TOWN OF
SAN ANSELMO
EST. 1907

In the Council Chambers at 525 San Anselmo Avenue, San Anselmo, CA 94960

Town Council
Agenda

Tuesday, October 24, 2023 6:30 PM

Meeting held In-Person and via Zoom:

https://us02web.zoom.us/j/81324116671

Or Telephone: +1 669 900 6833 | Webinar ID: 813 2411 6671

How to Submit Comments Before the Meeting: Members of the public are encouraged to submit email correspondence to towncouncil@townofsananselmo.org before the meeting begins.

How to Participate During the Meeting: Members of the public will have the option to speak during the meeting through the Zoom application by using their phone or an electronic device.

For PC, Mac, or smart phone, Use Raise hand function when public comment for an item is requested. It is a button that is located at the top or bottom of your screen, based on your computer For landline phones, raise hand to be recognized with *9

Please be advised those participating in the meeting remotely via Zoom do so at their own risk. The Town Council regular meeting will not be cancelled if any technical problems occur during the meeting.

A. Call to Order in the Council Chambers at Town Hall- 525 San Anselmo Avenue, San Anselmo CA 94960- 6:30 PM

B. Mayor Burdo announces that item B.1 will be discussed in Closed Session.

B.1. Closed session pursuant to California Government Code § 54956.8 - Conference with Real Property Negotiators Property: APN 005-011-60 Agency negotiator: Town Manager David Donery Negotiating parties: Marin Open Space Trust; Mary Conversano Under negotiation: Price and Terms of Payment

C. PUBLIC COMMENT on Closed Session Items.

D. Council Adjourns to Closed Session.

Council Reconvenes in the Council Chambers. Optional Pledge of Allegiance: The Mayor or a designated Council member will recite the Pledge of Allegiance for members of the Council and the public who wish to join in the recitation. 7:00 PM

Open time for public expression.

The public is welcome to address the Council at this time on matters not on the agenda that are within the jurisdiction of the Council. Please be advised that pursuant to Government Code Section 54954.2, Council is not permitted to discuss or take action on any matter not on the agenda unless it determines that an emergency exists, or that there is a need to take immediate action which arose following posting of the agenda. Comments may be no longer than three minutes and should be respectful to the community.

Written Public Comment

Council requests for future agenda items.

Council committee liaison reports, questions and comments to staff; staff miscellaneous items.

Special Presentation.

- Mayor's Proclamation Recognizing Cedars for their Excellent work on Supporting Individuals with Developmental Disabilities

1. Consent Agenda:

The opportunity for public comment on consent agenda items will occur prior to Council discussion of the consent agenda. The Council may approve the entire consent agenda with one action. In the alternative, items on the consent agenda may be removed by any Council or staff member, for separate discussion and vote.

1.1 Approval of the Draft Minutes of the Regular Town Council Meeting of October 10, 2023.
Staff Report (DOC)
Attachment 1- Draft Minutes of the October 10, 2023 (DOC)

1.2 Consideration of Special Event Application – Community Hanukkah Celebration and Menorah Lighting Ceremony 2023
Staff Report
Attachment 1 - Event Application

1.3 Quarterly Treasurer's Investment Report, September, 2023
Staff Report (DOCX)
Attachment 1 Quarterly Investment Report 9.30.23 (PDF)

1.4 Receive Climate Action Quarterly Update
Staff Report (DOC)

1.5 Revenue and Expenditure Reports, September 2023
Staff Report (DOCX)

Attachment 1 Budget Comparison Report Subcategory September 2023 (XLS)
Attachment 2 Budget Comparison Report Department September 2023 (XLS)

2. Council Business Items:

In general, the following procedural order applies to items of business:
•Presentation
•Town Council questions
•PUBLIC COMMENT – limited to 3 minutes/person
•Town Council discussion/action

2.1 Receive report and provide direction to staff whether to consider a rent stabilization ordinance and eviction protection ordinance beyond the Tenant Protection Act (AB 1482). Conducting a discussion regarding residential rental regulations is not considered a "project" under the California Environmental Quality Act (CEQA), because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

Staff Report (PDF)
Attachment 1 - San Anselmo Residential Rental Policies Presentation (PDF)
Attachment 2 - Summary of Community Engagement (PDF)
Attachment 3 - Parcels with 3 Units and Up - Sorted by Number of Units (PDF)
Attachment 4 Links to State Law and local ordinances (DOC)
Attachment 5 - Community Discussion #1 and 2 â€“ In-Person and Zoom Public Comments (PDF)
Attachment 6 - Public Comments (PDF)
Public Comment- Gott.pdf
Public Comment- Gray.pdf
Public Comment- Johnson.pdf
Public Comment- Knell.pdf
Public Comment- Najafi.pdf
Public Comment- Sexton.pdf
Public Comment- Timms.pdf
Public Comment- Turkan.pdf
Public Comment- Wong.pdf
Public Comment- Ahern.pdf
Public Comment- Berg.pdf
Public Comment- Carlston.pdf
Public Comment- Clapp.pdf
Public Comment- Coito.pdf
Public Comment- Engert.pdf
Public Comment- Fariwar.pdf
Public Comment- Goldin.pdf
Public Comment- Hogan.pdf
Public Comment- Smith.pdf
Public Comment- Armitage.pdf

2.2 Receive Staff Report Presented to Ross Valley Fire Board and Consider Recommendation from Fire Board's Labor Management Subcommittee Relating to Increased Staffing per the "2022 Staffing/Deployment" Side Letter and Provide Direction to the Town's Fire Board Representatives. Providing direction to the Town's Fire Board representatives on this matter is not considered a "project" under the California Environmental Quality Act (CEQA), because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

Staff Report (DOC)
Attachment 1 - Third Amendment to RVFD JPA (PDF)
Attachment 2 - RVFD Board 10.11.23 Staff Report on 3 Person Engine Companies_Labor_Managment Subcommittee Recomendation (PDF)
Attachment 3 - 2020 Side Letter between Ross Valley Fire Department and Ross Valley Professional Firefightersâ€™ Association Local 1775 (PDF)
Attachment 4 - 2022 Side Letter Staffing/Deployment Agreement between Ross Valley Fire Department and Ross Valley Professional Firefightersâ€™ Association Local 1775 (PDF)
Attachment 5 - Citygate Associates Standards of Coverage Assessment 2019 (PDF)
Attachment 6 - NIST Report Fireground Field Experiments (PDF)
Attachment 7 - NIST Report on EMS Field Experiments (PDF)

Public Hearing:

In general, the following procedural order applies to public hearing items:
•Presentation
•Town Council questions
•PUBLIC COMMENT – limited to 3 minutes/person
•Town Council discussion/action

2.3 Resolution Adopting Required Findings Pursuant to Government Code Section 4217 Approving Sole Source Energy Services Contract with EcoGreen Solutions LLC for Energy Efficient Lighting Improvements for Town Owned Facilities and Authorizing Town Manager to Execute Associated PG&E On-Bill Loan Financing. The project and associated on-bill financing are exempt from the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines section 15061 "common sense exemption" because it can be seen with certainty that they will not cause a significant effect on the environment.

Staff Report (DOC)
Attachment 1 - Copy of Public Notice (PDF)
Attachment 2 - Proposed Resolution (DOC)

Adjourn

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact Town Staff at email savila@townofsananselmo.org. Notification at least 48 hours prior to the meeting will enable the Town to make reasonable accommodation to help insure accessibility to this meeting.

Any writings or documents provided to a majority of the Town Council regarding any item on this agenda after the distribution of the original packet will be made available for public inspection at the public counter at Town Hall

located at 525 San Anselmo Avenue.

Notice is hereby given that Council may discuss and/or take action on any or all of the items listed on this agenda. If any of these matters above are challenged in court, you may be limited to raising only those issues you or someone else raised at any public hearing described on this agenda, or in written correspondence delivered at, or prior to, this Council meeting. Judicial review of an administrative decision of the Town Council must be filed with the Court not later than the 90th day following the date of the Council's decision (Code of Civil Procedure Section 1094.6) Any item not under discussion before 10:00 p.m. may be continued to the next regular meeting. Next regular meeting is November 14, 2023.

Administration Department
Town Hall, main floor
525 San Anselmo Avenue
San Anselmo, CA 94960
(415) 258-4691

Town Council
Steve Burdo, Mayor
Eileen Burke, Vice Mayor
Brian Colbert, Councilmember
Alexis Fineman, Councilmember
Tarrell Kullaway, Councilmember

Staff
David Donery, Town Manager
Linda Kenton, Assistant Town Manager / Town Librarian
Jeff Zuba, Finance and Admin Services Director
Megan Holt Acevedo, Town Attorney
Serge Avila, Town Clerk
Heidi Scoble, Planning Director
Sean Condry, Public Works Director
Dannielle Mauk, Community Services Director
Mike Norton, Chief of Police
Dan Mahoney, Interim Fire Chief

DECLARATION OF POSTING
This Notice is posted in accordance with Government Code §54954.2(a) or §54956. Members of the public can view electronic agendas and staff reports by accessing the Town of San Anselmo website. Under penalty of perjury, this Agenda was posted to the public at least 72 hours prior to the meeting.

STAFF REPORT

TOWN OF SAN ANSELMO Item #: 1.1

MEETING DATE: October 24, 2023

AGENDA TITLE: Approval of the Draft Minutes of the Regular Town Council Meeting of October 10, 2023

FROM: Serge Avila, Town Clerk

RECOMMENDATION: For Council to consider the approval of the Draft Minutes of the Regular Town Council meeting of October 10, 2023.

ATTACHMENT:

Attachment 1- October 10, 2023 Draft Minutes

San Anselmo Council Draft Minutes
Regular Meeting
Town Council Chambers and via teleconference
Tuesday, October 10, 2023

Call to Order 6:30 PM

COUNCILMEMBERS PRESENT: Steve Burdo, Mayor
Eileen Burke, Vice Mayor
Brian Colbert
Alexis Fineman
Tarrell Kullaway

STAFF MEMBERS PRESENT: Dave Donery, Town Manager
Megan Acevedo, Town Attorney
Serge Avila, Town Clerk
Sean Condry, Public Works Director
Scott Schneider, Assistant Public Works Director

A. Call to Order

B. Mayor Burdo announced that item B.1 will be discussed in Closed Session

Conference with Real Property Negotiators
Government Code Section 54956.8 Conference with Real Property Negotiators
Property: APN 005-011-60 Agency Negotiator: Town Manager David Donery
Negotiating Parties: Marin Open Space Trust; Mary Conversano Under negotiation: Price and Terms of Payment

C. Public Comment on Closed Session Items

The Chair of the Open Space Trust, Mr. Ralph Mayhem, Mr. John Guzman, Mr. Jack Judkins, Mr. Staley Radke, Ms. Sharon Batel, Mr. Ron Ecker, and Mr. Marty Simms supported the acquisition of the Hawthorne Canyon property.

D. Council Adjourned to Closed Session

Council reconvened to Open Session in the Council Chambers at 7:17 PM

Optional Recitation of the Pledge of Allegiance

Open Time for Public Expression

Michele discussed the need for more teen activities.

An individual discussed her non-profit theater organization.

Council requests for future agenda items; Committee liaison reports; questions and comments to staff; miscellaneous items

Mayor Burdo reported on the passing of former Councilmember Kay Coleman and noted they

would be honoring her at the November 14th meeting.

Vice Mayor Burke reported she attended the Dog Park Committee meeting; the last weekend of "Live on the Avenue"; watched the October 5th rental discussion; the Marin County Council of Mayors and Councilmembers (MCCMC) meeting in Fairfax; tomorrow is her father's 90th Birthday!

Councilmember Fineman reported she attended the MCE Board retreat and Technical Committee meeting; witnessed a bicycle accident on Greenfield Avenue and stated she would like the Council to talk about safety improvements along that corridor

Councilmember Colbert reported the County opened up the Karma Club for teens/tweens in the Northgate Mall; he attended a Policy Committee meeting regarding State Route 37; the Marin Music Gala; encouraged parents who are having problems with the Yellow Bus school service or the relocation of bus stops to contact Marin Transit; participated in the International "Walk and Roll"; he has been asked to join the Cedars Board.

Councilmember Kullaway had no reports.

Mayor Burdo reported he attended a meeting of the Ross Valley Fire Board Labor Management Subcommittee; and discussed the school bus service and the new vendors; the next JEPA meeting will be on November 7th; took a tour of Cedars and noted they have a lot of amazing activities going on; watched the rental discussion; attended the Spirit of Marin Awards Ceremony; asked to move Agenda Item #2.2 to the end of the agenda.

M/s, Burke/Fineman, Motion to move Agenda Item #2.2 to the end of the agenda.
AYES: Burke, Colbert, Fineman, Kullaway, Mayor Burdo

Town Manager Donery reported the Town has been contacted by a representative of Shabbat of West Marin about an event, an Evening of Solidarity, to be held tomorrow night at the Town Hall Plaza.

