January 2014

DRAFT REPORT: Evaluation and Options Appraisal

Contra Costa County Fire Protection District
Contra Costa County, CA

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CONSULTANT REPORT

Contra Costa County Fire Protection District - Contra Costa County, CA
Draft Report: Evaluation and Options Appraisal

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EXECUTIVE SUMMARY

In Spring 2013, emergency services consulting firm Fitch & Associates (*FITCH* or the Consultants) was engaged to determine the optimal emergency service response coverage, (both fire and first response) that could be provided by Contra Costa County Fire Protection District (ConFire) within its defined fiscal limitations. At project initiation, ConFire's financial position was deteriorating and considered critical. The public had rejected a District tax initiative that would have provided additional funding. Multiple fire companies were eliminated and fire stations shuttered in order to preserve fund balances that would allow the organization to function while contingency plans were developed.

By October 2013, property tax revenues began to increase slightly after several years of decline and additional relief came in the form of a one-time grant reimbursement and lower expense estimates for retirement contributions. Nevertheless, significant financial constraints remain. Of grave concern is the lack of funding for infrastructure or rolling stock — a need that will quickly become an emergency. The public, who will be asked to support another tax initiative in the near future, wants to see that ConFire is embracing change to become more efficient and effective.

Outlined below are a synopsis of the primary study finding, summary observations of ConFire's current state and *FITCH's* detailed data analysis framework that was used to assess ConFire's performance. The options *FITCH* has developed are short-term solutions that may sustain ConFire for three to four years depending on critical factors including: revenue estimates holding true, no material increases in salary or other expenditures, no need for heavy apparatus replacements, and no occurrence of natural or other disasters. The three options for consideration are:

- Maintain Status Quo
- Implement the Optimized Service Delivery Model Option (Three/Two Response Staffing)
- Implement the Single Patch Alternative Responder Personnel Option

The body of the report provides a snapshot of ConFire's financial state, followed by detailed data analysis of operational performance and more lengthy descriptions of the options developed. The operational analyses conducted, while highly technical in nature, serve to demonstrate both the performance characteristics and the viability of the options presented.

SYNOPSIS OF PRIMARY FINDING

ConFire's role is to mitigate risks imposed by emergency medical and fire related incidents. Response times are a fundamental **measure** of ConFire's ability to mitigate risk—**longer** response times are considered by the community as an indicator of reduced performance and **shorter** response times are considered to reflect improved performance.

In January 2013, ConFire closed four stations and decommissioned four frontline fire units. Using AVL (Automatic Vehicle Location) data, response times for the last half of 2012 and the first half of 2013

were compared to understand the impact of stations closures. Response times are defined as the time interval starting with 911 call pick-up to first ConFire unit on scene measured at the 90th percentile.

For life-threatening Priority 1 and Priority 2 EMS calls, response times are as follows:

- July through December 2012 (28 companies): 10 minutes 17 seconds
- January through June 2013 (24 companies): 10 minutes 24 seconds

For Priority 1 and Priority 2 fire calls, response times are as follows:

- July through December 2012 (28 companies): 10 minutes 24 seconds
- January through June 2013 (24 companies): 10 minutes 42 seconds

The impact of decommissioning four fire companies was six and 18 seconds longer response times for EMS and fire calls, respectively. The response time changes are relatively insignificant.[1]

When units can be removed from a system without significantly degrading response performance, the system is "saturated" as discussed further the section titled "Designing the System." Should ConFire reopen and reactivate the four stations and companies using its current traditional service model, the cost would be approximately $9 million and the response time benefit would be to gain back six and 18 seconds, respectively.

Notwithstanding the fact that ConFire has comparable response times to fire and EMS calls, there are benefits to be gained by implementing the proposed Option Two — Optimized Three/Two Response Staffing. This option involves transitioning several three-position engine companies and reassigning those crews to two-position quick response vehicles (QRVs). For every two engine company decommissioned, three QRVs are added to the system — a two to three conversion. The cost is that of capital to purchase the QRVs at approximately $150,000 per unit. Once an optimal mix of units is distributed throughout the system using exiting personnel, any additional financial resources can be directed at the much-needed capital replacement fund.

The attributes and benefits of Optimized Three/Two Response Staffing Option 2 include:

- The personnel capacity of the system to respond to fire-related incidents is maintained at an adequate level and both the capacity and flexibility for response to EMS incidents is increased.
- ConFire is proactively positioned to meet anticipated increases in EMS call volume, while meeting the needs of diminished fire call trends (based on 20 year national projections).
- There are no changes in schedules for firefighters to be negotiated.
- The useful lifetime of the heavy fire fleet is extended by shifting EMS mileage to the less expensive QRVs.
- Stations can be reopened at a significantly lower cost, thereby preserving fund balances.
- ConFire demonstrates and the public perceives positive change.

[1] Composite total response times weighted for Priority 1 and Priority 2 emergency fire and EMS calls.

CURRENT STATE — OBSERVATIONS

The Organization

- § ConFire is generally well organized and reasonably efficient in its emergency response operations. ConFire is under-resourced in the context of fire service industry "standards of cover" and in comparison to the average staffing ratios of other fire departments located in the western United States.
- § ConFire's fire prevention program is a contemporary, well-organized and efficient operation that uses an enterprise business model to fund almost all of its expense.
- § ConFire does not have sufficient resources in place to provide appropriate support services. Historically, these areas of the organization have taken the brunt of budget cuts.
- § Data from ConFire's Computer Aided Dispatch (CAD) system was found to be patient/incident centric in that it reported response times to calls for the *system* rather than reporting specifically on ConFire's performance. While this is a positive attribute for patients and property, analyses of ConFire's performance required that data be accessed from ConFire's automatic vehicle location (AVL) system. ConFire's monthly reports of response times are based on CAD data that should be verified against AVL data before decision-makers rely upon it.
- § Beginning in 2013 and going into 2014, three members of ConFire's senior management team will be new to their positions, including the recently appointed Fire Chief, Jeff Carman, a 29-year veteran of the Roseville Fire Department (CA). Accompanying this change is a revision in the reporting relationships, as the fire chief will now report to the County Administrator rather than to the District Board.
- § The Contra Costa County Grand Jury released a report in May 2012 calling for area fire departments including ConFire, to move "outside the box" and implement alternative service delivery models in order to align revenues and costs and operate at a level consistent with citizen expectations.

Emergency Response

- § For 90% of calls, high performance EMS systems in North American strive to respond to life threatening emergencies in eight minutes fifty-nine seconds from time of phone pick up at 911 until a unit arrives on scene. For the first half of 2013, ConFire's response time performance from 911 call ring-in to first ConFire unit on scene for EMS calls is ten minutes 23 seconds on 90% of calls.[2]
- § The largest change in the number of frontline units occurred in January 2013 when four units were decommissioned. As a result, the composite response time for life-threatening EMS calls was longer by only six seconds after the closures.
- § ConFire's response time goals include complying with NFPA® 1710, a non-regulatory, industry standard for the organization and deployment of fire suppression operations. This standard stipulates that a fire engine company should arrive on emergency calls within a range of six minutes 15 seconds to six minutes 45 seconds from call ring in to first unit on scene on 90% of

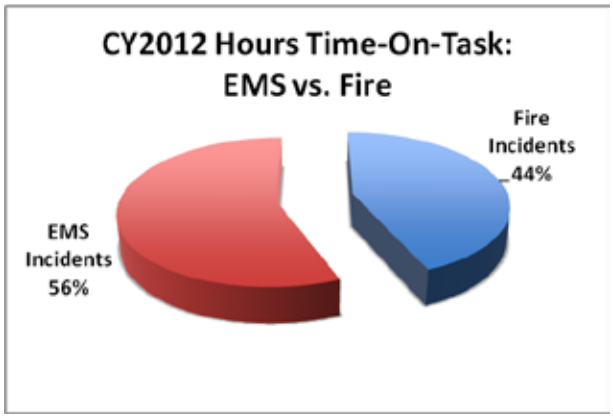
[2] Based on composite weighted AVL call data for EMS Priority 1 and 2 calls for January 1, 2013 through June 30, 2013.

incidents. For the first half of 2013, ConFire responded to 90% of Priority 1 and Priority 2 fire calls in 10 minutes 42 seconds.[3] While NFPA 1710 is a laudable goal, to which many fire departments aspire, it is not commonly achieved.

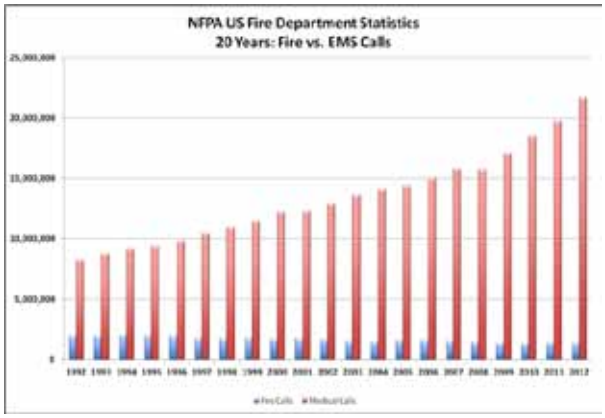
- § After four frontline units were decommissioned in January 2013, ConFire's response time to fire calls lengthened by 18 seconds compared to the prior six months. There was little change in response times because station closures were remote from areas of high call densities.
- § Crew chute time (time from when a unit is assigned to a call and the crew leaves the station) is two minutes 57 seconds and is longer than expected. Faster chute-time by crews can shorten ConFire's overall response time to incidents at little incremental cost. Chute time should be less than two minutes at the 90th and could reduce total response time by a minute.
- § ConFire routinely provides surrounding agencies more hours of mutual aid than it receives. Between 2012 and the first half of 2013, the pace of out-bound mutual aid almost doubled. Mutual aid to other jurisdictions consumes up to 18% of ConFire's time responding to and working EMS and fire calls.
- § Analysis of 75 major incidents that require between six and 14 ConFire frontline units showed that here was no negative impact on response times to the 1,081 calls that occurred simultaneous to the major incidents.

The figures below are representations of ConFire EMS and fire activities and the growth of EMS in the fire service. The figures are also found in the body of the report in the section titled "Time-on Task" and "Activity in the System – Quantitative Distribution."

ConFire Hours on Fire vs. EMS Calls



EMS vs. Fire Call Growth in US Fire Service



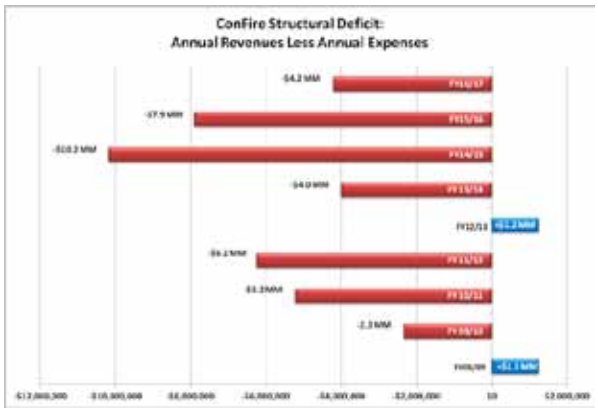
[3] Based on composite weighted AVL call data for fire Priority 1 and 2 calls for January 1, 2013 through June 30, 2013.

Fiscal Observations

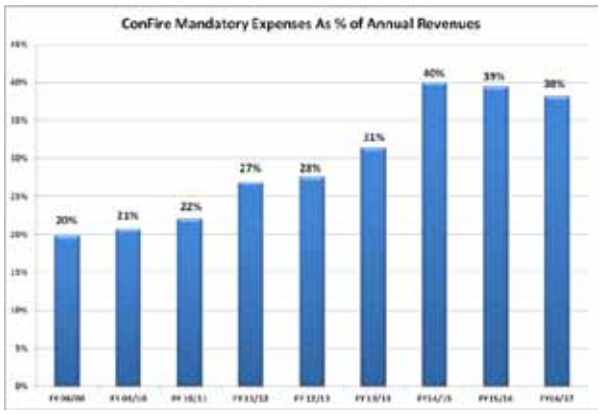
- § In late 2012, Contra Costa Fire District residents rejected a ballot initiative to increase funding for ConFire. Voters expressed desire for change and improved efficiencies in the fire department and that sentiment was echoed in stakeholder meetings.
- § From January 2011 through December 2013, seven response companies were eliminated and position reductions occurred through attrition; there were no firefighter layoffs.
- § Anticipated increases in property tax revenues and lower retirement expenses partially alleviated ConFire's immediate fiscal crisis. However, continuing structural deficits coupled with zero budgets for pressing fleet and infrastructure needs will threaten even short-term financial sustainability.
- § The ConFire Board of Directors will likely recommend a tax initiative within the next three years to meet ongoing service and capital needs. Options for change other than status quo will better position a ConFire initiative for voter approval.
- § The fact that operational plans going forward contain no budget provisions for capital replacement is a concern. The need for capital replacements will transition from being urgent to critical. This escalation is a certainty. How it plays out is a race of probabilities against time. An appropriate capital replacement plan is estimated at $4 million per year.
- § Both Moody's Investor Service and Standards & Poor's Rating Services downgraded ConFire's bond rating based on trends of weakened and structurally unbalanced financial operations.

The figures below are graphic representations of key financial findings. The figures are also found in the body of the report in the section titled "Financial State."

ConFire Structural Deficits



Mandatory Expenses as % of ConFire Budget



Communications Center Observations

- Analysis of Communications Center performance shows that station closures had no discernible impact on dispatch performance. For dispatching EMS calls, the ConFire Communications Center performs within seconds of the NFPA 1221 performance standards. It does not meet NFPA performance standards for dispatching fire calls.
- Call-handling from call ring-in until assignment of a unit to the call is longer when compared to high performing communications centers. By implementing a fire-based protocol for call taking, with its increased discipline, call-handling time could be decreased by up to one minutes thereby improving ConFire's overall response time to incidents.
- Accreditation status for the Communications Center lapsed due to budget constraints. It is in the best interest of the District and the County that protocol-based dispatch accreditation for EMS calls is re-established. In addition, protocol-based dispatch is recommended for fire calls.
- Communication Center staffing reflects a maximum of four to five dispatchers on site at all times and available for recall. Actual staffing at the consoles changes depending on the time of day and activity. It ranges from one dispatcher up to the maximum of five. Dispatchers work 48 hours on and 96 hours off on a schedule that corresponds to the suppression shift schedules. This is an uncommon dispatcher shift schedule in the industry. Surge capacity is hindered by these shifts and at some point a full dispatch review should be instituted in order to align the ConFire Communications Center with best practice.

OPTIONS GOING FORWARD

The options proposed for ConFire are short-term strategies designed to address immediate and significant underlying financial problems. The following expected events will likely exacerbate ConFire's precarious financial situation:

- increases in EMS call demand,
- concessions to labor for increases in salary and/or benefits,
- the need to replace critical fire apparatus.

Additionally, should ConFire experience a significant wildfire season or other natural disaster resulting in non-reimbursed expenses, even more fiscal pressure will be exerted. ConFire must make demonstrable changes in service delivery to be credibly positioned with voters for a new tax initiative.

Option 1 — Maintain Status Quo

Continue staffing three-person companies and otherwise maintain operations at current levels. Monitor property tax revenues. Anticipate requesting a tax increase closely following a potential change in majority requirements to pass tax initiatives. This option leaves current budgets in place and provides no funding for fleet maintenance, vehicle replacement, fire stations or dispatch infrastructure needs.

Status Quo Advantages

This option maintains maximum number of fire suppression apparatus on the road and introduces little change to the current system.

Status Quo Disadvantages

Constituents are seeking change. This option involves no material change in the current system. Should ConFire choose to introduce light rescue vehicles, any savings will not be achieved quickly. The system will appear to be virtually stagnant. Voters who have demanded change will likely be disappointed.

Prior Board decisions to decommission fire companies saved several million dollars. Option 1 provides the Board little flexibility to bring companies back on line due to the significant payroll cost using the traditional/status quo, staffing model.

Any decision to add back units or reopen stations will deplete fund balances more quickly than current projections.

Option 2 — Optimized Three/Two Response Staffing

Convert a select number of three-person companies to two person quick response vehicle (QRV) companies, thereby providing additional response units, expanded coverage, and improved response times to emergency events.[4] Modify deployment plans with an eye towards staffing stations that are now closed. The option utilizes the existing personnel roster and requires capital costs of approximately $100,000 to $200,000 for each fully equipped vehicle. QRVs could be phased into the system as funds become available to purchase vehicles.

Three/Two Response Staffing Advantages

This option results in additional units on the road, and reopens fire stations. The Option incurs no additional payroll costs.

There is no change to firefighters' work schedules.

As QRVs are integrated into the system, the workload on the heavier, more expensive apparatus is lessened thereby extending replacement cycles saving both capital and maintenance costs. Upfront costs are minimal, compared to the resulting service expansion.

Resources required to respond to EMS calls are maximized while maintaining necessary resources required for fire protection. Engines remain in stations and are available for fire responses using QRV crews, should additional apparatus be needed on an incident.

[4] The conversion is three to two meaning the decommissioning of two engines allows for deployment of three QRVs while utilizing the same number of personnel and no additional overtime.

For every two engines replaced, three quick response vehicles are added to the system. ConFire is thereby better able to address any increase in EMS call volume. The change is noticeable to the public and positions ConFire as a progressive organization seeking to become more efficient and effective.

This option has least potential impact on the District's ISO rating because there is neither a reduction in firefighter personnel nor a reduction in heavy apparatus.

Three/Two Response Staffing Disadvantages

To deploy QRVs, a capital purchase is required. One such vehicle is currently in use as a pilot project. Optimally purchase and deployment would occur immediately but could be phased into the operations.

This option also requires a different deployment strategy and increased adaptability in the way service is delivered. These challenges, while simple to describe, are complex to implement without ongoing leadership effort.

Option 3 — Single Patch Personnel for EMS Response

The premise of this option is to substitute current firefighter personnel (fire and EMS dual-certified) with lower cost single-purpose (EMS certified) personnel.

One of the key drivers of emergency service is personnel cost. Likewise, ConFire's largest budgetary item is frontline human resource costs. This is neither unusual nor unexpected. Firefighters have a number of diversified skills that they employ in the field. Many of these skills require specific training and there are real costs for both certification fees and replacement costs for frontline firefighters while they are trained. Patient care activities require that firefighters obtain and maintain at minimum, basic emergency medical technician (EMT) or paramedic certification. In addition, personnel can obtain a number of additional specialized emergency medical certifications. For example, several ConFire firefighters are certified in Advanced Cardiac Life Support, Pediatric Advanced Life Support and Pre-Hospital Trauma Life Support.

This option recognizes the specialty field of EMS and suggests that personnel whose sole purpose is emergency medicine be utilized for some or all EMS calls. Surveys of response personnel indicate that non-firefighter EMTs and paramedics earn substantially less than a firefighter who is also an EMT or paramedic. Option 3 provides a closer match of personnel skills with the largest task at hand in ConFire – EMS calls.

Implementation of Option 3 would take place over time as firefighter attrition occurs. No layoffs are anticipated. Smaller quick response type vehicles would be used, thereby reducing the workload and stretching out the replacement cycle of heavier engines and other apparatus.

Single Patch Personnel Advantages

This option introduces a different certification requirement for ConFire personnel. This would likely allow for a lower labor and retirement costs and introduce flexibility into the schedule that would further allow a matching of supply and demand.

Implementation of Option 3 could take place over time as firefighter attrition occurs. No layoffs are anticipated. Smaller quick response type vehicles would be used thereby reducing the workload and stretching out the replacement cycle of heavier engines and other apparatus.

Single Patch Personnel Disadvantages

Savings may be unsustainable over time, as labor pressure exists to increase wages to comparable wage rate to the more expensive multi-purpose firefighters.

There can be a great deal of employee dissatisfaction since the lowest wage earners end up doing the higher quantity of call volume and activity.

EMS-specific personnel have very limited use on fires and require that the fire system be self-sustaining with the remaining resources

Due a reduced number of firefighting personnel, this Option could have a negative impact on ConFire's ISO rating upon reevaluation.

While Option 3 certainly can be implemented, it adds complexity to the system by creating and maintaining two separate employment streams such as, administrative tasks that are part of establishing new positions, pay scales and training programs.

Conclusion

Seven ConFire companies were decommissioned since January 2011 and the most significant change occurred in January 2013 when four companies were decommissioned. Response times after the January 2013 closures to June 2013 showed little change. *FITCH* believes that excess capacity has been removed from the system and that subsequent efforts to demonstrate value to the public will be to improve dispatch and crew chute times. These efforts can result in improved service and can be accomplished at minimal financial cost. The result is that response times can be shortened by one to two minutes.

In choosing the way forward, policy makers have a unique opportunity to position ConFire for the future.

Table 1 below compares key attributes of the three service delivery options.

Table 1. Key Attributes of Options

Impact On	Status Quo	Three/Two Staffing	Single Patch Personnel
Firefighters	No Change in number To reactivate one company costs $2+ million in overtime	No Change in number To add one QRV incurs only vehicle cost; no additional payroll cost	Reduces the number of FFs; hire single patch personnel to replace FFs through attrition
Fire Stations	23 fire stations No change	Re-open stations as convert engines to QRVs No additional payroll cost	Can open additional stations and/or Post personnel
Change	Traditional – No Change	Somewhat Alternative Perceivable changes	Unusual in Fire Service
Emergency Funds	Little flexibility for any additional spending; fund balances easily depleted	Flexibility to quickly expand services; no payroll increase; one-time capital costs; can maintain reasonable emergency funds	Implementation will be slow and difficult; savings upon implementation may not sustain in long-term

Each option must be considered and compared against the criteria of successfully addressing underlying financial issues and demonstrating operational efficiencies that will be positively perceived by voters.

METHODOLOGY

To accomplish a comprehensive review and develop a transitional plan for ConFire, *FITCH* drew from the experiences of a multi-disciplinary team of fire chief officers and emergency services experts. A key objective of the review was to develop a transitional strategy. This strategy applies to the next three to four years during ConFire's financial crisis. While such planning considers current operations and future demands it also guides the organization through a perilous time, helping it to adapt more easily to its changing environment. Done correctly, transitional planning allows a department to become a more agile organization, anticipating and responding to changes before they adversely impact service delivery.

During the spring and summer of 2013, *FITCH* reviewed thousands of pages of documents, internal reports and data provided by ConFire, Contra Costa County and specific information, which *FITCH* requested. The team conducted multiple on-site observations within Contra Costa County including fire headquarters, fleet services, the training center, the fire-dispatch center, and neighboring fire agencies as well as, the offices of IAFF Local # 1230.

Follow-up information, principally 2012 and 2013 call data from computer databases, was requested and received. This report includes contemporary options for the fire department to use in managing its risks over the next three to four years. The options are intended as short-term solutions to an underlying significant financial crisis.

FITCH appreciates the opportunity to conduct this project and offers thanks to the numerous Fire Department and County employees, as well as the other fire departments and other organizations that assisted in the completion of this report. Many hours were spent in producing, compiling and analyzing the information gathered to conduct this study.

The sections that follow describe the methods by which we engaged stakeholders, completed the response data analysis, developed deployment models and conducted the financial analysis and how costing models were created.

STAKEHOLDER INVOLVEMENT

Site Visit One

FITCH employed a substantial stakeholder involvement process in order to ascertain a comprehensive and authentic composite assessment of ConFire's circumstances and operations. The first site visits occurred in early spring 2013 and entailed in-depth interviews with the Contra Costa County management, ConFire's management and union officials.

Site Visit Two

The second site visit (June 2013) afforded *FITCH* interview data from most of the local government agencies situated within ConFire's service area, as well as representatives from Contra Costa EMS and the Local Agency Formation Commission (LAFCo). City mayors and managers from Lafayette, Pittsburg, Concord, Walnut Creek, Martinez, Pleasant Hill and Clayton offered their perspectives, issues and interests. *FITCH* also met twice with leaders and members of IAFF Local # 1230 and the Fire Advisory Commission for ConFire.

Site Visit Three

In August of 2013, *FITCH* conducted a three-day site visit for the dual purpose of engaging fire service leadership from ConFire's neighboring jurisdictions and also to engage the public in a series of town hall Forums. *FITCH* met with senior fire officials from Rodeo-Hercules Fire District, Pinole Fire Department, El Cerrito/Kensington Fire Department, Moraga Orinda Fire District, Richmond Fire Department and officials from City of San Pablo. *FITCH* also met with the President of ConFire's Chief Fire Officer Association (chief officer labor union) during this visit, which had not occurred during the second site visit.

Multiple town hall style meetings were made available to the public on successive evenings in the communities of Pittsburg, Lafayette and Clayton. Over 200 individuals attended these forums, which included presentation of a *FITCH* progress report, followed by an open session with opportunities for both questions and input.

A number of recurring concerns surfaced from the public input, including the following:

- Is there a balance between cost and service levels? Is it possible to reduce wage and pension expenses?
- Are there other "models" out there, e.g., different staffing (including volunteer firefighters), different apparatus types, public safety (combined police and fire), contract for service?
- How do we compare to national standards?
- Would a change in governance address some or all of the challenges?
- How will contemplated changes affect fire department response to major incidents, concurrent calls, wildland incidents and ISO (insurance) ratings?
- How does automatic and mutual aid factor into these challenges?
- What are the chances to submit a new revenue ballot measure?
- We can't afford more property taxes; is there another revenue source?

A summary of the questions and comments from each forum is included in Attachment A of this report. Forum attendees were also offered the opportunity to submit further questions and comments to *FITCH* by electronic mail. A compilation of the multiple e-mails received is included in Attachment B.

Site Visit Four

During the fourth site visit (November 2013), *FITCH* provided a project update and dialog with each member of the Board of Supervisors, ConFire's management team including the new fire chief, labor leaders and Advisory Fire Commission leaders.

Site Visit Five

On December 3, 2013, team members returned to provide a formal report update to the Board of Directors in a Public Meeting of the ConFire Board.

Site Visit Six

FITCH will deliver the draft report to the County in early January 2014 and then present the draft Report to a meeting of the Public Managers' Association. The public release of the draft report is scheduled soon thereafter. Publication of the draft report will mark the start of the public comment period.

Site Visit Seven

FITCH will facilitate a public town hall meeting by mid-January to review the draft report before an audience of the general public and elicit comments. The public comment period will conclude by the end of January/beginning of February and the final report is then due to the ConFire Board of Directors in February, as determined by the Board.

Site Visit Eight (Final)

At the final site visit, *FITCH* will present the final report to the ConFire Board of Directors.

DATA ANALYSIS

Call Count Reconciliation

In any multi-variable analysis, it is important that the data being used for analysis reasonably represents the activity of the system. The manner in which ConFire captures data makes this a difficult task.

During the initial review and presentation of CAD data, it became clear that filter parameters utilized were not strictly set and some 51,000 records had to be filtered from the raw database because they contained data that did not bear on ConFire's performance. For example, incident dispatches handled by the ConFire Communications Center on behalf of other jurisdictions needed to be filtered out to reconcile the data sets. The relevant number of ConFire incidents for CY2012 was approximately 45,000.

Subsequently, *FITCH* worked closely with Chief Lewis Broschard and Kenneth Crawley, Information Technology Manager, to determine filter parameters to be applied to the 98,679 raw records logged into the CAD for CY2012 in order to capture relevant incidents. To facilitate tallies of incidents relevant to ConFire's activity, a new data field, "ConFire_Function," was created and added to the native CAD

fields already present in the data set. Values for "ConFire-Function" were restricted to those listed in Table 2.

Table 2. Values for Field Name "ConFire_Function"

Case	Value
1	EMS
2	FD
3	EMS MA-In
4	EMS MA-Out
5	FD MA-In
6	FD MA-Out
7	OMIT

"EMS" refers to emergency medical responses; "FD" refers to fire related responses; "MA-In" and "MA-Out" refer to mutual aid in-bound and mutual aid out-bound. "OMIT" refers to records in the CAD that have no bearing on evaluating the performance of the ConFire system.

Based on inputs from ConFire management (Chief Broschard and Kenneth Crawley) the raw data in the named fields of the CAD data were subjected to the filter logic listed in Attachment C. Filter logic for assignment of incidents to mutual aid in-bound and mutual aid out-bound is included that same Attachment for completeness. Assignments of incidents to these categories are described in detail in the Section titled "Mutual Aid Calls."

The tally of incidents in each of the "ConFire_Function" categories for CY2012 is presented in Table 3 below. These filter parameters result in a data set that conforms to ConFire's historical volume trends.

Table 3. Incident Counts in the "ConFire_Function" Categories for CY2012

ConFire_Function Value Assigned	Count	Totals
EMS	34,956	
FD	8,985	
EMS MA-Out (Mutual Aid-Out Bound)	265	
FD MA-Out (Mutual Aid-Out Bound)	777	
Activity by ConFire Units In and Out of ConFire District		**44,983**
EMS MA-In (Mutual Aid-In Bound)	925	
FD MA-In (Mutual Aid-In Bound)	376	
Activity By Other Agencies Within ConFire District		**1,301**
Total: All ConFire Activity + Mutual Aid Within District By Other Agencies		**46,284**
OMIT (Records Omitted)	52,395	

For the purposes of this report all of the incidents in the raw CAD database were assigned one of the seven categories in Table 3 above. Particular analyses were conducted using subsets of these categories. All incident categories, excluding only OMIT, are used to draw maps of incident zones. Incident

categories EMS, FD, EMS MA-Out, and FD MA-Out are used for analyses of ConFire vehicular activities. Incident categories EMS and FD are used for analyses of ConFire response times.

During the initial review, *FITCH* determined that elapsed time fields in the raw database had to be tested for consistency. In some records, the calculations of elapsed times between events are 12:00:00 [hh:mm:ss] greater than the manually calculated difference between the timestamps for the individual events. For instance, an elapsed interval that is obviously 10 seconds from the timestamps for the individual events was logged as an elapsed interval of 12:00:10 instead of 00:00:10. While the number of these instances is small, they are drastic outliers and were sufficient to significantly skew any statistics dependent on the affected elapsed time fields. When this condition was detected, the Consultants relied upon the timestamps for the individual events and manually corrected the elapsed time fields.

The raw data files from the CAD provided to the Consultants also contained data for January 2013 to mid-July 2013. Records in these files were isolated for the period January 1, 2013 through June 30, 2013, and were subjected to exactly the same filter logic as described in the tables above. The tally of incidents in each of the "ConFire_Function" categories for January to June 2013 is presented in Table 4 below.

Table 4. Incident Counts for "ConFire_Function" Categories Jan-June 2013

ConFire_Function Value Assigned	Count for 6 Months	6 Month Totals	Annualized To 12 Months
EMS	17,364		
FD	4,272		
EMS MA-Out (Mutual Aid-Out Bound)	86		
FD MA-Out (Mutual Aid-Out Bound)	328		
Activity By ConFire Units In and Out of ConFire District		**22,050**	**44,100**
EMS MA-In (Mutual Aid-In Bound)	699		
FD MA-In (Mutual Aid-In Bound)	264		
Activity By Other Agencies Within ConFire District		**963**	**1,926**
Total: All ConFire Activity + Mutual Aid Within District By Other Agencies		**23,013**	**46,026**
OMIT (Records Omitted)	24,429		

In 2013, dispatch logic for Incident_Type 5150 PD REQUEST (law enforcement request for an engine and an ambulance to accompany police unit) changed and no longer included a ConFire engine in assignment. As a result, the 732 such incident records that occurred in the first half of 2013 were assigned an OMIT function and these incidents were removed from the call count for 2013.

The call counts for ConFire incidents for 2012 and 2013 as revised by the various filters, conform to the call counts provided by ConFire.

Selection of Time Interval for Performance Analyses

In order to conduct analyses of the ConFire system, *FITCH* had to select a time interval as a representative base. This selection was complicated because the configuration of stations and frontline units has been in flux for several years. Ultimately, the Consultants chose calendar year 2012 for much of the analyses in this report. CY2012 is recent history, and the configuration of ConFire was relatively stable.

In July 2012, ConFire decommissioned one of two frontline units at Station 06 leaving a total of 28 response companies. In CY2013, a total of five frontline units were eliminated: four units in January and one additional unit decommissioned in July 2013. The data provided to *FITCH* covers the period January through June of 2013 and therefore, does not cover the period after elimination the July 2013 frontline unit. As of this report date, ConFire operates 23 frontline response units. Table 5 below summarizes the changes in frontline units starting in January 2011 through the most recent change in July 2013.

Table 5. Downsizing of Companies Starting in FY10/11

Date	FY	Action	No. Companies Remaining
Jan. 2011	FY10/11	Eliminated 1 of 2 companies at Station 1	30 - 1 = 29
July 2012	FY12/13	Eliminated 1 of 2 companies at Station 6	29 - 1 = 28
Jan. 2013	FY12/13	Eliminated 4 companies (Stations 4, 11, 12, 16)	28 - 4 = 24
July 2013	FY13/14	Eliminated 1 company at Station 87	24 - 1= 23

When appropriate and meaningful, analysis includes information covering January through June 2013.

Calculation of 90th Percentile

When analyzing the data, tallies of events are self-explanatory, as are metrics of "average response time." The situation is more complex for 90th percentiles. In analyses of CAD data, two methods are routinely used to calculate 90th percentiles: single-sided z-scores and ranked 90th. For purposes of analyzing ConFire CAD data, the Consultants used ranked 90th because this method better resists skewing to unrealistically long response times by small numbers of long duration outliers, such as those often found in the relatively smaller ConFire datasets.

DEPLOYMENT ANALYSIS

Deployment models were constructed based on making a connection between the funds available and how quickly the system is able to respond to specific types of emergencies. Historical data is scrutinized to determine the probability of risk and the probability of demand for service. Census data, particularly for emergency medical calls, is discarded as it indicates only where people live. A better predictor of demand for service is looking at past activity, which captures the movement of people and the historical patterns of service calls by time of day, day of week and even month of year.

The first step in analyzing ConFire's historical data is to define incident zones. Based on a specific algorithm, the *density* of call patterns for fire and for EMS calls is plotted on a map. Certain rules that are applied result in designing areas as Urban, Suburban or Remote. ConFire's units deploy from fixed locations, fire stations, and six-minute and eight-minute drive time maps, which are constructed around each station. The drive-time maps are then laid over the map of incident zones, and the percentage of total calls captured inside each drive zone is tallied. The numbers are cumulative and the goal is to see how many stations locations are needed to capture at least 90% of calls within a specified drive time. The process is repeated for fire calls only, EMS calls only and for a combination of the two. The results of the deployment analysis are shown in the Operations Section of the report titled: "Designing A Deployment System."

