland fires.

Goal 5

Hazardous Materials Response

Respond to hazardous materials emergencies with enough trained personnel to protect the community from the hazards associated with the release of hazardous and toxic materials. Achieve a total response time consistent with Goal 1, Goal 2 and Goal 3 with the first company capable of operating at the California OSHA First Responder Operations (FRO) level. After size-up and scene evaluation is complete a determination will be made whether to request the on-duty District Hazardous Materials Team and/or other appropriate resources.

Goal 6

Technical Rescue

Respond to technical rescue emergencies with enough trained personnel to facilitate a successful rescue. Achieve a total response time consistent with Goal 1, Goal 2 and Goal 3 with the first company capable of operating at the California Rescue System 1 (RS1) level. After size-up and scene evaluation is complete a determination will be made whether to request the on-duty District Rescue Team and/or other appropriate resources.

Goal 7

Call processing and turnout times

A concentrated focus will be placed on systems, training and feedback measures to crews to lower dispatch and turnout time reflex measures to national best practices of 1 minute for dispatch and 2 minutes for fire crew turnout, 90 percent of the time.

Response Time Benchmark Goals (Adopted)

Population Category	*1st Due Travel Time Minutes*	*1st Due Reflex Time Minutes*	*1st Alarm Travel Time Minutes*	*1st Alarm Reflex Time Minutes*
Urban	4:00	7:00	8:00	11:00
Suburban	5:00	8:00	9:00	12:00
Rural	14:00	17:00	18:00	21:00

ABOUT US

The San Ramon Valley Fire Protection District provides all-risk fire, rescue and emergency medical services to the communities of Alamo, Blackhawk, the Town of Danville, Diablo, the City of San Ramon, the southern area of Morgan Territory and the Tassajara Valley, all located in Contra Costa County. The District's service area encompasses approximately 155 square miles and serves a population of 167,500.

The District maintains nine career fire stations and one volunteer-staffed station, an administrative office building and other supporting facilities all strategically located throughout the jurisdiction. The District staffs fifteen companies, including structure and wildland engines, ladder trucks, ALS ambulances, and specialized Hazardous Materials, Rescue, Communications and other support units. The District also operates its own nationally accredited (NAEMD) 911 communications center.

The District's Fire Prevention Division manages several significant community risk reduction initiatives including notable vegetation and hazard abatement programs, plan review and engineering services, and comprehensive code enforcement and fire investigation activities. The Division also produces and delivers numerous programs intended to promote and teach fire safety, CPR/AED skills and emergency preparedness.

Within the boundaries of the District are expansive wildland and recreation areas, large single-family homes and multi-family residential complexes, hotels, a regional hospital and a 585-acre business park. The District is also bisected by a major interstate highway (I-680).

The San Ramon Valley Fire Protection District is an autonomous Special District as defined under the Fire Protection District Law of 1987, Health and Safety Code, Section 13800, of the State of California. A five-member Board of Directors, elected by their constituents and each serving a staggered four-year term, govern the District. The Fire Chief oversees the general operations of the District in accordance with the policy direction prescribed by the Board of Directors. The Fire Chief also serves as the Treasurer for the District.

The major revenue sources of the District are property taxes (92%), ambulance service fees and interest income. Total income for the year ending June 30, 2009 was $55,967,884. The District employs approximately 190 personnel. The *Comprehensive Annual Financial Report* (CAFR) provides complete financial statements for the District.

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San Ramon, CA 94583
www.firedepartment.org