Special Presentation

There were no Special Presentations.

1. Consent Agenda

1.1 Approve the Draft Minutes of the Town Council Meeting- September 26, 2023

1.2 Report of Checks Issued, September 2023

1.3 Approve the Second Reading and Adoption of Murals Ordinance No. 1182

1.4 Holiday Tree Lighting Ceremony 2023- Event Application

1.5 Consider to Approve the Hub Beautification Public Arts Project

1.6 Adopt a Proclamation to Welcome and Recognize Youth Commissioners for the Current Fiscal Year 2023/24

Mayor Burdo opened the meeting to public comments.

There were no comments.

Mayor Burdo closed the meeting to public comments.

Councilmember Fineman asked to pull item #1.4 from the Consent Calendar.

Councilmember Colbert asked to pull item #1.1 from the Consent Calendar.

M/s, Burke/Fineman, Motion to approve Consent Calendar items #1.2, #1.3, #1.5, and #1.6.
AYES: Burke, Colbert, Fineman, Kullaway, Mayor Burdo

1.1 Approve the Draft Minutes of the Town Council Meeting- September 26, 2023

Councilmember Colbert corrected the spelling of an individual's name.

1.4 Holiday Tree Lighting Ceremony 2023- Event Application

Councilmember Fineman thanked staff and the community for coming up with ways to make these events more inclusive.

M/s, Burke/Fineman, Motion to approve Consent Calendar items #1.1 and #1.4
AYES: Burke, Colbert, Fineman, Kullaway, Mayor Burdo

2. Council Business Items

2.1 Council Discussion of Title 14, Chapter 13, Private Tree Ordinance.

Public Works Director Condry presented the staff report. Staff answered a question from the Council regarding the definition of an undeveloped parcel given SB 9.

Councilmember Fineman reported the subcommittee formed in 2019 and reviewed ordinances from other jurisdictions. Some of the new ordinances are more sophisticated in evaluating the structure of trees, how to deal with riparian corridors, ecological and hydrological situations, replacement policies, etc.

Mayor Burdo opened the meeting to public comments.

Abby stated the Tree Ordinance needs to be completely replaced in phases. There should be higher fines for removing trees, removing crowns, and not having an Encroachment Permit. They should be saving as many trees as possible.

Mr. Renee Voss stated the title of the ordinance is a misnomer since it also covers public trees. The terms "protected" trees and "hazardous" trees should be defined.

Mayor Burdo closed the meeting to public comments.

Vice Mayor Burke stated there are presently more trees in San Anselmo than one hundred years ago- they are not losing trees at a fast pace. They will lose the Heritage Oaks over time unless they are planted on public property. She does not think it is a loophole to allow clear cutting of non-heritage trees on a developed parcel. People should be allowed to have a garden, pool, shed, etc. The undeveloped parcel definition needs to be revised. She did not want to over-regulate this if it is something residents do not want it. She would like to more feedback from residents.

Councilmember Fineman pushed back on the idea of twenty-two inches in diameter being sufficient. She liked the table used in the County's Tree Ordinance that shows different thresholds for protection of trees. It is more species specific. She supported the staff recommendations plus using the County's table, additional protections in riparian areas, making fines more of a deterrent, strengthen the replacement requirements, and updating the Nuisance Tree Resolution.

Councilmember Colbert stated he supported Councilmember Fineman's approach based on the work she has done. He would like an enforcement mechanism that has some "teeth" and would serve as a deterrent. He would like to see the revisions come back to the Council.

Mayor Burdo stated enforcement is problematic and noted some jurisdictions use a real time app to create a record. He supported an increase in penalties and the subcommittee's recommendations. He wants to move this forward.

Public Works Director Condry stated he could schedule a Community Meeting in the near future.

The Council took a 5-minute break at 8:36 p.m.

The Council reconvened in the Council Chambers at 8:41 p.m.

2.3 Consideration of Consultant Contract for the Downtown San Anselmo Active Transportation Safety Study

Councilmembers Fineman and Kullaway recused themselves from this item due to a potential conflict of interest.

Assistant Public Works Director Schneider presented the staff report. Staff answered questions from the Council regarding the timeline; the costs for improvements such as a bulb-out, adding sharrows, and bike lanes; the scope with respect to Greenfield Avenue; parallel projects; if the study includes vehicle accidents or just bikes and pedestrians; if they would be in a better position to receive grant funding by having this type of study.

Mayor Burdo opened the Public Hearing.

Mr. Matthew Hartzell, Director of Planning at WPB Tam, urged unanimous approval of this study. San Anselmo Avenue is a regionally important route and he asked the Council to consider converting it to one-way traffic.

Ms. Lori Bulger, Tiburon, stated she owns a business across from Town Hall and there are problems with bicyclists causing safety problems to pedestrians. She urged the Council to approve the study. Converting San Anselmo Avenue to one-way would be bad for business.

Mayor Burdo closed the Public Hearing.

Councilmember Colbert stated this is long overdue. He looks forward to the study and seeing what the options may be.

Vice Mayor Burke stated she does not support this proposal. The staff report is clear about what needs to be done and what is doable. They should implement measures they already know are effective. She did not want to spend the money for a study that would result in nothing tangible.

Mayor Burdo stated he tends to support these types of studies since they can help with grant opportunities and potential liabilities. He is not sure they know everything that needs to be done and supports this study. The funding amount ($80,000) is in line and should come from the Active Transportation Fund.

M/s, Colbert/Burdo, Motion to authorize the Town Manager to enter into a contract with Parasi Parametrics to start the study.
AYES: Colbert, Mayor Burdo
NOES: Burke
RECUSED: Fineman, Kullaway

The Council took a 5-minute break.

2.4 Adopt a Resolution Establishing Rules of Decorum for Town Public Meetings

Town Attorney Acevedo presented the staff report. Staff answered questions from the Council regarding Attachment #1, and the somewhat vague and subjective language; if they want to disallow applause from the public; if staff considered other options; if they can target racism and whether this would be considered unconstitutional.

Mayor Burdo opened the Public Hearing.

There were no comments.

Mayor Burdo closed the Public Hearing.

Mayor Burdo stated he asked for this item to be placed on the agenda. Rules of decorum provide more tools in the tool kit- it will not stop the problem. He noted the policies were not limited to the Town Council but apply to all Town body. He would like to beef up the rules.

Councilmember Fineman stated she struggles with these types of guidelines since they are discretionary. She supported these rules if it is something the presiding Mayor feels he or she would use.

Vice Mayor Burke stated everyone would like to see general decorum and it was a good idea to have a general civility policy. She did not see the need to change anything. The issues they are really trying to address should be discussed in Closed Session. She is not comfortable letting the Mayor take care of it and the Council, as a group, should decide how to handle something that has crossed the line.

Councilmember Colbert stated this is not going away and they might not be adequately prepared. It will be the Mayor's responsibility to deal with it and he will not second guess the decision.

M/s, Burke/Kullaway, Motion to adopt Resolution No. the Rules of Decorum for Town Public Meetings with the removal of A5, B2, B4, and the word "applause" in D1.
AYES: Burke, Colbert, Fineman, Kullaway, Mayor Burdo

2.2 Presentation of the Downtown Parking Study and Consideration of Recommendations

Councilmember Colbert stated he would recuse himself from this item since he lives in the area of several of the proposed parking changes.

Vice Mayor Burke stated she lives within 500 feet of several of the proposals and believes any changes would not have any material impact on the value of her property.

Assistant Public Works Director Schneider presented the staff report. Staff answered questions from the Council regarding the amount of revenue that could be generated; if more bike parking will be added; if they would be paying extra for enforcement services to the Central Marin Police Authority (CMPA); if staff considered all day parking passes for residents in regulated areas who have night time passes; what metering south of Ross would look like; if the Town Hall parking lot is optimized; accessible ADA spaces.

Mayor Burdo opened the meeting to public comments.

Mr. Robert DeFrieze, Magnolia Avenue, supported some sort of accommodation for residents as suggested by Vice Mayor Burke. The report is from the viewpoint of commercial and not residential. Parklets have reduced the number of parking spaces in the downtown.

David asked about the number of parking spaces for Police vehicles.

Erin stated the 10-minute parking zones have helped out businesses. She supported parking meters on the avenue.

Ms. Kathleen Guthrie, member of the Climate Action Commission, supported the staff recommendation for paid parking along San Anselmo Avenue.

Lori, speaking on behalf of the Chamber of Commerce Board, invited the Council to attend a meeting to hear from the merchants. The Chamber supports metered parking and it should be optimized for the peak hours of 11:30 a.m. to 1:30 p.m. with a maximum of one hour. The Chamber opposed reducing merchant parking and the reduction in the number of 4-hour parking spaces.

Belinda stated she has two stores on the avenue and is opposed to the proposed changes. Short-term meters would be bad for business. Parklets take up a lot of parking spaces and should be scaled back.

Mayor Burdo closed the meeting to public comments.

Vice Mayor Burke stated residents who live in neighborhoods with regulated parking and overnight stickers should get all day parking. The goal of a Parking Program is to help merchants. They also need to accommodate cars. She supports 2-hour parking meters on all of San Anselmo Avenue and on Sir Francis Drake Boulevard from Madcap to the Hub (on both sides of the street). She referred to the staff report and stated she did not support G1. She supported G2, CP1, CP2, SA 1, SA2, and stated G4 should be increased to $1.00 an hour. She would leave the pay station issue to staff.

Councilmember Kullaway stated the number one way to affect behavior change is to not have free parking. Free parking means more miles driven. She agreed with Vice Mayor Burke's comments.

Councilmember Fineman supported the expanded list of recommendations. It is reasonable to ask employees to park and walk. She is interested in the daytime/overnight hardship permit and would like to revisit the process.

Mayor Burdo stated he is supportive of the expanded recommendations and the revenue going to climate action activities. He would like to do more outreach to the merchants.

It was the consensus of the Council to discuss the issue of designation of the revenue and the daytime parking permit in the future.

Councilmember Fineman made a motion to direct staff to move forward with the full suite of recommendations listed in Table G1, G2, G3, G4, G5, CP1, CP2, SA1, SA2, along San Anselmo Avenue down to Bolinas Avenue. The next staff report should include explicit reference to a parking benefit district that would include the Climate Action Fund.

Vice Mayor Burke asked for a friendly amendment to the motion to exclude G1. This died for lack of a second.

M/s Fineman/Kullaway, made a motion to direct staff to move forward with the full suite of recommendations listed in Table G1, G2, G3, G4, G5, CP1, CP2, SA1, SA2, along San Anselmo Avenue down to Bolinas Avenue. The next staff report should include explicit reference to a parking benefit district that would include the Climate Action Fund.
AYES: Fineman, Kullaway, Mayor Burdo
NOES: Vice Mayor Burke
ABSENT: Colbert

M/s, Fineman/Burke, Motion to adjourn the meeting at 10:55 p.m. in memory of former Town Councilmember Kay Coleman.
AYES: Fineman, Kullaway, Vice Mayor Burke, Mayor Burdo
ABSENT: Colbert

Respectfully submitted,

Toni DeFrancis,
Recording Secretary

STAFF REPORT

TOWN OF SAN ANSELMO Item #: 1.2

MEETING DATE: 10/24/23

AGENDA TITLE: Consideration of Special Event Application – Community Hanukkah Celebration and Menorah Lighting Ceremony 2023

FROM: Mattie O'Grady – Recreation Manager

RECOMMENDATION: That Council approve the San Anselmo Chamber of Commerce's application for the Community Hanukah Celebration and Menorah Lighting Ceremony event scheduled for Sunday, December 10th, 2023, from 4:00 – 6:00 pm.

That Council approve closing San Anselmo Avenue between Tunstead Avenue and Magnolia on Sunday, December 10th, 2023, beginning with closing the street to incoming traffic at 3:30pm and closing San Anselmo to all vehicles from 4:00pm-6:30pm.

That Council approve installing a large Menorah in front of Town Hall from Wednesday, December 6th until Friday, December 15th when it is disassembled.

BACKGROUND

This family-oriented event is sponsored by the San Anselmo Chamber of Commerce in partnership with Chabad of West Marin.

This is a two-part event that includes both a multi-day Menorah lighting and one-day celebration filled with crafts, food, games, and a photobooth. The Chamber is expecting between 100-200 people in attendance.

The Chamber is proposing that the Menorah be assembled on Wednesday, December 6th so that it will be ready to be lit on Thursday, December 7th in conjunction with the start of Hanukkah. One additional light will be lit the following seven evenings until the eighth and final evening of December 14th. On the fourth evening of December 10th, the celebratory event and ceremonial lighting of the 4th light will take place from 4:00-6:00pm. At the event there will be activities, food, and a ceremony for lighting the Menorah. The Chamber is requesting the closure of San Anselmo Avenue on

December 10th from Tunstead to Tamalpais Magnolia from 4:00-6:30pm (with a soft closure beginning at 3:30pm).