FINANCIAL ANALYSIS/COSTING

Basis for Financial Analysis

The County and ConFire management work closely to track revenues and expenditures and to develop multi-year projections. To estimate property tax revenues, they are assisted by specialists in real estate and local economic trends.

Early in the project, *FITCH* met with the ConFire Chief of Administrative Services and the County Finance Director to obtain an overview of policies, practices and ConFire's financial state of affairs. Numerous financial documents were requested and received, and regular updates were provided.

The Consultants observed that ConFire finances are closely and effectively managed by its Chief of Administrative Services, who is responsible for financial reporting, ConFire payroll functions and other administrative tasks that impact the bottom line. County Finance and Audit provide additional oversight and support. For purposes of developing costing units that allow for the development of service options, *FITCH* relied on the detailed financial data provided by the County and augmented by ConFire.

In October 2013 there was a significant change in projections for two major costs, retirement expenses (lower estimated payments) and anticipated property tax revenues (increased projections for revenues). These changes, coupled with the earlier actions by the Board to eliminate fire companies and thereby reduce expenses, dramatically mitigated the immediacy of ConFire's financial crisis. *FITCH* was kept abreast of any material changes in the financial status of the District.

The financial sections of this report use a series of graphics to illustrate trends in expenditures, revenues and fund balances. The Consultants developed estimates for FY 17/18 based on the methodology used in prior years' data. Estimates that far out are not certain; however, they are instructive in this instance to demonstrate the impact of maintaining operational status quo.

Position Costing Method

As part of the operational analysis, it was necessary to estimate the cost of a firefighter crew position (not individual person) using a reasonable, understandable methodology. The purpose was to allow *FITCH* to develop operational plans that reasonably could be expected to fit within ConFire's annual revenue envelope for FY14/15 and to estimate the number of crew positions that could be funded by a no deficit budget.

FY14/15 was used as the base year for budgeted expenditures. Annual mandatory expenses were isolated along with salaries for non-response personnel and these sums were deducted from the annual expenditure budget. The remaining amount reasonably represents the budget covering response personnel for 23, three-position companies or a total of 69 response positions, plus operating expenses. Because of the firefighters' 24/7 work period, each company *position* requires least three individual firefighters.

The methodology and resultant calculations to determine the cost per position are outlined in Table 6 below.

Table 6. Cost Per Position Methodology

FY14/15 Total Expenditure Budget		**$105,837,354**
Less: Mandatory Expenses		
§ Retirement Expenses per Actuary update 10/7/13	(22,887,900)	
§ Pension Bond Payments	(12,730,727)	
§ Pension Bond Stabilization Fund Contributions	(2,600,383)	
- Subtotal Mandatory Expenses		(38,219,010)
Less: Salaries for Non-Response Personnel[5]		(14,368,715)
Result: Expenditure Amount Budgeted for 23 companies[6]		**$53,249,629**
Determine Per Position Cost: Salary and costs per position		
§ Number of companies funded in FY14/15 budget	23	
§ Number positions per company (23 x 3)	3	
§ Number of company *positions*	69	
§ Divide budget for 23 companies by 69 *positions*		
Result: Appx. per *Position* Cost (Salary and Operating)		**$771,734**

The cost per position was then used to determine the number of companies that could be supported within certain revenue envelopes. It also allowed the costing of various combinations of two and three position companies, again within prescribed revenue envelopes.

[5] Dispatch, Management, Support Staff, Investigations, Training, Battalion Chiefs, IT, Clerical staff. 25% of payroll is dedicated to personnel other than front-line response personnel. (Source: payroll April 2013 for 294 total personnel (212 captains, engineers, firefighters and firefighter paramedics).

[6] Includes 75% of salary budget (based on detailed analysis of salaries) plus services and supplies, interagency and other governmental charges and fixed asset/capital budget, which is zero.

PROJECT BACKGROUND

When the project was initiated in early Spring 2013, ConFire was in near crisis mode financially. Property tax revenues were relatively flat, annual deficits were climbing and reserves were being depleted rapidly. Projections showed the District going bankrupt within a few years. Stations were closed and a number of response companies were eliminated, with more reductions planned. The public rejected a tax initiative, which was a crushing blow to any hopes of moving forward with the current organization and response configuration unchanged.

Toward the end of 2013, ConFire received some relief in the form of higher projections for property taxes and lowered projections for certain mandatory expenses. The District is standing on better financial ground. Yet there are any number of events — an active wildfire season, inflationary increases, imminent need to replace expensive frontline equipment, or a natural disaster — that could shake that financial standing to the core. Meanwhile, fire personnel are seeking raises and public officials and communities are anxious to reopen stations.

Understanding the current financial state of ConFire, despite the recent reprieve in the crisis mode, is extremely important. For this reason, this report begins with a review of ConFire's financial status as it sets the stage for developing options for the future within the current annual revenue envelope.

FINANCIAL STATE

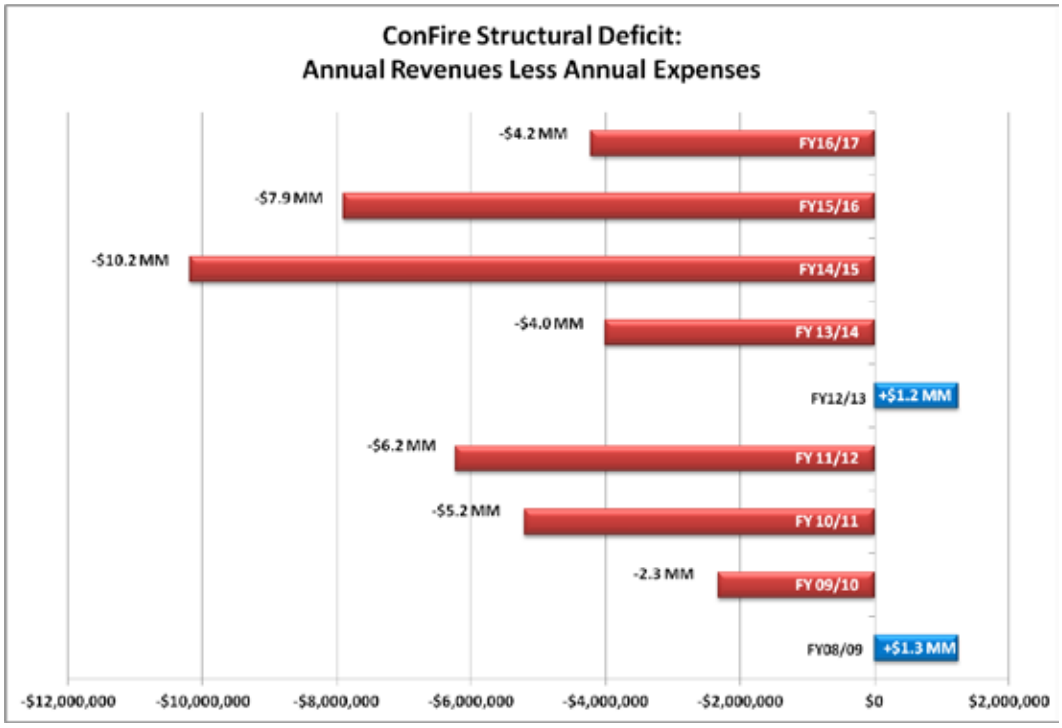
Overview

Both ConFire and County financial managers work together to create and update ConFire budgets that include detailed revenue and expenditure estimates for at least four fiscal years forward. Economic consultants provide advice concerning the future estimates of property tax revenues, which are ConFire's most significant revenue source consistently representing some 90% of annual revenues. In light of the detailed and professional financial processes, *FITCH* utilized the financial data as provided for the basis of their operational analyses. Financial data initially was provided in August 2013 and was updated when material changes in property tax estimates and retirement expenses occurred in October 2013. At the time of this report, the analysis that follows is based on financial projections as of October 2013, unless otherwise noted.

Structural Deficits

A budget deficit occurs when a governmental entity spends more than it receives in taxes and other revenues. A *structural deficit* occurs when the budget deficit persists for some time. For three of the last five fiscal years from FY08/09 to the fiscal year ending June 30, 2013, the Contra Costa County Fire Protection District incurred annual budget deficits. Budget projections for the next four fiscal years predict annual budget deficits, and in all there are structural deficits for seven of nine fiscal years from FY08/09 through FY16/17. Figure 1 below depicts the ConFire's structural deficit and includes projections through FY16/17.

Figure 1. ConFire's Structural Deficits



The largest budget deficit of $10.2 million is anticipated in FY14/15 despite recent increased property tax revenue projections for that fiscal year. ConFire has remained solvent primarily because spending was constrained after FY08/09 even though there were healthy reserve balances at the end of that fiscal year. These fund balances, along with one-off revenue windfalls, allow estimates to be solvent through FY16/17 *based on current operations and projections*. Any material increases in personnel, payroll, capital funding needs or significant emergency events will exacerbate the structural deficit and further deplete any reserves.

ConFire's ongoing structural deficit is of deep concern. The impact is reflected in the downgraded ratings of ConFire's Pension Obligation Bonds by Moody's Investors Services in February 2013 and by Standard & Poor's Ratings Services in September 2013. Moody's downgraded the bonds to A1 from Aa2 and Standard & Poor's revised the outlook on its "AA-" rating to negative from stable. Below are the comments made by the rating agencies.

- **Moody's Downgrade** — "The decision to move the rating two notches opposed to one primarily reflects the district's above average general fund debt burden and recent trend of unbalanced financial operations."[7]

[7] Moody's Investor Service. Rating Action: Moody's downgrades Contract Costa County Fire Protection District's Pension Obligation Bonds to A1 from Aa2, Global Credit Research, February 28, 2013.

- **Standard & Poor's Downgrade** — ". . . revised the outlook . . . to negative from stable. The outlook revision reflects our opinion of the district's weakened financial operations and the challenges it faces to balance the budget structurally."[8]

Both rating agencies noted concerns regarding the trend of structurally imbalanced operations, continuing reserve draws and declining reserves.

Mandatory Expenses

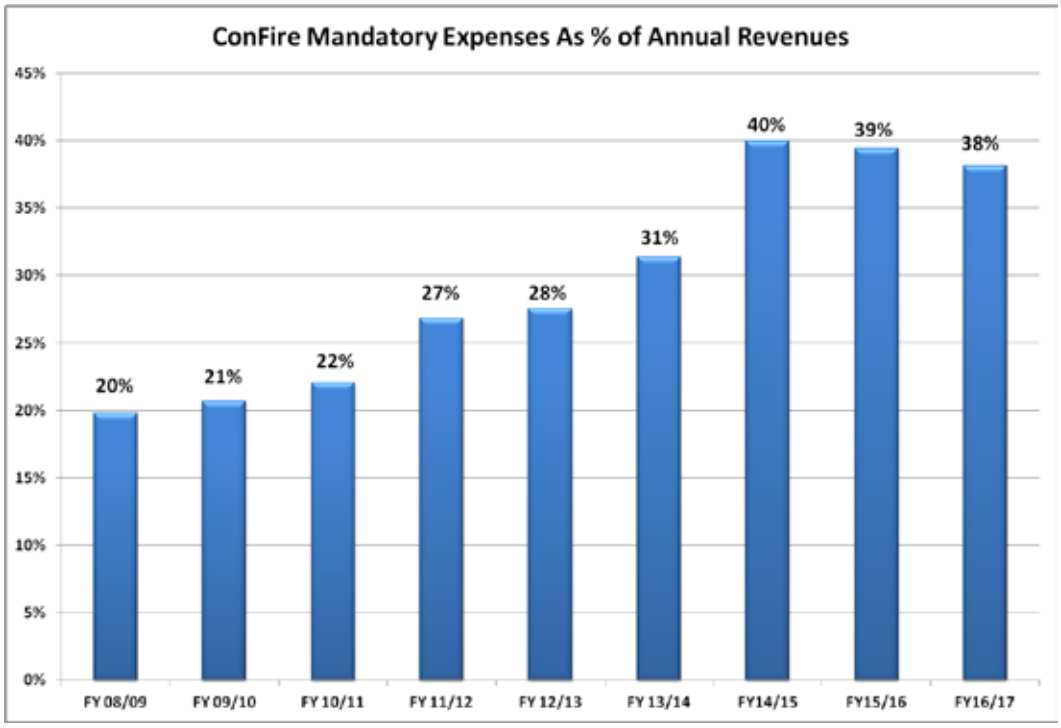
Three mandatory expenditure items consume a significant portion of ConFire's annual revenue:

1. **Pension Obligation Bond principal and interest payments** — For the current FY13/14, these total $12.2 million and increase to $14.1 million in FY16/17. Annual payments are due through June 30, 2023.
2. **Retirement Expenses for current and unfunded retirement liabilities** — These are determined actuarially but have been affected by policy decisions regarding projected interest rates and a decision to segregate the ConFire's retirement funds from a larger pool of funds. As a result, retirement expenses increased 64% from $13.9 million for FY13/14 to $22.8 million for FY14/15.
3. **Pension Bond Stabilization contributions** — These are budgeted at approximately $2.6 million annually. The funds can be used to pay principal and interest of the bonds if there are insufficient funds available, to pay increased pension funding costs, to pay reserve replenishment costs or any other lawful purposes of the District.

These three mandatory expenses consume an ever-increasing portion of available annual revenues and contribute to the District's structural deficit challenges. Figure 2 below shows the change in the mandatory expenses as a percentage of the annual revenues from FY08/09 and that are projected through FY16/17.

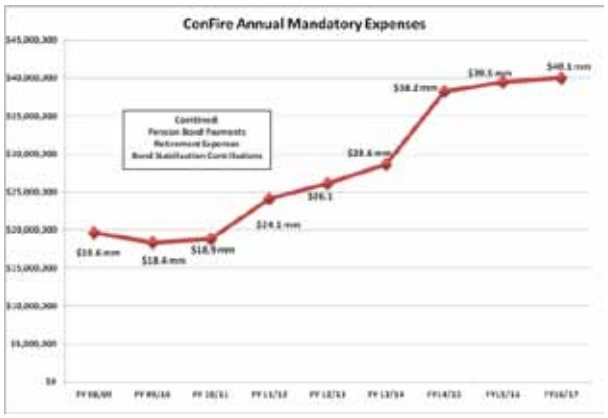
[8] Standard & Poor's Ratings Services. RatingsDirect Summary: Contra Costa County Fire Protection District, California; General Obligation, September 23, 2013.

Figure 2. Mandatory Expenses as Percent of Annual Revenues



Forty percent of FY14/15 annual revenues must be devoted to the mandatory expenses before any funds can be considered for service delivery. Figures 3 and 4 below depict the changes in the combined mandatory expenses and individual mandatory expenses from FY08/09 through FY16/17.

Figure 3 and Figure 4. Annual Mandatory Expenses



While Pension Obligation Bond payments are on an increasing schedule, the primary driver of the increase in mandatory expenses is the retirement expense.

Declining and stagnant property tax revenues, combined with annual increased bond and retirement expenses, have significantly contributed to ConFire's structural deficits. Since FY08/09, actions by the Board of Directors to reduce costs while maintaining reasonable reserve levels have mitigated some of

the negative impacts caused by these two factors. Nevertheless, their pressure on the budget is ongoing.

Annual Operating Expenses

To avoid a further fiscal crisis, the Board of Directors has taken action to eliminate fire companies, and in some instances close down the physical station houses. Table 7 below summarized the actions of the Board starting in FY10/11.

Table 7. Downsizing of Companies Starting in FY10/11

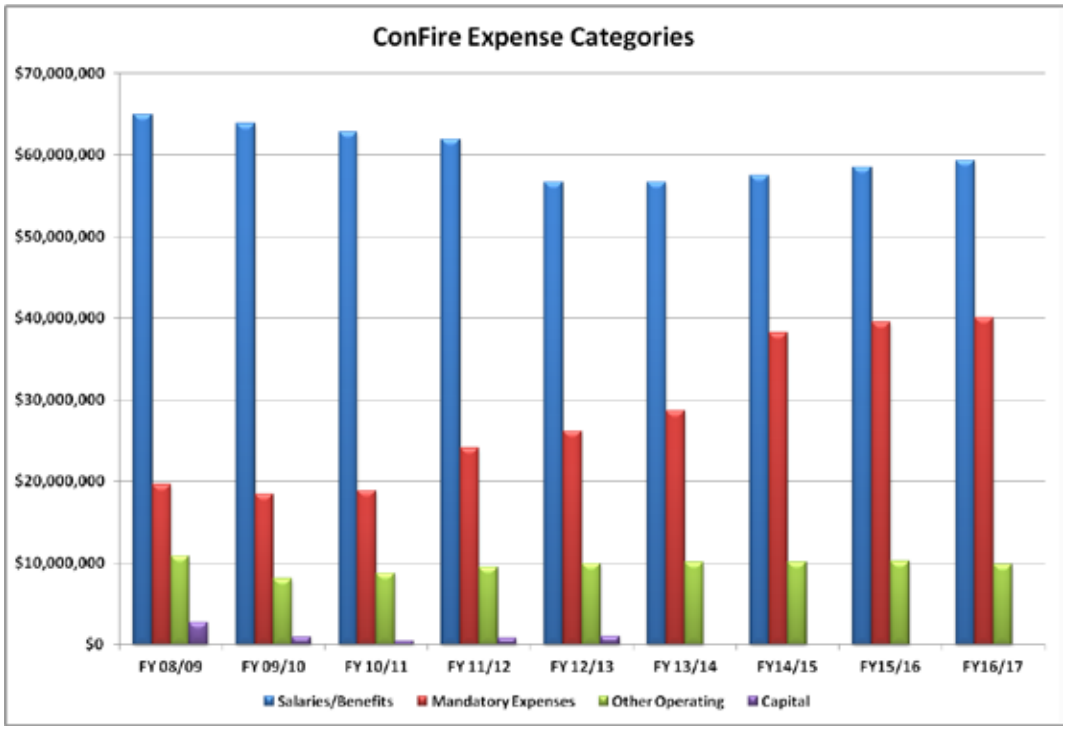
Date	FY	Action	No. Companies Remaining
Jan. 2011	FY10/11	Eliminated 1 of 2 companies at Station 1	30 - 1 = 29
July 2012	FY12/13	Eliminated 1 of 2 companies at Station 6	29 - 1 = 28
Jan. 2013	FY12/13	Eliminated 4 companies (Stations 4, 11, 12, 16)	28 - 4 = 24
July 2013	FY13/14	Eliminated 1 company at Station 87	24 - 1= 23

Although there were no actual firefighter layoffs, these actions stabilized the salary and benefits costs. In July 2013, the Board launched a pilot project that added a single two-person squad/quick response vehicle (QRV) to support EMS calls.

Expense Categories

Board actions slowed the growth of current employee salaries and benefits. Expenses for other line items that range from fuel to medical supplies have been held relatively constant and capital budgets going forward are now at zero. ConFire has been successful at securing one-off state and federal grant funds for a number of necessary projects. Figure 5 clearly indicates that expenditure growth is focused on the mandatory expenses that include retirement expenses for current and retired personnel.

Figure 5. ConFire Expense Categories FY08/09 to FY16/17



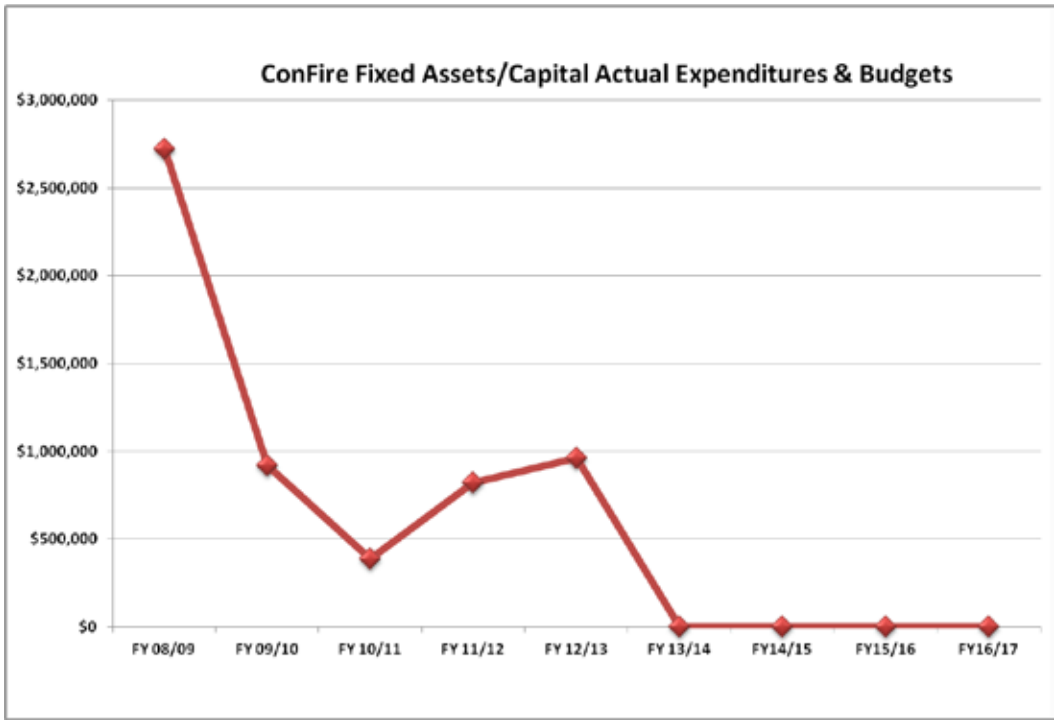
It is important to note that the Board of Directors has little to no control over the mandatory expenses and must manage around those items at the expense other needed budget items.

Other operating expenses have been held constant or decreased year over year. The range of expenses includes fuel for vehicles, uniforms, recertification and training costs, station and office supplies, equipment and building maintenance including vehicle maintenance. There is no growth indicated for FY14/15 and future years' budgets. It is surprising that ConFire has been able to continue operations with no growth in general operating costs for so many years. Any future inflationary increases will exacerbate an exceedingly lean budget.

Capital Asset Needs

As ConFire experienced multi-year budget constraints, funds were cut for vehicle replacement, building repairs and other equipment needs. The agency depends on sporadic grants to meet minimal capital needs. Figure 6 below indicates ConFire's capital spending through FY12/13 and budgets for FY13/14 and beyond.

Figure 6. Capital Expenditures and Budgets



No funds are budgeted in the current fiscal year. Future years continue with zero dollars budgeted for capital. Rolling stock, fire stations and other essential equipment must be maintained and replaced at specific cost benefit points in order to maintain efficient and effective operations. As ConFire plans for the future, capital budgeting must be a priority.

Revenues and Fund Balances

As with most government operations, ConFire's primary source of annual revenue is based on property tax valuations or *ad valorem* taxes. ConFire's other revenue sources include fees for inspections, plans review, weed abatement, false alarms, dispatch services and miscellaneous, which altogether total approximately $3.8 million. Assessments for the CSA EM-1, County Service Area Emergency Medical Services Measure and the Redevelopment Dissolution Act Non-Property Tax Pass-Through are two other material revenues that total $3.5 million.[9] As a special taxing district, ConFire's revenues are dedicated solely to the Fire District's operations. The District does not compete with other County departments for general fund dollars and any funds that are the residual of revenues, minus expenses, remain in the District coffers as fund balances.

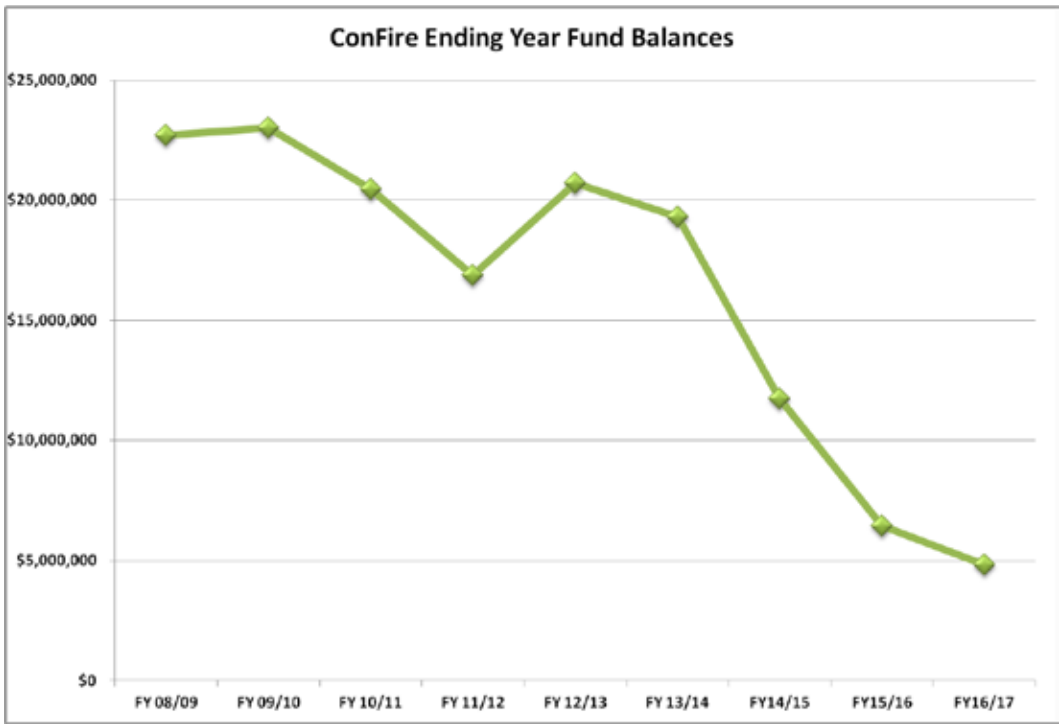
Since FY08/09, property taxes comprised at least 86% of total annual revenues and have been as much as 93% in prior years. Quickly responding to the radical downturn in property values, the Board of Directors' made decisions to maintain healthy reserve fund balances and this literally saved the District from bankruptcy.

[9] Recommended Budget Report for FY12/13.

Each year the District budgets $2.6 million as an expense transferred into the Pension Bond Stabilization Fund. As the funds accumulated, they reached a balance of $8.0 million by the end of FY10/11. From that point forward, the Bond Stabilization fund, along with the District's general operating fund balance, was tapped to offset annual operating deficits. This is a legitimate use of both funds.

Figure 7 reflects the actual year-end fund balances for FY08/09 through FY12/13 and the projected balances for FY13/14 through FY16/17.

Figure 7. ConFire Combined Year-End Fund Balances



Balances projected starting in the current fiscal year FY13/14 are based on 23 fire companies, a moderate increase in property taxes, somewhat lower retirement expenses and again, zero capital budgets.[10]

Financial Challenges Going Forward

The purpose of the consultant study is to find more efficient ways to provide fire and emergency medical services to the public within ConFire's revenue envelopes and constraints. Modest changes in the service delivery model can result in improved services (response times) for relatively the same dollars currently expended. ConFire's primary challenge is to embrace a plan to fund adequate — and even improved — service levels, and to fund critical fleet and other capital needs.

[10] Projections were provided by the County as of October 2013.

SYSTEM DESCRIPTION

DISTRICT PROFILE

Contra Costa County Fire Protection District covers approximately 304 square miles located within Contra Costa County and in the Oakland Bay Area of northern California. The District's 304-square-mile service area represents about 38% of the County's 802 square miles. The contemporary ConFire is a compilation of 12 different fire jurisdictions whose annexations occurred over the course of thirty years between 1964 and 1994. The District's current estimated population is 600,000 and it ranks among the 14 largest metropolitan fire agencies in the state of California.

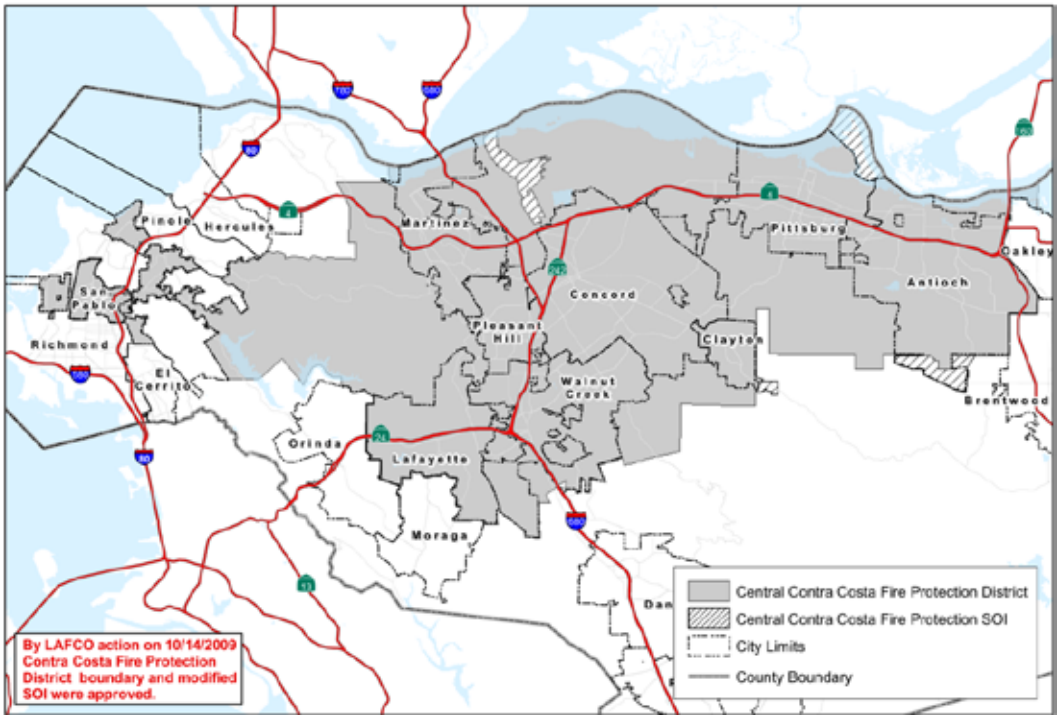
ConFire once staffed 30 stations with a complement of four-firefighters per apparatus. In the first round of budget cuts, the agency changed from four-person to three-person apparatus staffing. In subsequent rounds of budget cuts from FY10/11 to the current FY13/14, seven companies were eliminated and today, 23 stations remain operational. Some communities lost a significant fire presence in their community.

Approximately 25% of ConFire's payroll is dedicated to personnel other than front-line staff. This includes dispatch, management, support staff, investigations, training, battalion chiefs, technology support and clerical staff. The 25% allocation is on the lower end of what is typically seen in emergency services and it must be considered that Communications Center personnel represent eight to 10% of this total. In multiple interviews it was pointed out to the Consultants that many of the clerical and other support positions were unfilled due to budget constraints. The summary review of roles and responsibilities revealed that ConFire's internal alignment of responsibilities has been as optimized as much as possible within its budget constraints.

The concept of contiguous service areas does not apply in Contra Costa. Service delivery across ConFire is challenged by its geography, which results in three distinct population/service areas separated by significant non-populated territory between each area. Travel distances between these areas range from seven to fifteen miles. The District is further characterized by a combination of occupancies ranging from urban to rural; this includes high-rise office and apartment buildings, high-density multi-family dwellings, commercial shopping centers, as well as single-family dwellings and ranches with significant acreage.

Figure 8 below is a map of the Contra Costa Fire Protection District territory.

Figure 8. Contra Costa Fire Protection District Map[11]



ConFire responds to emergency 911 calls for fire-related incidents and emergency medical assistance. Firefighter personnel are certified as emergency medical technicians (EMTs) and paramedics and respond along with a contracted ambulance transport provider on emergency medical service (EMS) calls. In CY2012, ConFire responded to 46,284 calls for service. Some 78% of calls are for medical assistance. As of January 2013, ConFire deployed 23, three-person companies out of 23 fire stations. A few stations house more than one type of response vehicle and in these stations, personnel are able to respond on the vehicle that is most appropriate for the call.

DISTRICT GOVERNANCE

The District is governed by the Contra Costa County Board of Supervisors, which serves as the Board of Directors for this dependent fire protection district. Throughout the *FITCH* process, both stakeholders and general public raised questions and some concern about the governance structure of the District.

There are two types of special districts: dependent and independent. Dependent special districts are administrative extensions of cities or counties. They depend on another unit of government for their existence, and are only accountable to this layer of government. This is the structure for ConFire, which is dependent on Contra Costa County for its existence. ConFire exists within the County area and the District's boundaries are not drawn in common with those of the County.

[11] Contra Costa County LAFCO. Fire Protection Districts: Directory of Local Agencies, May 2011.

Independent special districts are separate local agencies, created by local petition or through popular election. They are directly accountable to their constituents, not another layer of government. Independent special districts are further characterized as enterprise and non-enterprise districts.

Non-enterprise districts provide those governmental services on a district-wide basis that cannot be economically funded solely through user fees, such as fire protection, parks and libraries. For this reason, non-enterprise districts rely primarily on a portion of local property tax revenues to fund their facilities and services.

Enterprise districts, on the other hand, usually provide direct, site-specific services, such as water and sewer services, to property within their district and may recover most or all of their service delivery costs through rates imposed on users of the service.

Those stakeholders and public who expressed concern regarding governance and the ConFire dependent district model suggested that the District would be better served by an independent district model.

There are typically five steps in the formation of a special district:

- *Application* - Registered voters in the proposed district apply to the Local Agency Formation Commission (LAFCo). The application must detail the proposed district's boundaries and services, any environmental effects, and financing options.
- *Review and Approval* - The LAFCo's staff studies the application and schedules a public hearing. The LAFCo can approve or deny the proposal. If the LAFCo approves, the next step is to measure protests.
- *Protest hearing* - The LAFCo holds a second public hearing, this time to measure formal protests from voters and property owners. A majority protest will stop the proposal. Otherwise, there's an election.
- *Election* - Only the voters inside the proposed district's boundaries are eligible to vote at this election, which usually requires a majority voter approval. If the proposal involves new special taxes, the measure needs two-thirds voter approval.
- *Formal filing* - If the voters approve the proposed district, the LAFCo and other officials file the formal documents to start the new district.

When the issue of governance was raised, general commentary suggested that a change to an independent district structure would be advantageous for long-term district success. The primary interest in such a change revolved around the nature of representation and attention delivered by the governing body. Members of the public and stakeholders both suggested that the many duties and responsibilities of County Supervisors potentially adversely impact their time and attention available for ConFire business interests and issues. Comments also noted that some Supervisors' districts include very limited segments of the fire district and, as a result, primarily ConFire constituents do not elect them to their position.

When queried about this issue, the Supervisors individually and collectively contested this suggestion and verbally underscored their interest in and commitment to ConFire.

FITCH is including this information in order to accurately report public and stakeholder input. However, this issue was outside the scope of the project and *FITCH* does not offer an opinion or recommendation on this issue. This issue is more appropriately reserved for local discussion, debate and resolution.