DISCUSSION/ANALYSIS

The Menorah measures 9' tall by 7.5' wide and will be secured by 2-4 sandbags which total will be between 100-200 lbs. Assembly will be completed by Chabad of West Marin with oversight from town staff and will be located on the decomposed granite area in front of Town Hall (due to proximity to electrical). The Menorah is equipped with a dual fire/incandescent system which means it can accommodate both fire and lightbulbs. The lighting of the fire will only occur in a supervised and ceremonial manner on both the first night of Hanukkah on December 7th and then again on December 10th. After the flames are lit they will be turned off and replaced with incandescent lightbulbs.

Central Marin Police Department will provide a Community Services Officer (CSO) to clear cars off the street and remain at the event on December 10th until 5:45pm. The Chamber may elect to hire additional security should they feel a need to do so.

The town will provide event infrastructure such as tables, chairs, barricades and road closure signage. Town staff will also coordinate janitorial services and street closure attendants with Good & Clean.

In the event of inclement weather, the Chamber may move the celebration to an alternate date which has been identified as Monday, December 11th or provide outdoor tents for coverage.

The attached application provides details of the event with comments and conditions from Town staff.

FISCAL IMPACT

The fiscal impact to the town for providing street closure attendants and a janitorial team is $200.

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

The proposed project is exempt from the California Environmental Quality Act (CEQA), under the "common sense" exemption, because it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment. (Cal. Code Regs. tit. 14, § 15061).

Attachment 1 – Event Application

TOWN OF SAN ANSELMO
1000 Sir Francis Drake Blvd, Suite # 14
San Anselmo, CA 94960
415-258-4640

APPLICATION FOR COMMUNITY-BASED EVENTS

Please complete this application if you wish to conduct a community-based event (non-commercial) in San Anselmo on public property for more than 50 people or involving the closure of a downtown street for more than fifteen minutes. The application will be reviewed by staff and forwarded to the Town Council for approval.

EVENT INFORMATION

Name of event: San Anselmo Community Hanukkah Celebration

Organization(s) presenting the event: San Anselmo Chamber of Commerce

Other event sponsor(s), if any: Chabad of West Marin

Contact Person: Laurie Berliner **Phone Number:** 415-497-5244

Address: 506 San Anselmo Ave. **Email:** madgeandmehats@gmail.com

Event Date(s): December 10, 2023

Start and end times: 3:30pm - 6:00pm **Number of attendees (estimate):** approx. 100

Location: Imagination Park, San Anselmo Ave.

Will alcohol be served or sold?

Yes [ ] No [X]

Brief Event Description:

This all ages event is for the Community to come together to light a Menorah. The Menorah will be installed on Thursday, December 7 and will remain for eight days. The event is on Sunday, December 10th. There will be a brief presentation and explanation of the Hanukkah holiday followed by accoustical music, arts and crafts for children and holiday food. Chabad of West Marin will officiate the event assisted by Town Officials and Chamber of Commerce Board Members.

Public space requested:

- [ ] **Creek Park**
- [ ] **Pine Street Parking Lot**
- [x] **Town Hall Lawn**
- [x] **Imagination Park**
- [x] **Other:** Ideally we would prefer the Menorah to be where the farm stand occurs at Town Hall.

  In the event of rain, we would like to request to move children's activities indoors to the Chamber Council.

- [ ] **Creek Park Parking Lot**
- [ ] **Magnolia Parking Lot**
- [x] **Council Chamber**
- [ ] **Memorial Park**

- [x] **San Anselmo Avenue: from (cross streets)** Tunstead **to** Magnolia
- [ ] **Tunstead Avenue: from (cross streets)** _____ **to** _____
- [ ] **Other street(s): from (cross streets)** _____ **to** _____
- [ ] **Other space use (e.g. parking spaces)** _____
- [ ] **Other Facilities:** _____

Additional Comments on the Public Space Requested:

Because the event will attract a large number of children and to allow for safe play and enjoyment for all attending - a one block street closure is requested.

Due to recent events in Israel as well as anti-semetic incidents locally, we request a police presence at the event.

To be qualified for consideration, applicants must fall into one of the following categories:

- Town-Sponsored Events
- Ross Valley* accredited or licensed schools (pre-kindergarten through 12th grade, (both public and private schools)
- Ross Valley* Youth Organized Sporting of Cultural Events
- Organizations located in the Ross Valley* which have received tax-exempt status pursuant to Internal Revenue Service Code Section 501c(3)
- Merchant associations located in incorporated San Anselmo and established as of 2006

*Ross Valley is defined as incorporated and unincorporated areas of San Anselmo, Fairfax, and Ross

Standards & Objectives

The Town Council, with input from downtown merchants, property owners, and local residents, has adopted the following criteria they will consider when reviewing applications for the closure of roadways or other public space in the downtown area.

Does the event:

- ✓ Attract local residents
- ✓ Attract people throughout the Bay Area
- ✓ Attract families
- ✓ Generate interest for people to return and spend money in local businesses
- ✓ Create a positive impact for real estate stimulation
- ✓ Provide a overall positive impact on business
- ✓ Provide an opportunity for downtown merchants to participate in the event
- ✓ Provide access to neighborhood streets during the event
- ✓ Avoid conflicting with a retail holiday
- ✓ Assure public safety
- ✓ Provide adequate parking
- ✓ Benefit the Town
- ✓ Provide access for persons with disabilities
- ✓ Provide for clean-up by event organizers
- ✓ Provide emergency vehicle access
- ✓ Assure that any booths or other structures are designed and placed so that storefronts have access and visibility
- ✓ Allow local businesses to exhibit merchandise on the sidewalk area in front of their stores, without charge, while maintaining wheelchair access

CONDITIONS OF APPROVAL

The following conditions apply to downtown events, unless waived or modified by the Town. Other conditions, as set by the Town Council and staff, may apply to particular events for public safety or other objectives of the Town.

A. **Police**: Off-duty police officers may be required for the event, as determined by the Police Chief, depending on the number of people attending and the nature of the event. Off-duty police officers are required during events where alcohol is served or sold.

B. **Emergency access**: An emergency access lane of at least 14 feet wide must be maintained at all times.

C. **Insurance**: Proof of general liability insurance, naming the Town, its employees, and agents as additional insured, at limits no less than $1,000,000.

D. **Recycling and garbage**: Extra containers for recycling cans and bottles, and garbage cans must be placed throughout the area of the event. Containers and cans are to be emptied when full during the event, and picked up after the event.

E. **Compostable/Disposable Foodware:** In accordance with the Town of San Anselmo's Ordinance 1136 all food vendors will provide takeout food in reusable foodware or compostable disposable foodware, or items composed entirely of aluminum. If a compostable disposable foodware item is not available, an alternative foodware item made of other materials, except polystyrene foam and polystyrene food ware, may be substituted.

F. **Toilet facilities**: Events estimated to attract more than 100 people and lasting more than two hours must provide portable toilets, in the number and location as approved by the Parks superintendent, unless alternate arrangements for toilet facilities are otherwise required or arranged to the approval of the Parks Superintendent. Toilet facilities must be provided for disabled persons at each location where portable facilities are provided. Hand washing facilities must be provided where food is served.

G. **Traffic control**: A traffic and parking control plan, including enforcement measures, must be approved by the Police Chief.

H. **Noticing:** Events that include closure of the street will require advance written notice to businesses and residents on the street(s) that will be closed. These notices must be distributed a minimum of five days prior to the Town Council meeting date that the event application will be considered.

I. **Sales tax**: Persons or businesses selling items as part of the event shall designate San Anselmo as the point of sale for sales tax purposes.

J. **Alcoholic beverages**: A permit is required from the Police Chief and the State Department of Alcohol Beverage Control in order to serve or sell alcoholic beverages. Off-duty police officers are required if alcohol is served or sold.

K. **Fire inspection**: A fire inspection is required of any and all appliances or devices that produce an open or enclosed flame and/or hot materials, including food.

L. **Creek Park**: No more than three booths are allowed inside the turf areas of the park.

M. **Signs and barricades**: Any "No parking signs" that are needed are to be provided by the event organizers, and posted according to the traffic control plan prior to the event. Barricades, detour signs, and other traffic control devices are to be provided by the event organizers.

N. **Parking:** Temporary accessible parking must be provided if a street closure or other event condition renders permanent accessible parking unusable.

O. **Cables**: Cables must be covered so as not to create a tripping hazard. When cable covers are used, they must not create a tripping hazard and must be navigable by wheelchair. The path of travel must be no more than 1:12.

On behalf of the organization applying for the permit to conduct the event, I have read and agree to follow the standards for events, as stated in this application, and have read and agree to follow the permit conditions as stated in this application and those which may be required of me as conditions of approval.

Name:  Date: 10/10/23

NAME OF EVENT: Menorah Lighting DATE OF EVENT: December 10, 2023

DEPARTMENT	COMMENTS/CONDITIONS	APPROVED BY
POLICE	Will provide CSO to clear cars from the Avenue and will also stay at the event until 5:45pm.	M. Norton
FIRE		D. Mahoney
RECREATION	Applicant must deliver notices to merchants affected by the street closure. Applicant must abide by Ordinance 1136 stating that all food vendors must provide items in reusable foodware or compostable disposable foodware.	D. Mauk & M. O'Grady
PUBLIC WORKS	Requires compliance with all ADA regulations, including providing ADA-approved cord covers on all cords located on public right of way.	S. Condry & J. Healy
ADMINISTRATION		D. Donery
TOWN COUNCIL		

STAFF REPORT

TOWN OF SAN ANSELMO Item #:1.3

MEETING DATE: October 24, 2023

AGENDA TITLE: Quarterly Treasurer's Investment Report, September, 2023

FROM: Jeff Zuba, Finance & Admin Services Director

RECOMMENDATION: That the Town Council consider approving the Treasurer's Investment Report for the quarter ending September 30, 2023.

SUMMARY

The Treasurer's Investment Report is a quarterly itemization of the market value of Town investments. The purpose of this report is to present financial information for review and discussion.

DISCUSSION/ANALYSIS

The attached report itemizes the Town's investments and states the market value of each investment as of September 30, 2023 The Wells Fargo bank account is the Town's primary checking account used for the deposit and expenditure of operating funds. The Bank of America checking account is a controlled account used for payroll processing only.

The Town holds three investment accounts; one with Moreton Capital with funds held at U.S. Bank, one with Wells Fargo Securities with funds held at Wells Fargo, and one with RBC Capital Markets held at RBC. The investments held are allowable by the Town's investment policy.

The Town maintains two Local Agency Investment Fund accounts (LAIF) for the purpose of maximizing interest income on funds not needed for immediate expenditure. One LAIF account is for the investment of general operating funds. The other is for the remaining series 2003 Measure G bond proceeds, required by law to be maintained in a segregated account.

The Town's cash balances as of September 30, 2023, are $12,237,456 which is $280,163 more than the balances at this time last year. This increase is driven by the timing of cash flow between money received versus money to be paid out the following period.

FISCAL IMPACT
Not applicable

GENERAL PLAN CONSISTENCY
Not applicable

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

The Council's discussion and approval of this report is not a "project" under the California Environmental Quality Act, because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

ATTACHMENTS
Attachment #1: Quarterly Treasurer's Investment Report, September 30, 2023

TOWN OF SAN ANSELMO

TREASURER'S INVESTMENT REPORT
for the quarter ending September 30, 2023

INSTITUTION	TYPE OF INVESTMENT	MATURITY DATE	EFFECTIVE YIELD	MARKET VALUE OF AMOUNT ON DEPOSIT	NOTES BOOK VALUE	NOTES UNREALIZED GAIN
Wells Fargo Bank	Government Advantage Checking	None	1.65%	-		
Wells Fargo Bank	Government Sweep Account	None	4.95%	863,158		
Bank of America	Business Checking Account	None	0.49%	62,268		
LAIF (Local Agency Investment Fund) Operating Account	State Treasurer's Pool	None	3.25%	67,071		
LAIF (Local Agency Investment Fund) Measure G Proceeds	State Treasurer's Pool	None	3.25%	93,933		
Moreton Capital	Money Market	None	4.74%	3,041,961		
Moreton Capital	Municipal Bonds	Varies	4.73%	4,071,352		
Moreton Capital	Treasury/Federal Agency	Varies	4.65%	1,525,299		
Wells Fargo	Treasury/Federal Agency	Varies	4.63%	1,492,478		
Wells Fargo	Money Market	None	5.27%	14,408		
RBC Wealth Management	Certificate of Deposits	Varies	5.30%	485,000		
RBC Wealth Management	Money Market	None	4.42%	520,530		
Total Investment Portfolio:				12,237,456		

I hereby verify that this report is in conformity with the Town of San Anselmo Investment Policy.