DISTRICT ORGANIZATION

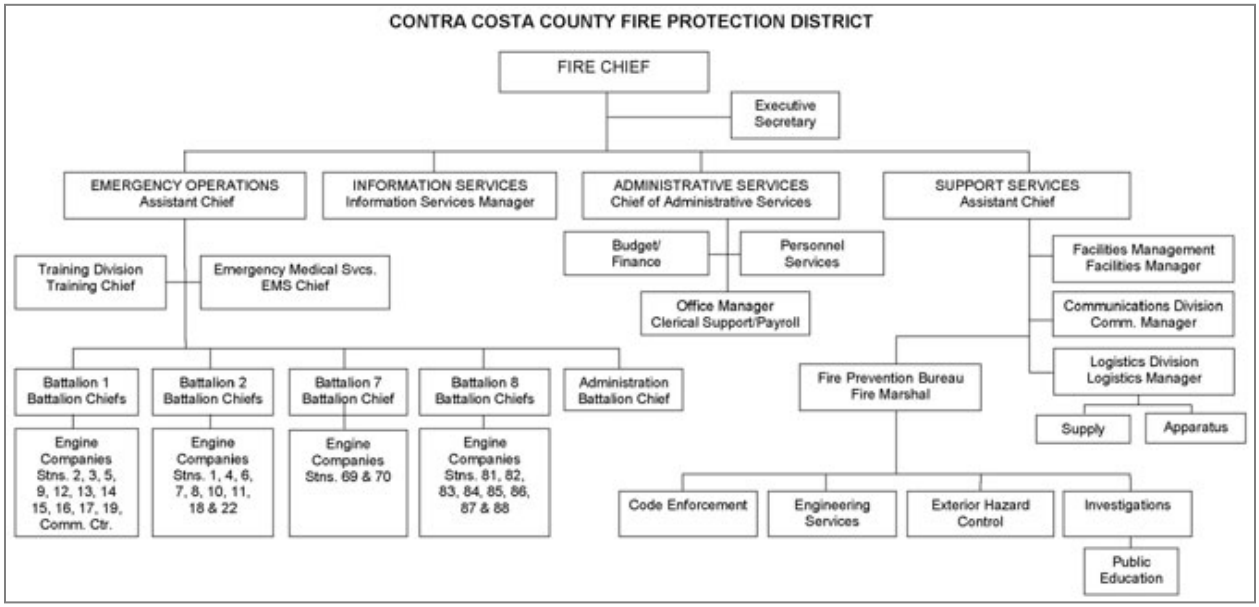
Fire Chief Daryl Louder served as the fire chief of the District when this study commenced. Subsequent to his resignation in the fall of 2013, the Board appointed Jeff Carman, a 29-year veteran of the Roseville Fire Department (CA), as the Fire Chief. At the Board's direction, Chief Carman will now report to the County Administrator and will oversee the management of a $103 million annual budget and approximately 300 full-time equivalent positions operating from 23 fire station locations. Station personnel are assigned to a shift schedule of 48 hours on and 96 hours off. The department is organized into four battalions and organized along the following four functions:

- Emergency Operations
- Support Services
- Administrative Services
- Information Services

An assistant chief is assigned to Operations and oversees four battalions along with Training and EMS. An assistant chief also supervises Support Services including the fire prevention, communications, facilities management and logistics functions. An Administrative Chief supervises Administrative Services.

Figure 9 below represents ConFire's current organizational structure as provided by the agency.

Figure 9. ConFire Organizational Chart



As a special taxing district, ConFire is a separate unit of local government. The County Board of Supervisors also sits as the Contra Costa County Fire District Board of Directors. ConFire personnel perform many essential functions; however, the County also provides services to the District. The District is charged for these services based on a cost allocation plan developed by the County and annually approved by the State Controller's Office. Services provided by the County and allocated to the District include, but are not limited to the following functions:

- § Board of Directors
- § Elections
- § Clerk of Board
- § Internal and External Auditor
- § Controller
- § Property Assessor
- § County Counsel
- § Human Resources
- § Employee/Retiree Benefits
- § Risk Management/Insurance
- § Purchasing
- § Accounts Payable and Receivables
- § Payroll
- § Banking
- § Cash Management
- § Treasurer/Tax Collector
- § Information Technology
- § Bond Sales/Management

This is a typical arrangement of cost allocation for shared services and is based on the premise that the District benefits by engaging the County's larger and more developed organization and administrative staff to accomplish certain tasks.

INSURANCE SERVICES OFFICE (ISO) RATING

A portion of the insurance premiums that homeowners and businesses pay is based on the quality of the fire protection available. The Insurance Services Office (ISO) compiles locality ratings and provides them to any insurance company that requests them. The ISO conducts inspections of fire departments and their capabilities, available water supply, emergency communications facility and community risk reduction efforts.

The ISO continues to evaluate and evolve the criteria and community public protection class (PPC) system to better reflect the actual response capabilities of a community. An example of recent system considerations includes credit for foam systems and prioritization of response priorities.

ISO's Fire Suppression Rating Schedule (FSRS) measures the major elements of a community's fire protection system and develops the numerical PPC grading. Below is a summary of the items considered in the FSRS and the weight of each item used in calculating a PPC rating.[12]

- **Fire Alarm and Communications Systems (10 points),** including telephone systems, telephone lines, staffing, and dispatching systems.
- **Fire Department (50 points),** including equipment, staffing, training and geographic distribution of fire companies.
- **Water Supply System (40 points),** including available water supply in the community with needed fire flows, hydrant size and type, installation, inspection and fire flow testing of hydrants.
- **Community Risk Reduction (5.5 points),** including fire prevention code adoption and enforcement, public fire safety education and fire investigation activities.

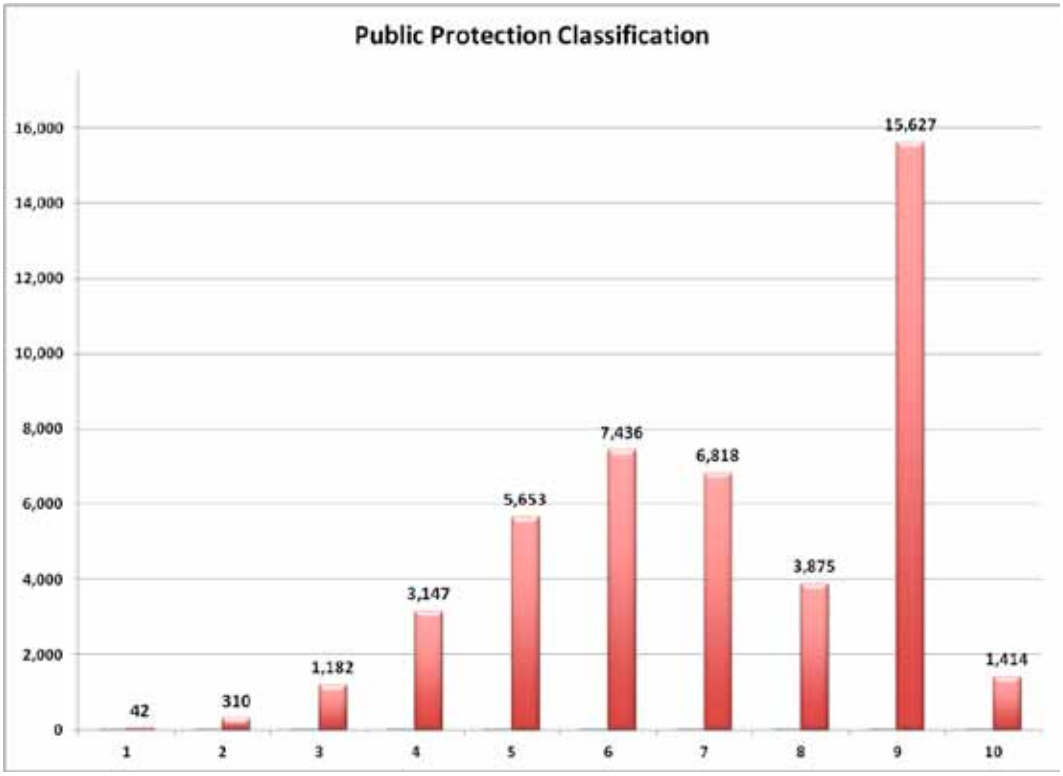
The maximum achievable PPC score is 105.5 points.

Upon completion of an inspection, a score/grade is assigned to the area that the fire department protects. This grade is the determining factor in the cost of insurance premiums. A Class 1 is the very best rating. In communities with better ratings citizens can generally expect to pay lower premiums. A Class 10 is the worst rating and is assigned to areas with little or no fire protection.

The Contra Costa County Fire Protection District achieved a Class 3 rating except for the rural areas of the District. Figure 10 below, illustrates the distribution of various Public Protection Classifications across communities the United States:

[12] Insurance Services Office, http://www.isomitigation.com/ppc/2000/ppc2007.html as of December 27, 2013.

Figure 10. ISO Public Protection Classification National Distribution



Of the over 45,000 communities rated by ISO, fewer than 4% are rated as class 3 or higher. It is desirable to maintain current rating levels. However, additional investment required to achieve a Class 1 rating is unlikely to represent good value for the investment given for the small difference in premium observed in other communities.

For grading within the Class 1 – Class 8 segment, the ISO Schedule stipulates that engine companies are ideally located no more than 1½ road miles from the incident. The deployed companies should contain a minimum of four firefighters responding on the initial alarm; one of the four may be a chief officer. In calculating station staffing, ISO states:

> *"To evaluate the total number of firefighters on duty with companies at the station, take an average over the entire year, considering vacations, holidays, sick leave and other absences."*
>
> And further...
>
> *"Credit fire department personnel staffing ambulances or fire department apparatus responding on medical calls if those personnel participate in fighting structure fires. Prorate the credit to reflect the extent to which those personnel are available, respond on the initial alarm to all reported structure fires and perform company duties."*

While the grading schedule is necessarily complex in its complete design and application, its foundation includes the four major components listed above.

The focus of this report and its recommendations has little to no impact on the grading components of fire alarm/communications systems and the water supply system. The Fire Department component, which is worth 50 points of the maximum 105.5 points, has the potential to change the rating depending upon whether any of these proposals are implemented.

- Option 1 — Maintain Status Quo, would potentially have an adverse impact on ConFire's ISO rating should additional stations close or overall staffing is further reduced.
- Option 2 — Optimized Three/Two Response Staffing, has the least potential to impact the ISO rating for the District. With this option, average daily firefighter staffing remains the same and it enables ConFire to put the same number of fire personnel on the fire ground scene.
- Option 3 — Single Patch Response EMS Personnel, potentially degrades the ISO rating, as the personnel hired would not have firefighting capability; this results in reduced fire suppression resources available.

Because of the design of the ISO rating system, it is impractical to accurately assess the absolute impacts of ConFire system changes without a comprehensive re-rate by an ISO certified engineer.

COMMUNICATIONS CENTER

The Contra Costa Regional Fire Communications Center (Communications Center) provides call taking, fire and EMS dispatch, coordination and technical support services to the agencies that it serves. Utilizing a TriTech Computer Aided Dispatch (CAD) system, the Center functions as a secondary Public Safety Access Point, or PSAP, which means that most emergency calls come through various law enforcement 911 access points first.

In addition to the cities, towns and territory covered by the County Fire District, the Communications Center also provides dispatch services to the following:

- Crockett-Carquinez Fire Protection District
- East Contra Costa Fire Protection District
- Moraga-Orinda Fire Protection District
- City of Pinole Fire Protection District
- Rodeo-Hercules Fire Protection District

For medical assistance calls, the Communications Center provides standardized Medical Priority Dispatch System (MPDS) protocols that include caller interrogation, determination of appropriate response configurations and modes, and provision of post dispatch and pre-arrival instructions. Dispatchers are certified as Emergency Medical Dispatchers (EMDs). MPDS is considered best practice for medical dispatch operations. For all but one agency, requests for ambulance service are forwarded to American Medical Response, the area's contracted ambulance provider, via a CAD-to-CAD interface.

Staffing in the Communication Center is a maximum of four to five dispatchers on site at all times and available for recall. Actual staffing at the consoles changes depending on the time of day and activity and ranges from one dispatcher up to the maximum of five. Dispatchers work 48 hours on and 96 hours off on a schedule that corresponds to the suppression A, B and C shift schedules. This is an uncommon dispatcher shift schedule in the industry. The capability for surge capacity is hindered by these shifts and at some point a full dispatch review should be instituted in order to align the ConFire Communications Center with best practice.

The Communications Center *does not* use best practice protocol-based dispatch for fire calls, which impacts dispatch performance negatively. The quality assurance component of a protocol system results in consistency across dispatchers and improved dispatch times. Another area for concern lies with the Communications Center structure itself. There are redundant systems within the Communications Center and generators are available; however, the facility itself is not a "hardened" structure. The San Ramon Valley Fire Protection District's dispatch center is the designated back up facility should the ConFire Communications Center building be compromised. ConFire personnel would augment San Ramon's personnel. In addition, the mobile communications unit, Comm Support 31, is capable of providing additional backup support for dispatching. This unit is housed at San Ramon Valley Fire.

DISPATCH STANDARDS AND CONFIRE PERFORMANCE

The National Fire Protection Association (NFPA) and the National Emergency Number Association (NENA), publish standards for processing emergency calls. The NFPA standards on dispatching (NFPA 1221) specify the flow of an emergency call and the time allotted for each step in the process. For clarification, the Public Safety Access Point (PSAP) is the call answering point(s) designated in a community to receive 911 calls. A summary of NFPA standards regarding the dispatch process and its performance is provided in Table 8 below.

Table 8. NFPA 1221 Dispatch Standards

NFPA 1221 Section #	Standard
Section 6.4.2	95% of calls to be answered within 15 seconds; 99% within 40 seconds.
Section 6.4.3	95% of emergency dispatching shall be completed within 60 seconds.
Section 6.4.5	95% of calls transferred from the PSAP (911 intake) shall be within 30 seconds (10 seconds for ring answer and 20 seconds for identification of primary resource required).

Standards published by the National Emergency Number Association (NENA) are consistent with NFPA 1221 with additional embellishments as noted in Table 9 below.

Table 9. NENA Call Taking Operational Standards

NENA 56-005	Standards
Master Glossary 00-001	90% of all PSAP calls to be answered within 10 seconds during the busy hour; 95% of all calls should be answered within 20 seconds.
Page 8 of 12	911 call taker is limited to *very few questions prior to transferring the call to the agency that will dispatch the call*. This is done in order to reduce the delay of the responding agency, which will ultimately deal with the crisis.
Section 3.3	All 911 lines at a PSAP shall begin with "911." The correct statement is "Nine-One-One," never "Nine Eleven." Additional information or questions may be added, as in: "911, what is the emergency?", or "911 what is the address of the emergency?"

Chute Time is the time interval from when the unit receives notification from the ConFire 911 Communications Center to when the unit with its crew is rolling en route to the site of the emergency. Table 10 below indicates the NFPA standards for Chute Time performance.

Table 10. NFPA Standard for Chute Time

Section	Standard
NFPA 1710	After "tone-out," response units shall be rolling within 90 seconds 90% of the time.

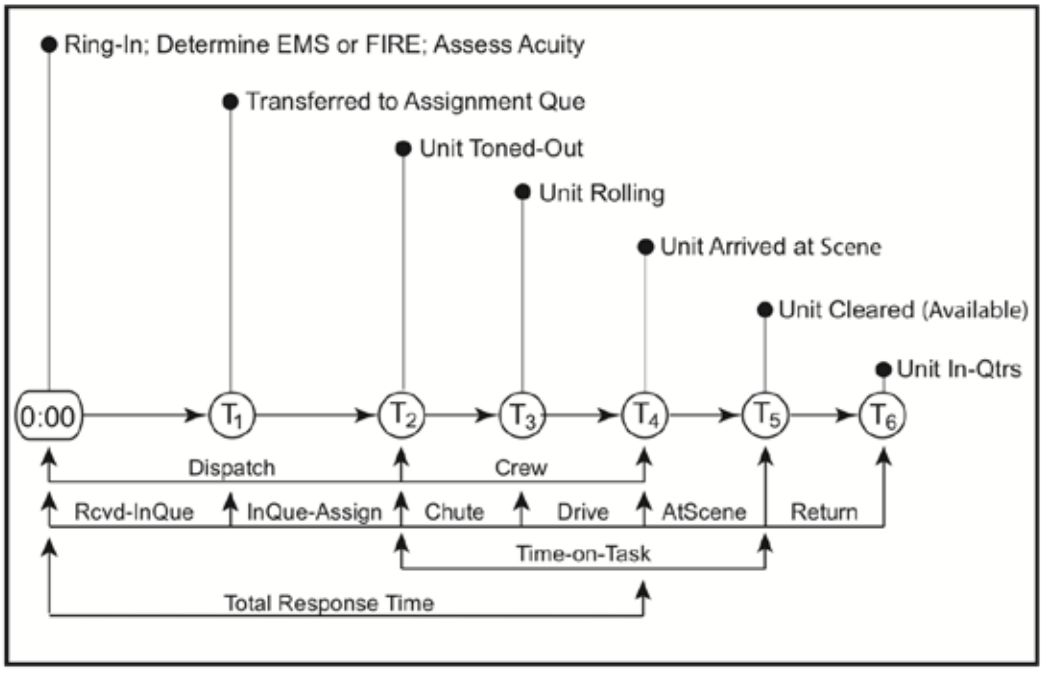
Table 11 below is a simplified depiction of the first six of the multiple steps in the flow of a 911 call. Step 5 in Table 11 is significant. The dispatcher at the 911 Call Center has authority to assign a unit to meet the request for service. At ConFire Dispatch, Steps 3 and 4 are merged together because in the initial call taking, the same operator conducts all EMS or FIRE determination, and the acuity assessment.

Table 11. Initial Steps of 911 Call Handling and Performance Standards

Step	Action
1	An individual observes an emergency event and determines the need for emergency intervention.
2	The individual initiates a call to 911.
3	A call taker at the 911 Dispatch Center answers the incoming call, identifies whether it should be medical, police or fire that handles the call, and transfers the call to a dispatcher. ***NFPA 1221 6.4.5 Performance Standard: Less than 30 seconds for 95% of calls***
4	The dispatcher answers the transfer and uses experience and/or scripted dialogs based on best practices to identify the category and acuity of the call. ***NFPA 1221 6.4.2 Performance Standard: Less than 15 seconds for 95% of calls***
5	The dispatcher identifies an available response unit and "tones out" that unit. ***NFPA 1221 6.4.3 Performance Standard: Less than 60 seconds for 95% of calls***
6	The unit "turns-out" and begins rolling to the site of the emergency. ***NFPA 1710 Performance Standard: Less than 90 seconds for 90% of calls***

The complete flow of a 911 call through the ConFire system is schematically depicted in Figure 12 below. The purpose of this schematic is to show the relationship of all the named time intervals to each other.

Figure 11. Flow of a Call Through the ConFire



As can be seen in the schematic:

- Dispatch Time = (Rcvd-to-InQue) + (InQue-to-Assign)
- Crew Time = (Chute-Time) + (Drive Time)
- Total Response Time = (Dispatch Time) + (Crew-Time)
- Time-on-Task = (Crew-Time) + (AtScene-Time)

For any single incident, these time intervals add up exactly. However, the additions described above become approximate when the time intervals that are being totaled are either averages or 90th percentile descriptions.

Based on NFPA 1221 6.4.2 and 6.4.5, the ConFire time interval labeled "Rcvd-InQue" should be no greater than 00:45 [min:sec] @ 90th percentile. Based on NFPA 6.4.3, the ConFire time interval labeled "InQue-Assign" should be no greater than 01:00 [min:sec] @ 90th percentile Based on the combination of these standards, the ConFire time interval labeled "Dispatch" should be no greater than 01:45 [min:sec] @ 90th percentile.

The actual performance of ConFire Communications on calls of P1-Emergency priority for emergency medical or fire service is presented in Table 12 and Table 13.

Table 12. Dispatch Time Intervals on EMS Calls

P1-Emergency Priority Codes: *NFPA Standard* @ 90th %-tile	Jan – Jun 2012 29 Units [min:sec] @ 90th %-tile	Jul – Dec 2012 28 Units [min:sec] @ 90th %-tile	Jan –Jun 2013 24 Units [min:sec] @ 90th %-tile
Rcvd-to-InQue *(not > 00:45)*	00:36	00:35	00:32
InQue-to-Assigned *(not > 01:00)*	01:14	01:14	01:10
Dispatch (*not > 01:45)*	01:42	01:42	01:36

The line labeled "Dispatch" in the table above is the combined total of "Rcvd-to-InQue" and "InQue-to-Assigned." This is an example of the minor and acceptable variations, either plus or minus, that occur when adding or subtracting statistically derived time intervals. This effect that shows up in many of the tables of statistic time intervals presented in this report does not materially affect the conclusions of this report.

Table 13. Dispatch Time Intervals on FIRE Calls

P1-Emergency Priority Codes: *NFPA Standard* @ 90th %-tile	Jan – Jun 2012 29 Units [min:sec] @ 90th %-tile	Jul – Dec 2012 28 Units [min:sec] @ 90th %-tile	Jan –Jun 2013 24 Units [min:sec] @ 90th %-tile
Rcvd-to-InQue *(not > 00:45)*	01:05	01:12	01:19
InQue-to-Assigned *(not > 01:00)*	01:06	00:55	00:53
Dispatch *(not > 01:45)*	01:56	02:00	02:17

The first observation from the data in Tables 12 and 13 above is that station closures had no discernible impact on the performance of the Communications Center. The second observation is that ConFire Dispatch met and exceeded the NFPA performance standards for dispatching EMS calls. Thirdly, ConFire Dispatch did not meet the performance standards for dispatching fire calls.

The time interval "Rcvd-to-InQue" is substantially longer for Fire calls than it is for EMS calls. Three functions must be performed by the operator during this time interval: 1) call pick-up, 2) determination

that the call is EMS or FIRE, and 3) assessment of the acuity of the incident. The Consultants feel that the assessment of acuity is the main difference between EMS and Fire dispatch performance.

For EMS calls, the assessment of acuity is guided by dispatch logic based on ProQA™ and Medical Priority Dispatch System™ determinants. In contrast, no system of formal dispatch logic was used to assess fire calls. The Consultants suggest that ConFire Communications implement the Fire Protocol, a system of formal dispatch logic, to reduce call taking time on requests for fire services.

COMMUNICATIONS CENTER ACCREDITATION

Since May 2003, the ConFire Communications Center had been accredited to the standards of the International Academies of Emergency Dispatch (IAED). A legacy of this accreditation is that the Communications Center continues to use dispatch logic based on ProQA™ and Medical Priority Dispatch System™ determinants. Accreditation funding was subsequently cut out of the budget in 2009/2010 and the Center is no longer accredited.

The Consultants highly recommend that accreditation be reestablished. Table 14 below presents 20 points of excellence that must be formally documented and verified as part of the IAED accreditation process.

Table 14. Requirements for IAED Dispatch Center Accreditation[13]

Formally describe and document the following.
1. All medical dispatch call-taking, dispatching and supervisory workstations.
2. Current Advanced Medical Priority Dispatch System (MPDS) licensing of each EMD position.
3. Current Academy certification of all EMD personnel.
4. How Academy certifications and case review will continue to be maintained.
5. Full activity of Quality Improvement (QI) committee processes.
6. EMD quality assurance and improvement methodology.
7. Case review at the Academy's recommended number and percentage of randomly reviewed cases.
8. EMD quality assurance and improvement database.
9. Consistent, cumulative MPDS case review at or above the following percentages: 95% - Case Entry protocol compliance; 95% - Chief Complaint selection accuracy; 90% - Key question protocol compliance; 90% - Post dispatch instruction protocol compliance; 95% Pre-arrival instruction protocol compliance; 90% - final code selection accuracy; 90% - cumulative overall score
10. Correct case review and QI procedures validated through independent Academy review.
11. How EMS field personnel were oriented to the proper use of the MPDS and feedback report.
12. Local policies and procedures for implementation and maintenance of the EMS program.
13. Current Continuing Dispatch Education (CDE) and EMD recertification program functions.
14. How police and fire dispatchers were oriented to the proper use of MPDS (S.E.N.D. protocol).
15. Properly established local configuration of all MPDS response assignments.
16. How MPDS response assignments will be regularly reviewed and recommended changes approved.
17. Incidence of all MPDS codes and levels.
18. Specific medical director oversight and involvement in EMD activities.
19. Sharing of non-confidential data with the Academy.
20. Support of the Academy's Code of Ethics and practice standards.

[13] International Academies of Emergency Dispatch, Twenty Points of Accreditation Excellence, www.emergencydispatch.org.

Accreditation requires top-notch systems, reporting and processes. Accreditation ultimately benefits patients and the community-at-large. While the ConFire Communications Center follows many of the accreditation standards policies and processes, it would be in the best interest of the County to pursue and achieve accreditation status. This is particularly important as a liability mitigation tool, as the County will increasingly rely on the medical priority dispatch system to choose to assign or not assign specific resources to calls. Achieving accreditation means that IAED, a third-party agency, has stated that the Communication Center has met and continues to meet the highest standards of triage protocols.

It was outside the scope of this project to determine if the appropriate number of dispatch centers exist in the County or if consolidating dispatch centers can result in improved efficiency. This type of analysis has to be done independent to any other analysis. These studies are complex and require evaluation of people, processes and technologies. Consolidation has several pros and cons and requires significant stakeholder input to determine what would be considered a successful outcome.

DESIGNING A DEPLOYMENT SYSTEM

Fundamentally, fire service systems reduce risk to material assets and human lives. These systems are designed from many perspectives. Its mission is complex since perceived risk is a mix of factual assessment of "what is" overlaid with the societal tolerance for the consequences of this person or object being lost or damaged.

BOTTOM-UP DESIGN

Traditionally, fire services have used a white paper approach to designing delivery systems for risk mitigation. The white paper approach, commonly called a "standard of cover," is developed by first evaluating the risk in the community, object by object and person by person (figuratively), then assigning the appropriate resources to response to each risk, and finally determining the costs as a consequence of the resources identified in the second step. A traditional, purely bottom-up, design for the delivery of fire services can occur only in systems without fiscal constraints.

One of the major challenges with the bottom-up fire service delivery design is that the people who are going to provide the service determine risk tolerance. While this expert model seems intuitively correct, it lacks societal transparency and, as such, often encounters political resistance because the general public does not understand what they are buying.

TOP-DOWN DESIGN

The challenge to designing fire service delivery systems occurs when there are fiscal constraints. At this point, the design process has a new element. The dollars that are available limit what can be accomplished. Thus the design process inverts from a bottom-up to a top-down approach. In the top-down approach, the fundamental considerations center on the available dollars and the levels of risk the society is willing to assume. Hard choices have to be made because society cannot afford to mitigate all risk. While the top-down approach improves societal transparency, it also often encounters political resistance because the general public does not understand that some risks must be only partially mitigated and others remain un-mitigated.

In top-down designs, the metric that applies to partial, or incremental, mitigation of risk is response time. Basically, the system is designed by making a connection between the money available and how quickly the system is able to respond to specific types of emergencies. The understanding to the general public is clear: X dollars buys Y resources that respond to emergencies in Z amount of time. The more available funding and added resources, the faster the response will be. Response time, whether for fire or medical emergencies, is a key driver to positive outcomes.

Responses to fire emergencies are complicated. They can be of many different types. Effectively responding to them requires bringing together three elements:

1. Arrival within an appropriate response time,
2. Arrival of the appropriate apparatus and equipment,
3. Arrival of the appropriate number of personnel.

Throughout this report each element will be considered based on the top-down modeling.

HISTORICAL DATA

When dealing with both medical and fire related emergency services, it is essential to understand the concept of the "risk" which is the probability of a demand for service. Designing a system for the delivery of fire services requires predictions of two fundamental elements:

- Volume — the number of the emergency incidents.
- Distribution — the location of the emergency incidents.

When creating a model, the first question to answer is how risk, or demands for service, will be distributed across Contra Costa County. The next component, future behavior, will be based not on predictions of single incidents, but on statistical descriptions of large numbers of predicted incidents *occurring over significant spans of time.* The designer must knowledgably play the odds regarding what apparatus to station where.

The erroneous belief that many policymakers hold is that census-derived population densities are a good predictor of total risk. Census data shows where people are domiciled and where residential structures are located. As such, it is a better predictor of demands for fire suppression services than for emergency medical services. In and of themselves, fire station locations are not a predominant determinant of performance; rather, the number of frontline units in the system is the leading determinant.

A prevailing concept in emergency services is that past activity is the predominant predicator of future activity. This concept stems from the fact that risk, to both infrastructure and humans, is geographically non-migratory. That means that industrial areas yesterday will persist as industrial areas today, and will tend to produce similar call activity or risk into the future. Likewise, this approach assumes that a dormitory community yesterday will be a dormitory community today and into the future. Thus, past risk predicates future risk. An evaluation of historic risk becomes the foundation of a future system design.

In emergency medical services, census-derived population density has proven to be only a relative predictor of demand for services. This is primarily due to the fact that many regions in and around Contra Costa County are "bedroom communities." The populations of the bedroom communities affect other areas that have the working populations. People get up in the morning and go about their

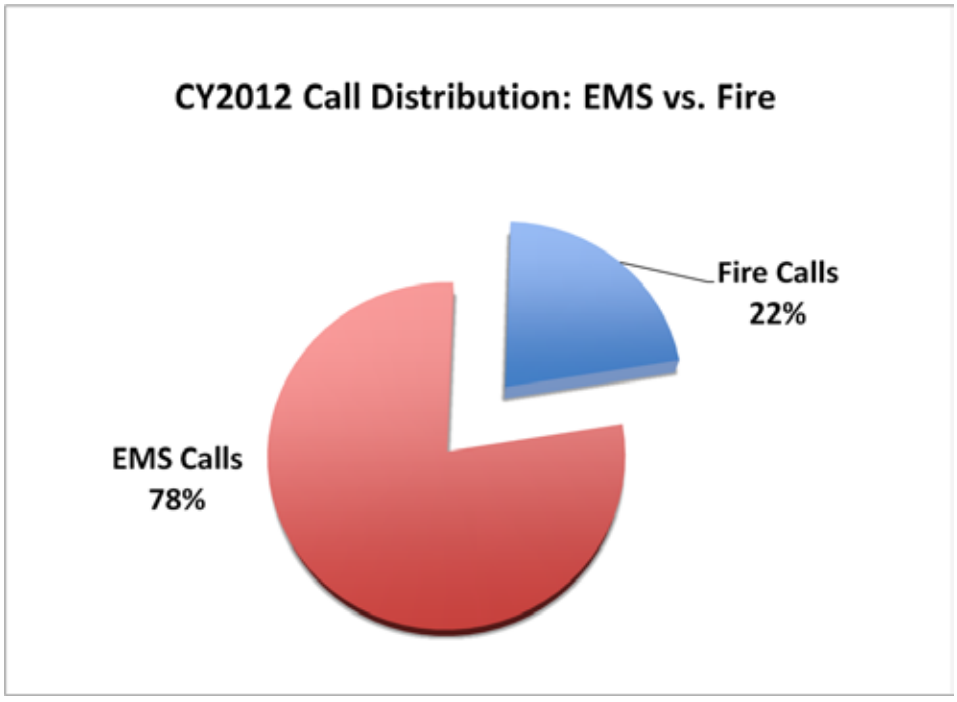
business, moving around the County in complex geo-temporal patterns. Simply put, not everyone has their emergency medical event at home.

From the perspective of EMS risk, the data in the Computer Aided Dispatch system shows historic demands for service and is a good predictor of where future demands will occur because the geographic and temporal mobility of the population is already embedded in the historic data. Hence, historic data is of immense and *irreplaceable* value to planners and policy makers because it obviates the need to otherwise know the details of the geographic and temporal mobility of the population.

ACTIVITY IN THE SYSTEM — QUANTITATIVE DISTRIBUTION

The most simplistic description of the activity in the Contra Costa Fire Protection District is to merely calculate percentages from a tally of counts of emergency medical and fire service incidents. Such an approach produces a primary level of analysis referred to as a quantitative distribution and is presented in Figure 12 below.

Figure 12. Call Distribution EMS vs. Fire Calls CY2012



The quantitative distribution seems to demonstrate a disproportionate predominance of EMS activity. Ideally, the allocation of system resources would be expected to match the ratio of 78% EMS calls to 22% of fire calls. Certainly, there is no question that EMS incident response is a major activity of the department, and some apparatus specification should be dedicated to EMS response. Yet ConFire's finite fiscal resources guarantee that substituting light vehicles into the fleet for EMS responses will displace funds available for purchasing the heavier fire response engines. Ultimately, this will infringe on fire service capacity to respond to fire calls. The balance between light vehicles and engines is

complicated by the fact the engines can respond to both EMS and fire incidents while light vehicles can only respond to EMS incidents, except to deliver additional personnel as needed to a major incident.

ConFire initiated EMS first response service, as did many fire departments, to enhance the local ambulance services capacity, and to reduce morbidity and mortality of patients. Given its budget restraints, ConFire must perform a fine balancing act between the conflicting requirements of EMS and fire responses in order to enhance its service to the community.

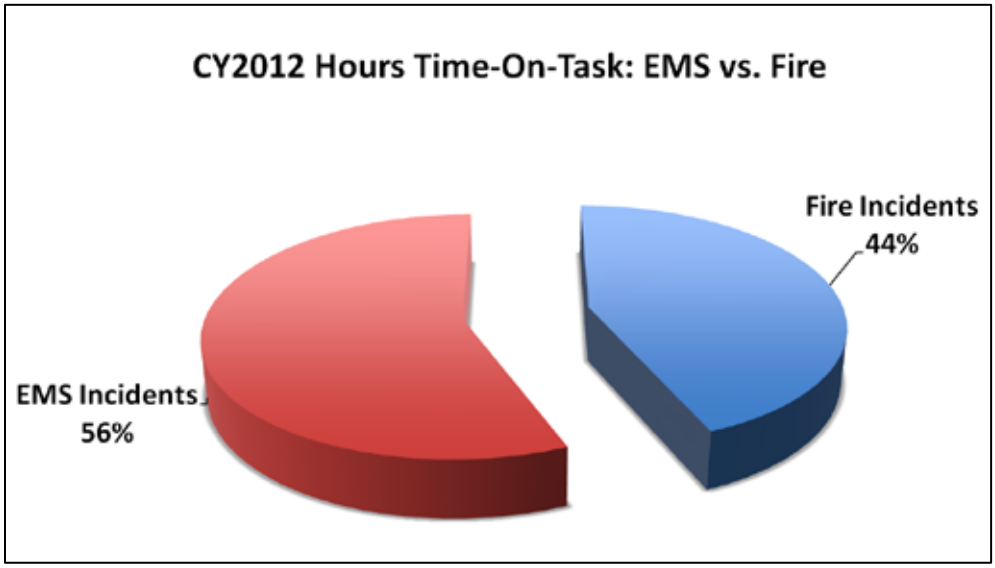
TIME-ON-TASK

Allocating resources based on counts of incidents carries the implicit assumption that both EMS and fire incidents consume the same amount of resources. Of course, this assumption is fundamentally flawed. EMS incidents are remarkably homogeneous in the resources required for response. In contrast, fire incidents are remarkably heterogeneous in the resources required for response.