John Mahl Digitally signed by John Mahl Date: 2023.10.18 07:23:00 -07'00'

John Mahl, Town Treasurer

Jeff Zuba, Finance & Administrative Services Director

October 12, 2023
Date

STAFF REPORT

TOWN OF SAN ANSELMO Item #: 1.4

MEETING DATE: October 24, 2023

AGENDA TITLE: Receive Climate Action Quarterly Update

FROM: Sean Youra, Climate Action Coordinator

RECOMMENDATION: Receive the Climate Action Update report.

BACKGROUND

The quarterly Climate Action Update report details progress made by staff in implementing the Town's Climate Action Plan (CAP).

DISCUSSION

This report details progress made in implementing the CAP since the last report provided to Council on July 25, 2023. The table on the next page details actions taken by staff during the past quarter to implement the CAP and reduce greenhouse gas (GHG) emissions. The applicable measures from the CAP along with the estimated GHG emissions reduction that would result from achieving the targets for each of the applicable measures are provided for reference for each action taken.

Action	CAP Measure	Estimated GHG Emissions Reduction in 2030 (in MTCO2e)
Continued to implement the landscape equipment ordinance and promote the rebate program through the Town's Landscape Equipment webpage, newsletters, and flyers. Public Works staff have continued to process and approve rebate applications with 48 total applications approved thus far. Approximately $3,900 in rebate funds still remain.	T-10: Electric Landscape Equipment	24 **Note:** The estimated emissions reduction in the CAP for this measure is based on achieving a target of 100% of leaf blowers in the Town being electric by 2030. If all landscape equipment used in the Town are electric by 2030, the estimated emissions reduction would be 516 MTCO2e.
Submitted a combined MCE and TAM rebate reservation form for installing EV chargers in the Creek Park, Memorial Park, and Pine St. parking lots for public and staff use. A total of $39,000 in rebates for each project site has been reserved that will be issued to the Town upon completion of each project.	T-1: Zero Emission Vehicles	5,242
	I-3: Identify and Secure Funding Sources	N/A
Continued to meet with Sage Energy consultants to work on the San Anselmo Resilience Hub project. The consultants prepared an RFP for the project covering the design, build, commissioning, and ongoing maintenance of the proposed solar PV carport, battery energy storage system (BESS), and microgrid, which staff reviewed and provided feedback. It is expected that the RFP will be published on November 1, 2023 and the deadline for submitting proposals will be January 12, 2024. Staff continued to research additional funding opportunities for this project as well.	R-4: Innovative Technologies	N/A
	R-5: Solar Energy Systems for Municipal Buildings	N/A
	A-1: Preparation and Response	N/A

Action	CAP Measure	Estimated GHG Emissions Reduction in 2030 (in MTCO2e)
Researched various e-bike rebate programs currently offered by local governments/agencies along with the e-bike incentive program funded by the California Air Resources Board (CARB) that will be available to California residents. This research will be compiled and analyzed to support the development of an e-bike rebate program that could be administered by Town staff and initial funding for this type of program has already been allocated in the FY 2023-24 Climate Action Fund budget.	T-2: Bicycling	211
Developed a draft work plan in collaboration with Public Works to prioritize selected strategies for implementation from the Marin Countywide EV Acceleration Strategy. Developed a draft Fleet Zero-Emissions Vehicle (ZEV) policy in collaboration with Public Works that is compliant with the Advanced Clean Fleets regulation adopted by the CARB and aligned with the recommended strategies in the Marin EV Acceleration Strategy and the Town's Climate Action Plan. Updated the Town's fleet vehicle inventory spreadsheet to include fields that will be required to report to CARB starting in April 2024 and determine how many fleet vehicles will be subject to the Advanced Clean Fleets regulation.	T-1: Zero Emission Vehicles	5,242
	T-2: Bicycling	211
	T-11: Zero and Low Emission Town Vehicles	13
	T-12: Low Carbon Fuels	1
Continued to serve on the Marin Countywide Building Electrification Plan Steering Committee to develop a building electrification plan/roadmap in collaboration with community stakeholders. Helped facilitate two stakeholder workshops organized by County staff that had over 45 attendees at each one representing contractors, utilities, government staff, realtors, environmental advocates, affordable housing developers, etc. from across the County. Valuable feedback was received during these workshops that will be incorporated into the building electrification plan. Reviewed the residential and commercial building inventories for San Anselmo that were developed by Christine O'Rourke, which include	R-3: Building and Appliance Electrification	46
	O-2: Community Engagement	N/A

Action	CAP Measure	Estimated GHG Emissions Reduction in 2030 (in MTCO2e)
insightful information on gas use in buildings, estimated age of the buildings, the estimated number of different appliances that will need to be electrified broken out by housing type, and other factors that will be incorporated into the building electrification plan.		
Prepared the staff report and ordinance in collaboration with Public Works, Building, and Legal staff for adoption of the new green building requirements modeled off of the County's reach codes. Presented the green building ordinance to the Council, which was subsequently adopted.	E-4: Green Building Reach Code	27
	R-3: Building and Appliance Electrification	46
Continued to work with ReadySetReplace (RSR) to promote the Water Heating Electrification Campaign Program to help residents in both Fairfax and San Anselmo get electric-ready and install heat pump water heaters (HPWH). Promoted the campaign in the Town newsletter, flyers, and information available on the website. Explored opportunities to streamline the overall electrification process for homeowners and innovative funding options to lower the upfront installation costs for electric appliances. Updated the Town's Green Building webpage with new content to help homeowners and renters plan for electrification.	R-3: Building and Appliance Electrification	46
	E-1: Energy Efficiency Programs	3,077
	O-2: Community Engagement	N/A
Promoted the Resilient Neighborhoods Climate Action Workshops in the Town newsletter. Helped organize and promote the EV and E-bike show in partnership with the Town of Fairfax and Ride and Drive Clean. Ride and Drive Clean estimated that anywhere from 200-300 people attended the EV and E-bike show. Of those that participated in the event survey, over 45% said they planned to purchase an EV over the next 24 months and 29% said they already drove an EV. Promoted the Marin Green Home Tour (that the Town is sponsoring again) and webinars hosted by the County covering home energy	O-1: Community Education	N/A
	O-2: Community Engagement	N/A

Action	CAP Measure	Estimated GHG Emissions Reduction in 2030 (in MTCO2e)
improvement projects such as installing heat pump water heaters and solar + battery storage.		
Approved waivers issued by Marin Sanitary Service (MSS) for San Anselmo businesses that qualified for an exemption from complying with SB 1383 requirements. Collaborated with MSS staff on how to handle enforcement of non-compliant organic waste generators to ensure they enroll in organics collection service. Updated the Town's SB 1383 Local Assistance grant budget to include new potential programs such as ordering kitchen compost bins that would be made available to residents that need them and allocating additional funds towards procurement of compost and mulch to assist in meeting the Town's required procurement targets. Trained on how to use the ArcGIS Recovered Organics Procurement and Distribution Tracker developed by PlaceWorks that will be used to identify opportunities for using compost/mulch within San Anselmo and countywide, and can be used to track how much compost/mulch has been applied on an annual basis along with associated costs.	W-1: Commercial Organic Waste	216
	W-2: Residential Organic Waste	508
	S-2: Habitat Restoration and Soil Regeneration	N/A
Prepared a staff report and resolution to contract with EcoGreen Solutions to upgrade the lighting in Town-owned facilities to LEDs as part of PG&E's Energy Efficiency Retrofit Loan Program and to authorize the Town Manager to execute the PG&E On-Bill Financing agreement. If approved by the Council, the lighting would be upgraded at Town Hall, the Historical Museum, Library, Corporation Yard, Memorial Park, and Isabel Cook Community Center and result in an estimated cost savings to the Town of approximately $193,000 over the life of the loan.	E-7: Municipal Energy Efficiency Audit and Retrofits	19

In addition, staff is continuing to:

- Serve as a staff liaison to the Climate Action Commission (CAC), provide updates on CAP implementation during the CAC meetings, and provide feedback on CAC proposed initiatives.

- Identify new climate action funding opportunities and manage existing grant funds (Applicable to CAP Measure I-3: Identify and Secure Funding Sources).
- Educate community members about climate action-related incentives, programs, events, and regulations through the Town's newsletter, social media, website, flyers, etc. (Applicable to CAP Measure O-1: Community Education, and Measure O-2: Community Engagement).
- Coordinate with MCEP members to discuss and develop plans, policies, programs, and strategies that can assist in CAP implementation across all Marin jurisdictions.
- Monitor CAP implementation progress and prioritize projects to meet the CAP goals.
- Stay abreast of new climate-related state and federal regulations, technological innovations, and opportunities to further the Town's climate action efforts.

FISCAL IMPACT
Not applicable

GENERAL PLAN CONSISTENCY
Not applicable

CEQA AND CLIMATE ACTION PLAN CONSISTENCY
The Council's review and approval of this report is not a "project" under the California Environmental Quality Act, because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

ATTACHMENTS
None

STAFF REPORT

TOWN OF SAN ANSELMO Item #:1.5

MEETING DATE: October 24, 2023

AGENDA TITLE: Revenue and Expenditure Reports, September 2023

FROM: Jeff Zuba, Finance & Admin Services Director

RECOMMENDATION: Approve the monthly year-to-date Revenue and Expenditure Reports and corresponding activity for the period ending through September 30, 2023.

SUMMARY

Every reporting period end, the Town of San Anselmo presents to the Town Council its operations as shown on the Revenue and Expenditure reports for discussion and approval.

BACKGROUND

The Revenue and Expenditure reports are year-to-date summaries of revenues and expenditures from the Town's financial system ('Tyler Incode') for both the current as well as the prior corresponding fiscal year. These reports include the General Fund's operations given most of the Town-level operational activities are processed through the General Fund either directly or indirectly. This approval is to be obtained once a month within the fiscal year.

DISCUSSION/ANALYSIS

The revenue and expenditure data through September 30, 2023, is a compilation of all operating activity that is year-to-date for the current and prior fiscal year. These reports are sourced directly from the Town's financial system, of which a corresponding analysis has been performed identifying the key trends the Town Council should take note of.

Revenues

Overall, through the September 2023 reporting period end, the Town's General Fund revenue has decreased its base relative to the prior year by $0.036M. As it's the beginning of the fiscal year the revenue numbers are low since most of the Town's revenue is collected at specific times. All activity is either flat year-over-year or nets

correspondingly to an immaterial change—all of which are within management's expectations.

Category	SEP YTD FY24	SEP YTD FY23	$ Change	% Change
Property Tax	20,913.98	24,041.45	(3,127.47)	-13.01%
Sales Tax	124,719.49	101,736.25	22,983.24	22.59%
Property Transfer Tax	-	-	-	
Franchise Taxes	112,486.66	111,470.27	1,016.39	0.91%
Licenses & Permits	250,425.99	300,479.58	(50,053.59)	-16.66%
Fines	18,118.71	11,932.97	6,185.74	51.84%
Cash & Investment Interest	2,915.88	4,331.99	(1,416.11)	-32.69%
Intergovernmental	24,180.52	37,950.33	(13,769.81)	-36.28%
Other Fees	94,091.60	95,799.49	(1,707.89)	-1.78%
Transfers In	65,731.57	62,635.85	3,095.72	4.94%
Total	713,584.40	750,378.18	(36,793.78)	-4.90%

As shown above, the Town's overall revenue base decreased by $0.036M as its

- Property Taxes - The Town receives disbursements from the County of Marin for property taxes in December, April, and June.
- Sales Tax increased by $0.23M compared to the prior period due to an increase in consumer activity and the costs of goods. The Town receives disbursements monthly from the State for Sales Tax. This disbursement was the first for fiscal year 2023-24.
- License & Permits decreased by $0.050M compared to the prior period due to declining construction activity around the Town and the timing of collection for Business License Taxes.
- Intergovernmental increased by $0.013M compared to the prior period due to timing of collections for the Prop 172 .5% sales tax.

As far as the other revenue streams, these changes either decreased or remained relatively flat year-over-year resulting in an immaterial change.

Expenditures

Overall, through the September 2023 reporting period end, the Town's General Fund expenditures have increased by $0.566M compared to the prior year. This is primarily from increases in compensation, outside services, debt service, and other expenditures. All other activity is either flat year-over-year or nets correspondingly to an immaterial change—all of which are within management's expectations.