ConFire's response to an EMS incident is most often a three-position crew and an engine. The incidents are cleared in an average of 18 minutes. The appropriate response to a fire incident spans the range of a single engine, to full alarm, and to multi-alarm. Clearing these incidents spans the range of 30 minutes to 18 hours.

The concept of time on task becomes the normalizing factor that allows evaluators to understand work as a function of time and to make real world distinctions between responses to EMS and fire incidents. Such and analysis is presented in Figure 13 below.

Figure 13. Percentage of Time-on-Task Fire vs. EMS Calls CY2012



Of the more than 18,000 hours dedicated directly to delivery of service, 8,000 were consumed in fire-based activity and approximately 10,000 hours were consumed in emergency medical services type activity. This distribution is 56% EMS activity and the 44% fire activity.

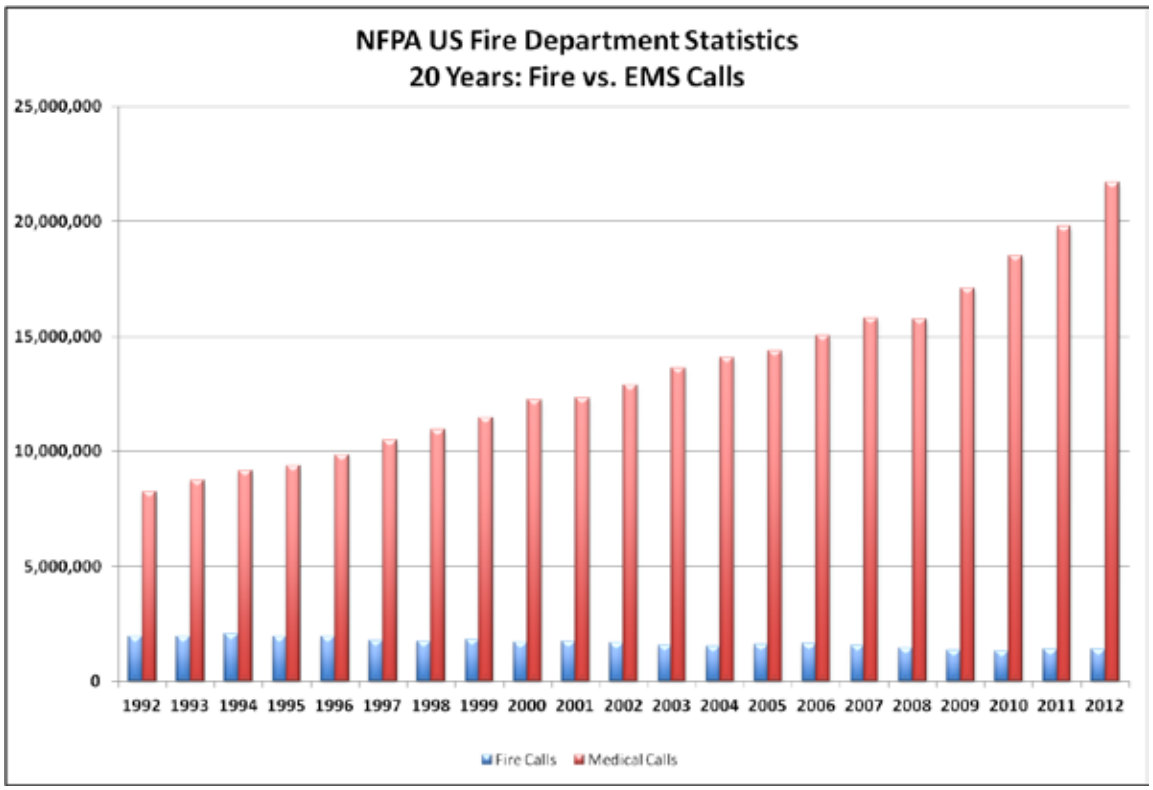
UNDERSTANDING RISK — HISTORIC GROWTH OF EMS RESPONSES

Risk is the key element in the design of systems to deliver emergency services. The more risk a community is willing to take the less emergency services the community needs. Inversely the less risk a community is willing to tolerate, the more emergency service capacity the community needs.

Historically, emergency medical services or responding to medical emergencies was not a core function of fire agencies. Fire services had available resources, and gradually EMS calls were seen as a function where fire services could improve response times to life critical calls. EMS has evolved to become a core function of modern fire services and represents greater call activity than fire response throughout the United States.

Figure 14 below was published by the National Fire Protection Association (NFPA) and represents the growth in fire and EMS responses nationwide for the period 1986 through 2009.

Figure 14. Continued Growth of EMS Functions in North America



The figure above clearly indicates that call growth for emergency medical incidents far outstrips the growth in the number of fire calls. Thus, EMS calls and EMS risk mitigation are a key element for fire protection agencies.

DEFINING INCIDENT ZONES

Manually placing calls on a map becomes overwhelming very quickly because the geography becomes cluttered with call markers. In addition, manual placement gives no sense of the temporal distribution of calls. In order to create maps of call demand that are intelligible and interpretable, the Ontario Municipal Benchmarking Initiative, OMBI, derived an algorithm to automate the establishment of Urban, Suburban, and Remote call behavior. For the analyses in this report, *FITCH* used proprietary software that refines the OMBI methodology.

The five steps to mapping urban, suburban and remote incident zones are:

1. Use the predetermined political boundaries of Contra Costa Fire Protection District as the mapping area.
2. Import the CY 2012 data for EMS and/or fire demands for service onto this map.
3. Create a grid of one-kilometer squares (1 km^2) that covers the Contra Costa Fire Protection District.[14] For all squares in the 1km grid, the analysis counts the number of incident locations that fall within each square.
4. Divide the calls falling into each zone by 12 months to get calls per grid square per month.
5. Use the rules in Table 15 below to assign designations of Urban, Suburban, or Remote zones to the grid squares. For each one-kilometer square (1 km^2) grid element, the analysis also determines the number of incidents that fall within the eight surrounding 1km squares in the grid. This methodology removes the artifact or potential that a singular address, such as a nursing home, can affect a grid square to such an amount that it becomes Urban (high density demand) without truly exhibiting high-density demand over the whole square.

Table 15. Rules for Assigning Urban, Suburban, and Remote Incident Zones

Incident Zone	Color Code	Assignment Rule
Urban	**RED**	Two calls or more per square kilometer per month with at least four of the adjacent square kilometers having the same number of calls per month.
Suburban	**GREEN**	At least one call per square kilometer every four months with at least half the adjacent square kilometers having the same number of calls per month.
Remote	**CLEAR**	Less than one call per square kilometer every four months.

The outcome of this procedure is the map of fire incident zones presented in Figure 15 below.

[14] Using grid elements of 1 km^2 rather than 1 mi^2 yields a map of incident zones having a higher resolution.

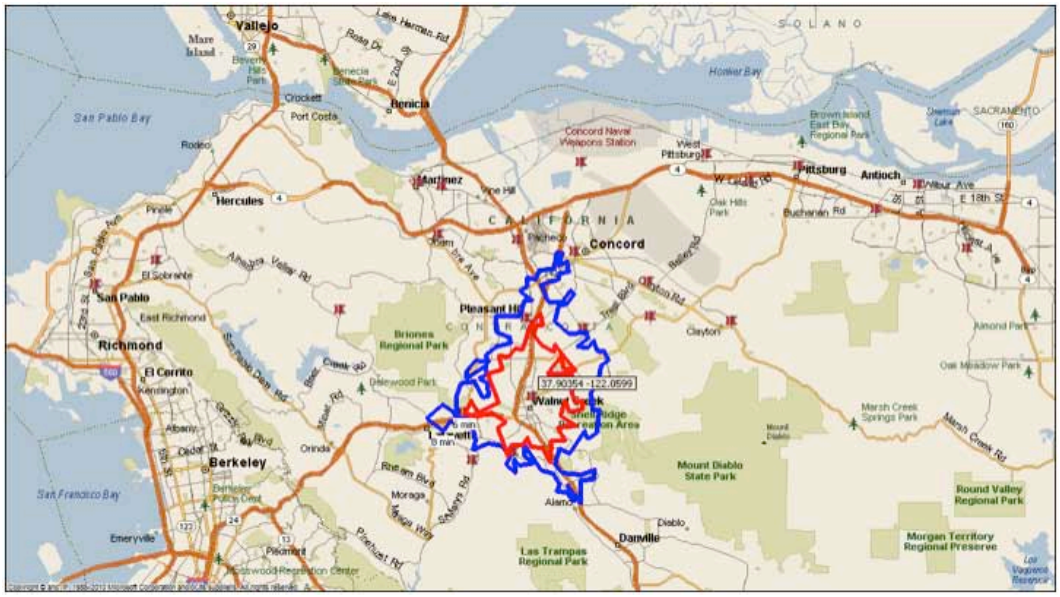
Figure 15. ConFire Fire Incident Zones Based on Call Densities for CY2012

The first significant observation regarding the above map of fire incidents is that there are three geographically distinct regions of Urban and Suburban incident zones surrounded by vast areas of Remote incident zones. Remote incident zones are mapped using transparent grid squares to leave enough of the underlying map visible for orientation purposes. The three regions are separated by geographic barriers and are linked by highways prone to severe congestion. The consequence is that each of these regions needs to have its own surge capacity. They are poorly positioned to be mutually supporting.

The second significant observation regarding the above map is that there are a small number of urban incident zones embedded in larger numbers of Suburban incidents zones. Since an Urban incident zone has eight times the call count of a Suburban incident zone, response times into Urban incident zones have a disproportionate influence on countywide response times. A small number of station locations are key to making responses into the Urban incident zones.

The next step in the design process is to establish drive zones around the locations where units are to be posted. In models being considered for ConFire, these locations will be existing station locations. Figure 16 below presents six-minute and eight-minute drive zones around C-CON Station 01. In order to avoid undue complexity in this report, drive zones are assumed to be the same for all equipment types. More sophisticated modeling is possible, but would not change the conclusions of this report.

Figure 16. Six-Minute and Eight-Minute Drive Zones1 Around C_CON Station 01



[1] The red perimeter delineates the six-minute drive zone. The blue perimeter delineates the eight-minute drive zone.

Obviously, an eight-minute drive zone is bigger than the six-minute zone. A unit located at Station 01 can access more geography in eight minutes than it can in six minutes. Thus, fewer units are required to cover the whole county using eight-minute drive zones than using six-minute zones. The penalty is that it takes longer to arrive at scene. The number of calls that will be assigned to Station 01 is greater from an eight-minute drive zone than from a six-minute zone. Even with an eight-minute drive zone, the station utilization is low enough that the probability of calls stacking when several are received in the same area, is remote.

Figure 17 below indicates the locations of the stations required for coverage of 90% of the fire incidents in the County within eight-minute drive zones of the various stations. Table 16 below identifies these stations and lists the incremental and cumulative capture of fire incidents by each station.

The drive zone maps are then laid over the incident zone maps, and the percentage of total calls captured inside each drive zone is tallied. The results of this procedure can be very dramatic. Almost half of all fire incidents occur inside the two eight-minute drive zones surrounding Station 05 and Station 83.

Achieving an eight-minute drive time 90% of the time to fire calls requires that eight to nine units be available for coverage at all times in the stations with the highest incremental capture. This model requires that ConFire implement an aggressive move-up logic strategy. To achieve an eight-minute drive time for 90% of all fire calls, every time a station with a high incremental capture responds to a call, a unit from a station with a lower incremental capture must be moved up the cover the empty station. Since there are three distinct regions of fire risk, with poor accessibility between regions, each region has to have its own surge capacity.

Table 16. Eight-Minute Drive Time Station Identities with Incremental and Cumulative Capture of Fire Incidents

Fire Incidents		Percent Incidents Captured Within 8-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-05	28.24%	28.24%
2	CON-83	20.51%	48.75%
3	CON-70	9.77%	58.52%
4	CON-86	7.81%	66.33%
5	CON-08	7.44%	73.77%
6	CON-15	6.03%	79.80%
7	CON-12	5.92%	85.72%
8	**CON-82**	**4.51%**	**90.23%**
9	CON-05	4.71%	94.94%
10	CON-03	1.31%	96.25%
11	CON-83	1.15%	97.40%
12	CON-22	0.89%	98.29%
13	CON-69	0.63%	98.92%

Adding an additional unit at Station 05 would capture more demand than adding units in other stations that have little risk. See Attachment D for a full explanation of the Risk Model Methodology and associated algorithm.

Figure 17. Stations Required For Eight-Minute Drive Zones for Fire Incidents

Based on the above logic and using an estimated requirement of 50% for surge capacity, the total number of units required is between 12 and 13.

The same exercise can be done for six-minute drive zones. Table 17 below identifies these stations and lists the incremental and cumulative capture of fire incidents by each station. Figure 18 below indicates the map locations of the stations.

Table 17. Six-Minute Drive Time - Station Identities with Incremental and Cumulative Capture of Fire Incidents

Fire Incidents		Percent Incidents Captured Within 6-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-06	15.24%	15.24%
2	CON-83	13.67%	28.91%
3	CON-01	8.59%	37.50%
4	CON-70	8.15%	45.65%
5	CON-84	6.13%	51 78%
6	CON-12	4.52%	56.30%
7	CON-05	4.31%	60.61%
8	CON-15	4.12%	64.73%
9	CON-86	3.78%	68.51%
10	CON-08	3.68%	72.19%
11	CON-88	3.60%	75.79%
12	CON-07	3.12%	78.91%
13	CON-09	2.28%	81.19%
14	CON-69	1.49%	82.68%
15	CON-82	1.49%	84.17%
16	CON-81	1.31%	85.48%
17	CON-03	1.19%	86.67%
18	CON-11	1.03%	87.70%
19	CON-04	0.91%	88.61%
20	CON-13	0.79%	89.40%
21	**CON-16**	**0.61%**	**90.01%**
22	CON-05	2.71%	92.72%
23	CON-83	2.35%	95.07%

Figure 18. Stations Required For Six-Minute Drive Zones for Fire Incidents

Achieving an six-minute drive time 90% of the time to fire calls requires that 21-22 units be available for coverage at all times in the stations with the highest incremental capture. Again, aggressive move-up logic must be implemented. Estimating the requirement for surge units at 50%, the total number of units required would be 30-31. Given ConFire's current resources, a six-minute drive time could not be achieved 90% of the time.

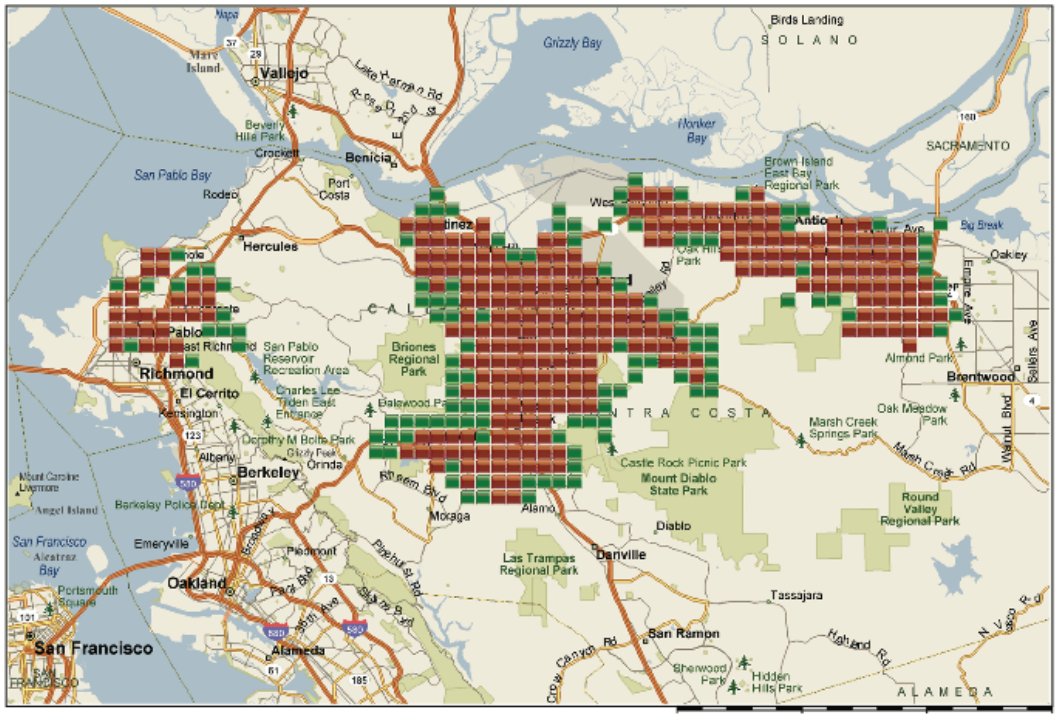
The point of presenting the model for six-minute drive times was to emphasize how small changes in response times translate to large changes in resources. A ConFire system with an eight-minute drive time required 13 frontline units. The system with a six-minute drive time required 31 frontline units. Shortening drive time by two minutes more than doubles the required number of frontline units (and expenses) required.

Now invert the perspective on this model. Assume ConFire is running a system with 31 stations and a six-minute drive time, and, for fiscal reasons, needs to reduce expenses. A key observation/finding of applying inverse logic is that if more than half of the units were decommissioned, the drive time would increase by only two minutes.

CONFIRE'S EMS RISK

Incident zones describing EMS risk were mapped using the same procedures as previously described for mapping fire risk. The result of this mapping is presented in Figure 19 below.

Figure 19. ConFire EMS Incident Zones Based on Call Densities for CY2012



As can be seen in Figure 19 above, the footprint of EMS risk segregates into the same three regions as fire risk. The most significant difference from the map of fire incident zones is the much greater number of zones with high EMS call densities. This outcome is an expected result of EMS incidents outnumbering fire incidents four-to-one.

Again, maps of six-minute and eight-minute drive zones were laid over the map of EMS incident zones, and rosters of stations were determined that captured 90% of the EMS incidents. These are shown in Tables 18 and 19 and Figures 20 and 21 below.

Table 18. Eight-Minute Drive Time - Station Identities with Incremental and Cumulative Capture of EMS Incidents

EMS Incidents		Percent Incidents Captured Within 8-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-05	26.87%	26.87%
2	CON-83	23.76%	50.63%
3	CON-70	9.33%	59.96%
4	CON-08	8.73%	68.69%
5	CON-86	7.41%	76.10%
6	CON-12	6.13%	82.23%
7	CON-03	5.10%	87.33%
8	**CON-82**	**3.19%**	**90.52%**
9	CON-05	6.41%	96.93%
10	CON-83	0.99%	97.92%

Figure 20. Stations Required For Eight-Minute Drive Zone for EMS Incidents

Table 18 above identifies these stations and lists the incremental and cumulative capture of fire incidents by each station. Figure 20 above indicates the locations of the stations required for coverage of 90% of the fire incidents in the County within eight-minute drive zones of the various stations.

The number of units required to achieve an eight-minute drive-time 90% of the time to EMS calls is similar to the eight to nine required for an eight-minute drive time to fire calls. This is actually an expected result because the footprint of EMS incidents is coterminous or congruent with the footprint of fire calls. Again, this model requires that ConFire Dispatch implement aggressive move-up logic. To achieve an eight-minute drive time for 90% of all EMS calls, every time a station with a high incremental capture responds to a call, a unit from a station with a lower incremental capture must be moved up to cover the empty station. Since there are three distinct regions of fire risk, with poor accessibility between regions, each region has to have its own surge capacity. *FITCH* estimated the requirement for surge units at 50%, making the total number of units required be 12 to 13.

The same exercise can be used for six-minute drive zones. Table 19 below identifies these stations and lists the incremental and cumulative capture of fire incidents by each station. Figure 21 indicates the map locations of the stations.

Table 19. Six- Minute Drive Time - Station Identities with Incremental and Cumulative Capture of EMS Incidents

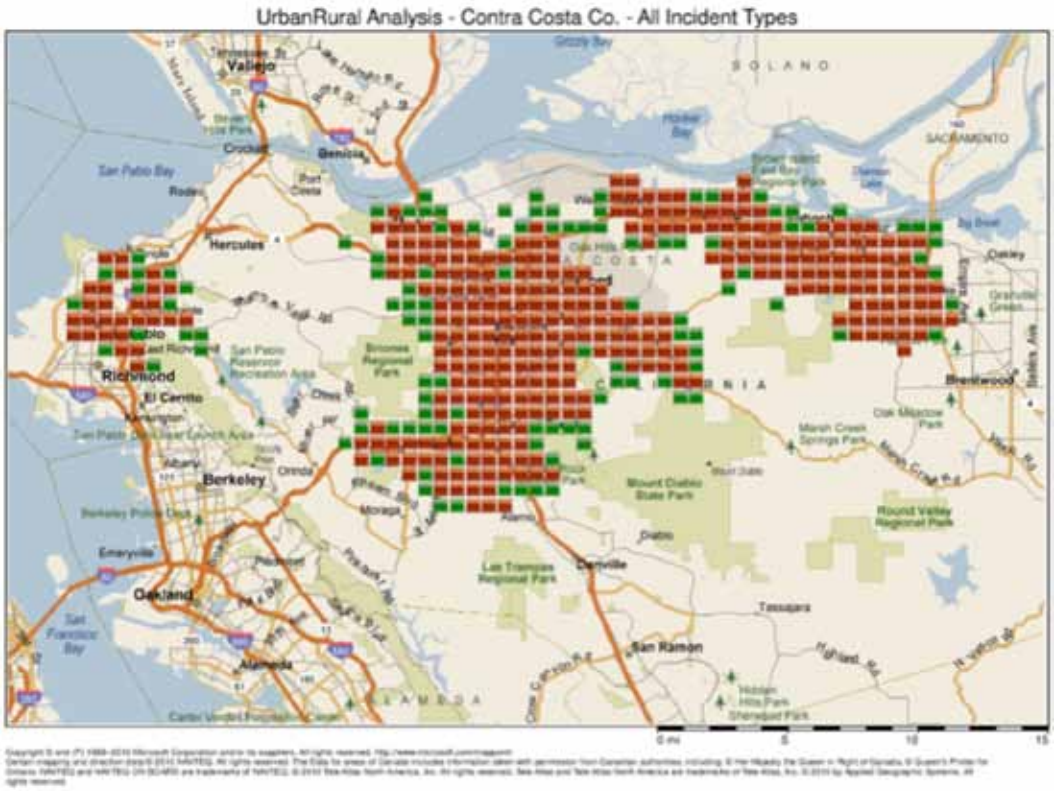
EMS Incidents		Percent Incidents Captured Within 6-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-05	16.47%	16.47%
2	CON-83	16.40%	32.87%
3	CON-70	7.92%	40.79%
4	CON-08	7.90%	48.69%
5	CON-86	5.45%	54.14%
6	CON-12	5.33%	59.47%
7	CON-03	4.37%	63.84%
8	CON-82	4.28%	68.12%
9	CON-05	4.07%	72.19%
10	CON-83	3.20%	75.39%
11	CON-03	3.09%	78.48%
12	CON-22	2.38%	80.86%
13	CON-70	1.77%	82.63%
14	CON-15	1.58%	84.21%
15	CON-11	1.25%	85.46%
16	CON-13	1.20%	86.66%
17	CON-07	1.18%	87.84%
18	CON-04	1.07%	88.91%
19	CON-84	1.03%	89.94%
20	**CON-17**	**0.74%**	**90.68%**
21	CON-16	2.59%	93.27%
22	CON-81	1.80%	95.07%

Figure 21. Stations Required For Six-Minute Drive Zone for EMS Incidents

CONFIRE COMBINED EMS AND FIRE RISK

The system has to respond to both EMS and fire calls, so the required risk coverage is all calls combined. Figure 22 presents the map of incident zones that combines EMS and fire calls.

Figure 22. ConFire Incident Zones EMS and Fire Call Densities for CY 2012



The salient feature of this map is that it is almost indistinguishable from the map of EMS incidents only. This is an expected result because EMS incidents outnumber fire incidents by four to one.

Again, maps of six-minute and eight-minute drive zones were laid over the map of incident zones comprising both EMS and fire calls. Rosters of stations were then determined that captured 90% of the incidents.

Table 20 below identifies these stations used for achieving eight-minute drive zones and lists the incremental and cumulative capture of all incidents (EMS plus fire) by each station. Figure 23 indicates the map locations of these stations.

Table 20. Eight-Minute Drive Time - Station Identities with Incremental and Cumulative Capture of EMS & Fire Incidents

EMS & Fire Incidents		Percent Incidents Captured Within 8-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-05	27.36%	27.36%
2	CON-83	23.39%	50.75%
3	CON-70	9.31%	60.06%
4	CON-08	8.49%	68.55%
5	CON-86	7.43%	75.98%
6	CON-12	6.12%	82.10%
7	CON-15	5.00%	87.10%
8	**CON-82**	**3.38%**	**90.48%**
9	CON-05	5.09%	95.57%
10	CON-03	1.99%	97.56%

Figure 23. Stations Required For Six-Minute Drive Zones for EMS & Fire Incidents

Achieving an eight-minute drive time 90% of the time to all calls (EMS and fire) requires that eight to nine units are available for coverage at all times in the stations with the highest incremental capture. This model requires that ConFire implement aggressive move-up logic. To achieve an eight-minute drive time for 90% of all fire calls, every time a station with a high incremental capture responds to a call, a unit from a station with a lower incremental capture must be moved up the cover the empty station. Since there are three distinct regions of fire risk, with poor accessibility between regions, each region

has to have its own surge capacity. The Consultants estimated the requirement for surge units at 50%, making the total number of units required be 12 to 13.

The same exercise can be done for six-minute drive zones. Table 21 below identifies these stations and lists the incremental and cumulative capture of fire incidents by each station. Figure 24 below indicates the map locations of the stations.

Table 21. Six-Minute Drive Time - Station Identities with Incremental and Cumulative Capture of EMS & Fire Incidents

Fire & EMS Incidents		Percent Incidents Captured Within 6-Minute Drive Zones	
		Incremental Capture per Station	Cumulative Capture
1	CON-06	16.43%	16.43%
2	CON-85	16.10%	32.53%
3	CON-10	7.89%	40.42%
4	CON-70	7.86%	48.28%
5	CON-86	5.35%	53.63%
6	CON-15	5.25%	58.88%
7	CON-12	4.38%	63.26%
8	CON-82	4.23%	67.49%
9	CON-05	3.81%	71.30%
10	CON-08	3.22%	74.52%
11	CON-81	2.98%	77.50%
12	CON-03	2.94%	80.44%
13	CON-09	1.86%	82.30%
14	CON-84	1.58%	83.88%
15	CON-88	1.24%	85.12%
16	CON-69	1.22%	86.34%
17	CON-13	1.17%	87.51%
18	CON-01	1.10%	88.61%
19	CON-83	1.09%	89.70%
20	**CON-11**	**0.77%**	**90.47%**
21	CON-05	2.56%	93.03%
22	CON-82	1.84%	94.87%

Figure 24. Stations Required For Six-Minute Drive Zones for EMS & Fire Incidents

The Option 2 deployment plan was developed based on the analyses in this section.

OPERATIONAL ANALYSES

A number of analyses were conducted as part of the overall review of ConFire's operations to provide a complete picture of the organization's performance. As the analyses proceeded, the Consultants noted significant issues with CAD data and the ability to isolate performance of ConFire units. Those issues are described in the first section below and *FITCH* concluded that only response time data derived from ConFire's automatic vehicle location system (AVL) should be used for ConFire performance analyses.

CAD DATA RECONCILIATION

Issues noted in the CAD data caused *FITCH* to seek validation from the AVL data logged into the AVL server. To cross validate response time intervals, CAD data is compared to AVL data. CAD data is entered manually by crewmembers pushing a button indicating the unit's status as being "en route" or "at scene." Data logged into the CAD can be susceptible to human error or bias if crew members fail to push the button in a timely fashion. In contrast, AVL is a fully automated system that runs in the background without human input and provides a running list of timestamps and geographic locations of all vehicles in the system at seven-second intervals.

The Consultants were unable to reconcile data logged in the CAD with the actual geographic locations of the vehicles as logged into the AVL. When CAD data and AVL data cannot be reconciled, the AVL data is considered more reliable.

In January 2013, four of ConFire's 28 stations were closed and four response companies were eliminated. While the four closed stations represent about 15% of all stations, the closed stations handled fewer than 5% of the calls flowing though the system. Coincident with the station closures, response time data logged into the CAD showed drive-times that were longer by more than two minutes. Drive-time is the interval from when the unit leaves the station to when it arrives at scene.

Based on *FITCH's* experience with emergency response systems, a change affecting fewer than 5% of the calls would not lead to two minute longer drive-times for all calls in the system. Furthermore, the Consultants conducted detailed analyses of incident zones, station locations, and drive zones specific to ConFire's geography in order to estimate changes in drive-times for the system. The conclusion from the analyses was that drive-times are not a sensitive function of the exact number of stations in this system. Again, removal of four stations from the system should not have led to a two minute lengthening of drive-times.

FITCH determined it was necessary to run analyses based on the AVL system and compare those to the CAD data reports. The AVL system has a Global Positioning System or GPS receiver on board each vehicle that reports the vehicle's position along with a timestamp back to the AVL server every seven seconds. Thus, the interval from when a vehicle leaves quarters and arrives at scene can be determined independently of the timestamps in the CAD.

CAD Logic Defect Description

The EMS response times below provide a comparison of CAD response times to those derived from AVL data analyses. The analyses show that the logic underlying how the CAD logs response data contains a structural defect. On most EMS calls, ConFire Dispatch usually assigns the engine first and the ambulance second. In the Master Incident table, the timestamp for" first assigned" refers to the engine. The next timestamp is for "first en route." The AMR ambulance is often dynamically deployed at a post in the field with the crew already loaded. Under these circumstances, the ambulance can get rolling in 10 to 30 seconds, while the engine takes up to two minutes. The ambulance triggers the timestamp for "first en route" in the ConFire CAD.

Chute time is the difference between the "first en route" timestamp and the "first assigned" timestamp. The problem is that a chute time calculated from when the engine was notified to when the ambulance is rolling is fundamentally meaningless.

The comparison of CAD and AVL data is shown below in Table 22 for Chute Time intervals. The period January 2013 to June 2013 was used as for the sample.

Table 22. EMS Chute Time Interval Comparisons of CAD to AVL Data Jan-Jun 2013

Priority Description	CAD Data 90%-tile [min:sec]	AVL Data 90%-tile [min:sec]
P1-Emergency	01:50	02:56
P2-Emergency	01:51	02:57
P3-Routine	01:51	02:57
P4-Routine		
P5-Non-emergency	02:07	03:14

The logic defect does not allow for tracking performance of an individual agency through the various time intervals. It does, however, indicate the performance of the system overall. As such it has value as it reflects the overall performance of the *system* from the viewpoint of person experiencing the emergency.

Automatic Vehicle Location Data

FITCH requested a download of the AVL data files from ConFire's AVL server. The data files received were defective in that the data types of each field were not correctly specified. Repairing the data tables was time consuming, and was completed during the last week of December 2013. Until that point in time, the Consultants relied upon CAD data for their verbal discussions and formal presentations. Based on the improved ability to track and report performance of the individual agencies as noted above AVL data was used for analyses.

Response time performance information in this report now conforms to AVL analyses. In many instances, response time data in this report are materially different from previous representations made

by ConFire and the Consultants. Two specific areas of discrepancy involve drive-times on EMS responses and the impact of station closures on response times.

Based on the discrepancies discovered, *FITCH* recommends that Contra Costa County policymakers use response time data from the CAD with caution. *FITCH* concludes that the Department's 2012 and 2013 response time reports, including the Department's Monthly Productivity Reports that describe the movements and performance of vehicles reflect *system* performance and not ConFire's performance.

CALL PRIORITIZATION AND PERFORMANCE METRICS

ConFire dispatchers prioritize fire and medical calls as P1 or P2 emergencies, P3 or P4 routine calls, or P5 non-emergency calls. P1 and P2 calls are deemed to be life-threatening emergencies. While the discussion on performance in this report focuses on P1 calls, performance metrics for all fire and medical call priorities are included in Attachment E.

The ConFire CAD time-stamps a number of performance intervals starting with the time a call rings into the 911 call center through the time the response unit closes out the call. ConFire's performance was analyzed for Calendar Year (CY) 2012 and for the first six months of CY2013. Unless otherwise noted, the calls analyzed were for responses by ConFire units to calls within the Contra Costa Fire Protection District only.[15]

Call intervals analyzed include the following:

- Dispatch Time — call received at 911 to assignment of a unit for response
- Chute Time — unit receives dispatch instructions until wheels are rolling
- Drive Time — wheels are rolling until first unit arrives on scene
- Crew Time —unit receives the dispatch until it arrives on-scene; for a single call this is the same as Chute Time plus Drive Time
- Total Response Time — call received at 911 until unit arrives on scene

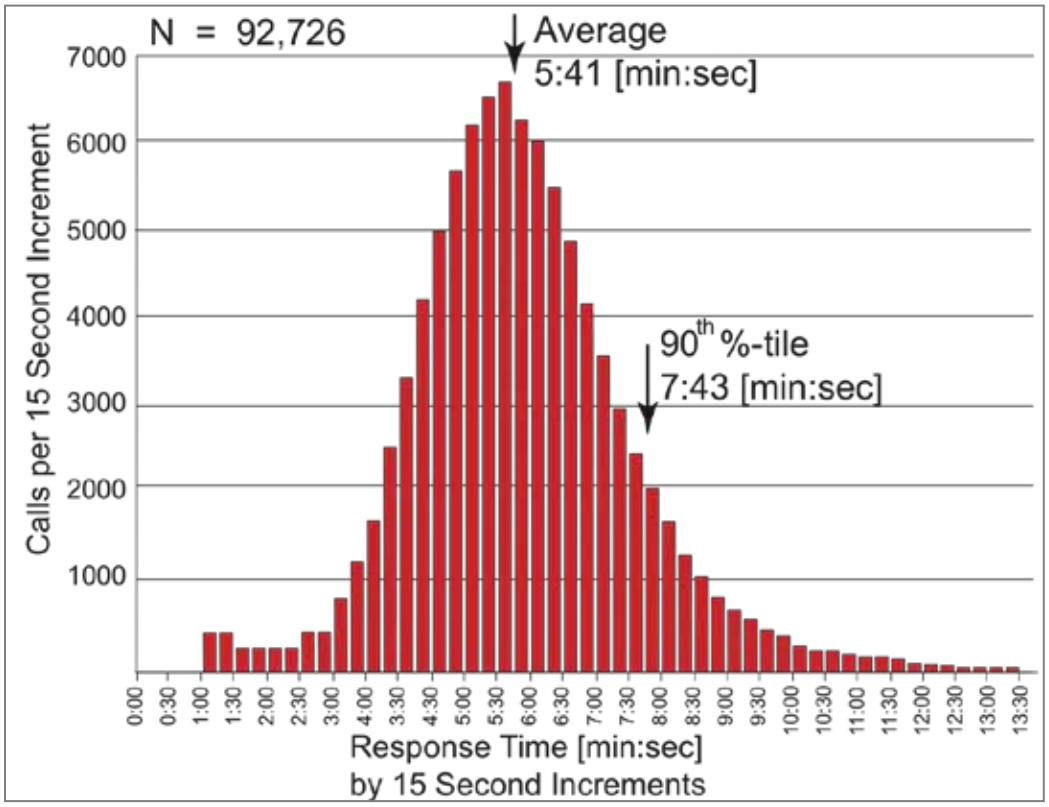
Total response time is the most important time interval because it is assessed from a patient centric viewpoint. It is the composite time from when a call rings into 911, to when help arrives at the scene of the incident.

Performance is reported in terms of fractile measurements of 90% reliability. This means that 90% of calls are responded to within the noted time interval.

[15] The ConFire Communications Center dispatches calls for a number of other jurisdictions. These calls are not part of this analysis. Additionally, mutual aid response by ConFire units into other jurisdictions and mutual aid responses by other jurisdictions into the ConFire district are not part of this analysis. Mutual aid calls are discussed in a separate section of this report.

Figure 25 provides an example of the relationship of response times reported as an average versus the 90th percentile.

Figure 25. Comparison 90th Percentile vs. Average Performance Metrics[16]



Using a 90% reliability measure is a best practice methodology and is more meaningful than using an average response time. Average means that half of all calls are either faster or slower than the time interval stated and gives little indication of response reliability. For these reasons, analyses of response times will be shown at the 90th percentile in this report.

In sophisticated modern emergency services real-time evaluation of occurrences is taking place continuously in order to maximize service delivery to the population. An ancillary benefit to real-time dashboard technology is that the compliance reporting is independent of the service and transparent to the County, the Board and ultimately the community.[17] As changes have occurred within the ConFire system, no real time monitoring of the impacts has been done. Disseminating information later creates a situation in which lag occurs between taking an action in the system and measuring the impacts.

ConFire's monthly productivity reports published on the website report "average" response times for all calls (fire and EMS) across the entire County. In addition to implementing more sophisticated — and

[16] Histogram is based on data from an actual high performance first response system in the US.
[17] The most commonly used dashboard technology software for emergency services organizations is "First Watch" based in San Diego.

independent — reporting, the Consultants recommend the following changes to the monthly report, based on best practices and a desire for clarity and transparency.

- § Define response time: Best practice would be to report from the time the call is received until a unit arrives on scene. This definition reports times from the perspective of the person experiencing the emergency.
- § Report using 90th percentile: Reporting responses occurring nine times out of 10 is more informative than average which reports times as 50% slower and 50% faster.
- § Report based on incident zones: Using incident zones as defined in this report indicates performance at high call demand areas as well as areas where there are fewer calls. In this manner, responses to rural or remote areas do not distort the data but information is provided for all response areas.

RESPONSE TIME PERFORMANCE/IMPACT OF CLOSURES

From a patient-centric perspective, total response time to EMS calls is the single, most important metric describing the performance of the system. It is the interval from when a call rings-in to 911 until help arrives at scene, as is reported in the tables above. All of the other named time intervals in this report are merely tools to diagnose things-gone-wrong when total response time is too slow.

As noted previously, response times are best reported using the 90th percentile, which means that nine times out of ten a unit arrives within the stated period of time. The tables below report ConFire's response times to EMS and fire incidents separately and for the six-month periods January to June 2012, July to December 2012 and January to June 2013. In July 2012, one response company was eliminated from the system and in January 2013, four companies were eliminated. All data is based on analyses of ConFire's AVL database.

Response time is defined at the time interval from when a call is received at the Communications Center via 911 and stops when the first ConFire unit arrives on scene. Mutual aid calls from other jurisdictions in-bound and mutual aid calls by ConFire units outside the District territory are excluded from these statistics. Tables 23, 24 and 25 below indicate the total response times as defined above for EMS calls.

Table 23. Jan-Jun 2012 – EMS Calls: Received to 1st At Scene Response Time: 29 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,593	07:07	09:45
P2-Emergency	5,579	07:25	10:26
P3-Routine	2,332	07:31	10:37
P4-Routine			
P5-Non-emergency	1,030	08:54	12:43
Total Count	**14,534**	**Composite**	**10:06**

Composite Weighted by Priority Codes P1 and P2.

Table 24. Jul-Dec 2012 – EMS Calls: Received to 1st At Scene Response Time: 28 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,441	07:11	09:52
P2-Emergency	5,816	07:32	10:40
P3-Routine	2,416	07:25	10:21
P4-Routine			
P5-Non-emergency	1,014	09:12	13:15
Total Count	**14,687**	**Composite**	**10:17**

Composite Weighted by Priority Codes P1 and P2.

Table 25. Jan-Jun 2013 – EMS Calls: Received to 1st At Scene Response Time: 24 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,909	07:26	10:01
P2-Emergency	5,682	07:50	10:46
P3-Routine	2,697	07:49	10:42
P4-Routine			
P5-Non-emergency	1,124	09:22	13:25
Total Count	**15,412**	**Composite**	**10:23**

Composite Weighted by Priority Codes P1 and P2.

Between January 2012 and June 2013, ConFire decommissioned five frontline units. The impact on Priority 1 and 2 composite response times for EMS calls at the 90th percentile was six seconds longer in January to June 2013 compared to the prior six months.

Tables 26, 27 and 28 below report response times to fire calls at both average and 90th percentile.

Table 26. Jan-Jun 2012 – Fire Calls: Received to 1st At Scene Response Time – 29 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	176	06:53	09:30
P2-Emergency	874	06:43	09:41
P3-Routine	727	07:52	11:27
P4-Routine	630	08:03	11:10
P5-Non-emergency	1,233	09:56	14:39
	3,640	**Composite**	**09:39**

Composite Weighted by Priority Codes P1 and P2.

Table 27. Jul-Dec 2012 – Fire Calls: Received to 1st At Scene Response Time – 28 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	164	07:07	10:14
P2-Emergency	878	07:05	10:26
P3-Routine	731	08:06	11:53
P4-Routine	571	08:13	11:04
P5-Non-emergency	1,300	10:04	14:51
	3,644	**Composite**	**10:24**

Composite Weighted by Priority Codes P1 and P2.

Table 28. Jan-Jun 2013 – Fire Calls: Received to 1st At Scene Response Time -24 Units

Priority Description	Call Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	172	07:57	11:40
P2-Emergency	870	06:06	10:31
P3-Routine	743	07:55	12:10
P4-Routine	538	06:56	11:08
P5-Non-emergency	1,147	10:53	15:12
	3,470	**Composite**	**10:42**

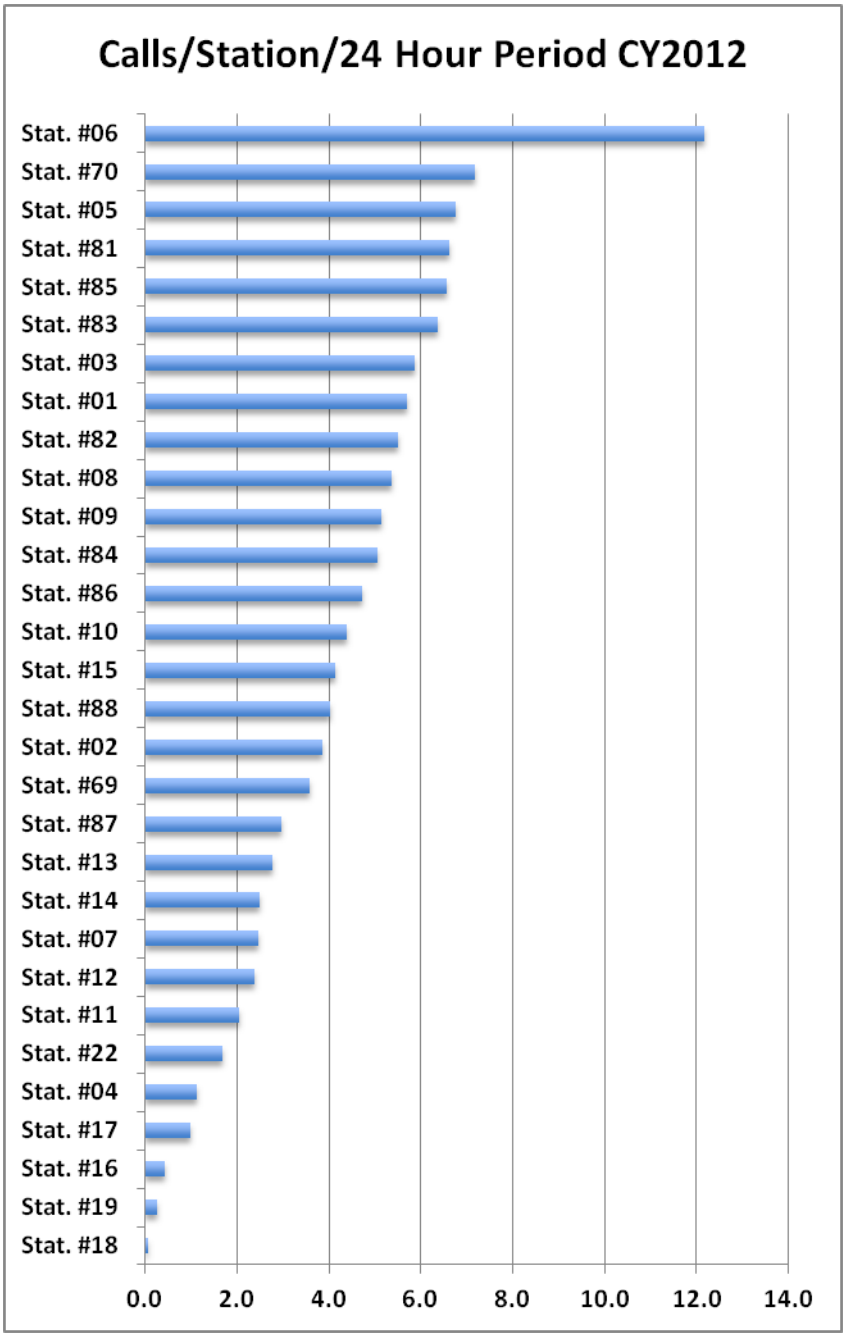
Composite Weighted by Priority Codes P1 and P2.

Between January 2012 and June 2013, ConFire decommissioned five frontline units. The impact on composite response times for fire calls at the 90th percentile was 18 seconds longer in January to June 2013 compared to the prior six months. The number of fire calls is very small and the composite times provide a more realistic comparison.

STATION UTILIZATION

For greatest clarity, station utilization is best considered as the number of calls experienced in a station on one 24-hour period. It is a metric that is used to understand the workload for individual firefighters as well as to look at any deployment issues. Figure 26 below indicates the average number of calls per station for a 24-hour period.

Figure 26. Calls Per Stations Per 24 Hour Period CY2012



Firefighters at Station 06 experience, on average, 12 calls during a 24-hour period. The next busiest station is Station 70 that experiences seven calls per 24-hour period. As Figure 26 above indicates, calls per 24-hour period quickly fall away with 18 stations running fewer than five calls in a 24-hour period. Workload for ConFire firefighters is not an issue. There is, however, great disparity in the distribution of calls between stations. This is an issue that can be addressed by modifications to dispatch deployment practices.

CONFIRE'S RESPONSE FLEET

Light and Heavy Apparatus Fleet

Maintaining and replacing front line response vehicles is a priority for any public safety organization. Vehicles are utilized by fire prevention, management and other operations personnel. Of the 47 light fleet vehicles reviewed, five Operation's Division vehicles were identified as needing replacement in the near future based on age (more than 10 years old) and mileage (100,000+ miles). A replacement decision should also include scrutiny of maintenance records for each vehicle. A frugal approach for ConFire would be to budget $40,000 to $50,000 a year and annually replace the most critical vehicle(s) that have reached the end of their life cycle(s).

The ConFire basic response fleet includes 24 Type 1 engines, five Type 2 engines, 12 Type 3 engines, seven quints and one ladder truck. The majority of the fleet is circa 2003 and high mileage with only limited acquisitions since 2008. There are nominally 66 response vehicles in the fleet, with an estimated contemporary replacement value of $28 million. (This does *not* include light/administrative vehicles). The District does not have an equipment replacement fund, nor does it have financial capacity to fund apparatus currently due for replacement.

Approximately replacement costs for primary response vehicles are as follows:

- Type 1 Engines: $580,000 each
- Type 3 Engines: $325,000 each
- Quints: $950,000 each

ConFire's equipment replacement needs represent a looming financial crisis that will significantly and negatively impact the District's ability to provide essential services.

Utilization of Quints

A quintuple combination pumper or "quint," is a fire service apparatus that serves the dual purpose of an engine and a ladder truck. The name *quint* is derived from the Latin prefix "quinque-," meaning *five*. This refers to the five functions that a quint provides: pump, water tank, fire hose, aerial device and ground ladder. These units hold a unique place as the biggest, heaviest and most expensive apparatus to both maintain and replace of ConFire's frontline fleet.

The data in Table 29 below reflects how ConFire utilizes quints compared to the engines that comprise the bulk of its frontline fleet during CY2012.

Table 29. Engine and Quint Utilization Comparison – CY2012

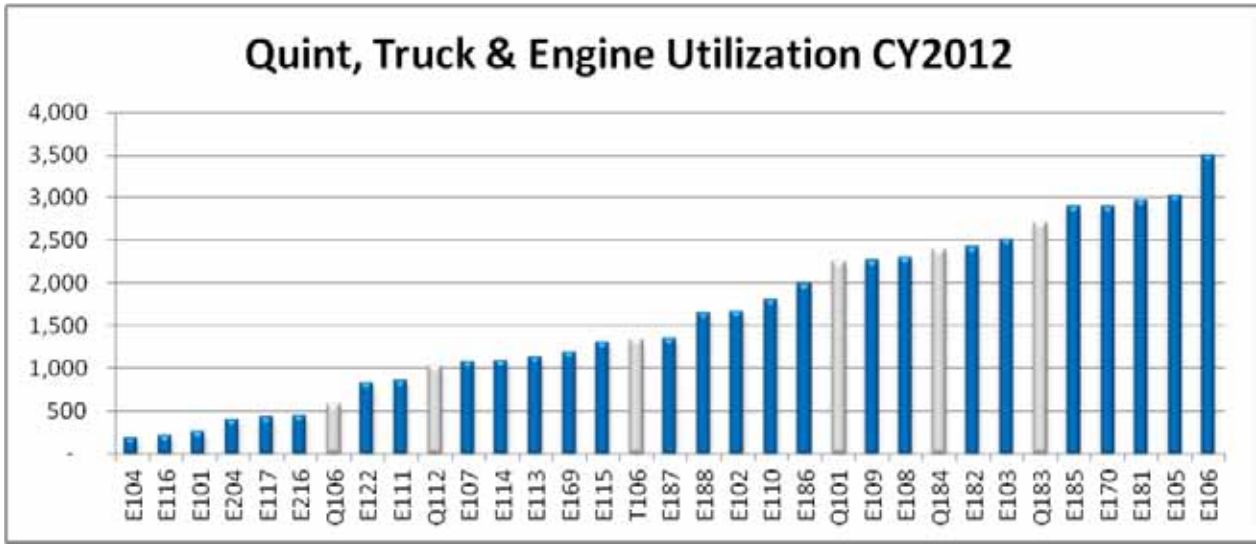
Unit Type	No. Vehicles	Average No. Dispatches / Unit Fire & EMS Calls	% Dispatches Occurring While In Field Fire & EMS Calls	% of Dispatches to EMS Calls Only
Engines	27	1,580	21%	69%
Quints [1]	6	1,716	22%	63 %

[1] Includes ladder truck T106.

Though some difference exists between the average number of assignments made to engines versus quints, quints generally are utilized in an unexceptional manner. The same conclusion applies to the assignments of quints and engines made while out of quarters and in the field, that is to say, call-on-call.

The assignments to quints are in no way unusual compared to assignments to the lighter and smaller engines. This point is reinforced by the histogram of assignments made to engines, truck and quints presented in Figure 27 below.

Figure 27. Average No. Dispatches To Quints, Truck & Engines – CY2012



That there is no distinction between the utilization of quints and engines is an inefficiency of the current service delivery model. Given ConFire's current financial limitations, there may be no alternative to using quints in this manner until response units require replacement. While quints are multi-functional, targeting their deployment may allow ConFire to reduce the number of quints and thereby avoid maintenance and replacement costs that are far greater than other vehicles.

MUTUAL AID CALLS

To better understand the role of mutual aid in ConFire operations, the Consultants conducted a detailed analysis of the subject. Although there are flags logged into the ConFire CAD for incidents involving mutual aid and auto aid, these existing flags are inadequate to provide the level of detail desired for an

in-depth analysis. Consequently, *FITCH* applied a mutual aid algorithm to explicitly extract mutual aid information from the CAD files. Figure 28 below provides an example of the output from this algorithm. The mutual aid algorithm was applied to all incidents in the CAD files for January 2012 through June 2013.

Figure 28. Sample Output – *FITCH* Mutual Aid Algorithm Applied to ConFire Data

Mutual Aid Analysis

Mutual Aid	
In-Bound	Out-Bound
N	Y

Vehicles	
Assigned	Arrived
5	3

Amb	Con	Xcc	MIS
1	1	1	0

Jurisdiction	W_RDO Rodeo-Hercules
Master_Incident_Number	12,001,279
Master_Incident_ID	560,539
Incident_Type	EMS-DELTA
Problem	EMS-Delta
Priority_Description	P1-Emergency
ConFire_Function	EMS MA-Out
Division	Rodeo Hercules
Battalion	Battalion 7 RDO
Location_Name	STAGE
Address	322 California St
City	Rodeo
County	Contra Costa
ClockStartTime	1/5/2012 9:35 PM
Time_CallClosed	1/5/2012 10:31 PM
Elapsed_CallRcvd2CallClosed	00:55:53

Radio_Name	Agency	Arrvd
E175	RDO	Y
AMRA302	AMR Dispatch	N
PM216	AMR	Y
BC7	CON	Y
PD	MIS	N
REACH	MIS	N

Incidents are categorized as Mutual Aid In-Bound or Mutual Aid Out-Bound, depending on the geographic jurisdiction of the incident and the agency of origin of the unit(s) arrived at scene. For example, if a ConFire unit arrives at a call outside the ConFire District, then the call is categorized as Mutual Aid Out-Bound. Conversely, if a non-ConFire unit arrives at a call inside the ConFire District, then the call may be categorized as Mutual Aid In-Bound. The final categorization of Mutual Aid In-Bound is described below.

For purposes of this report, the Yes/No flags for in-bound or out-bound mutual aid are triggered by the following logical filters.

The logical filter for categorizing mutual aid as out-bound is:

Jurisdiction ≠ W_CON, C_CON, or E_CON

AND ConFire Arrived > 0

For CY2012, there were 1,042 incidents captured by this filter. These are incidents where at least one ConFire unit arrived at scene in one the surrounding jurisdictions.

The logical filter for categorizing mutual aid as in-bound is:

Jurisdiction = W_CON, C_CON, or E_CON
AND ConFire Arrived = 0
AND non-ConFire Arrived > 0

For CY2012, there were 1,172 incidents were captured by this filter. These are incidents where a non-ConFire unit arrived at scene within the ConFire jurisdiction.

Categorizing mutual aid as in-bound becomes more complicated when both ConFire units and non-ConFire units arrived at scene for an incident within the ConFire jurisdiction. When the number of non-ConFire units arrived at scene is equal to or greater than the number of ConFire units, the incidents was tallied as Mutual Aid In-Bound. Conversely, when the number of ConFire units arrived at scene is greater than the number of non-ConFire units, the incident was tallied as ConFire only and appears in the statistics for ConFire response times.

The consultant chose the following logical filter to categorize these kinds of incidents as a Mutual Aid In-Bound:

Jurisdiction = W_CON, C_CON, or E_CON
AND ConFire Arrived ≤ non-ConFire Arrived

For CY2012, there were 129 incidents captured by this filter.

For CY2012, the distribution of EMS and fire Mutual Aid In-Bound and Mutual Aid Out-Bound and hours time-on-task is presented in Table 30 below.

Table 30. Mutual Aid Incidents for CY2012 (12 months)

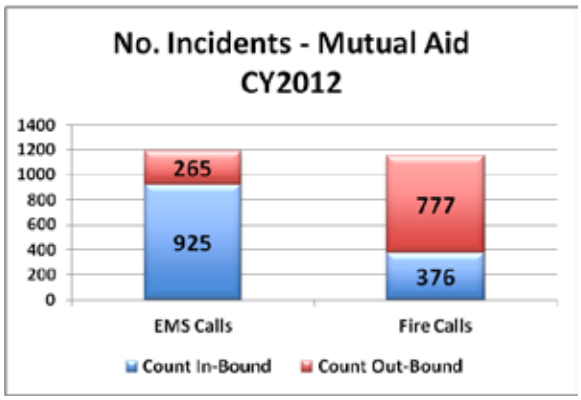
	Mutual Aid In-Bound [Count]	Mutual Aid Out-Bound [Count]	Mutual Aid In-Bound [Hours on task]	Mutual Aid Out-Bound [Hours on task]
EMS	925	265	344	305
Fire	376	777	684	2,002
Totals	**1,301**	**1,042**	**1,028**	**2,307**

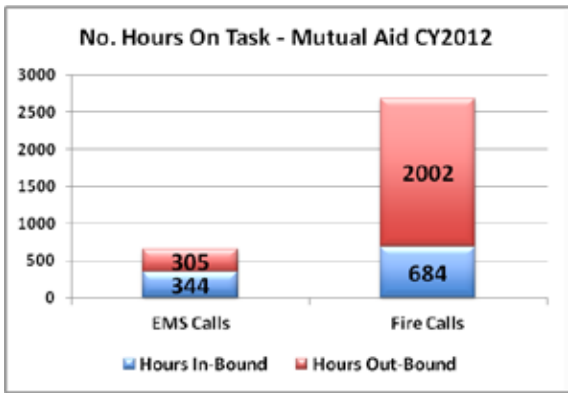
The initial analysis examined only the tally of mutual aid incidents, in-bound and out-bound. Based on these tallies, it appeared that ConFire received more in-bound aid than it provided out-bound aid. A deeper examination of mutual aid activities in terms of time-on-task provided a significantly different picture appeared. The result of subtracting 1,028 total in-bound hours on task where ConFire received aid from other jurisdictions from the total of 2,307 out-bound hours where ConFire provided aid to other jurisdictions indicates that ConFire provided 1,279 more hours of mutual aid than it received.

The time-on-task metric is an important measure to understand the actual impact of mutual aid on operational activity. In terms of this metric, ConFire is a net provider of mutual aid to surrounding agencies.

Figure 29 below is a graphic representation of the number of mutual aid incidents, both in-bound from other providers and out-bound by ConFire and Figure 30 represents the hours spent on calls both in-bound (other jurisdictions) and out-bound (ConFire units) for CY2012.

Figures 29 and Figure 30. CY2012 Mutual Aid Incidents and Hours On Task





Based on analysis of all CY2012 calls, out-bound mutual aid calls consumed approximately 12% of the actual hours worked by ConFire units on fire and EMS calls.

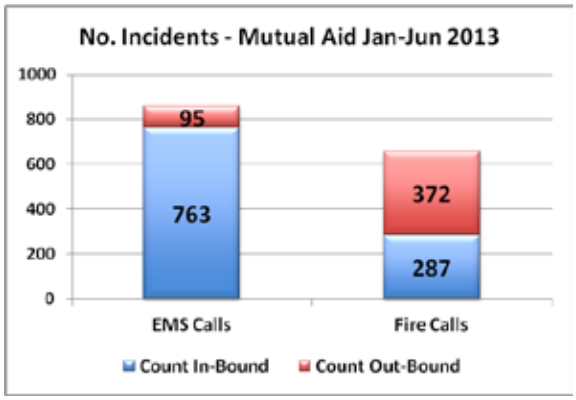
A similar analysis was conducted for the first half of 2013. Table 31 indicates the mutual aid data for the six month period from January to June 2013.

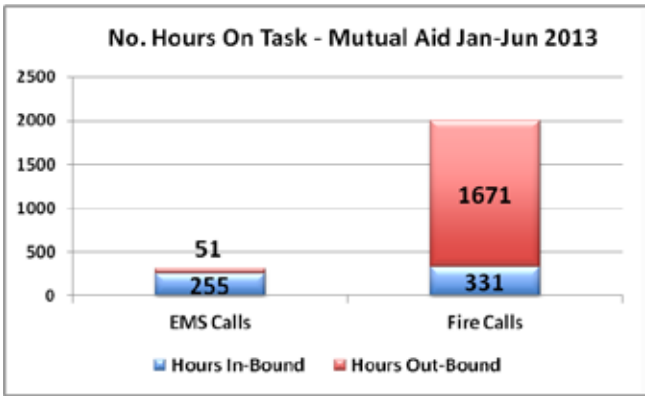
Table 31. Mutual Aid Incidents for January to June 2013 (6 months)

	Mutual Aid In-Bound [Count]	Mutual Aid Out-Bound [Count]	Mutual Aid In-Bound [Hours on task]	Mutual Aid Out-Bound [Hours on task]
EMS	763	95	255	51
Fire	287	372	331	1,671
Totals	**1,050**	**467**	**586**	**1,722**

Again, time-on-task shows a different picture than simply counting incidents. Figure 31 represent the number of EMS and Fire incidents and hours on task for both in-bound and out-bound mutual aid incidents.

Figure 31. Jan. to June 2013 - Mutual Aid Incidents





Based on analysis of all calls for January to June 2013, out-bound mutual aid calls consumed approximately 18% of the actual hours worked by ConFire units on fire and EMS calls. This is a higher percentage than experienced in CY2012. The significant point regarding 2013 is that the pace of out-bound mutual aid has increased dramatically.

MAJOR INCIDENTS

FITCH conducted detailed analyses to measure ConFire's ability to continue its normal functions during periods of stress induced by major incidents. Major incidents have three characteristics. First, a large fraction of ConFire's units are drawn off the frontline and committed to the major incident. Second, major incidents have long durations, so that units committed to the incident are absent from the frontline for lengthy periods of time. Third, for the duration of the major incident, the normal flow of calls through the system proceeds unabated and must be serviced by the units remaining on the frontline. The more frontline units committed to the major incident, the greater the stress it applies to the rest of the system.

Analysis focused on the normal flow of calls that occur as a background to the major incident. The premise is that changes in response times on these "background" calls provide a quantitative measure of the impact the major incident has on the rest of the system. For purposes of this analysis, all incidents that drew off more than one-fifth of the frontline units were considered to be "major incidents".

Crew time is defined as the time from when a unit is assigned to a call and the vehicle arrives at the scene. Based on AVL data, the crew times are tabulated for simultaneous calls of Priority 1, 2, 3, and 4 codes. These are high acuity calls. The designation of a Priority 5 non-emergency code is for calls of low acuity, and as such, ConFire dispatch assigns resources to them with lesser urgency. Inclusion of crew times for Priority 5 calls was inappropriate for this analysis.

During CY2012, there were 75 major incidents in which six or more ConFire frontline units arrived at scene. The range of ConFire units arrived at scene was from six to 14, or about one-fifth to fully one-half

of all frontline units. No incident during CY2012 had more than 14 frontline ConFire units arrived at scene.

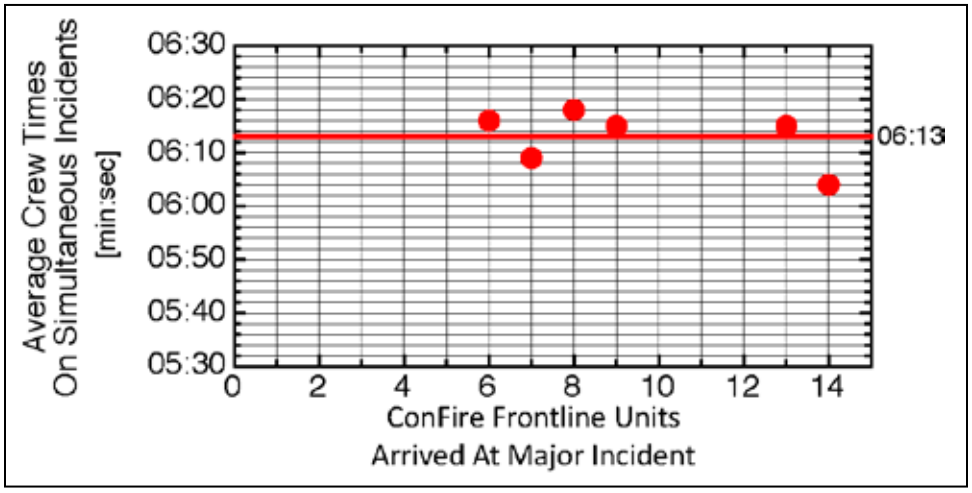
For the duration of these 75 major incidents, 1,081 other incidents entered the system simultaneously and resulted in ConFire units arriving at scene. Crew times based on AVL timestamps were tabulated individually for each of these 1,081 incidents. Crew times were then averaged for each class of major incident. The results are presented in Table 32 below.

Table 32. Average Crew Times For Normal Incidents Simultaneous with Major Incidents - CY2012

# Frontline ConFire Units Arrived At Scene for Major Incident	# of Major Incidents	# of Normal Incidents Simultaneous With Major Incidents	Average Crew Time for Normal Incidents [min:sec]
6	45	563	06:16
7	12	182	06:09
8	7	86	06:18
9	6	100	06:15
10	0	0	n/a
11	0	0	n/a
12	0	0	n/a
13	3	68	06:15
14	2	82	06:04
Totals	75	1,081	
Avg Crew Time for all EMS & Fire P1, P2, P3, & P4 CY2012		**33,409**	**06:13**

For purposes of comparison, the average AVL derived crew time for all 33,409 EMS and fire incidents Priority 1, 2, 3 and 4 during CY2012 was six minutes 13 seconds as shown in the last line of Table 32 above. In Figure 32 below, average crew times for normal incidents are plotted as red circles versus number of ConFire units arrived at scene.

Figure 32. Crew Times for Normal Incidents Occurring Simultaneous With Major Incidents



For each major incident noted in the figure above by the number of frontline units arrived, the average crew times on the normal incidents does not diverge significantly from the system wide average crew time of six minutes 13 seconds. The horizontal line above indicates the average crew time for all 33,409 calls that occurred simultaneous to the major incidents.

The analysis indicates that during major incidents, when one-fifth up to one-half of ConFire's frontline units were committed to a major incident, there was no adverse impact on the response time performance by the remaining frontline units as they respond to the normal flow of calls.

SPECIAL RISK INCIDENTS

Special Operations

In discussions with the Fire Chief and senior staff, concern about ConFire's readiness to respond to special operations incidents was expressed repeatedly. In response, the Consultants reviewed call data to better understand the frequency of such incidents. The data provides a basis for decision-making to determine the best use of training and equipment funds to maintain various special operations certifications and skills.

Special operations incidents involve the following:

- Water rescue events (dive rescue and recovery, swift water/flood rescue marine firefighting,
- Hazardous materials responses (chemical spills, petrochemical incidents, gas leaks),
- Technical rescue events (confined space, trench rescue, high and low angle rope rescue, urban search and rescue, structural collapse rescue),
- Wildland fire response,
- Natural and man-made disaster response (earthquakes, bombings, air crashes).

The risk of petrochemical incidents is fairly high in Contra Costa County due to the number of petrochemical industrial sites. This risk topic is discussed separately in the report section below.

ConFire data was reviewed for CY2012 and the first six months of CY2013. Call counts for EMS and fire incident categories are presented below in Tables 33 and 34. For easier comparison of CY2012 data to the six months of CY2013 data, the tables also indicate CY2012 data halved to approximate a six-month interval.

Table 33. EMS Incidents for CY2012 and for January through June 2013.

EMS Incidents	Annual	6-Mo. Comparison	
	2012	2012 1/2 Annual	2013 6-Mo. Actual
5150 PD (Police Dept) Request	583	291.5	0
EMS-ALPHA Code 2 with Engine	2,187	1,093.5	1,022
EMS-BRAVO	5,877	2,938.5	3,132
EMS-CHARLIE	10,635	5,317.5	5,339
EMS-DELTA (life threatening)	15,980	7,990	8,185
EMS-DELTA with Helicopter	6	3	0
EMS-ECHO	714	357	378
EMS-HAZ MAT	4	2	0
EMS-MAJOR	1	0.5	0
EMS-OMEGA NO RESPONSE	1	0.5	0
VEH ACCIDENT Motorcycle	158	79	93
Total	**36,146**[18]	**18,073**	**18,149**

The total number of incidents is effectively unchanged between CY2012 and CY2013. Moreover, the distribution of incident types is also unchanged, except for 5150 Police Department Requests. As of CY2013, ConFire no longer responds to these calls, thereby eliminating approximately 500 calls from ConFire's system. The EMS incident count for the first half of 2013 increased by 0.4% relative to CY2012.

Table 34 below presents fire incident categories for CY2012 and for the first half of 2013. Again, to facilitate comparisons between CY2012 and CY2013, the CY2012 incident counts were divided in half and presented in the column titled "Semi-Annual 2012."