Category	SEP YTD FY24	SEP YTD FY23	$ Change	% Change
Compensation	1,051,424.92	905,034.97	146,389.95	16.18%
Retirement	74,784.63	60,689.48	14,095.15	23.23%
Training	9,156.41	12,947.20	(3,790.79)	-29.28%
Outside Services	3,116,905.69	3,029,924.15	86,981.54	2.87%
Maintenance	41,947.10	35,510.52	6,436.58	18.13%
Utilities	16,010.39	16,202.72	(192.33)	-1.19%
Supplies	61,633.07	14,969.96	46,663.11	311.71%
Debt Service	498,269.00	405,926.80	92,342.20	22.75%
Other Expenditure	922,744.45	745,270.49	177,473.96	23.81%
Transfers Out	-	-	-	
Total	5,792,875.66	5,226,476.29	566,399.37	10.84%

As shown above, the Town's expenditures base overall increased by $0.566M of which is driven by compensation, outside services, debt service, and other expenditures:

- Compensation (Salaries & Wages and Benefits) increased by $0.0146M compared to the prior fiscal year primarily due to the 4.5% cost of living adjustment effective July 1, 2023, step adjustments, and increase in health insurance premiums.
- Outside Services increased by $0.086M compared to the previous fiscal year due to the changes in payments for Public Safety JPA's and construction project activity.
- Debt Service increased by $0.092M compared to the previous fiscal year due to the repayment of the 2021 Pension Obligation Bonds noted above. The bond payments are due in August and February.
- Other Expenditures increased by $0.177M compared to the previous fiscal year due to the increase in insurance premiums for property, liability, and cyber security as well as a slight increase in internal service charges for technology and building maintenance.

As far as the other expenditure streams, these changes either slightly changed or remained flat year-over-year resulting in an immaterial change. All other changes are taken together overall immaterial for further discussion and are expected given the Town's operations.

FISCAL IMPACT

None

GENERAL PLAN CONSISTENCY

Not applicable

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

The Council's discussion and approval of this report is not a "project" under the California Environmental Quality Act, because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

ATTACHMENTS

Attachment #1: General Fund Revenue and Expenditure Report by subcategory, September 2023

Attachment #2: Expenditure Report by department, September 2023

Town of San Anselmo
2023-2024 Rev & Exp Report
as of 09/30/2023
Fund: 01 - GENERAL FUND

	2022-2023 Revised Budget	2022-2023 Audited Actuals	2022-2023 YTD Actuals	% of Audited Actuals	2023-2024 Adopted Budget	2023-2024 Revised Budget	2023-2024 YTD Actuals	% of Actual / Budget
Revenue								
400 - PROPERTY TAX GENERAL	9,030,734.00	9,316,564.27	4,444.97	0.05 %	9,609,527.00	9,609,527.00	3,029.66	0.03 %
401 - PENSION	2,592,646.00	2,913,414.27	599.21	0.02 %	2,756,290.00	2,756,290.00	54.98	0.00 %
402 - PROPERTY TAX OTHER	3,760,449.00	3,537,673.91	18,997.27	0.54 %	3,875,006.00	3,875,006.00	17,829.34	0.46 %
410 - OTHER TAXES	1,610,000.00	1,579,452.60	101,736.25	6.44 %	1,545,000.00	1,545,000.00	124,719.49	8.07 %
411 - FRANCHISE TAXES	775,000.00	900,545.14	35,267.14	3.92 %	848,000.00	848,000.00	112,486.66	13.26 %
420 - BUSINESS LICENSE	260,000.00	299,090.84	26,364.54	8.81 %	290,000.00	290,000.00	12,402.91	4.28 %
421 - PARKING	24,500.00	2,080.10	3,859.63	185.55 %	0.00	0.00	0.00	0.00 %
422 - CONSTRUCTION	1,075,000.00	1,074,971.84	270,255.41	25.14 %	1,016,000.00	1,016,000.00	238,023.08	23.43 %
430 - VEHICLE CODE	10,000.00	10,268.23	0.00	0.00 %	10,000.00	10,000.00	703.76	7.04 %
431 - LIBRARY	0.00	4,050.62	307.57	7.59 %	1,250.00	1,250.00	532.13	42.57 %
432 - PARKING	50,000.00	73,714.66	11,625.40	15.77 %	115,000.00	115,000.00	16,882.82	14.68 %
440 - USE OF MONEY AND PROPERTY	70,000.00	121,574.14	4,331.99	3.56 %	75,000.00	75,000.00	2,915.88	3.89 %
450 - STATE REVENUE	127,500.00	185,570.89	37,950.33	20.45 %	137,500.00	137,500.00	24,180.52	17.59 %
460 - FEDERAL REVENUE	0.00	0.00	0.00	0.00 %	0.00	0.00	0.00	0.00 %
470 - LOCAL AGENCY REVENUE	0.00	66,000.00	0.00	0.00 %	0.00	0.00	0.00	0.00 %
480 - FEES FOR SERVICES	171,000.00	151,507.01	51,858.24	34.23 %	178,250.00	178,250.00	47,431.33	26.61 %
490 - MISCELLANEOUS REVENUE	100,070.00	162,016.07	43,941.25	27.12 %	102,772.00	102,772.00	46,660.27	45.40 %
519 - TRANSFERS IN	384,447.00	356,096.38	0.00	0.00 %	384,030.00	384,030.00	65,731.57	17.12 %
520 - SOURCE OF PROCEEDS	0.00	0.00	0.00	0.00 %	0.00	0.00	0.00	0.00 %
Total Revenue:	20,041,346.00	20,754,590.97	611,539.20	2.95 %	20,943,625.00	20,943,625.00	713,584.40	3.41 %
Expense								
600 - SALARIES AND WAGES	3,072,145.00	2,837,609.24	701,641.98	24.73 %	3,336,127.00	3,336,127.00	812,742.36	24.36 %
601 - RETIREMENT	535,751.00	240,972.70	60,689.48	25.19 %	561,590.00	561,590.00	74,784.63	13.32 %
602 - EMPLOYEE BENEFITS	884,105.50	634,244.72	180,589.85	28.47 %	890,116.00	890,116.00	215,789.38	24.24 %
604 - RETIREE BENEFITS	156,390.00	156,390.00	22,803.14	14.58 %	164,779.00	164,779.00	22,893.18	13.89 %
610 - TRAINING	43,200.00	54,360.77	12,947.20	23.82 %	55,750.00	55,750.00	9,156.41	16.42 %
611 - OUTSIDE SERVICES	12,461,732.37	12,342,729.85	3,029,924.15	24.55 %	12,885,864.00	12,885,864.00	3,116,905.69	24.19 %
613 - PUBLICATION / DUES	15,845.50	9,189.26	2,170.99	23.63 %	25,272.00	25,272.00	2,251.00	8.91 %
614 - MAINTENANCE	21,792.50	26,704.73	18,397.97	68.89 %	83,235.00	83,235.00	24,391.36	29.30 %
615 - BUILDING MAINTENANCE	98,643.00	64,029.70	16,963.58	26.49 %	50,000.00	50,000.00	16,596.06	33.19 %
616 - VEHICLE MAINTENANCE	6,515.00	14,686.62	148.97	1.01 %	2,000.00	2,000.00	959.68	47.98 %
617 - UTILITIES	0.00	43,034.42	16,202.72	37.65 %	0.00	0.00	16,010.39	0.00 %
618 - HIRING	1,000.00	4,279.64	1,600.00	37.39 %	1,000.00	1,000.00	1,501.73	150.17 %
619 - MISCELLANEOUS	19,000.00	11,208.45	0.00	0.00 %	50,000.00	50,000.00	0.00	0.00 %
620 - OFFICE SUPPLIES	36,665.00	25,478.83	3,085.49	12.11 %	0.00	0.00	3,316.06	0.00 %
622 - DEPARTMENT SUPPLIES	46,355.00	131,309.00	7,940.67	6.05 %	152,450.00	152,450.00	53,587.35	35.15 %
623 - BOOKS / MAGAZINES / VIDEOS	24,074.00	22,973.10	3,943.80	17.17 %	27,500.00	27,500.00	4,729.66	17.20 %
629 - MISCELLANEOUS	1,185,641.00	1,212,247.26	741,499.50	61.17 %	1,371,875.00	1,371,875.00	918,991.72	66.99 %
630 - EQUIPMENT	0.00	132.30	0.00	0.00 %	500.00	500.00	0.00	0.00 %
631 - CAPITAL OUTLAY - CONSTRUCTION	0.00	0.00	0.00	0.00 %	0.00	0.00	0.00	0.00 %
640 - PRINCIPAL	285,000.00	285,000.00	285,000.00	100.00 %	410,000.00	410,000.00	410,000.00	100.00 %
641 - INTEREST	248,976.00	209,248.63	120,926.80	57.79 %	176,067.00	176,067.00	88,268.81	50.13 %
670 - TRANSFERS OUT	1,503,517.00	1,503,517.00	0.00	0.00 %	699,500.00	699,500.00	0.00	0.00 %
Total Expense:	20,646,347.87	19,829,346.22	5,226,476.29	26.36 %	20,943,625.00	20,943,625.00	5,792,875.47	27.66 %
Total Fund: 01 - GENERAL FUND:	-605,001.87	925,244.75	-4,614,937.09		0.00	0.00	-5,079,291.07	
Report Total:	-605,001.87	925,244.75	-4,614,937.09		0.00	0.00	-5,079,291.07	

STAFF REPORT

TOWN OF SAN ANSELMO Item #: 2.1

MEETING DATE: October 24, 2023

AGENDA TITLE: Receive report and provide direction to staff whether to consider a rent stabilization ordinance and eviction protection ordinance beyond the Tenant Protection Act (AB 1482)

FROM: Administration, Planning, Town Attorney's Office

RECOMMENDATION: Receive report and provide direction to staff whether to consider a rent stabilization ordinance and/or an eviction protection ordinance providing protections beyond what is provided in the Tenant Protection Act (AB 1482).

BACKGROUND

At its June 21, 2023 meeting, the Town Council received an update from staff regarding State laws related to renter protections along with additional rental protection efforts in Marin County. Following the presentation, the Council directed staff to conduct two community discussions to gather opinions from San Anselmo residents regarding residential rental policies. At that meeting, Councilmembers asked that feedback be focused on both rent stabilization and on eviction protections.

Councilmember Fineman asked specifically that staff address particular aspects of renter protections, including Rent Stabilization/Rent Cap, Fair Return/Appeals Process, Short Term Relocation Assistance, Long Term Relocation Assistance, Applicability/Type of Unit, Associated Fees, Master Tenants, Anti-Retaliation Provisions, and Re-Rental/Right to Return.

In response to the Council's request and to solicit feedback from the community, staff conducted the two community discussions on September 14, 2023 (focus on tenants), and October 5, 2023 (focus on landlords). Both workshops were conducted in-person and via Zoom with Spanish interpretive services available. See Attachment 2 for a summary of all public comments received at the discussions along with emailed public comments.

DISCUSSION

The purpose of this agenda item is to provide the Council with general background regarding rental policies statewide along with several jurisdictional examples and to provide the Council with a summary of the public comments received at the two community workshops and through email. Another purpose of this report is for the Council to identify the information it may want to examine in greater detail as the process advances. Lastly, this discussion is not intended to be an exhaustive examination of rent regulations, but rather to spotlight key elements of the topic should the Council direct staff to prepare a Rent Stabilization and/or Eviction Protections ordinances.

General Overview

To enhance understanding and provide context, staff will furnish details about the tenant protection aspects that were identified during the June Town Council meeting. Presented below is a glossary that defines key terms related to residential rent stabilization and eviction protection regulations and that reflect the identified elements that were the focus of the community forums:

Rent Cap: Rent control in AB 1482, the California Tenant Protection Act of 2019, refers to the set of regulations and limitations placed on the ability of landlords to increase rent for residential rental properties covered by the law. This legislation imposes specific restrictions on how much and how often rents can be increased in eligible properties. Under AB 1482, Landlords cannot raise rent more than 10% total or 5% plus the percentage change in the cost of living – whichever is lower – over a 12-month period. Rent may be increased a maximum of two times per year but may not exceed the total cap. If the tenants of a unit move out and new tenants move in, the landlord may charge a market rate to the new tenants.

Fair Return/Appeals Process: A provision that allows landlords to achieve a reasonable rate of return on their investment in rental properties when a landlord requests a rent increase above what is allowed under either State or local rules to obtain a fair and reasonable return on their property. Such an increase may be appealed by the tenant to the designated appeals officer or board for consideration and decision.

Short-Term Relocation Assistance: Refers to when a landlord must provide the tenant with temporary housing or short-term relocation payments while performing repairs to the rental unit for a period of 30 days or less. There is no State law requirement for short-term relocation benefits.

Long-Term Relocation Assistance: State law, AB 1482, requires landlords to provide relocation assistance in the event of a no-fault termination. No-fault terminations include when the landlord or family intends to occupy the property, withdraw the unit from the

rental market if required by law, or if the landlord intends to demolish or substantially remodel the property.

Applicability: This refers to the type of housing unit such as a single-family home, accessory dwelling unit (ADU), condominium, duplex, 3-plex building, 4-plex building, multi-unit apartment building, etc.

Rental Registration and Fees: Local ordinances may impose landlord requirements such as registration of rental units or carrying a business license. These requirements will typically include a fee paid by the landlord.

Subleasing and Master Tenants: Prohibits a sublease where the total subtenant rent exceeds the rent cap under the primary lease. State law does not authorize a tenant to sublet or assign the lease where otherwise prohibited.

Anti-Retaliation Provisions: Prohibits a landlord from retaliating against a tenant in response to the tenant's exercise of legal rights. Retaliation includes a variety of actions such as increasing rent, threatening to report immigration status, attempting to force the tenant to move, or decreasing housing services such as parking or laundry.
The tenant may bring legal action against the landlord and can receive monetary damages and recovery of legal costs. In some cases, the tenant may receive "treble damages" which is three times the amount of actual damages incurred.

Re-Rental and Right to Return: Provides landlords with a legal process to exit the rental housing market and remove their rental units from the market. Allows property owners to evict all tenants from their rental units, effectively ending their participation in the rental market. Landlords typically use the Ellis Act when they want to sell or demolish the rental property, or if they intend to withdraw it from the rental market for other reasons.

<u>Existing State Renter Protections</u>

Two state laws are of particular note in considering rent protections. The *Costa-Hawkins Rental Housing Act (1995)* introduced three limitations. First, it exempted certain types of rental units from local rent stabilization (most notably single family homes, condominiums and duplexes where one if the units is occupied by the owner). Second, it exempted units built after the February 1, 1995, effective date of the Act. Third, it prohibited "vacancy control." Vacancy control refers to regulating the amount a landlord may charge for a new lease of a vacant unit. Under Costa-Hawkins, when a unit becomes vacant, a landlord is not restricted in the amount of rent charged in a new lease.

The *Tenant Protection Act (AB 1492 - 2019)* introduced rent stabilization on a statewide basis. The Act establishes a rent ceiling of five percent (5%) plus inflation (local Consumer Price Index), with a maximum of ten percent (10%). The current inflation rate has resulted in a ceiling of 10%. Among the notable features of the Act are that it

applies to units that are more than fifteen years old on a rolling basis, and it applies to single family homes and condominiums if those units are owned by a real estate trust or a corporation. In this respect, the Act expands its reach beyond what local ordinances are allowed under the Costa-Hawkins Act. No local rent cap stricter than the Tenant Protection Act limits may be imposed on post-1995 units per Costa Hawkins, but local rent caps may be stricter for pre-1995 units. The Act sunsets on January 1, 2030.

Establishing an Annual Rent Increase Ceiling

Perhaps the most significant component of a rent stabilization ordinance is the establishment of a rent increase ceiling – the most rent can increase in a given period. Most ordinances in California define the ceiling using a formula based on a consumer price index (##% of CPI) or a fixed number, whichever is lower. The challenge is to determine a rent increase ceiling that the tenant can afford while ensuring that the landlord realizes a fair rate of return. Many ordinances set the percentage of CPI within the range of 50-75% and the fixed number in the range of 3-5%.

Locally, two Marin County jurisdictions have adopted renter protection ordinances. The Town of Fairfax has established a rent cap at .75% of the annual CPI. The original ordinance had a cap of .60% of the CPI but the Fairfax Town Council made the noted adjustment following community feedback it received. In Larkspur, the City Council has established a rent cap of 5% plus the annual CPI with a cap not to exceed 7%.

Of the two local rent control ordinances that have been adopted in Marin County to date, both have been challenged and will be put to the voters in November of 2024. If voted down, the rent cap and eviction protections would revert to those contained in State law, the Tenant Protection Act.

Local jurisdictions remain subject to the Costa-Hawkins Act and its restrictions. Should it desire to consider an ordinance, the Council must decide what is a fair rent increase ceiling for both the tenant and the landlord. Many speakers have suggested that the Council establish 60% of CPI or 5%, whichever is lower.

Rent stabilization ordinances establish a ceiling (or maximum amount) by which the rent of a residential unit may be increased in a given period of time. The ordinances identify under what circumstances the rent increase might be allowed to exceed the ceiling – usually relating to the incurrence of capital improvement and other extraordinary costs. Local jurisdictions that control land use are allowed to create rent stabilization regulations as a form of police power, meaning that the local jurisdiction has determined that rent stabilization is needed to protect the health and welfare of the community. Rent stabilization is perceived as a tool to protect tenants from displacement. Creating a ceiling gives tenants greater certainty about their cost of living as it relates to housing.

Constitutional case law requires that landlords are entitled to receive a “fair and reasonable return” on their property so as not to constitute an unconstitutional “taking”.

What constitutes a fair and reasonable return is evaluated by case law, is fact-specific, and is not subject to a precise legal formula. In broad terms, landlords are entitled to cover their costs plus make a profit. Accordingly, any ceiling placed on annual rent increases must be sufficient to ensure a fair rate of return, or the jurisdiction must provide a regulatory scheme and guidelines for the landlord to exceed the ceiling in order to receive a fair return. While most rent regulation structures require the landlord to seek approval to exceed the ceiling, others require tenants to petition for the review of an extraordinary increase. These applications and petitions require evaluation and, sometimes, adjudication. Most jurisdictions rely on an appointed or elected board or commission, usually called a "rent stabilization board," to resolve disputes and make determinations.

Eviction Protections

The recent community discussions presented information on both rent stabilization and eviction protections, although much of the focus of public input has been around the rent cap issue. The Council may choose to take up the question of additional eviction protections to complement any rent regulations it might want to adopt. In particular, rent regulations are rarely adopted without also adopting a body of regulations meant to protect tenants from eviction without cause. Because the Costa Hawkins Act prohibits vacancy control (i.e., landlords are allowed to increase to market rent upon a vacancy), there is concern that rent regulations will incentivize landlords to evict tenants without cause so that a unit's rent can be raised to market rate. Eviction protections limit the reasons a tenant can be evicted to reasons for cause.

The Tenant Protection Act does include eviction protections, so there are State law protections in place in San Anselmo today. The Act enumerates eleven "at fault" reasons that a tenant might be evicted, nearly all of which deal with violations of leases or the law.

The Act also provides four "no fault" reasons why a landlord can evict a tenant:

• the landlord or their family wish to move in to the unit;
• the landlord withdraws the rental from the market as per the Ellis Act (which protects a landlord's right to withdraw a property from the rental market);
• an order is issued by a court or government agency that requires a tenant to vacate; and
• the landlord wishes to demolish or substantially remodel the unit.

Under the Act, no fault evictions require a payment to the tenant of relocation assistance of at least one month's rent.

Many jurisdictions have evaluated no fault evictions and determined that they require further definition and additional limitations to address the concern of displacement. The Council may want to add this topic to subsequent agenda items.

Rental Registry

Rent regulation requires an accurate and comprehensive accounting of residential rental property. Jurisdictions create this database by requiring landlords to register their rental units. The resulting rental registry assists the jurisdiction in monitoring its regulation program. Jurisdictions are allowed to charge a fee for registration of rental units to cover costs. The fee can be used to offset the cost to the jurisdiction to administer its regulation program. Some agencies have a flat fee for all rental units, while others have different fees based on the types of regulation that apply to that unit (rent regulation, eviction protections, or both). Some jurisdictions allow landlords to pass a portion of the fee to the tenant, while others require the fee to be absorbed entirely by the landlord.

Cost recovery fees are defensible if they have been subjected to a fee study. Fee studies are typically done by a third party to ensure impartiality. Many jurisdictions acknowledge that the start-up costs for a new regulatory program (including the cost of the fee study) will be borne by the General Fund until a defensible fee is adopted.

Applicability in San Anselmo

The current US Census Bureau Quickfacts data from 2017-2021 states that there are 4,995 units (AKA Households) located in San Anselmo. The households are comprised of single-family residences, duplexes, triplexes, and multifamily units. Of those units, approximately 3,436.56 units, or 68.8%, are owner-occupied and the remaining 1,558.44 units, or 31.2% are renter occupied. Other data sources available, such as RentCafe.com, Zumper, and City-Data.com shows that the number of rental units is fluid and ranges from 31% to 34%. The increase in units may be attributed to previous owner-occupied units coming onto the market.

Upon review of the Marin County Assessor's Office data and as of the writing of this staff report, there appears to be 338 parcels totaling 1,276 units that may be eligible for rent control/stabilization policies (single family units have not been counted). Of those units, it appears that 106 parcels or 206 units would be exempted under the Tenant Protection Act because they are owner occupied units located within a commercial zoning district or an owner-occupied duplex. Thus, 232 parcels totaling 1,070 units (2 or more units on a single parcel) are remaining. Furthermore, as presented at the June 21, 2023, Town Council meeting, 117 parcels have three or more units totaling 839 units and 84 parcels have more four units or more units that total 733 units. See *Attachment 3* for a list of the parcels that have 3 or more units and *Attachment 4* for a list of 4 or more units.

Existing State Rent Regulations and Jurisdictional Examples

For the purpose of comparison, in the attached presentation (Attachment 1) staff has presented a breakdown of both existing State laws along with ordinances enacted by five specific California jurisdictions. These ordinances offer supplementary rent

stabilization measures and eviction protections, or a combination of both. As directed, staff has provided of local jurisdictions includes the Town of Fairfax, the City of Larkspur, along with the City of Petaluma as local examples. Furthermore, we have chosen two jurisdictions outside of the Bay Area, namely the City of Oxnard and the City of Ojai, to provide insights into differing approaches. Staff selected these jurisdictions due to their relative similarity to San Anselmo.

Public Input

Feedback from members of the public both at the community forums and via email express similar sentiment. Tenant input is primarily focused on the establishment of a rent cap, while many landlords expressed that existing State law provides adequate renter protections while still allowing “mom and pop” landlords to stay in business. Landlords have also expressed that if the Town were to consider local rent stabilization and eviction protection ordinances that they should be enacted by the voters and not the Town Council.

Staff received very little if any direct feedback regarding eviction protections as most of the input was focused on rent stabilization.

A full accounting of feedback received at the two community forums can be found in Attachment 6 and emails received by the posting of the agenda can be found in Attachment 7.

County of Marin – Upcoming Public Process

In January, the County of Marin will be initiating a public outreach process regarding housing anti-displacement strategies. Anti-displacement strategies are designed to help low- and moderate-income households stay in their homes and neighborhoods when rising rents or property taxes make it difficult or impossible for them to afford to remain there. These strategies aim to preserve housing opportunities for low- and moderate-income households and prevent displacement among existing residents who struggle to afford the higher housing costs.

Anti-displacement strategies often include policies that help protect renters from being forced to move. These protections can be in the form of regulating property renting practices, bolstering tenant rights, and providing financial and legal assistance to tenants.

The County has invited any Marin jurisdictions who would like to be part of this process to get involved. Staff believes that this process may produce regulations that could be adopted by other local municipalities and potentially create processes such as a share rental registry or a shared review committee/rent board to process disputes.

The County anticipates the outreach process will take 6-9 months and the County planners will present the strategies to the Board of Supervisors by the end of

2024. Although the County does not have any specific plans to discuss rent stabilization, it is anticipated that the topic of rent stabilization may discussed during the public outreach process.

OPTIONS

Staff recommends that the Council discuss the following questions as a basis for providing direction about future agenda items.

1) Does the Council want to consider a rent stabilization ordinance?
- If yes, is there consensus on the Council about what the rent increase ceiling should be?

2) Does the Council want to consider eviction protections beyond those in the Tenant Protection Act?
-If yes, is there consensus on specific provisions to be addressed?

3) If yes to either or both of the above questions, does the Council wish to approve the ordinance(s) at the Town Council level or put the draft ordinance(s) on a future ballot?

4) Does the Town Council want to direct staff to join in the County of Marin's efforts in 2024?

FISCAL IMPACT

None.