Table 34. Fire Incidents for CY2012 and for January through June 2013

FIRE Incidents	Annual	6-Mo. Comparison	
	CY2012	2012 1/2 Annual	2013 6-Mo. Actual
BART ABOVE GROUND	1	0.5	0
COMM WARNING SYSTEM - LEVEL 0	1	0.5	1
FIRE ALARM Commercial	1,303	651.5	614
FIRE ALARM Residential	661	330.5	354
FIRE EXTERIOR	634	317	354
FIRE-1ENG FIRE BOAT	2	1	1
FIRE STRUCTURE Commercial	330	165	160
FIRE STRUCTURE Residential	441	220.5	214
MULTI-CASUALTY INCIDENT	1	0.5	1
NO RESPONSE	1	0.5	25
ON VIEW	8	4	3
RESCUE CONFINED SPACE	2	1	1
RESCUE EXTRICATION	393	196.5	191
RESCUE MAJOR	0	0	1
RESCUE OFF ROADWAY	24	12	17
RESCUE ROPE	3	1.5	0

[18] Includes all EMS calls (34,956), EMS mutual aid out-bound (265) and mutual aid in-bound (925).

FIRE Incidents	Annual	6-Mo. Comparison	
	CY2012	2012 1/2 Annual	2013 6-Mo. Actual
RESCUE STRUCTURE	27	13.5	0
RESCUE STRUCTURE (ACCD)	9	4.5	14
RESCUE SWIFT WATER (Canal)	1	0.5	4
RESCUE TRENCH	2	1	0
RESCUE WATER	2	1	2
SAFE PLACE INCIDENT	6	3	1
SINGLE ENGINE C2	3,135	1,567.5	1,411
SINGLE ENGINE C3	1,204	602	577
STRIKE TEAM	2	1	0
VEGETATION	247	123.5	78
VEGETATION Full	88	44	35
VEGETATION Non Wildland Season	21	10.5	47
VEGETATION Structure	3	1.5	7
VEH ACCIDENT Motorcycle	12	6	2
VEHICLE ACCIDENT	1,574	787	749
Total	**10,138**	**5,069**	**4,864**

The total number of fire incidents is effectively unchanged between CY2012 and CY2013 through June 2013.

Table 35 below highlights CY2012 call counts for certain special operations categories and displays the same six-month comparison columns.

Table 35. Highlights of Special Operations Call Categories CY2012

Incident Categories	Annual	6-Mo. Comparison	
	CY2012	2012 1/2 Annual	2013 6 Mo. Actual
MULTI-CASUALTY INCIDENT (MCI)	1	0.5	1
RESCUE CONFINED SPACE	2	1	1
RESCUE ROPE	3	1.5	0
RESCUE SWIFT WATER (Canal)	1	0.5	4
RESCUE TRENCH	2	1	0
RESCUE WATER	2	1	2
EMS-HAZ MAT	4	2	0

The number of ConFire calls requiring special operations training and certifications is relatively few. That is not to say that specialized training is not required. For example, training and exercising responses to multi-casualty incidents (MCIs) is recognized as an organizational priority whether or not an MCI occurs. Decisions to prioritize special operations require a detailed assessment of the prevalence and likely occurrence of certain call categories, an estimation of the time and money for training, equipment and skills retention, and an understanding of the potential magnitude of certain incidents. Fire departments have also had to carefully assess the impact of their response on the potential for a victim's viability in order to prioritize training and funding efforts.

Certain catastrophic events such as earthquakes, tornadoes, or terrorist attacks typically overwhelm local public safety agencies. Realistically, in these instances, local communities must rely on Federal Emergency Management Agency (FEMA) and other regional teams for response and recovery efforts.

Refinery Accident Response

Contra Costa County and the adjacent area are home to a number of major petrochemical industrial facilities. Contra Costa County Health Services maintains records of all Major Accidents at Chemical/Refinery Plants in Contra Costa County.[19] Incidents at refineries fall into two broad categories:

- Incidents originating within the petrochemical industrial sites and whose *effects* are contained "inside the fence,"
- Incidents originating within the petrochemical industrial sites and whose *effects* extend "outside the fence."

Industrial Incidents With Effects "Outside the Fence"

It is the role and responsibility of the Contra Costa County Community Awareness and Emergency Response (CAER) Group, Inc. to coordinate community awareness and emergency response to industrial accidents in Contra Costa County. CAER is a non-profit public benefit corporation of public emergency response agencies, local government officials and facilities and businesses that use, store, handle produce or transport hazardous materials. CAER's core objectives are:

- Safe industrial facility operations
- Coordinated emergency response
- An effective safety sharing forum
- A trust-based relationship with the community[20]

ConFire is a member of CAER along with other fire districts, cities, government agencies and industry representatives. Attachment F lists the CAER member organizations. Member companies share their emergency plans to create a coordinated response in the event of an accident.

The Contra Costa County Health Services Department is the agency responsible to both track hazardous materials (HazMat) incidents occurring within the County. Training and emergency responses are coordinated through the Coastal Region Hazardous Materials Response Organization (CRHMRO) and CAER.

Over the last 10 years, incidents originating within industrial sites but whose effects extended "outside the fence" involved only plumes of noxious or hazardous vapors. In these incidents, Contra Costa County's Community Warning System (CWS) alerts the community and emergency responders when there is a hazardous materials plume.

[19] For a link to the Contra Costa Health Services database of major accidents, see - http://cchealth.org/hazmat/accident-history.php

[20] Community Awareness & Emergency Response. www.cococaer.org as of December 2013.

Sirens have been placed in the industrial corridor of the County where they are intended to notify the community to shelter-in-place in the event of chemical plumes. The next level of community communication is provided by broadcasts over the National Weather Service system to NWS radio receivers using Specific Area Message Encoding (SAME) to provide alerts restricted to specific geographies within the County. The final level of community communications is provided by an automated telephone ring-down system that specifically calls numbers within the afflicted geography and makes the shelter-in-place alert. Both shelter-in-place and stand-down messages are transmitted by the National Weather Service system and the telephone ring-down system. The sirens provide no stand-down signal.

According to the Health Services database, in the past 10 years there were no industrial incidents with effects outside the actual sites that required ConFire's fire suppression services.[21]

Industrial Incidents With Effects Inside Industrial Sites

The petrochemical industry in Contra Costa County is well organized, equipped and staffed to handle incidents that occur within the confines of their respective industrial sites. The sites represent a significant asset to these corporations and as such, emergency response to incidents is a high priority.

The database of Major Accidents at Chemical/Refinery Plants in Contra Costa County contains multiple incidents that required fire suppression "inside the fence." Responses to these incidents were made by the refinery's own fire brigades with backup from the Petrochemical Mutual Aid Organization (PMAO), as described in the Petrochemical Mutual Aid Organization (PMAO) Emergency Response Manual.[22] The resources of the refinery fire brigades are substantial, especially with the coordination provided by PMAO.

Responding companies of the Petrochemical Mutual Aid Organization comprises Chevron Products, Chevron Richmond Refinery; Dow Chemical Company, Pittsburg Plant; Phillips 66 Company, San Francisco Refinery; Shell Oil Products U.S., Shell Martinez Refinery; Tesoro Refining & Marketing Company, Golden Eagle Refinery; Valero Energy Corporation, Benicia Refinery.

NuStar LP Selby Terminal and Solvay-Rhodia Inc. are non-responding members of PMAO. Additional members of PMAO include Contra Costa County Health Services/Hazardous Materials, the United States Coast Guard, American Medical Response (AMR), OES Organizations, and local Fire Departments: Contra Costa County, Rodeo-Hercules, Richmond, San Ramon, Benicia, Concord Naval Weapons Station.

The capabilities of PMAO are complementary to those of ConFire. PMAO is trained and equipped to fight petroleum-fed process and tankage fires using specialized equipment including large capacity pumpers,

[21] Contra Costa Health Services database of major accidents, http://cchealth.org/hazmat/accident-history.php.

[22] Petrochemical Mutual Aid Organization (PMAO) Emergency Response Manual, Revised April 2013; http://www.cococaer.org/PDF/protected/PMAO%20Manual%20Final.pdf

large delivery devices, and foam extinguishing agents. In contrast, ConFire personnel are trained and equipped to fight, interior, structure and wildland fires.

PMAO makes area mutual aid available to local fire departments upon request. To this end, the three Task Forces have been designated by PMAO to respond to mutual aid requests from ConFire. Figure 33 below describes those Task Forces and the equipment that is made available to local fire departments upon request.

Figure 33. Petrochemical Mutual Aid Task Forces & Equipment

East Contra Costa County: Pittsburg, Antioch, Oakley areas

TASK FORCE "A"

Dow Chemical (925) 432-5555	Foam Engine #1 1,000 g. 3%
Tesoro Golden Eagle (925) 372-3120	Foam Aerial Truck 1,000 g. 1%
Valero Refinery (707) 745-7562	Foam Tender 4,000 g. 3%
Special move-up: Shell Refinery (925) 313-3601	Foam Engine to cover Dow Chemical fire station for facility coverage.

Central Contra Costa County: Martinez, Concord, Walnut Creek, San Ramon, Moraga

TASK FORCE "B"

Shell Refinery (925) 313-3601	Engine #2 1,000 g. 1%
Tesoro Golden Eagle (925) 372-3120	Foam Aerial Truck 1,000 g. 1%
Valero Refinery (707) 745-7562	Foam Tender 4,000 g. 3%

West Contra Costa County: Crockett, Pinole/Hercules, Richmond, Berkeley, Oakland

TASK FORCE "C"

PHILLIPS 66 Refinery (510) 245-4475	Foam Engine #7 800 g. 1%
Chevron Refinery (510) 242-5555	Foam Aerial Truck 60 750 g. 1%
Valero Refinery (707) 745-7562	Foam Tender 4,000 g. 3%

In aggregate, the apparatus of the PMAO responding organizations comprises 10 foam engines, five aerial foam trucks, seven foam tenders or trailers, and two fireboats. The complete list of apparatus is

available in Attachment G. The PMAO uses two communication centers, Chevron Dispatch and Dow Chemical Dispatch situated at the ends of the industrial corridor.

Historically, the refineries impose little fire suppression risk on the Contra Costa County Fire Protection District. Furthermore, the refinery fire brigades require minimal support from ConFire. The refinery brigade personnel outnumber ConFire personnel. They are specifically trained in the suppression of petroleum fed process and tankage fires. They are trained in confined space and high angle rescue. In addition they have their own EMT and paramedic capabilities.

OPTIONS GOING FORWARD

OPTION 1 - MAINTAIN STATUS QUO

Dramatic changes have already been implemented in ConFire's service delivery model. The District went from four-position engine companies to three-position companies; dispatch protocols changed such that alpha, non-emergency, medical calls received an ambulance only rather than an engine and an ambulance; and five stations were decommissioned over the past two years. This said, constituents seem to expect more efficiencies and ConFire's financial situation requires more.

The following options are short-term, three-to-four year solutions going forward. There are three key drivers that impact these options. The first driver consists of revised budget projections plus current reserves, which, in combination, barely make the current system sustainable until 2017. The second driver is that current and projected budgets do not include a capital allocation plan. The need for capital replacements will transition from being urgent to critical and this escalation is a certainty. The third driver is that the premises for growing revenues that underlie the County's project budgets must hold true for the District to be sustainable. No volume increases for EMS calls are considered and these will certainly occur in the out years. For these reasons, the options must be viewed in the context of short-term solutions.

Status Quo Summary

Continue implementing the current service delivery model with gradual modifications. As additional funds become available, add resources to the system in the form of light rescue vehicles to replace heavy, more expensive apparatus.

Status Quo Advantages

The *status quo* is almost completely retained. Changes are introduced into the system at a very gradual pace.

The maximum number of engines and quintuple combination pumpers or quints, are retained on the frontline for fire service responses.

Light rescue vehicles are less expensive than the traditional engines. When utilizing light rescue vehicles, the same number of capital dollars puts more units on the frontline and has a greater impact on EMS response times.

With changes in dispatch logic, such that usage on emergency medical incidents is shifted from engines and quints to the light rescue vehicles, the utilization of the heavier apparatus will be reduced and their useable lifetimes extended thus delaying expenditures on replacement capital.

Status Quo Disadvantages

The *status quo* is almost completely retained since this option involves no material change to the current system. The system will appear to be virtually stagnant. Constituents who have demanded change likely will be disappointed.

The introduction of lighter rescue vehicles into the fleet will occur as heavy apparatus fails and needs replacement. Thus, the cost benefits of light rescue vehicles will not impact the budget for several years.

OPTION 2 – OPTIMIZED THREE/TWO RESPONSE STAFFING

FITCH'S analyses of ConFire's system resulted in two findings that prompted this option. The first finding is that response to the historic fire risk in the District requires about 19 fire apparatus. The current configuration of the system has 23 fire apparatus. The system does not need additional fire apparatus. The second finding was that the system requires additional EMS response capacity particularly in out years as EMS call volume increases.

Three/Two Staffing Summary

Acquire a select number of quick response vehicles and determine which engine companies should be converted to QRVs. Engine company staffing is three positions; QRV staffing is two positions. Decommissioning two engine companies allows for deployment of three QRVs. All quintuple combinations pumpers (quints), as well as other fire suppression equipment remain in the designated stations and are available for response as needed. Adjust dispatch logic to utilize the QRVs to best advantage.

Three/Two Staffing Advantages

Implementation is highly visible to the District's constituents and positions the District as a progressive organization seeking to become more efficient and effective.

The number of response vehicles increases with no additional payroll impact.

Two stations may be reopened with no increase in personnel expenses.

The resources in the system better reflect the actual demands on the system for EMS relative to fire responses. The resources available to respond to EMS incidents are increased. The resources available to respond to fire incidents are maintained at an adequate level.

With changes in dispatch logic, such that usage on emergency medical incidents is shifted from heavier apparatus to the light rescue vehicles, the utilization of the engines and quints will be reduced and their useable lifetimes extended, thus delaying expenditures on replacement capital.

The number of cross-trained firefighter is not impacted, which allows ConFire to retain current on-duty firefighting capacity. Traditional firefighter schedules are retained.

Three/Two Staffing Disadvantages

Light rescue vehicles must be acquired at an estimated cost of approximately $150,000 for each fully equipped vehicle. One QRV is already in use in a pilot program, thus leaving fewer new vehicles to purchase. Lease purchase arrangements may ameliorate the immediate draw down on reserves.

This option will require dispatch logic that uses aggressive move-up strategies that will continually shift light rescue vehicles between stations. Personnel routines will need to adjust. Dispatch operations will need to be adjusted, as well.

OPTION 3 - SINGLE PATCH PERSONNEL FOR EMS RESPONSE

One of the key drivers of service is personnel cost. ConFire's largest budgetary item is frontline human resource costs, and this is neither unusual nor unexpected. Firefighters have a number of diversified skills that they employ in the field. Many of their skills require specific training and there are real costs in both certification fees and the cost to replace frontline firefighters while they are being trained. EMS requires that firefighters obtain and maintain at minimum, emergency medical technician (EMT) or paramedic certification. In addition, a number of additional specialized emergency medical certifications exist that personnel can obtain. For example, several ConFire firefighters are currently certified in Advanced Cardiac Life Support, Pediatric Advanced Life Support, and Pre-Hospital Trauma Life Support.

This option recognizes the specialty field of EMS and suggests that personnel whose sole purpose is emergency medicine be utilized for some or all EMS calls. Surveys of response personnel indicate that non-firefighter EMTs and paramedics earn substantially less than a firefighter who is cross-trained as an EMT or paramedic. Option 3 provides a closer match of personnel skills with the largest task at hand in ConFire – EMS calls.

Implementation of Option 3 would take place over time as firefighter attrition occurs. No layoffs are anticipated. Smaller quick response type vehicles would be used thereby reducing the workload and stretching out the replacement cycle of heavier engines and other apparatus.

Single-Patch Personnel Summary

Acquire light rescue vehicles as in Option One or Option Two. Through attrition, replace firefighter positions with certified EMTs and paramedics, whose functions are specifically limited to emergency medical services.

Single-Patch Personnel Advantages

Emergency medical personnel providing a singular function (single patch) likely will have lower personnel costs than firefighters.

Work rules will be more flexible than for firefighters. Consequently, it becomes possible to efficiently match active staffing by time-of-day to changes in EMS demand by time-of-day. Personnel expenses are further decreased.

All of the capital advantages regarding light rescue vehicles seen in Option One and in Option Two also accrue to Option Three.

There are no firefighter layoffs. Rather single-patch personnel are integrated through attrition.

Single-Patch Personnel Disadvantages

The reduction in personnel expenses may not be sustainable over time. Historically, implementations of this approach have seen cost savings erode over time.

Employee dissatisfaction among the EMS personnel is almost guaranteed. The lower paid EMS personnel will end up running substantially more calls than the fire personnel.

EMS specific personnel will provide very limited backup to fire functions in the event of major incidents.

We again wish to thank the Contra Costa County Fire Protection District and County employees, as well as individuals from other fire organizations and communities who participated in the study process.

ATTACHMENT A

Forum Notes:
August 2013 Public Meeting

CCFPD | Public Forum Notes

City of Pittsburg Library

August 19, 2013

Media

35 to 40 people attended.

4 TV news agencies covered the meeting.

1 (known) print reporter.

Duration

The event took approximately 1:45 with another 45 minutes of interviewing, follow up one on one questions, press request, etc.

Questions/comments/statements/concerns

17 people spoke with 35 questions and/or comments.

1. Is there a delivery model that looks at the uses of volunteer firefighters?
2. With the Clayton station closed can more stations be kept open if more admin functions were eliminated and or civilianized?
3. Soon property taxes will increase and we will have more money
4. Could mobile manpower units be used and a part of the delivery model?
5. Why were newer fire stations constructed when they will now be closed?
6. When will there be a new ballot measure (i.e., a new measure Q)
7. Could measure Q be reworded?
8. And if did succeeded how would it work (financially)
9. How do you get ballot measure out to the public?
10. Why do we have big fire engines respond to non-fire calls (classic question)?
11. What are the revenue generation ideas to be place into the report?
12. What is the severity of the alarms (referring to the PPT about alarms)?
13. When are firefighters and the public at most risk when consider staffing reductions?
14. Are there other delivery models around and if so are you considering them?
15. I have a concern that since you mentioned a dynamic deployment that you will be find

fact to support this model.

16. How do we make the fire district better and wow do we save more lives and not just look at cost?
17. There has to be a balance between cost and having a sustainable system that is safe and provide operational readiness.
18. Will this study ensure that the county is compatible with other counties (interoperability question)?
19. The report is due in in its final version in January 2014. Who will make the final decision?
20. How would a fire station being closed not harm us?
21. 90th fractal measurements were not used. Why not?
22. Have there been studies done to measure post change and see the difference
23. Do QRV improve response times?
24. Will the recommendations (of this report) be based upon national standards?
25. If we reduce our standing fire force what does that do to us during a real disaster?
26. Is there a threshold (needed by the Feds) for a standing fire force?
27. How many of these types of reports has Fitch done?
28. Why should we listen to you?

Open Comments

A. I've reviewed your web sight. Fire consultants that work for Fitch have experience managing agencies with no more than 5 fire stations.

B. No one talked to the battalion chiefs.

C. Concerned about staffing levels.

D. Dynamic staffing levels will not work for us.

E. New service delivery model is a concern.

F. If there are others using this model could they be shown?

G. Those here tonight represent those that can't be here and we need to be listened to as we represent them as well.

City of Lafayette – Veterans Hall

August 20, 2013

Media

85 to 100 people attended.

No TV news agencies covered the meeting.

No known newspaper covered it.

Duration

Presentation took 35 minutes; questions and comments ran from 7:20 pm to 9:00 pm.

Questions/comments/statements/concerns

23 people spoke with 47 questions and/or comments.

1. Please explain the ISO rating? How can this be increased?
2. Question referred to a PPT about calls per hour. We might be better off if Lafayette separates from the district. It might be better if the district was broken up.
3. A question – statement regarding a non-profit report regarding aerial support – air ambulance in the wildand and the cost. And if there could be a blend tax fund or user fees. Can you charge for services?
4. Question about what this member saw in Jay's presentation to the BOS re the maps. How do you handle peak hour calls for service? How do you explain a 2 person EMS staging program? In regards to the map shown no reference or impact regarding seasons and or mutual aid.
5. CPR instructor worried about response times. What is the ideal response time? How many FF should Lafayette have? What is the national standard for the ideal cardiac response time?
6. Will the report consider using volunteer and or reserves?
7. Will revenues be studied? How will you deal with the risk assessment? How does Con Fire interact with the communities they serve?
8. A question regarding the Alhambra Valley Road Station that Cal Fire will be building in the next 5 years. This needs to be expedited. Request for a Cal fire Alamedor contract with in the county
9. Is the study looking governance? Can the district switch to a department? Is the report going to be solely based upon cost?
10. Comment about PPT 9 and 10; does this PPT take in account of multiple alarms? Comments on the need to account for the resources required for structure alarms.

11. Fatal fires; when is the public most at risk?
12. Why did measure Q fail?
13. Will the report review health care and pension cost?
14. Comment about the loss of 2 firefighters 6 years ago (LODD) and the need to increase staff to national standards.
15. Is the data collection accurate – there is a trust issue with the Board of Supervisors?
16. There needs to be more effort to get the message out to the community
17. Comment: There is no need for volunteer firefighters. What is the advantage of a city department versus a fire district?
18. Labor comment (V Wells): Wanted an RFP for the consulting firm; review of governance; funding issues; staffing levels; need to have a community meeting prior to the release of the report.
19. The report needs to look at how Orinda Moraga was successful in passing their fire tax (measure).
20. Is the study going to review the impact on Orinda Moraga?
21. Property taxes are for fire protection and EMS funding should come from somewhere else. We can't sustain EMS funding with property tax.
22. The report needs to address national standards.
23. Will a recommendation be made with out asking for additional funding?
24. The PPT does not address concurrent calls.

City of Clayton Library

August 21, 2013

Media

50 to 60 people attended.

No TV news agencies covered the meeting.

1 known newspaper covered it.

Duration

Presentation took 30 minutes; questions and comments ran from 7:20 pm to 8:15 pm.

Questions/comments/statements/concerns

23 people spoke with 47 questions and/or comments.

1. Why wasn't ISO included in the presentation?
2. How do wildland fires fit with the risk and demand?
3. How do refineries fit into the risk models?
4. What is going to happen to EMS with Obama Care?
5. What are the breakdowns between EMS and Fire calls?
6. Does 2 am reduced staffing take into consideration structure fires?
7. In regards to mutual aid, what if the Con Fire can't participate?
8. Are you considering consolidating with Cal Fire?
9. Mount Diablo will burn again; will you consider that as part of the report?
10. What is the cost of labor?
11. Will your study consider the effects of mutual aid and automatic aid?
12. Statement: the cost benefit analyses written by the Contra Costa Times give a false impression.
13. Station location and interlaced funding (not sure if this was a statement or question)
14. There was lack of detail in the PPT.
15. Will the study have a new governance model?
16. Will we have a future meeting prior to the report coming out?
17. Will the report cover funding?
18. What is the target date for the report to come out?

19. Could a future Measure Q be a simple majority?
20. Will the public get to see a pre-report?
21. Are FEMA SAFER funds still available?
22. Statement; we are confused on the problem. It seems other county departments are doing just fine. As a taxpayer shouldn't the County Administrator figure something out?
23. Why the brown outs? What is your opinion on brown outs versus closing a station?
24. Have you done a study similar with similar problems?
25. Comment: Clayton is the only city in the county without a fire station.
26. Comment: Clayton is the only city that did not support measure Q.
27. Some small rural communities pay subscription fees for fire protection; do we want to do this?

ATTACHMENT B

E-mails: August 2013 Public Meeting

CCFPD | Public E-Mail Comments

The following comments are unedited text received via electronic mail by Fitch & Associates during the time period from August 21, 2013 to September 2, 2013. Many are responding based upon the Public Forums conducted on August 19 – 21, 2013 within Contra Costa Fire Protection District in the communities of Pittsburg, Lafayette and Clayton. Names were omitted where requested.

I am writing you in regard to the Contra Costa Fire District expenditures exceeding income, as reported in today's Contra Costa Times. The article by Tom Barnidge mentioned that pension costs continue.

I have several friends and other acquaintances who have retired from CC Fire, and learned from them about the immense pension benefits which often approach or may exceed their actual annual; salaries. I have resided in other areas where the Fire Department employee benefits were substantially less than in our area, and the workers also made a significant monthly payment from their salaries toward their own retirement. Those areas had no problems in recruiting firemen and other department workers. I suggest that your proposals statistically outline various methods or formulas, which will alleviate the financial burden of the disproportionate retirement, benefit costs of the district, including substantial employee contributions, as well as changes in station staffing, equipment, and responses to calls.

It is my understanding that your company was employed to analyze the circumstances and suggest methods of correcting the problems, irrespective of the political implications, employee demands, or union requests, and that the decisions would be made by the Board of Supervisors, after considering the data. I trust that your full analysis and possible alternatives would also be made available to the media and the public.

Thank you. Stanley Sizeler, Pleasant Hill, CA

I was unable to attend any of the town hall workshops. Please consider the attached thoughts. There is a model that can provide the level of service we need at a cost we can afford, if only we can move beyond the union and associated political considerations that have stymied effective study of the issues involved.

Thank you, and bona fortuna!

Jack Weir, Vice-Mayor, Pleasant Hill Board Member, Contra Costa Taxpayers Association

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Steps should be taken to limit the number of situations in which the fire department responds – or at least limit the type of calls where they provide the role of "first responder". In listening to a firefighter share what his typical day consists of, only 20%-30% of responses have to do with a fire. Many of his calls have to do with smelling gas, a broken water pipe, and perceived medical

emergencies. Our "entitlement society" needs to be weaned from the idea that the fire department must respond to non-fire incidents.

An observation that I find questionable (wasteful? necessary?) is when private companies that provide EMT and EMR personnel/capability and local fire department personnel respond to the same incident.

Recommend that fire stations be staffed to fight fires and assist those individuals involved in the fire. Let private companies provide the EMTs and EMR capability for non-fire incidents. Private EMR providers could request fire department personnel when needed (i.e. jaws of life, etc.). Let the gas company deal with gas odors. Let the water company address broken water mains. Let EMR providers address medical calls. Taking these steps may dramatically reduce the number of calls that a department responds to as well as staffing requirements.

David Madsen, Pleasant Hill, CA

Contract with CAL FIRE, like the Coast side and many other jurisdictions do. It saves millions and provides excellent services. Your union will hate the idea, of course, but the community will benefit.

Peggy Emrey, Montara, CA

My name is Steve Cohn. I am a resident of Orinda in Contra Costa County. I am responding to a comment in Tom Barnidge's column in the Contra Costa Times "If you have a plan for fixing ConFire, now is the time to speak up."

I am sure that you know that living in Orinda I am served by MOFD, not ConFire, but I have been "studying" Contra Costa emergency services for several years now and believe I have may have some insights for you (maybe not a "plan", per se).

I lead a group which we call the Orinda Emergency Services Task Force. We are not an "official" creation of the City of Orinda; in fact just the opposite. A couple of years ago a couple hundred Orinda citizens signed a petition asking the city to review the service being provided Orinda by MOFD which was formed in 1997. The City refused, telling us to go to MOFD. Since going to MOFD and asking it to review itself was a fool's errand, a group of us formed our own task force and did the review. I attach our report here and there is supplemental information on our web site www.OrindaTaskForce.org.

While we did not have the resources to plot responses to small areas as your study has, we did review one year's of incident data and noted essentially the same things you noted. Mainly that the vast majority of incidents were not fires but mostly medical incidents. We focused more on the true emergencies (what MOFD calls Code 3) because those were the ones that the right people had to show up as soon as possible to prevent or deal with personal injury or illness. And what we noted that while EMS incidents might outnumber non-EMS incidents by 2.7 times overall as your study reports, when it comes to Code 3 emergencies, EMS accounts for 90% of all incidents, fire for only 5%, and if you dig deeper, serious fires (that really need 3 persons on an engine, in fact multiple engines) are only 2-3% of the total. Therefore, if an

agency only had enough money for six firefighters, this would be enough to provide adequate first responder emergency service for three stations (at two per station) 98% of the time, while the other 2% of the time the two-person first responder would have to wait for backup to provide the appropriate force for the situation. The alternative, staffing two stations with three each, would provide adequate force 100% of the time but increase average response times by 50%. Obviously closing only underutilized stations shifts theses percentages, but not by much.

But this is looking at only one half of the problem; reducing costs by reducing expenses via reduced staff. The real problem is a balanced budget with revenues equal to expenses. In this, MOFD's problem does not even approach ConFire's. ConFire has about $100 million to serve 600,000 residents or about $165 per resident. MOFD has almost $20 million to serve 34,000 or almost $600 per resident. But MOFD has done what any public agency worth its salt would do, spend every available dollar and then some explaining that this is what is required to keep people safe. Before ConFire started closing stations, they had 30 stations with about three personnel in each station; 90 personnel serving 600,000 residents or 1.5 firefighters per 10,000 residents. MOFD has 19 firefighters in five stations; 5.6 firefighters per 10,000 residents. MOFD only has an expense problem; not a revenue problem. ConFire has both.

ConFire tried a district-wide parcel tax but that did not fly. Those people with fine service were not willing to pay for those without and a 2/3 vote would not pass. Plus people wanted to see the County fully understand and get its pension problem under control before they threw more money at the problem. (The 2012 CCCERA results did not help there.) In 1997 Orinda left ConFire because it determined it could get better service on its own (Orinda pays 22.6% of its property taxes to emergency services AND has a parcel tax) than it was getting from ConFire. Lafayette, paying $8.5 million for emergency services while ConFire closes one of its stations, is now in the same boat. ConFire only serves part of Contra Costa county while it is being run by politicians representing parts of all of Contra Costa. Four of the five of them had no trouble closing one of Lafayette's stations because they wanted Lafayette's dollars allocated to their residents' needs. They could not imagine Lafayette having the chutzpah to take its $8.5 million elsewhere; and it will be a long road for Lafayette to accomplish this but considering what the county did, I can imagine them persevering.

Is there a better way to deal with this? I think if each community, whether it be a single city or an aggregation like Lamorinda (Lafayette, Moraga and Orinda) was in control of what services it wanted and was willing to pay for (including a local, not global, parcel tax if necessary), then it could contract ConFire for those services and ConFire, by definition, would be solvent.

A city like Lafayette could pay for two stations while sharing one with MOFD, paying for 7.5 firefighters with its $8.5 million. If allocated pension and OPEB costs caused the cost to rise to an amount greater than $8.5 million, Lafayette would have to decide to pay out of its general fund, pass a parcel tax, or cut services by reducing staff at one or more of their stations. But it would be a local choice.

A small district like MOFD might even revert to contracting services as opposed to being an independent employer. The benefit would be to have firefighters swapping in and out of stations that saw lots of action (and thus got lots of practice) with "underutilized" backwaters, thus providing a higher level of proficiency. Plus, a larger district can more easily maintain a

force with the many specialized skills and equipment that are needed infrequently but are crucial when they are required.

But along with contracting for services, "clients" would also have a say in how ConFire was run in aggregate. By some means, ConFire's "clients" would have to have substantive input into the management of the district so that the contributing communities would have assurances that ConFire's debts were being repaid and it was returning to a sustainable entity.

I believe that this is the "regional" approach that LAFCO has attempted to get people to discuss but the hubris existing in the various agencies and cities has prevented the idea from gaining traction. Fiscal mismanagement has not helped. I believe that MOFD has been as mismanaged as ConFire but due to serendipity in the fact that Orinda and Moraga real estate values weathered the recent "storm" where many of ConFire's areas did not, ConFire is on the ropes while MFOD just has to "adjust" a bit. I would bet San Ramon Valley Fire is in a similar position as MOFD but I know nothing about it other than it appears to have more money than Midas. I realize that the problem goes much deeper, all the way into Prop 13 allocations, but at some point communities have to accept what is, even if it does not seem right or fair, and deal with it. If there is an under-allocation to emergency services with an over-allocation to the county then the county can make adjustments (if it has the guts) but other than that, communities need to make due and cannot necessarily rely on others to subsidize them.

I hope these thoughts are helpful. I look forward to seeing what happens with ConFire.

Steve Cohn

As I can see nothing much has changed. They still run around all day in fire trucks doing personal business. These are the people who cry wolf too much and no one comes. The pensions need to be addressed unfortunately nothing can be done with what has been given away. As a private sector retiree my pension does not come anywhere close to these exorbitant pensions, and I pay my own health care and will never get a cost of living increase. I retired under a Teamster contract and we never got anything close to a public sector contract!

Tony Amundsen

I am lifetime Contra County resident with in interest in effective local government and fire services. I have many years' experience as a project manager.

As you know, the arithmetic of balancing the ConFire budget is straightforward, but the politics are not. The plan presented below outlines how to proceed, in the unlikely event that this has not already been proposed and burned in the heat of public outrage.

Background

Budgets can be categorized in many ways to help decision makers, a useful one in this case is to divide ConFire's yearly budget into personnel costs and non-personnel fixed costs (F). This breakdown aids public decision-making by allowing the key decision elements to be addressed separately. Personnel costs can be usefully further broken down into an average labor rate (R)

multiplied by the total number of hours worked (H), including overtime. In this simple breakdown the Budget (B) equals

B = F + R * H

This model is useful in that it helps the public understand how their interest in the total cost is affected by their policy decisions, personal pay and benefits and the number of personnel and staffing at stations.

A Compromise

The nature of the compromise suggested between the four elements is illustrated below. The budget B must be brought into balance with the expenditures over a three year period before reserves are consumed, with the easiest and hardest measures being done first, while the ardor is highest.

For a Budget that is 10% lower than current expenditures.

1. Reduce fixed costs as much as possible. Perhaps 3% is likely (97% F)

2. Optimize the number of stations remaining open and staffing levels including all overtime for the first year. For this example I presume that 3% of the current total number of staff working hours can be reduced. (97% H). This can include releasing all staff not essential over the next five years.

Now the politically hard part.

3. Reduce the average compensation package to all ConFire district personnel equally by some fraction of the remaining overrun, I this example I am going to use ½ of the remaining overrun. Suppose that the budget was still over 8% at the end of the first 2 steps above. Personnel wage benefits and total compensation will be reduced 4 % in the first year. This is hard and has implications for performance and personnel unrest and retention, but appears to be necessary.

4. At the end of the first or second year, another CCC parcel tax will be proposed to taxpayers to fund the remaining deficit in 2015, a year after these changes take place and a year before David Twa suggests money runs out. A public who sees that the supervisors and ConFire personnel have taken on a share of the burden will pass a measure to share the burden, if it is clearly communicated and broadly supported.

5. If the measure does not pass, another round, based on steps 1-3 above must occur to bring budgets into balance.

The objections to the route proposed here are well –stated elsewhere and need not be repeated. Something must be done. This compromise seems the correct approach. The benefit of the model is that it allows decision makers to understand and trade-off different approaches, maximizing what economists call Utility or what politicians call Votes.