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

Conducting a discussion regarding g residential rental regulations is not considered a "project" under the California Environmental Quality Act (CEQA), because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

ATTACHMENTS

Attachment 1: Staff Presentation
Attachment 2: Summary of Community Engagement Activities
Attachment 3: Listing of residential parcels in San Anselmo with three units and above
Attachment 4: Links to State laws and local ordinances
Attachment 5: Public Comment from the Community Discussions
Attachment 6: Public Comment via Email

SAN ANSELMO RESIDENTIAL RENTAL POLICIES

October 24, 2023

OUTLINE

1. Introductions
2. Summary of Community Outreach
3. Rent Stabilization and Eviction Protection Presentation
4. Closing Comments

SUMMARY OF COMMUNITY OUTREACH

- Two community discussions were planned and designed to receive input from tenants and from landlords
- Recordings of meetings are available on the Town's rental policies website: sananselmorentalpolicies.org
- Each discussion focused on potential tenant protection policies as outlined by the Town Council (list on following slide)
- Staff will provide a presentation of the tenant protection items along with examples of how each is applied statewide or in the other jurisdictions
- All feedback was recorded and presented as part of a staff report to be presented to the Town Council

OVERVIEW OF RENTER PROTECTIONS

- Rent Stabilization/Rent Cap
- Fair Return/Appeals Process
- Short Term Relocation Assistance
- Long Term Relocation Assistance
- Applicability/Type of Unit
- Associated Fees
- Subleasing and Master Tenants
- Anti-Retaliation provisions
- Re-Rental and Right to Return

EXISTING STATE LAWS

Tenant Protection Act, AB 1482 (Civil Code §§ 1946.2, 1946.12) – Expires January 1, 2030

- Requires a landlord to have a "just cause" to terminate a tenancy.
- Limits annual rent increases to no more than 5% + local CPI (CPI = inflation rate), or 10% whichever is lower. Limit of 2 increases within the cap per year.
- Exempt units include single-family homes, owner-occupied duplexes, units 15 years old or newer on rolling basis.
- Landlord must pay/waive one-month's rent for no-fault eviction.

Costa-Hawkins Rental Housing Act (Civil Code §§ 1954.500-1954.535)

- Prohibits local rent control on post-1995 units.
- Exempts single-family homes and condominiums from rent control
- Allows landlords to reset the rental rate upon a vacancy or where the last rent-controlled tenant no longer permanently resides at the unit.

Ellis Act (Government Code §§ 7060-7060.7)

- 2 years – landlord must offer unit to displaced tenant if tenant gave notice at same rate
- If re-rented within five years, rental rate must be that in effect at time unit was withdrawn plus allowable annual adjustments.
- Ellis Act allows local ordinances requiring that landlord shall first offer withdrawn unit to displaced tenant if re-rents unit within 10 years.
- Local ordinances may be more protective. Local ordinances may impose landlord requirements such as registration of rental units or carrying a business license. These requirements will typically include a fee paid by the landlord.

RESIDENTIAL RENT STABILIZATION

- **Rent Cap – Rent Stabilization** - The Tenant Protection Act (AB 1482) is a State law that caps rent increases for most residential tenants in California. Landlords cannot raise rent more than 10% total or 5% plus the percentage change in the cost of living – whichever is lower – over a 12-month period. Rent may be increased a maximum of two times per year but may not exceed the total cap. If the tenants of a unit move out and new tenants move in, the landlord may charge market rate to the new tenants

STATE LAW – RENT CAP

State

- **LOCAL REGULATION MUST CONSIDER STATE LAW**
- Statewide rent control is 10% total or 5% + % change in cost of living – whichever is lower, retroactive to rent amount on March 15, 2019. (Tenant Protection Act, AB 1482, Sunsets January 1, 2030.)
- Local rent caps prohibited on units constructed after 1995. Local rent caps allowed on pre-1995 units if more protective of tenants. This does not apply to buildings constructed within the past 15 years on a rolling basis.
- Owners may reset rent to market rate upon a vacancy.
- Rent may not be increased more than twice over a 12-month period within the total rent cap amount.

OTHER JURISDICTIONS RENT CAP

Jurisdiction	Rent Cap
Fairfax	75% of Consumer Price Index.
Larkspur	5% plus inflation or 7%, whichever figure is lower.
Petaluma	No local rent stabilization ordinance
Oxnard	No more than 4% and no more than once in any 12-month period.
Ojai	No more than 4% and no more than once in any 12-month period.

FAIR RETURN/APPEALS PROCESS

- **Fair Return/Appeals Process -** Refers to when a landlord requests a rent increase in excess of what is allowed under either State or local rules in order to obtain fair and reasonable return on their property. Such an increase may be appealed by the tenant to the designated appeals officer or board for consideration and decision.

FAIR RETURN/APPEALS PROCESS

State
• Does not address

FAIR RETURN/APPEALS PROCESS

Fairfax

- Landlord and/or a Tenant may petition the Maximum Allowable Rent of individual Stabilized Rental Units.
- May be adjusted upward or downward.
- Hearing examiner may refuse to hold a hearing and/or grant a Rent adjustment if an individual hearing has been held and the decision made with regard to the Maximum Allowable Rent within the previous twelve (12) months.
- Any person aggrieved by the decision of the hearing examiner may appeal to the Town Council acting as the Appeals Board.

FAIR RETURN/APPEALS PROCESS

Larkspur

- An owner of a residential property may petition for a rent increase in excess of that provided in the rent cap in order to obtain a fair and reasonable return on their property.
- Such a petition shall be decided by the City Manager or their designee. An appeal of the City Manager's decision may be filed with the rent review board.

FAIR RETURN/APPEALS PROCESS

Petaluma

- No local rent stabilization ordinance

FAIR RETURN/APPEALS PROCESS

Oxnard

- An owner of a residential property may petition for a rent increase in excess of that provided in the rent cap in order to obtain a fair and reasonable return on their property.
- Such a petition shall be decided by the City Manager or their designee. The decision of the City Manager is final.

FAIR RETURN/APPEALS PROCESS

Ojai

- Landlords can apply to the Community Development Director for an increase above 4% if the landlord contends than the limitations on rent increases will prevent them from receive a fair and reasonable return

EVICTION PROTECTIONS

SHORT TERM RELOCATION ASSISTANCE

- Refers to when a landlord must provide the tenant with temporary housing or short-term relocation payments while performing repairs to the rental unit for a period of 30 days or less.

SHORT TERM RELOCATION ASSISTANCE

Jurisdiction	
State	• Does not address
Fairfax	• Where a Tenant shall be displaced from their Rental Unit for renovation work for a period of thirty days or less, the Landlord shall immediately make a per diem per day to the Tenant or the Tenant may elect not to receive short-term relocation payments. • If the Tenant receives short-term relocation payments, the Tenant remains obligated to pay the lawful Rent in effect when the Tenant vacated. • If the Tenant has elected not to receive short-term relocation payments, the Tenant shall not be obligated to pay Rent until the Tenant re-occupies the Rental Unit.
Larkspur	• Does not address
Petaluma	• Does not address
Oxnard	• Does not address
Ojai	• Does not address

LONG TERM RELOCATION ASSISTANCE

State law, AB 1482, requires landlords to provide relocation assistance equal to one month's rent in the event of a no-fault termination. No-fault terminations include when the landlord or family intends to occupy the property, withdraw the unit from the rental market if required by law, or if the landlord intends to demolish or substantially remodel the property. To qualify for relocation assistance, a tenant must have occupied the unit for at least 12 months.

LONG TERM RELOCATION ASSISTANCE

State

- For no fault termination, landlord must provide either: 1-month's rent or waive final month's rent as relocation benefit if tenant occupied unit for at least one year, or one common tenant occupied for 2 years.

LONG TERM RELOCATION ASSISTANCE

Fairfax

- A Landlord seeking to recover possession must make relocation payments to the Tenant's household of the Rental Unit.
- The amount of the relocation benefit shall be equal to two months' Rent, at the rate of Rent applicable at the time of the relocation.
- Any Tenant household that, at the time the notice of intent to withdraw Rental Units is filed with the Town, includes a Tenant who is 65 years of age or older, 17 years of age or younger, Disabled, or certified as being terminally ill by the Tenant's treating physician shall be entitled to receive payment of one months' rent.

LONG TERM RELOCATION ASSISTANCE

Larkspur

- The amount of relocation assistance shall be equal to: (i) three months of the tenant's rent that was in effect when the owner issued the notice to terminate the tenancy, (ii) $5,000, whichever is greater.
- If a tenant or member of tenant's household has resided in the unit for at least twelve (12) consecutive months and is sixty-two (62) years of age or older, disabled, or certified to be terminally ill by the treating physician, the amount of relocation assistance shall be increased by $3,000.

LONG TERM RELOCATION ASSISTANCE

Petaluma

- Landlords terminating any tenancy for no-fault just causes must provide relocation assistance in the form of a direct payment to the tenant equal to the lessor of 250% of one month of rent under the rental agreement in effect at the time of notice of termination of the tenancy or $9,000.00 as adjusted annually for inflation beginning on the first anniversary of the effective date of this chapter and continuing every year thereafter.
- Relocation assistance required pursuant to this chapter shall be paid within 14 calendar days of service of notice of termination.

LONG TERM RELOCATION ASSISTANCE

Oxnard

- The amount of relocation assistance will be equal to (i) two months of the tenant's rent that was in effect when the owner issued the notice to terminate the tenancy, or (ii) $5,000, whichever is greater.
- Any relocation assistance shall be provided within 15 calendar days of service of the notice.

LONG TERM RELOCATION ASSISTANCE

Ojai

- If a tenant is evicted for a no-fault reason, the landlord is required to give the displaced tenant financial assistance to move in the amount equal to two months rent or $5,000, whichever is greater.

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

This refers to the type of housing unit such as a single-family home, accessory dwelling unit (ADU), condominium, duplex, 3-plex building, 4-plex building, multi-unit apartment building, etc.

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

State

The just cause provisions of the state bill only apply after a tenant has occupied the unit for 12 months. After meeting this requirement of the bill, all rental units are covered, which exceptions for the following:

- Condos or single-family homes, unless owned by a real estate investment trust (REIT), a corporation, or a limited liability company where at least one member is a corporation, and so long as the tenants have been given proper notice of the exemption.
- Duplexes where the owner's principal residence is one of the units.
- Buildings constructed in the last 15 years, a rolling date. Which means that units built in 2006 will be covered in 2021, and units built in 2007 will be covered in 2022.
- Dormitories owned by an educational institution.
- Affordable housing restricted by a deed covenant, regulatory agreement or other recorded document.
- Units covered by a local Just Cause ordinance, if the ordinance was adopted before September 1, 2019, or a local ordinance that is more protective was passed after September 1, 2019.
- Transient and tourist hotel occupancies.
- And housing in a nonprofit hospital, religious facility, extended care facility, license care facility for the elderly or an adult residential facility.

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Fairfax

Shall apply to all properties in Fairfax that are hired, rented, or leased to a household within the meaning of Cal. Civil Code section 1940, including properties that contain any of the following:

(1) Dwelling Units which contain a separate bathroom, kitchen, and living area in a multifamily or multipurpose dwelling;

(2) Dwelling Units in single room occupancy residential structures;

(3) Dwelling Units owned by a limited liability company when at least one member is a corporation, a limited partnership, a real estate investment trust (REIT) as defined in Section 856 of the internal Revenue Code, a private equity firm, a private equity REIT, a corporation or other corporate structure

(4) units in a structure that is being used for residential uses whether or not the residential use is a conforming use permitted under the Fairfax Town Code

Exemptions:

- Rental Units in hotels, motels, and inns which are rented for a period of fewer than 30 days
- Rental Units in any hospital, convent, monastery, extended medical care facility, non-profit home for the aged, or dormitory
- Rental Units which a government unit, agency or authority fully owns, operates and manages.
- Any dwelling unit located in a development where the dwelling units are subject to legally binding restrictions

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Fairfax (cont'd)

Exemptions:

- Rental Unit occupied by a lodger
- Junior Accessory Dwelling Unit (JADU) – with or without a separate entrance, as long as the owner of the Dwelling Unit resides in the Dwelling Unit
- Accessory Dwelling Unit (ADU) as long as the ADU is attached to an owner-occupied Dwelling Unit

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Larkspur

- Shall not apply to the following types of residential real properties or residential circumstances:
- Transient and tourist hotel occupancy as defined in Cal. Civil Code, Section 1940(b).
- Housing accommodations in a nonprofit hospital, religious facility, extended care facility, or licensed residential care facility for the elderly
- Dormitories
- Housing accommodations in which the tenant shares a bathroom or kitchen facilities with the owner
- Single-family owner-occupied residences, including a residence in which the owner occupant rents or leases no more than two bedrooms
- A duplex in which the owner-occupied one of the units as the owner's principal place of residence
- A unit permitted as an Accessory Dwelling Unit (ADU) or Junior Accessory Dwelling Unit (JADU).

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Petaluma

- Shall apply to tenants and tenant households on the first day of the term of rental agreements for dwelling units:

  (1) That contain separate bathroom, kitchen, and living area in a multifamily or multipurpose dwelling
  (2) In a single room occupancy residential structure
  (3) In a structure that is being used for resident uses whether or not residential use is a conforming use permitted under the Zoning Ordinance, that is hired, rented, or leased to a household within the meaning of California Civil Code Section 1940. This includes any dwelling unit that is actually used for residential purposes, including live-work spaces, whether or not the residential use is legally permitted.