Buzz Pedrotti, Discovery Bay

You probably recall I presented a comment and question at your Lafayette meeting. For additional community comments on the subject, go to the Contra Costa County Official website and look up the February 12, 2013 Board of Fire Directors meeting. View the video section under Short Discussion Item 1. In that section you will see public comments and requests from several residents. These comments represent the interests of the approximate 450 homes and 1000 residents of the Briones Hills Agricultural Preservation Area. Please contact me if you need any additional information. I have a LinkedIn site with additional professional and contact information.

Thank you, Anonymous

Barnidge's article of this morning's Times planted the idea that you may be open to some suggestions. Here are a couple that you have perhaps looked at, the IAFF will not consider but could make ConFire affordable with professional service in our low incident areas that have (or will have) service cuts:

Two-man fire stations with two stations forming a company. NFPA 1710 requires 4 person company before full suppression can commence but their is much required prior to full attack which can be provided by the initial 2 person crew with their truck. NFPA specifies a 4 min. initial response time with an 8 min. response for a full attack complement (Chapter 5 NFPA1710). Please note that ConFire average response time is in the order of 6 or 7 min. for a 3-person company with another 2 to 4 min. required for the 2nd company to arrive at the incident. Full attack can only begin on average of 8 to 12 min., which is at the outer envelope of NFPA 1710 chapter 5.

The same service can be provided with a 2-man station crew as with the existing 3-man model.

Mixed public safety officer/fire person model with one full time fire protection engineer at each fire station 24/7 and fire trained police officers on duty. Two engineers drive their trucks to the incident and two police officers respond, put on their turnout gear and assist as require to form the 4-person attack crew. My direct observation of 3 structural fires in the last 30+ years in Lafayette is that the cops always showed up first. Cost savings perhaps in the 50% range with response time the same (or better than) as the existing model.

Volunteer model organized under the standards of NFPA 1720 but with a full time professional chief and assistant chief and one engineer at each Lamorinda station 24/7. Lamorinda out of ConFire. This proposal taps into the custom and practice of our volunteer citizen involvement almost all of our local civic and cultural affairs-- even our city councils are unpaid. In addition most of our commercial buildings and some of our higher elevation homes are protected by fire protection sprinklers installed according to fire code. This mixed professional - volunteer model is used in many parts of this and other states. Cost savings perhaps better than 50%.

Medical emergency provided by EMS or other qualified contractors is part of all these suggestions put forth for your consideration.

Best Regards, Erling Horn

Under the Supremacy Clause of the U.S. Constitution, federal law, including federal bankruptcy law, supersedes state law, including a state constitution. [You can argue states' rights and state sovereignty until the Easter Bunny is elected President of the United States, which could occur soon, and you will never win.]

ConFire should become a separate legal entity, if it is not already, and file for bankruptcy. In bankruptcy, all of the obscene firefighter pensions can and should be cut to "pennies on the dollar." The corrupt and ruthlessly greedy firefighters who bankrupted ConFire should suffer for its demise.

After bankruptcy, Contra Costa County should establish a "ConFire Compensation Oversight Committee" composed of residents who live within the service area of ConFire and are involved in the negotiation and approval of any subsequent labor agreement.

Obviously, none of the above will ever happen because the Contra Costa County Supervisors are corrupt and spineless puppets who gleefully dance to the tune of their corrupt and ruthlessly greedy ConFire puppet masters.

Scott Ernst

"You can't fool Mother Nature". "There is no FREE lunch." It is long past time to stop pretending that the result of incompetence at the highest level is 'just bad luck'. The problem with the finances of the CCFD rests solely on the failure of the CCC Board of Supervisors who set the policies and rules that govern the fire district. The CCC Civil Grand Jury has been warning the County Board of Supervisors for years that the salaries and benefits of the fire District were unsustainable. The warning was not heeded perhaps because the County Board of Supervisors relies heavily on the contributions/support of the public employee unions to insure their election/reelection to office.

The result has been the Board of Supervisors granting unsustainable benefits to public employee union members with an insatiable appetite. Pensions benefits were grossly excessive with the county failing to address the full cost of promised benefits. Fire chiefs retired at 100%++ of their exorbitant and 'spiked' final year salaries as early as age 50 with lifetime medical benefits. (Contra Costa Times coverage of San Ramon FD and Orinda/Moraga FD). There were no budget provisions for realistically funding these 'other post-employment benefits'. Fire fighters retirement income, often starting as early as age 50 is frequently supplemented by lucrative consulting contracts or income from a second career.

As the Grand Jury pointed out numerous times, for every fire position opening the county receives over 1,000 applications which to any observant person would indicate that employment benefits of firefighters grossly exceeded market conditions. The Board of Supervisors historically concluded that increasing tax rates or implementing parcel taxes was the only solution to controlling run-away costs. So sorry. Continued crying wolf by the elected officials does not meet a reasonable person's standard of prudence.

The Contra Costa County Board of Supervisors has proved themselves incompetent for the task of governing the fire district in good times. The outlook of 'more of the same' is outlandish,

especially now in a deteriorated and overregulated economy. Change is coming so 'get used to it'. There has never been a 'free lunch' and having the property owners and working sector pay increasing 'fair shares' of uncontrolled costs is not a solution. The fire district needs real management and fiscal discipline now. Granting a parcel tax or other override tax to bail out the fire district is just feeding the insatiable appetite of the out of control dragon.

Lloyd & Juanita Sawchuk

Hello, my name is Neil Altimari and I was in attendance at one of the town hall meetings held this week regarding the study that Fitch & Associates is currently doing for the Contra Costa Fire Protection District. Thank you for taking the time to present your findings to date and for hosting these meetings.

I have lived in Contra Costa County for 27 years, I grew up in Antioch and I currently live in Oakley. I have many family and friends that live within the district as well. I work as an ambulance paramedic here in Contra Costa with American Medical Response, whom I have been employed with for seven years this October. I am also actively involved with the EMS system as the field paramedic representative on the county Emergency Medical Care Committee (EMCC), a position I have held for approximately three years, and one of two field paramedic representatives on the county Medical Advisory Committee (MAC) for almost two years now.

As is well known, a large part of what the fire department does these days is EMS. I would like to ask you, and put into consideration (if not already being done) if the necessity of Contra Costa Fire providing advanced life support (ALS) paramedic services is being examined. I can say that from my personal experience of working on the ambulance in this EMS system for nearly seven years I have never experienced a single situation or patient in which I feel there would have been any detriment in patient care or outcome had Contra Costa Fire provided care at the now Advanced EMT scope of practice level, and in the majority of cases good BLS care at the EMT-Basic Level. I know that from my experience reviewing and discussing data and outcomes at the committees I am involved with that this does not solely rest with my experience and perception but is a widespread consensus.

We now know that the things that make the biggest difference and impact on our most critical patients are the basics (BLS care) and rapid transport, with paramedic care having begun a shift into supportive, palliative care. Cardiac arrests are best handled by great quality CPR and timely defibrillation, both of which can be provided by a lay-rescuer. STEMI's and Strokes depend on rapid transport to definitive treatment at our STEMI and Stroke centers within the county, very little is shown to provide any proven benefit to these patients besides aspirin in our STEMI patients which the 911 dispatcher can instruct the patient to take over the telephone. Similar can be said for Trauma patients, time to definitive surgical intervention is the mainstay of treatment, very little prehospital care makes a difference, and that which does are things such as respiratory support which can initially be handled by a BLS provider just fine.

It seems to me that Contra Costa Fire providing ALS paramedic care is a significant duplication of services that evidence based medicine is showing has no significant benefit yet I am sure

bears a significant cost to the district. As a long term resident of this county whom has many loved ones that call this county home as well, I urge you to include this in your study for further exploration and research. It is my feeling that this duplication of services may not only be unwarranted, but actually be a detriment to the EMS system as a whole by causing a dilution in skill sets and clinical knowledge and expertise of the EMS system paramedics. As EMS systems elsewhere have already figured out, it comes to a point where you have put quantity of providers over quality of providers.

If you have any further questions I would be happy to speak further on this matter. Please note that I am speaking for myself based on my personal in depth experiences of the EMS system in Contra Costa. I am not speaking for AMR nor any committee that I am involved with.

Thank you, Neil Altimari

Thanks very much for an informative and well-done meeting last night in Lafayette.

By coincidence I had need of the services of Con Fire the previous day. Though my need was clearly described to their dispatcher as medical only (and for just one person who was sitting comfortably beside a trail not trapped in a car or in danger in any other way), they dispatched both a fire truck and an ambulance. The reason, per the EMT, was that the fire truck was the assigned first responder; yet they arrived concurrently. Obviously this was a waste of very valuable resources; there's certainly got to be a better way.

No need to respond to this. Jerry Schauffler

I wanted to see if you have spoken to the San Ramon Valley Fire District chief regarding the success he is having in reducing spending by millions of dollars. What is he doing that the Con Fire District cannot? Also, I understand there are several real estate properties owned by Con Fire...can any of these be sold or leased as a revenue source?

I look forward to your response.

Thank you, Nancy Becker

In general, the issue of firefighting equipment being used for medical calls and the pressure from underfunded expensive pension plans demands that belt-tightening happen before more tax increases beget even more tax increases. My vote is for improved cost management and match services to equipment. Given 3.3% of calls for fire and the “vast majority” for medical suggests something is out of whack in how medical and fire calls are managed. Yes, if crews are standing around ‘waiting for a fire’ while on the clock, something useful for them to do should be found, yet it’s certainly not clear that medical / accident response should be the answer which may be better handled by medical ambulance services. And I am still amazed at how government pension plans can continue to assume such high rates of returns on investments (7.25%). Private company managers would risk claims of fraud for such optimistic projections. How do these public officials get away with it?

Where is the budget comparison for private medical response services vs. expensive public fire services where retirement looms after 20(?) years and gold-plated, optimistically future-funded pension plans kick in? Our current system is a formula for decline by a thousand duck bites in the form of ever-increasing taxes and fees.

In short, reorganize and reform to live within existing budgets and trim those pension plans which are unaffordable.

Michael Olson Alamo, CA

If it's a separate agency with it's own board, the logical solution is to declare bankruptcy, liquidate, and contract with Cal Fire for fire services or create a new consolidated district. Pension liabilities can be adjusted to assets on hand--laws allow this. Assets can be sold to new entity. Cal Fire's costs are lower because firefighters work 20% more shift time than the standard 10 per month. Also, make pay and benefits similar to military--not premium pay, 24-7 "on call", 4-week vacation/holiday per year, which includes weekends, etc. There is an abundance of workers eager to take these jobs--you should price compensation to market conditions similar to what is required for competitively bid contracts. You have to bust the union contracts, which were negotiated in bad faith to restore sanity, and followed by dissolution is only realistic solution.

Marcia Fritz

I was at the fire meeting in Lafayette. I was wondering why pension reform was not discussed? Also, will taking fire services private be an option?

Bruce R. Peterson, Lafayette

I have spent some of my career working for public agencies and have had the opportunity to see how they operate, the incentives, the abuses and how the pension system works. I have come to the conclusion that public safety services will have to fundamentally change for them to be sustainable.

To be brief, these are the realities of public safety:

1) Public safety is mostly a young adult's occupation.

2) Public safety unions have too much political control over the decision makers.

3) Public monies are limited and even more limited when a big portion is servicing bond and pension fund debt.

4) 3% @ 50 pensions are not sustainable.

5) Volunteer fire fighting organizational structures do not work for medium and high density suburban and metropolitan areas.

6) Large regional catastrophic events will quickly overwhelm current public safety resources.

Sustainable public safety must fundamentally change as follows:

1) A majority of public safety employees must be less than 35 yrs. old

Most people nowadays will have multiple careers during their lifetime. Public safety should be no different and a career of 6-10 yrs. would be ideal. How would you convince a young adult to commit to a 6-10 yr. public safety career during their 20's and early 30's? Pay them a moderate salary AND pay for their college education. The idea would be that 75% of the public safety workforce would cost the taxpayers a moderate salary and the cost of a college education. Only the top 25% of public safety employees would test and be promoted up into the higher ranks of the public safety organization where those in the 35-50 yr. old range would train, mentor and organize the day to day public safety services. Around age 50, there would be more testing and the top 25% of this group would be promoted to high-level administration. Those not making the cut would receive a MODERATE pension that would max out at 52 yrs. old. The remaining group would serve as high-level administrators planning the overall strategy of public safety services and supervising the mid level trainers and mentors. This high level group's pension benefits would max out at 62 yrs old where they would be required to retire.

2) Public Safety employees should not be allowed to unionize

There was a day when public employees were not allowed to form collective bargaining groups. FDR said it best, "All Government employees should realize that the process of collective bargaining, as usually understood, cannot be transplanted into the public service. It has its distinct and insurmountable limitations when applied to public personnel management. The very nature and purposes of Government make it impossible for administrative officials to represent fully or to bind the employer in mutual discussions with Government employee organizations. The employer is the whole people, who speak by means of laws enacted by their representatives in Congress. Accordingly, administrative officials and employees alike are governed and guided, and in many instances restricted, by laws which establish policies, procedures, or rules in personnel matters." I have seen far too many politicians reward public safety unions with collective bargaining contracts that were not in the best interest of the community at large. The community is now paying for it with unsustainable compensation and pension obligations.

3) Public monies are limited

Taxpayer resources have hit their ceiling in paying for public safety resources. No matter the sentiment and good will, taxpayers cannot provide additional funds for public safety. The system will have to fit under this funding ceiling for it to be sustainable

4) 3%@50 pensions are not sustainable.

Keep the current promises and restructure any new promises.

5) Volunteer fire fighting organizational structures do not work for medium and high-density areas.

Urban areas require sophisticated coordination and supervisory structures. Volunteers would not work under such a organizational structure. Although allowing past public safety employees the option of maintaining a loose relationship with public safety services in the form of a ready

reserve until age 45 would provide a pool of trained personnel to supplement existing personal under high load events.

6) Large regional catastrophic events will quickly overwhelm current public safety resources.

It is in the highest public interest to have the most citizens competently trained with public safety skills during a catastrophic event. Having a high turnover rate in the lower levels of public safety, where such individuals spread out to 2nd careers, distributes competent safety personal all throughout the community. Such a distribution would greatly stem the loss of life and property during catastrophic events.

So there are some ideas on fundamentally enhancing public safety and making it economically sustainable to the community at large.

Thank you, Matt Townsend

ATTACHMENT C

Filter Logic for CAD Data Files

FITCH

Attachment: C

Filter Logic Applied to ConFire CAD Data For CY2012

Filter Parameters Field_Name : value	ConFire_Function Value Assigned
Master_Incident Number: "" (no entry)	OMIT
Incident_Type: "" (no entry)	OMIT
Problem: "info"	OMIT
DuplicateFromID: not blank	OMIT
Incident_Type: contains "TEST"	OMIT
Location_Name: contains "test"	OMIT
Location_Name: contains "drill"	OMIT
Priority_Description: "P9-TEST"	OMIT
Cancel_Reason: "Cancelled" *And* Elapsed_InQue2FirstAssigned: "" (no entry)	OMIT
Jurisdiction: W_CON, C_CON, E_CON *And* Incident_Type: EMS-ALPHA Code 2 (Ambulance without Engine)	OMIT
Jurisdiction: W_CON, C_CON, E_CON *And* Incident_Type: EMS3-AMB ONLY	OMIT
Incident_Type: "strike team"	OMIT
Jurisdiction: "" (no entry)	OMIT
Jurisdiction: contains "advised"	OMIT
Jurisdiction: not [W_CON, C_CON, E_CON]	OMIT
Incident_Type: contains "EMS"	EMS
Incident_Type: 5150 PD REQUEST *And* Response_Plan: noted as EMS-ALPHA CALL	EMS
Incident_Type: VEHICLE ACCIDENT Motorcycle *And* Response_Plan: noted as EMS-DELTA CALL	EMS
ConFire_Function: not "EMS" *And* ConFire_Function: not "OMIT"	FD
ConFire_Function: EMS *And* Jurisdiction: not [W_CON; C_CON; E_CON] *And* ConFire Arrived > 0	EMS MA-Out
ConFire_Function: EMS *And* Jurisdiction: W_CON; C_CON; E_CON *And* ConFire Arrived ≥ 0 *And* non ConFire Arrived ≥ ConFire Arrived	EMS MA-In
ConFire_Function: FD *And* Jurisdiction: not [W_CON; C_CON; E_CON] And ConFire Arrived > 0	FD MA-Out
ConFire_Function: EMS *And* Jurisdiction: W_CON; C_CON; E_CON *And* ConFire Arrived ≥ 0 *And* non ConFire Arrived ≥ ConFire Arrived	FD MA-In

ATTACHMENT D

Risk Model Methodology

FITCH

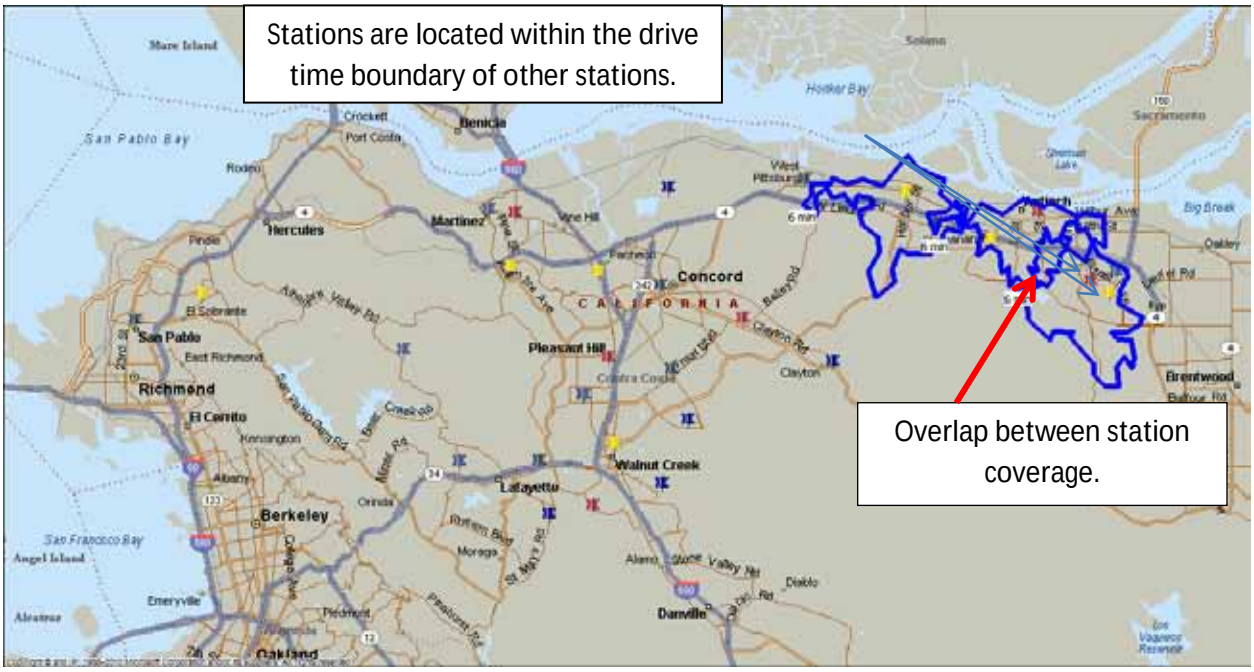
Risk Model Methodology

Risk coverage is a process that requires a system or in this case, a computerized program to achieve optimal coverage against historical demand. If one assumes a pattern to historical demand then by establishing key posts locations, the historical demand can be covered optimally, thus mitigating risk. The question is how to cover risk optimally.

Response Vehicle Post Locations

Since post locations or stations have a natural proximity to one another there is a natural drive time boundary around each station location. This means that at some fixed drive time boundary, another station' capacity for coverage will overlap with the first station. Figure 1 below is a sample map indicating the 6-minute drive time boundaries for three established post locations and reflects the overlap of drive time boundaries.

Figure 1. Sample of 6-Minute Drive Time Overlapping Boundaries



Understanding the overlapping issue means that some stations are more optimal than others for removing risk. The sum of optimal station coverage is called cumulative coverage modeling. Using a cumulative model count not only establishes which stations are optimal but how many stations are required to give the desired percentage of risk coverage.

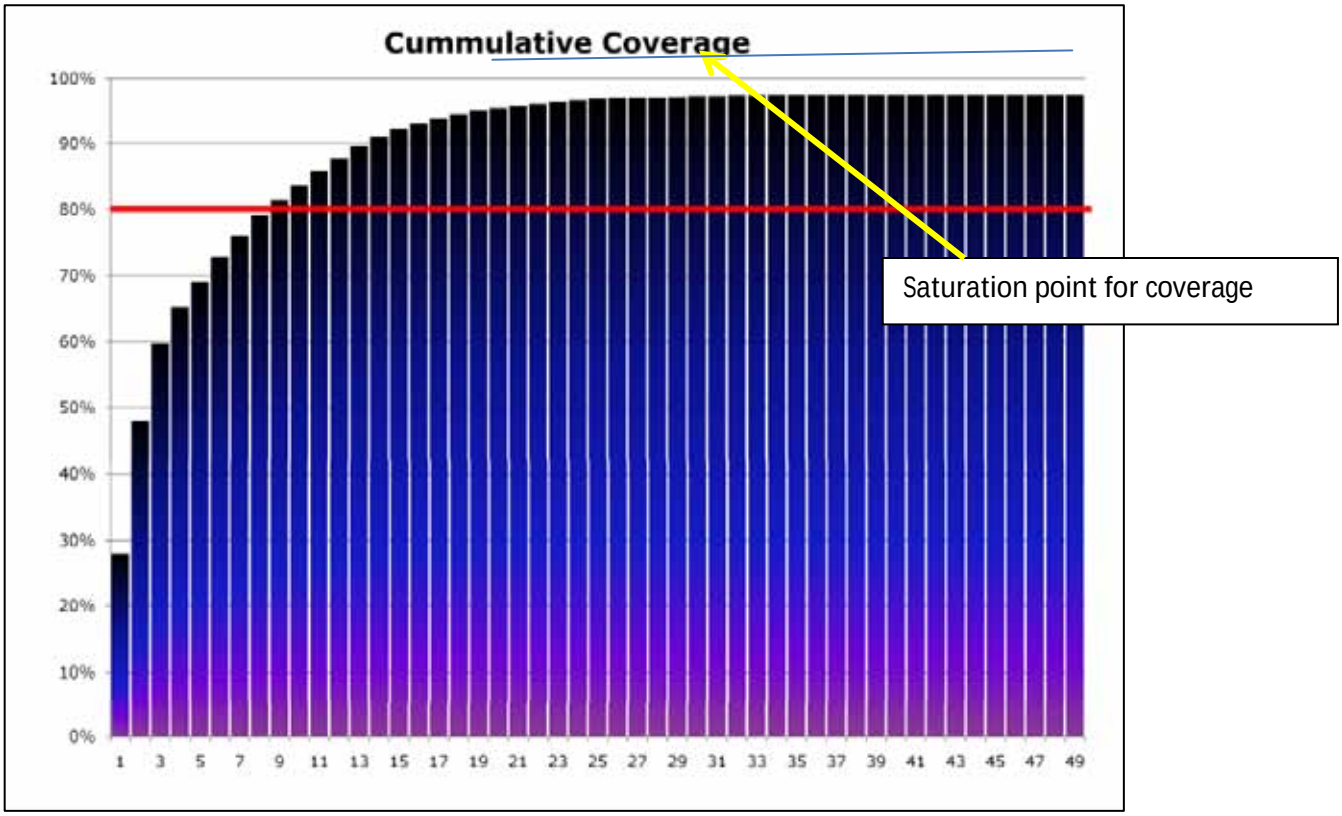
Sample Of Cumulative Coverage

The concept of cumulative coverage is as follows:

1) Cumulative coverage represents the amount of risk covered by unit or station. The key is to optimize each unit location and remove the maximum amount of risk with each additional unit.
2) In all systems there is a limiting point at which additional resources simply do not remove any risk. This is often due to station locations being in close proximity to one another.

Figure 2 below illustrates the concept of cumulative coverage.

Figure 2. Cumulative Coverage and the Saturation Point



Saturation is the point at which adding more units does not result in diminishing risk.

Defining Incident Zones

Manually placing calls on a map becomes overwhelming very quickly because the geography becomes overrun with call markers. In addition, manual placement gives no sense of the temporal distribution of calls. In order to create maps of call demand that are intelligible and interpretable, the Ontario Municipal Benchmarking Initiative, OMBI, derived an algorithm to automate the establishment of Urban, Suburban, and Remote call behavior. *FITCH* used proprietary software that refines the OMBI methodology for the analyses in this report. There are five steps to mapping urban, suburban, and remote incident zones:

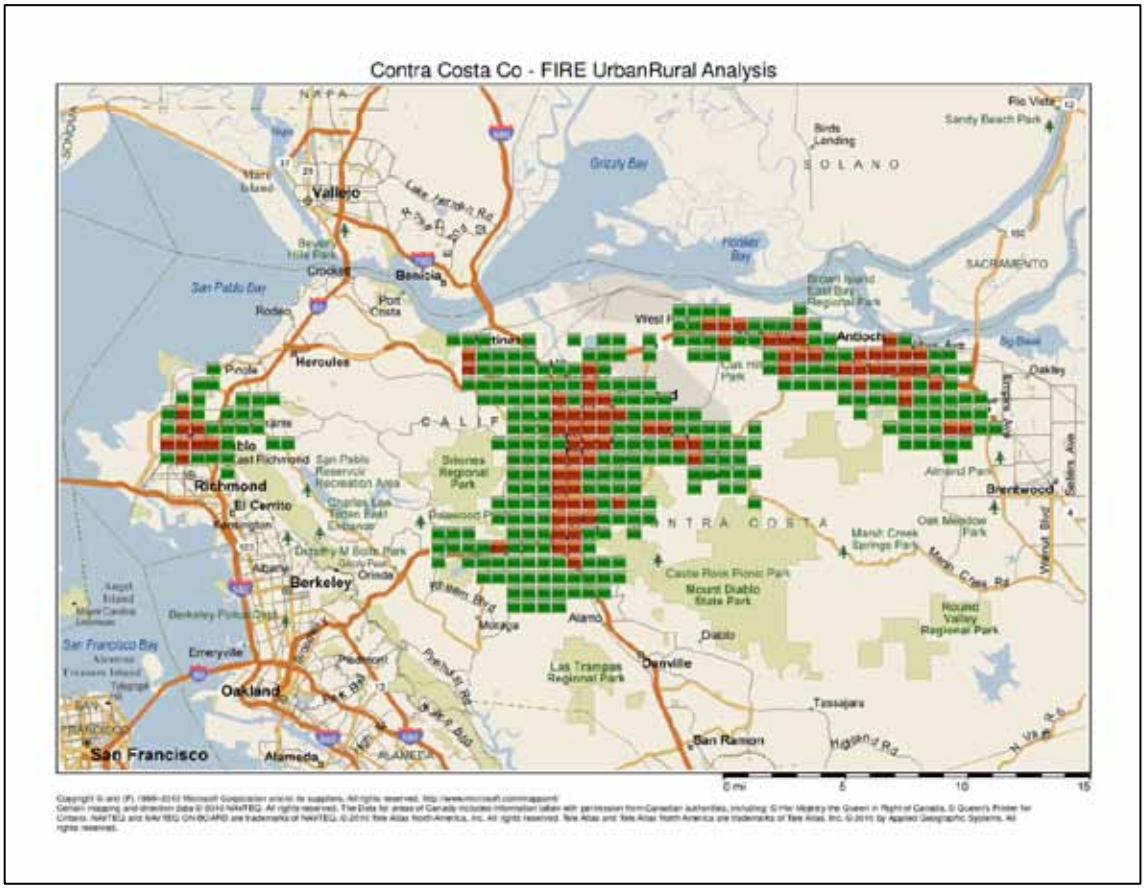
1. Use the predetermined political boundaries of Contra Costa Fire Protection District as the mapping area.
2. Import the CY 2012 data for EMS and/or Fire demands for service onto this map.
3. Create a grid of one-kilometer squares (1 km^2) that covers the Contra Costa Fire Protection District. For all squares in the 1km grid, the analysis counts the number of incident locations that fall within each square.
4. Divide the calls falling into each zone by 12 months to get calls per grid square per month.
5. Use the rules in Table 1 below to assign designations of Urban, Suburban, or Remote zones to the grid squares. For each one-kilometer squares (1 km^2) grid element, the analysis also determines the number of incidents that fall within the eight surrounding 1km squares in the grid. This methodology removes the artifact or potential that a singular address, such as a nursing home, can affect a grid square to such an amount that it becomes Urban (high density demand) without truly exhibiting high-density demand over the whole square.

Table 1. Rules for Assigning Urban, Suburban, and Remote Incident Zones

Incident Zone	Color Code	Assignment Rule
Urban	**RED**	Two calls or more per square kilometer per month with at least four of the adjacent square kilometers having the same number of calls per month.
Suburban	**GREEN**	At least one call per square kilometer every four months with at least half the adjacent square kilometers having the same number of calls per month
Remote	**CLEAR**	Less than one call per square kilometer every four months

Figure 3 below reflects the plotting of calls using the rules above and indicates the various incident zones.

Figure 3. Incident Zones for Fire Calls In Contra Costa County

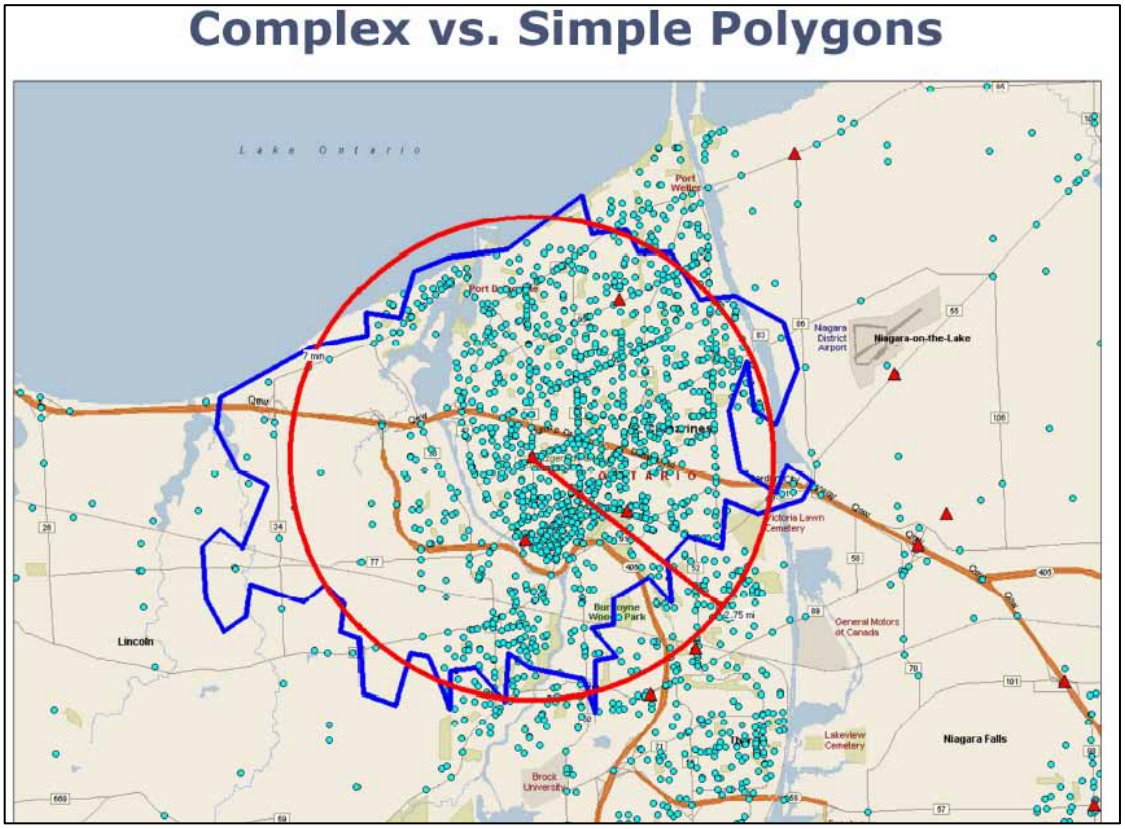


Since risk can be identified and qualified geo-spatially based on historic demand, polygons can be drawn around strategic posts to remove a quantity of risk. This quantity of removed risk has two features: 1) it can be ranked by importance and 2) it can be identified by the quantity of risk it removes.

Drawing Polygons On A Map

There are a couple of approaches to drawing polygons on a map. Since a polygon is simply a shape file a computer can simply attribute a preconditioned shape such as a circle or a square or it can use mapping intelligence such as the road network to define a distinct polygon. Figure 4 below represents displays complex versus simple polygons.

Figure 4. Display of Complex vs. Simple Polygons

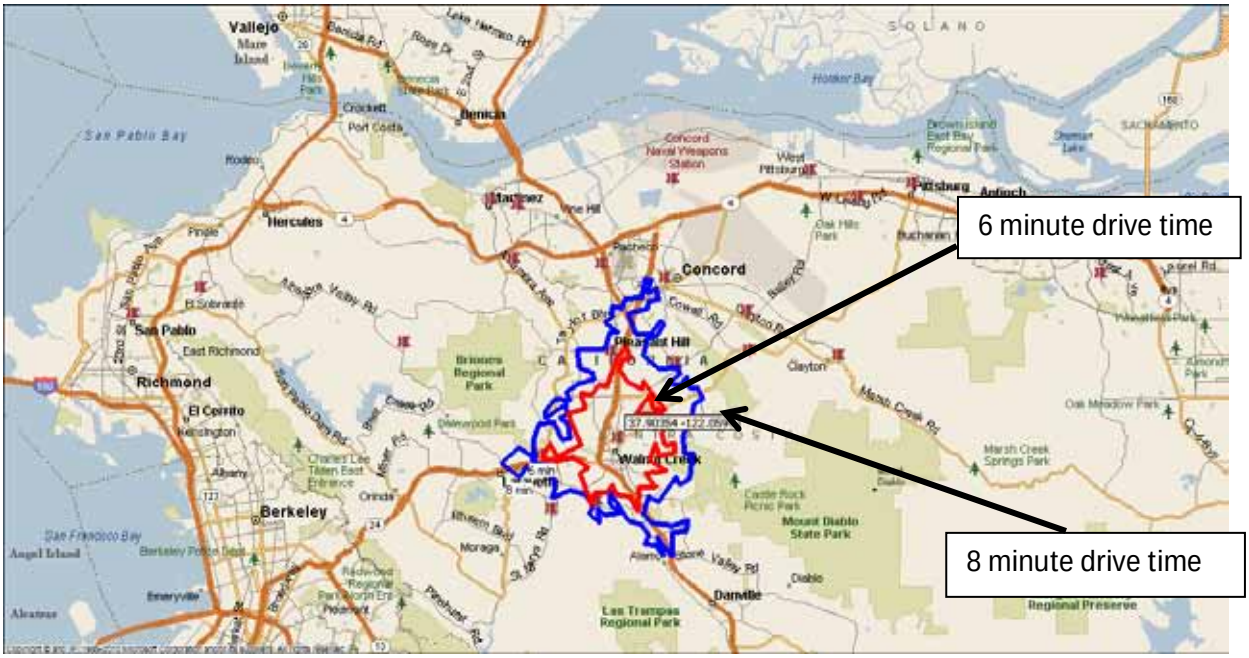


Using a drive time road network polygon gives a realistic understanding of the value of a post. The drive time polygon gives an understanding of what can be achieved by one unit:

1) How far that unit can travel?
2) How much risk can be removed by the unit (through geographic coverage)?

The complexity is that a singular post will leave residual demand on a map. In other words, while it may be optimal in covering a certain level of demand at six minutes, it may be equally optimal at covering additional demand at eight minutes. Figure 5 below displays both a 6-minute and an 8-minutes drive time for a particular fixed location.

Figure 5. Six and Eight-Minute Drive Time Display

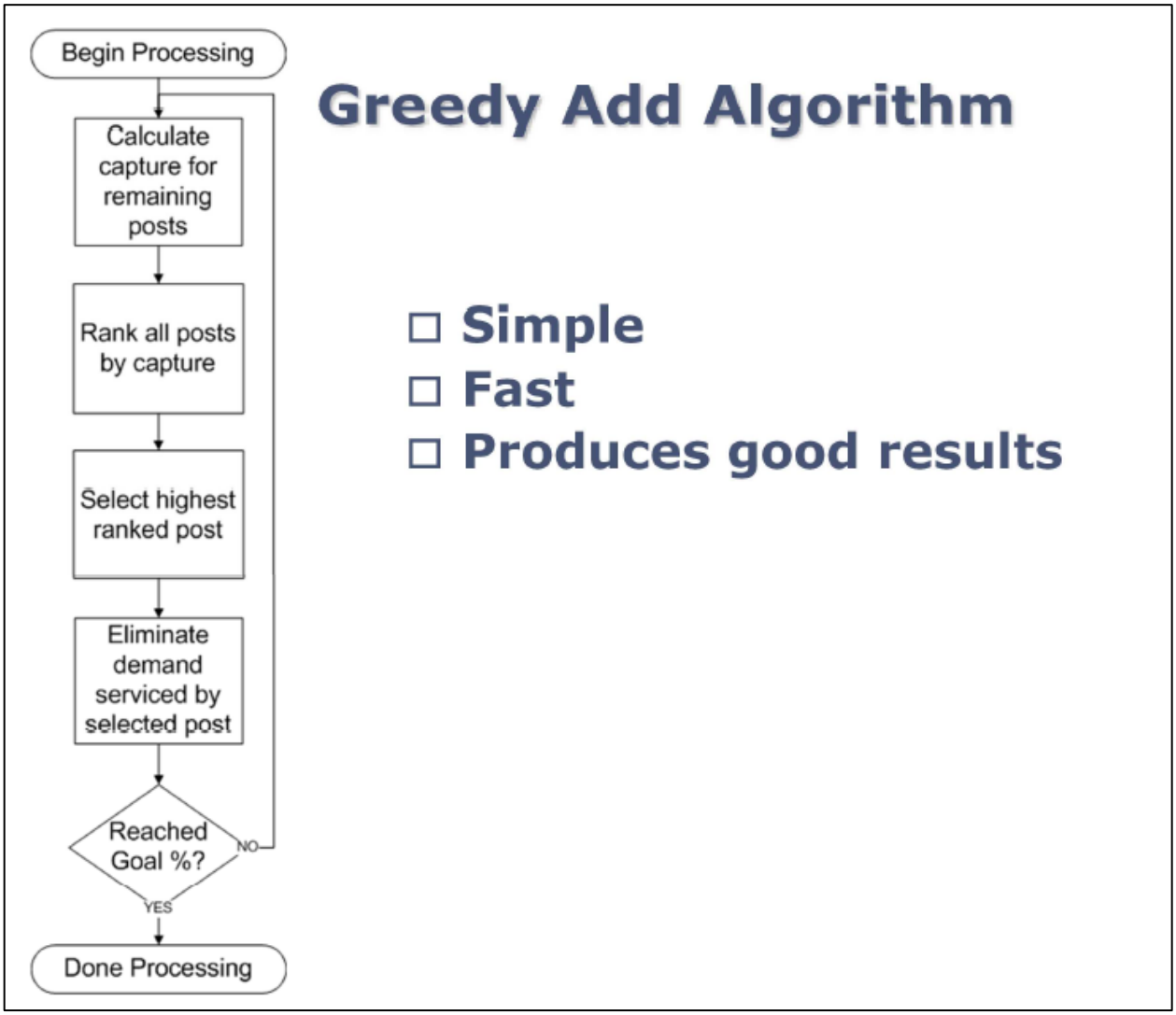


Using this logic, certain posts will not only have a high ranking for urban or high risk coverage that require faster response times, but will also have a secondary ranking for lower risk rural type coverage that requires slower response times. Thus, it may be more applicable to place a second unit in the same vicinity in order to capture additional demand than it is to try to place a unit in another area, which will capture lesser demand or risk. This is particularly true in fixed post location where units cannot be placed at the highest centroid location of risk or halfway between two risk areas.

Using A Computer Algorithm

Since the process is repetitive, a computer can and does a better job at both mapping the risk and subsequently removing the risk either through prescribed existing stations or logical optimal post location. The system that the Consultant used is called the Greedy Add System. Figure 6 below is a flow chart of this system.

Figure 6. Greedy Add Algorithm Flow Chart

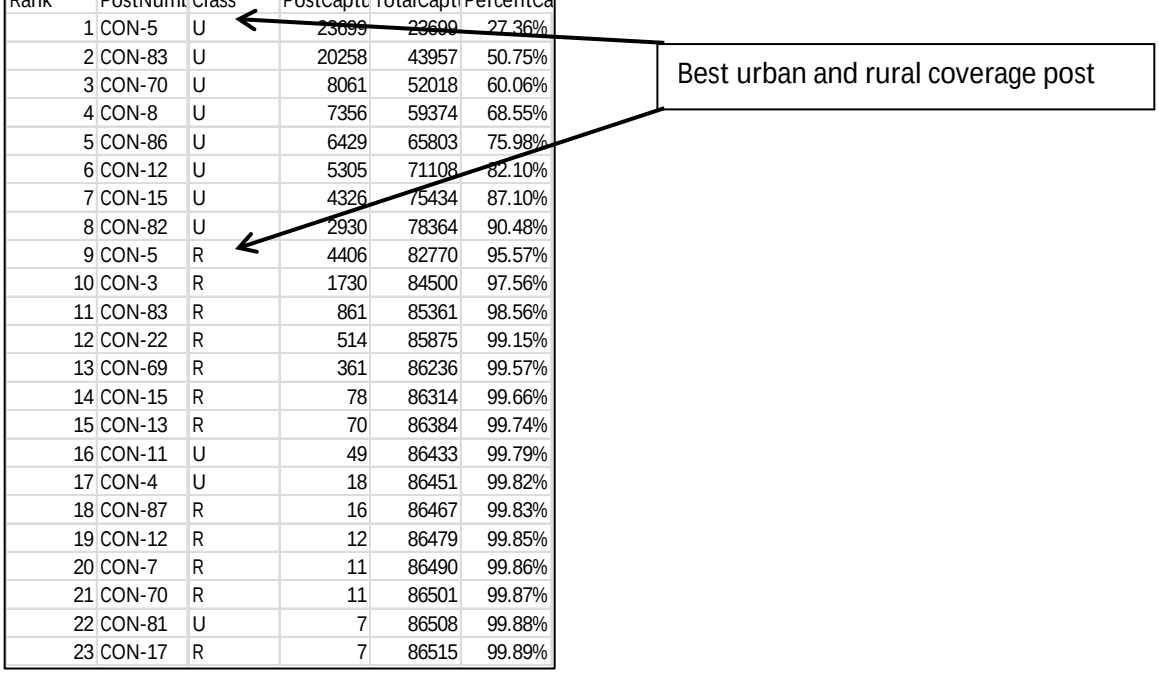


The Greedy Add System simply looks at the entirety of the map and draws prescribed drive polygons around each station or post. It then calculates how much demand each posts removes, ranks each posts by the amount of demand it removes and finally removes the demand covered by the most significant post. It then recalculates the remaining demand on the map using the same methodology as above, and reassigns a ranking to the posts, removes the data of next most significant post, etc.

The system continues to apply this process until the desired level of risk coverage is achieved. In most systems there are different performance metrics for urban coverage, rural coverage and remote coverage. Due to these differences in performance requirements, posts continue to come in and out of importance to risk reduction. In other words a post can appear as a primary urban post and reappear as a post for rural coverage. Table 2 below indicates this concept.

Table 2. Example of Station Post In Multiple Risk Reductions

Rank	PostNumb	Class	PostCaptu	TotalCapt	PercentCa
1	CON-5	U	23699	23699	27.36%
2	CON-83	U	20258	43957	50.75%
3	CON-70	U	8061	52018	60.06%
4	CON-8	U	7356	59374	68.55%
5	CON-86	U	6429	65803	75.98%
6	CON-12	U	5305	71108	82.10%
7	CON-15	U	4326	75434	87.10%
8	CON-82	U	2930	78364	90.48%
9	CON-5	R	4406	82770	95.57%
10	CON-3	R	1730	84500	97.56%
11	CON-83	R	861	85361	98.56%
12	CON-22	R	514	85875	99.15%
13	CON-69	R	361	86236	99.57%
14	CON-15	R	78	86314	99.66%
15	CON-13	R	70	86384	99.74%
16	CON-11	U	49	86433	99.79%
17	CON-4	U	18	86451	99.82%
18	CON-87	R	16	86467	99.83%
19	CON-12	R	12	86479	99.85%
20	CON-7	R	11	86490	99.86%
21	CON-70	R	11	86501	99.87%
22	CON-81	U	7	86508	99.88%
23	CON-17	R	7	86515	99.89%



Conclusion

In short, the Greedy Add System replaces the brute force model or experience by simply applying the same mechanism that one would use if looking at risk manually. The advantage of using a computerized model is there is no bias introduced from personal preference or other exterior factors that may or may not be optimal for risk demand mitigation models.

ATTACHMENT E

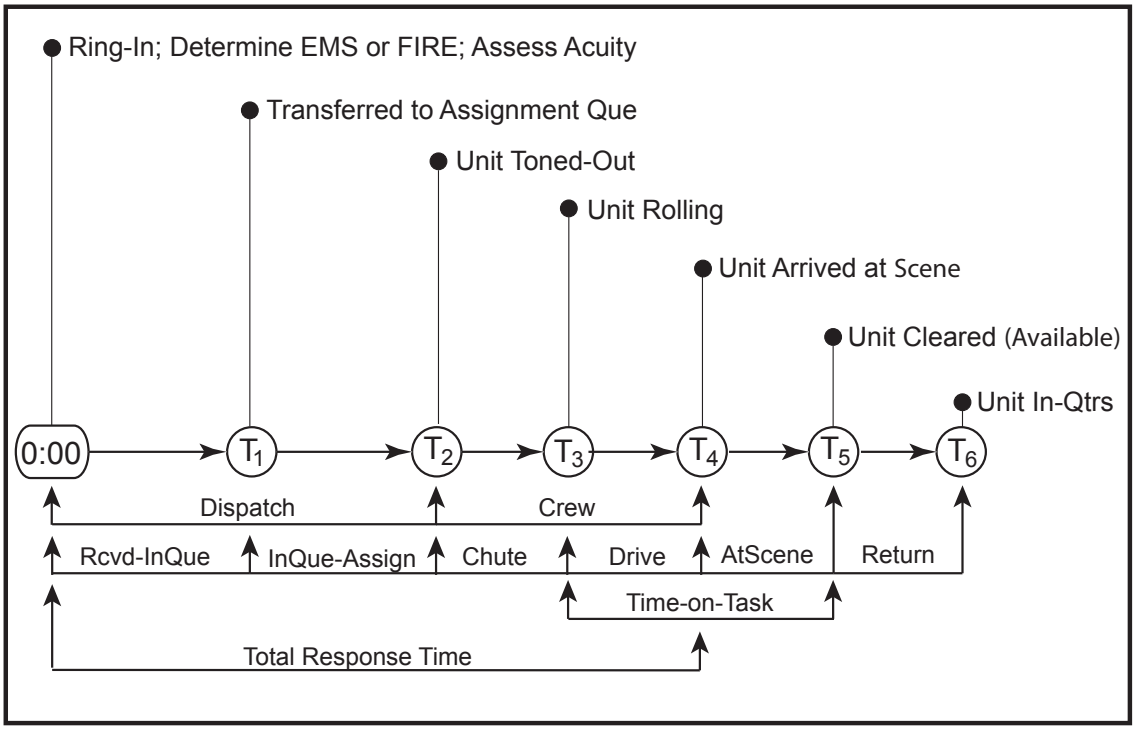
ConFire Performance Metrics: AVL Data

FITCH

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Time Intervals named in these tables have the meanings and relationships to each other as indicated in the following Figure.



Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : Rcvd-to-InQue
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,458	00:17	00:00:36
P2-Emergency	6,730	00:29	00:01:06
P3-Routine	2,807	00:26	00:01:01
P4-Routine			
P5-Non Emergency	1,137	00:19	00:00:46
Total Count	17,132	**Composite**	00:00:51

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : Rcvd-to-InQue
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,314	00:16	00:00:35
P2-Emergency	6,921	00:29	00:01:04
P3-Routine	2,869	00:25	00:00:57
P4-Routine			
P5-Non Emergency	1,706	00:18	00:00:37
Total Count	17,810	**Composite**	00:00:50

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : Rcvd-to-InQue
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,356	00:15	00:00:32
P2-Emergency	6,780	00:27	00:01:01
P3-Routine	2,991	00:24	00:00:55
P4-Routine			
P5-Non Emergency	1,231	00:17	00:00:37
Total Count	17,358	**Composite**	00:00:47

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : InQue-to-Assigned
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,458	00:45	00:01:14
P2-Emergency	6,730	00:39	00:01:19
P3-Routine	2,807	00:54	00:01:34
P4-Routine			
P5-Non Emergency	1,137	00:57	00:01:31
Total Count	17,132	**Composite**	00:01:17

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : InQue-to-Assigned
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,314	00:45	00:01:14
P2-Emergency	6,921	00:40	00:01:21
P3-Routine	2,869	00:54	00:01:33
P4-Routine			
P5-Non Emergency	1,706	00:42	00:01:30
Total Count	17,810	**Composite**	00:01:17

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : InQue-to-Assigned
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,356	00:44	00:01:10
P2-Emergency	6,780	00:40	00:01:17
P3-Routine	2,991	00:53	00:01:32
P4-Routine			
P5-Non Emergency	1,231	01:00	00:01:31
Total Count	17,358	**Composite**	00:01:14

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : Dispatch-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,458	01:04	00:01:42
P2-Emergency	6,730	01:12	00:02:01
P3-Routine	2,807	01:22	00:02:12
P4-Routine			
P5-Non Emergency	1,137	01:19	00:02:06
Total Count	17,132	**Composite**	00:01:52

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : Dispatch-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,314	01:04	00:01:42
P2-Emergency	6,921	01:13	00:01:58
P3-Routine	2,869	01:22	00:02:10
P4-Routine			
P5-Non Emergency	1,706	01:04	00:01:55
Total Count	17,810	**Composite**	00:01:50

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : Dispatch-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	6,356	01:02	00:01:36
P2-Emergency	6,780	01:11	00:01:52
P3-Routine	2,991	01:21	00:02:06
P4-Routine			
P5-Non Emergency	1,231	01:20	00:01:57
Total Count	17,358	**Composite**	00:01:44

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL Chute-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,568	02:11	00:02:44
P2-Emergency	5,515	01:47	00:02:44
P3-Routine	2,296	02:18	00:02:45
P4-Routine			
P5-Non Emergency	1,015	01:55	00:03:09
Total Count	14,394	**Composite**	00:02:44

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Chute-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,401	01:44	00:02:49
P2-Emergency	5,748	01:44	00:02:51
P3-Routine	2,389	01:43	00:02:50
P4-Routine			
P5-Non Emergency	1,006	01:59	00:03:14
Total Count	14,544	**Composite**	00:02:50

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Chute-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,891	02:33	00:02:56
P2-Emergency	5,629	02:26	00:02:57
P3-Routine	2,656	02:19	00:02:57
P4-Routine			
P5-Non Emergency	1,117	02:40	00:03:14
Total Count	15,293	**Composite**	00:02:57

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL Drive-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,568	04:11	00:06:26
P2-Emergency	5,515	04:23	00:07:01
P3-Routine	2,296	04:16	00:06:41
P4-Routine			
P5-Non Emergency	1,015	05:28	00:09:01
Total Count	14,394	**Composite**	00:06:43

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Drive-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,401	04:14	00:06:37
P2-Emergency	5,748	04:26	00:07:01
P3-Routine	2,389	04:11	00:06:33
P4-Routine			
P5-Non Emergency	1,006	05:39	00:09:12
Total Count	14,544	**Composite**	00:06:49

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Drive-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,891	04:19	00:06:41
P2-Emergency	5,629	04:31	00:07:10
P3-Routine	2,656	04:18	00:06:55
P4-Routine			
P5-Non Emergency	1,117	05:51	00:09:23
Total Count	15,293	**Composite**	00:06:55

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL Crew-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,568	06:23	00:08:21
P2-Emergency	5,515	06:11	00:08:46
P3-Routine	2,296	06:34	00:08:44
P4-Routine			
P5-Non Emergency	1,015	07:23	00:10:49
Total Count	14,394	**Composite**	00:08:34

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Crew-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,401	05:59	00:08:29
P2-Emergency	5,748	06:11	00:08:57
P3-Routine	2,389	05:55	00:08:25
P4-Routine			
P5-Non Emergency	1,006	07:39	00:11:06
Total Count	14,544	**Composite**	00:08:43

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Crew-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,891	06:53	00:08:45
P2-Emergency	5,629	06:57	00:09:10
P3-Routine	2,656	06:38	00:09:00
P4-Routine			
P5-Non Emergency	1,117	08:31	00:11:24
Total Count	15,293	**Composite**	00:08:57

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL Total Response Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,593	07:07	00:09:45
P2-Emergency	5,579	07:25	00:10:26
P3-Routine	2,332	07:31	00:10:37
P4-Routine			
P5-Non Emergency	1,030	08:54	00:12:43
Total Count	14,534	**Composite**	00:10:06

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Total Response Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,441	07:11	00:09:52
P2-Emergency	5,816	07:32	00:10:40
P3-Routine	2,416	07:25	00:10:21
P4-Routine			
P5-Non Emergency	1,014	09:12	00:13:15
Total Count	14,687	**Composite**	00:10:17

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Total Response Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,909	07:26	00:10:01
P2-Emergency	5,682	07:50	00:10:46
P3-Routine	2,697	07:49	00:10:42
P4-Routine			
P5-Non Emergency	1,124	09:22	00:13:23
Total Count	15,412	**Composite**	00:10:23

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL AtScene-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,593	12:57	00:22:19
P2-Emergency	5,579	11:24	00:19:46
P3-Routine	2,332	11:43	00:20:11
P4-Routine			
P5-Non Emergency	1,030	13:24	00:23:50
Total Count	14,534	**Composite**	00:21:03

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL AtScene-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,441	12:47	00:22:25
P2-Emergency	5,816	11:21	00:19:54
P3-Routine	2,416	11:48	00:19:57
P4-Routine			
P5-Non Emergency	1,014	12:58	00:23:19
Total Count	14,687	**Composite**	00:21:07

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL AtScene-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,909	12:47	00:22:02
P2-Emergency	5,682	11:12	00:19:55
P3-Routine	2,697	11:33	00:19:49
P4-Routine			
P5-Non Emergency	1,124	12:25	00:23:26
Total Count	15,412	**Composite**	00:21:00

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : EMS
Time Interval : AVL Time-on-Task
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,593	19:18	00:28:26
P2-Emergency	5,579	17:32	00:25:54
P3-Routine	2,332	18:13	00:26:09
P4-Routine			
P5-Non Emergency	1,030	20:41	00:31:22
Total Count	14,534	**Composite**	00:27:10

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Time-on-Task
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,441	18:45	00:28:31
P2-Emergency	5,816	17:29	00:26:07
P3-Routine	2,416	17:40	00:25:59
P4-Routine			
P5-Non Emergency	1,014	20:35	00:31:54
Total Count	14,687	**Composite**	00:27:17

Composite Weighted by Priority Codes P1 & P2.

Service : EMS
Time Interval : AVL Time-on-Task
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	5,909	19:39	00:28:24
P2-Emergency	5,682	18:07	00:26:41
P3-Routine	2,697	18:08	00:26:06
P4-Routine			
P5-Non Emergency	1,124	20:55	00:31:09
Total Count	15,412	**Composite**	00:27:33

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : Rcvd-to-InQue
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	206	00:35	00:01:05
P2-Emergency	1,053	00:32	00:01:03
P3-Routine	802	00:42	00:01:20
P4-Routine	979	01:15	00:01:56
P5-Non Emergency	1,381	00:58	00:01:56
Total Count	4,421	**Composite**	00:01:03

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : Rcvd-to-InQue
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	185	00:35	00:01:12
P2-Emergency	1,058	00:35	00:01:12
P3-Routine	804	00:46	00:01:31
P4-Routine	897	01:15	00:01:59
P5-Non Emergency	1,480	01:00	00:02:08
Total Count	4,424	**Composite**	00:01:12

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : Rcvd-to-InQue
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	198	00:39	00:01:19
P2-Emergency	996	00:34	00:01:11
P3-Routine	832	00:41	00:01:18
P4-Routine	904	01:14	00:01:58
P5-Non Emergency	1,265	00:59	00:01:59
Total Count	4,195	**Composite**	00:01:12

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : InQue-to-Assigned
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	206	00:31	00:01:06
P2-Emergency	1,053	00:23	00:00:50
P3-Routine	802	00:23	00:00:49
P4-Routine	979	00:28	00:00:58
P5-Non Emergency	1,381	00:37	00:01:05
Total Count	4,421	**Composite**	00:00:52

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : InQue-to-Assigned
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	185	00:30	00:00:55
P2-Emergency	1,058	00:23	00:00:47
P3-Routine	804	00:24	00:00:52
P4-Routine	897	00:29	00:01:00
P5-Non Emergency	1,480	00:38	00:01:19
Total Count	4,424	**Composite**	00:00:48

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : InQue-to-Assigned
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	198	00:28	00:00:53
P2-Emergency	996	00:22	00:00:46
P3-Routine	832	00:21	00:00:44
P4-Routine	904	00:34	00:01:02
P5-Non Emergency	1,265	00:44	00:01:19
Total Count	4,195	**Composite**	00:00:47

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : Dispatch-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	206	01:11	00:01:56
P2-Emergency	1,053	00:59	00:01:43
P3-Routine	802	01:08	00:01:59
P4-Routine	979	01:46	00:02:42
P5-Non Emergency	1,381	01:41	00:02:52
Total Count	4,421	**Composite**	00:01:45

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : Dispatch-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	185	01:11	00:02:00
P2-Emergency	1,058	01:03	00:01:56
P3-Routine	804	01:15	00:02:19
P4-Routine	897	01:49	00:02:45
P5-Non Emergency	1,480	01:46	00:03:23
Total Count	4,424	**Composite**	00:01:56

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : Dispatch-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	198	01:12	00:02:17
P2-Emergency	996	01:00	00:01:47
P3-Routine	832	01:06	00:01:59
P4-Routine	904	01:52	00:02:42
P5-Non Emergency	1,265	01:49	00:03:03
Total Count	4,195	**Composite**	00:01:52

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : AVL Chute-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	170	01:28	00:02:30
P2-Emergency	854	01:31	00:02:28
P3-Routine	721	01:36	00:02:42
P4-Routine	619	01:48	00:02:52
P5-Non Emergency	1,215	02:59	00:03:04
Total Count	3,579	**Composite**	00:02:28

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Chute-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	159	01:30	00:02:32
P2-Emergency	855	01:30	00:02:38
P3-Routine	721	01:41	00:02:52
P4-Routine	565	01:49	00:02:57
P5-Non Emergency	1,269	01:54	00:03:07
Total Count	3,569	**Composite**	00:02:37

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Chute-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	167	01:38	00:02:56
P2-Emergency	851	03:17	00:02:41
P3-Routine	729	01:46	00:02:56
P4-Routine	533	03:15	00:03:02
P5-Non Emergency	1,133	01:59	00:03:16
Total Count	3,413	**Composite**	00:02:44

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : AVL Drive-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	170	04:11	00:06:21
P2-Emergency	854	04:06	00:06:21
P3-Routine	721	04:49	00:08:00
P4-Routine	619	04:23	00:07:07
P5-Non Emergency	1,215	06:00	00:09:48
Total Count	3,579	**Composite**	00:06:21

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Drive-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	159	04:15	00:06:48
P2-Emergency	855	04:22	00:07:11
P3-Routine	721	04:55	00:07:55
P4-Routine	565	04:30	00:07:10
P5-Non Emergency	1,269	06:13	00:10:01
Total Count	3,569	**Composite**	00:07:07

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Drive-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	167	04:53	00:08:14
P2-Emergency	851	03:20	00:07:16
P3-Routine	729	04:54	00:08:10
P4-Routine	533	03:04	00:06:54
P5-Non Emergency	1,133	06:14	00:10:21
Total Count	3,413	**Composite**	00:07:25

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : AVL Crew-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	170	05:40	00:08:01
P2-Emergency	854	05:38	00:07:55
P3-Routine	721	06:25	00:09:31
P4-Routine	619	06:11	00:08:51
P5-Non Emergency	1,215	09:00	00:11:54
Total Count	3,579	**Composite**	00:07:56

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Crew-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	159	05:46	00:08:31
P2-Emergency	855	05:52	00:08:46
P3-Routine	721	06:36	00:10:02
P4-Routine	565	06:19	00:08:52
P5-Non Emergency	1,269	08:07	00:11:55
Total Count	3,569	**Composite**	00:08:43

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Crew-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	167	06:32	00:09:57
P2-Emergency	851	06:37	00:08:57
P3-Routine	729	06:40	00:10:12
P4-Routine	533	06:20	00:08:58
P5-Non Emergency	1,133	08:13	00:12:30
Total Count	3,413	**Composite**	00:09:06

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : AVL Total Response Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	176	06:53	00:09:30
P2-Emergency	874	06:43	00:09:41
P3-Routine	727	07:52	00:11:27
P4-Routine	630	08:03	00:11:10
P5-Non Emergency	1,233	09:56	00:14:39
Total Count	3,640	**Composite**	00:09:39

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Total Response Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	164	07:07	00:10:14
P2-Emergency	878	07:05	00:10:26
P3-Routine	731	08:06	00:11:53
P4-Routine	571	08:13	00:11:04
P5-Non Emergency	1,300	10:04	00:14:51
Total Count	3,644	**Composite**	00:10:24

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL Total Response Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	172	07:57	00:11:40
P2-Emergency	870	06:06	00:10:31
P3-Routine	743	07:55	00:12:10
P4-Routine	538	06:56	00:11:08
P5-Non Emergency	1,147	10:53	00:15:12
Total Count	3,470	**Composite**	00:10:42

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

Time Intervals by Priority Descriptions
Derived From AVL Timestamps

Mutual Aid In-Bound and Mutual Aid Out-Bound are excluded from these statistics.

Service : FD
Time Interval : AVL AtScene-Time
Date Range : 1/1/2012 **thru** 6/30/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	176	20:44	00:38:51
P2-Emergency	886	26:48	01:00:14
P3-Routine	728	18:49	00:46:30
P4-Routine	630	11:23	00:25:40
P5-Non Emergency	1,233	12:31	00:28:13
Total Count	3,653	**Composite**	00:56:41

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL AtScene-Time
Date Range : 7/1/2012 **thru** 12/31/2012

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	164	22:17	00:43:41
P2-Emergency	887	25:34	00:56:54
P3-Routine	732	19:28	00:47:56
P4-Routine	571	10:36	00:22:11
P5-Non Emergency	1,300	12:27	00:27:06
Total Count	3,654	**Composite**	00:54:50

Composite Weighted by Priority Codes P1 & P2.

Service : FD
Time Interval : AVL AtScene-Time
Date Range : 1/1/2013 **thru** 6/30/2013

Priority Description	Count	Average [min:sec]	90%-tile [min:sec]
P1-Emergency	172	19:13	00:37:59
P2-Emergency	875	26:14	00:59:32
P3-Routine	744	19:34	00:44:45
P4-Routine	538	11:36	00:24:24
P5-Non Emergency	1,147	12:21	00:26:21
Total Count	3,476	**Composite**	00:56:00

Composite Weighted by Priority Codes P1 & P2.

Timestamp: 01/03/2014 07:48:47

ATTACHMENT F

Community Awareness and Emergency Response (CAER) Member Organization

2013 Member List
Contra Costa County Community Awareness & Emergency Response Group, Inc. (CAER)

Organization Name
Air Liquid Corporation
Alerting Solutions
American Medical Response (AMR)
CCC Fire Protection District
CCC Health Services Department
CCC Office of Education
CCC Sheriff-Coroner
Chevron Richmond Refinery
City of Antioch
City of Martinez
City of Pittsburg
City of San Pablo
Criterion Catalysts
Diablo Water District
Dow Chemical Company
General Chemical Company
IMTT
K2 Pure Solutions
Phillips 66 Refinery
Rhodia (formerly Rhone-Poulenc)
San Ramon Fire District
Shell Martinez Catalyst Plant
Shell Refinery
Tesoro Golden Eagle Refinery
USS Posco
Valero Refinery

www.cococaer.org/ as of December 2013.

ATTACHMENT G

Petrochemical Mutual Aid Organization Equipment Summary

CHEVRON REFINERY

Emergency (510) 242-5555

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Engine #60	2,000 gpm		500 g. 1%	1,000 ft. 5" Storz
Foam Engine #60	3,500 gpm		1,200 g. 3%	1,000 ft. 5" Storz
Truck #60	2,000 gpm	95' extension	750 g. 1%	900 ft. 5" Storz
Foam Pod			3,000 g. 1%	
Hose Trailer				5,000 ft. 5" Storz
Monitor #60	(2) 1,000 gpm	Hydro-Foam Nozzles		500 ft. 5" Storz
Monitor Trailer	2,000 gpm	Hydro-Foam Nozzle		
HazMat #60	Level "A"/"B" Entry suits, Leak control kits, SCBA equipment, and Decon equipment.			

DOW CHEMICAL

Emergency (925) 432-5555

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Engine #1	1,500 gpm		1,000 g. 3%	600 ft. 5" w/4½" NST
Engine #2	1,250 gpm		No foam	600 ft. 5" w/4½" NST

PHILLIPS 66 REFINERY Emergency (510) 245-4475

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Foam Engine #7	3,500 gpm		800 g. 1%	1,000 ft. 5" Storz
Foam Engine	1,250 gpm		1,000 g. 3%	450 ft. 5" Storz
Foam Tender	300 gpm		3,000 g. 1%	
Monitor Truck P/U	2,000 gpm Hydro-Foam/Chem Nozzle			200 ft. 5" Storz
Ambassador Monitor	1-6000 gpm hydro foam nozzle			
(2) Screaming Eagle portable monitors	150-1500 gpm nozzles			

SHELL REFINERY Emergency (925) 313-3601

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Engine #2	3,000 gpm		1,000 g. 1% National Foam 1x3	800 ft. 5" Storz 1600 ft. 2½ "
Engine #3	3,000 gpm		1,000 g. 1% National Foam 1x3	800 ft. 5" Storz
Foam Tender			4000 g. 1% National Foam 1x3	
Two Quick Attack Units 500 lb. Purple K Extinguisher Unit, 1000GPM Deck Guns and 500 gpm Blitzfire monitors				

TESORO REFINERY

Emergency (925) 372-3120

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Engine #1	3,500 gpm		1,000 g. 1%	1,000 ft. 5" Storz
Foam Aerial	1,500 gpm	75' Aerial	1,000 g. 1%	500 ft. 5" Storz
Special Trailer #1 41 Ft long trailer	5,000 gpm pump. Can Draft	(2) 2,000 gpm Hydrofoam monitors	2,000 g. 3%	400 ft. 5" Storz 80 ft. 5" draft Hose
Special Trailer #2 41 ft. long trailer	400 gpm transfer pump		4,270 g. 3%	
Special Trailer #3 45 Ft long trailer	400 gpm transfer pump		4,000 g. 3%	
Special Trailer #4 22 ft. long trailer	5000 gpm pump. Can Draft		N/A	(8)10' lengths 5" draft hose
Foam Tender	~300 gpm		1,500 g. 1%	
5" Hose Trailer				4000 ft. 5" Storz
3" Hose Trailer				3200 ft. 5" Storz
Ford Tractor	Tows Special Trailers 1,2,3			
Ambassador Monitor	1000 – 6000 GPM Trailer Mounted Monitor			

***Note: Engine and Aerial will not be dispatched simultaneously

***Note: Special Trailer #1 has (2) 2,000 gpm Hydro-Foam Deck Guns
Special Trailer #3 has (2) 1-3,000 gpm hand portable Hydro-Foam Monitors

VALERO REFINERY

Emergency (707) 745-7562

EQUIPMENT	PUMP	LADDER or NOZZLE	FOAM	SUPPLY HOSE
Engine #16	2,000 gpm		1,000 g. 3%	1,000 ft. 5" Storz
Truck #16	2,000 gpm	95' aerial	700 g. 1%	800 ft. 5" Storz
Foam Tender	150 gpm		4,000 g. 3%	900 ft. 5" Storz
Big Sucker	5,000 gpm Portable Pump Unit			
6 K Pump	6000 gpm portable pump unit. (6) 5" Discharges			
5" Hose Trailer				3,500 ft. 5" Storz
3" Hose Trailer				1,300 ft. 2½" coupling
Six Gun	2,000-6,000 gpm Portable Monitor			

www.fitchassoc.com