- Exceptions: Notwithstanding above, the provisions of this chapter shall not apply to:

  (1) Tenant Protections Act Exceptions: (a) Transient and tourist occupancies (b) Housing accommodations in a nonprofit hospital, religious facility, extended care facility, licensed residential care facility for the elderly, or adult residential facility (c) Dormitories owned and operated by an institution of higher education or a kindergarten and grades 1 to 12, inclusive, school.

  (2) Small Property Owners: Residential rental units of property owners that are not real estate investment trust, or a corporation, or a limited liability company in which at least one member is a corporation, that own 3 or fewer such units in the city, and that have provided written notice to the tenants in the rental agreement that the residential property is exempt from this chapter. (3) Temporary Tenancies (4) Tenant Property Managers (5) Units shared with Owner

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Oxnard

- "Tenancy" means the lawful occupation of residential real property, including Accessory Dwelling Units, or mobile home spaces that are not subject to Chapter 24, Mobile Home Parks, of the Oxnard City Code, and includes a lease or sublease, as such may be subject to local ordinance. The Article shall not apply to the following types of residential real properties or residential circumstances.

1. Transient and tourist hotel occupancy and properties that have obtained a City of Oxnard Short Term Vacation Rental Permit

2. Housing Accommodations in a nonprofit hospital, religious facility, extended care facility, or licensed residential care facility for the elderly

3. Dormitories owned and operated by an institution of higher education or a kindergarten and grades 1 to 12, inclusive, school

4. Housing accommodations in which the tenant shares a bathroom or kitchen facilities with the Owner who maintains their principal resident at the residential real property

5. Single-family Owner occupied residents, including a residence in which the Owner-occupant rents or leases no more than two bedrooms.

6. A duplex in which the Owner occupied one of the units as the Owner's principal place of residence at the beginning of the Tenancy, so long as the Owner continues in occupancy.

APPLICABILITY – TYPE OF UNIT (E.G., DUPLEX, ADU, JADU, ETC.)

Ojai

- Shall not apply to the following types of residential real properties or residential circumstances:

1. Transient and tourist hotel occupancy

2. Housing Accommodations in a nonprofit hospital, religious facility, extended care facility, or licensed residential care facility for the elderly

3. Dormitories

4. Housing accommodations in which the tenant shares facilities with the landlord

5. Single-family Owner-occupied residents, including a residence in which the Owner-occupant rents or leases no more than two bedrooms

6. A duplex in which the Owner occupied one of the units as the Owner's principal place of residence

7. Residential real property that is alienable separate from the title to any other dwelling unit, provided that both of the following apply:
i. The owner is not any of the following a real estate investment trust, a corporation, or limited liability company in which at least one member is a corporation.

ii. The tenants have been provided written notice that the residential property is exempt

8. Housing Restricted by deed, regulatory restriction contained in an agreement with a government agency

ITEM 2.1 - Attachment 1

9. Residential real property occupied by the landlord or their spouse, domestic partner, etc.

RENTAL REGISTRATION AND FEES

Local ordinances may impose landlord requirements such as registration of rental units or carrying a business license. These requirements will typically include a fee paid by the landlord.

RENTAL REGISTRATION AND FEES

State
• Does not address

RENTAL REGISTRATION AND FEES

Fairfax

- All Landlords shall pay the business license fee required by the Town Code section 5.16.010, if applicable, in addition to the Rental Housing Fee. The Town may charge the Rental Housing Fee at the same time as the business license fee.
- The Rental Housing Fee will be set by resolution of the Town Council. Enforcement of this Chapter shall be funded by the Rental Housing Fee

RENTAL REGISTRATION AND FEES

Larkspur

- All owners with rental units shall pay the tenant protection program fee, as established by city council resolution.
- The tenant protection program fee is to fund the city's cost to implement and enforce the provisions of this ordinance.

RENTAL REGISTRATION AND FEES

Petaluma
• Does not address

RENTAL REGISTRATION AND FEES

Oxnard

- All owners with rental units shall pay the tenant protection program fee, as established by city council resolution. The tenant protection program fee is to fund the city's cost to implement and enforce the provisions of this ordinance.

RENTAL REGISTRATION AND FEES

Ojai

- Once established by City Council, landlords will be required to pay a rent stabilization and/or tenant protection program fee to offset the costs of implementing the ordinance, as established by City Council Resolution.

SUBLEASING AND MASTER TENANTS

State law, AB 1482, prohibits a sublease where the total subtenant rent exceeds the rent cap under the primary lease. State law does not authorize a tenant to sublet or assign the lease where otherwise prohibited.

SUBLEASING AND MASTER TENANTS

State

- A tenant of residential real property subject to this section shall not enter into a sublease that results in a total rent for the premises that exceeds the allowable rental rate authorized by subdivision. Nothing in this subdivision authorizes a tenant to sublet or assign the tenant's interest where otherwise prohibited.

SUBLEASING AND MASTER TENANTS

Fairfax

- Notwithstanding any lease provision to the contrary, a Landlord shall not take any action to terminate a tenancy based on a Tenant's sublease of the Rental Unit if the Landlord has unreasonably withheld the right to sublease following written request by the Tenant.

- The following requirements must be met:
  - (i) The Tenant continues to reside in the Rental Unit as their primary residence.
  - (ii) The sublease replaces one or more departed Tenants under the Rental Agreement on a one-for-one basis or the sublease adds additional occupants up to the maximum amount of occupants legally allowed under section 503(b) of the Uniform Housing Code as incorporated by California Health & Safety Code section 17922, except where prohibited by law.
  - (iii) A Landlord's refusal of a subtenant must state the reason for the refusal. If the Landlord fails to respond to the Tenant's request to sublease in writing within fourteen (14) days of receipt of the Tenant's request, the Tenant's request shall be deemed approved by the Landlord.
  - (iv) A Landlord's reasonable refusal of the Tenant's written request may not be based on the proposed additional occupant's lack of Creditworthiness, if the occupant will not be legally obligated to pay some or all of the Rent directly to the Landlord.

- Before endeavoring to recover possession based on the violation of a lawful obligation or covenant of tenancy regarding subletting or limits on the number of occupants in the Rental Unit, the Landlord shall serve the Tenant a written notice of the violation that provides the Tenant with a minimum of fourteen (14) days' opportunity to cure the violation. The Tenant may cure the violation by making a written request to add occupants referenced in subsection (ii) of section 5.54.030(C)(2)(a) or by using other reasonable means to cure the violation.

SUBLEASING AND MASTER TENANTS

Larkspur

- Notwithstanding any contrary provision in this section, an owner shall not take any action to terminate a tenancy based on a tenant's sublease of the residential real property if all the following requirements are met:

  (a) The tenant requests permission from the owner in writing to sublease the residential real property;

  (b) The tenant continues to reside in the residential real property as their primary residence;

  (c) The sublease replaces one or more departed tenants under the lease on a one-for-one basis; and

  (d) The owner fails to respond to the tenant in writing within a reasonable amount of time of the receipt of the tenant's written request. If the owner fails to respond to the tenant's written request, the request shall be deemed approved by the owner if the lease is for a period of one year or less. An owner's reasonable refusal of the tenant's written request may be based on, but is not limited to, the ground that the total number of occupants in a residential real property exceeds the maximum number of occupants as determined under Section 503(b) of the Uniform Housing Code or successor provision.

SUBLEASING AND MASTER TENANTS

Petaluma
• Does not address

SUBLEASING AND MASTER TENANTS

Oxnard

- Assigning or subletting the premises in violation of the tenant's lease, as described in paragraph (4) of Section 1161 of the California Code of Civil Procedure. Notwithstanding any contrary provision in this section, an Owner shall not take any action to terminate a Tenancy based on a tenant's sublease of the residential real property if all the following requirements are met:

  (1) The tenant requests permission from the Owner in writing to sublease the residential real property;

  (2) The tenant continues to reside in the residential real property as their primary residence;

  (3) The sublease replaces one or more departed tenants under the lease on a one-for-one basis; and

  (4) The Owner fails to respond to the tenant in writing within a reasonable amount of time of the receipt of the tenant's written request. If the Owner fails to respond to the tenant's written request, the request shall be deemed approved by the Owner if the lease is for a period of one (1) year or less. An Owner's reasonable refusal of the tenant's written request may be based on, but is not limited to, the ground that the total number of occupants in a residential real property exceeds the maximum number of occupants as determined under Section 503(b) of the Uniform Housing Code or successor provision.

SUBLEASING AND MASTER TENANTS

Ojai

- Assigning or subletting the premises in violation of the Tenant's lease, as described in Section 1161(4) of the California Code of Civil Procedure. Notwithstanding any contrary provision in this section, a Landlord shall not take any action to terminate a Tenancy based on a Tenant's sublease of the Rental Unit if all the following requirements are met:

  i. The Tenant requests permission from the owner in writing to sublease the Rental Unit.;

  ii. The Tenant continues to reside in the Rental Unit as their primary residence;

  iii. The sublease replaces one or more departed Tenants under the lease on a one-for-one basis; and

  iv. The Landlord fails to respond to the Tenant in writing within a reasonable amount of time of the receipt of the Tenant's written request. If the Landlord fails to respond to the Tenant's written request, the request shall be deemed approved by the Landlord if the lease is for a period of one year or less. A Landlord's reasonable refusal of the Tenant's written request may be based on, but is not limited to, the ground that the total number of occupants in a residential real property exceeds the maximum.

ANTI-RETALIATION PROVISIONS

State

- State law prohibits a landlord from retaliating against a tenant in response to the tenant's exercise of legal rights. Retaliation includes a variety of actions such as increasing rent, threatening to report immigration status, attempting to force the tenant to move, or decreasing housing services such as parking or laundry.
- The tenant may bring legal action against the landlord and can receive monetary damages and recovery of legal costs. In some cases, the tenant may receive "treble damages" which is three times the amount of actual damages incurred.

ANTI-RETALIATION PROVISIONS

Fairfax

- Whenever a Landlord attempts to prevent a Tenant from acquiring any rights under this Chapter, retaliates against a Tenant for the exercise of any rights under this Chapter, or engages in activities prohibited under this Chapter, the Tenant may institute a civil proceeding for money damages or injunctive relief, or both. This section creates a private right of action to enforce all terms, rights, and obligations under this Chapter.

- Whomever is found to have violated this Chapter shall be subject to appropriate injunctive relief and shall be liable for damages, costs, and reasonable attorneys' fees, and whatever other relief the court deems appropriate. In the case of an award of damages, said award may be trebled if the trier of fact finds that the Landlord acted in knowing violation, reckless disregard, or otherwise willfully failed to comply with this Chapter.

- The court may award the defendant attorney's fees and costs as the prevailing party in cases where plaintiff's claim is deemed unreasonable, frivolous, meritless, or vexatious

ANTI-RETALIATION PROVISIONS

Larkspur

- Any person whose rights pursuant to this article have been violated shall have the right to file an action for injunctive relief and damages. Whoever is found to have violated this article shall be subject to appropriate injunctive relief and shall be liable for damages, costs, and reasonable attorney fees.
- Treble damages shall be awarded for willful failure to comply with the relocation payment obligations established by this article. Any action pursuant to this article shall be a civil matter and adjudicated through civil court.

ANTI-RETALIATION PROVISIONS

Petaluma

- Whenever a landlord attempts to prevent a tenant from acquiring or exercising the tenant's right under this chapter or retaliates against a tenant or tenant household for the exercise of their rights under this chapter, or otherwise violates the requirements of this chapter, the tenant, tenant household, or the City may institute a civil proceeding for money damages or injunctive relief, or both.

- Landlords found to have violated this chapter shall be subject to appropriate injunctive relief and shall be liable for damages, costs and reasonable attorneys' fees, and whatever other relief the court deems appropriate.

ANTI-RETALIATION PROVISIONS

Oxnard

- It shall be unlawful for any person to violate or fail to comply with any provision of this article. The violation of any provision of this article shall first be punished through the use of a civil citation, prior to prosecution as a misdemeanor, infraction, or civil injunction as provided in City Code section 1-10.
- Any person whose rights pursuant to this Ordinance have been violated shall have the right to file an action for injunctive relief and damages. Whoever is found to have violated this Ordinance shall be subject to appropriate injunctive relief and shall be liable for damages, costs, and reasonable attorney fees.
- Treble damages shall be awarded for willful failure to comply with the Relocation Payment obligations established by this Ordinance. Any action pursuant to this Ordinance shall be a civil matter and adjudicated through civil court.

ANTI-RETALIATION PROVISIONS

Ojai

- Contact the Community Development Department and present them with evidence of a violation. If the evidence supports it, the City may begin issuing citations for the violations, however, the City's enforcement may be limited to the citation process. If the City's citation process is not effective, the ordinance allows tenants to file suit on their own.

RE-RENTAL & RIGHT TO RETURN

Properties removed from rental market, State law:
*2 years – landlord must offer unit to displaced tenant if tenant gave notice at same rate
*If re-rented within five years, rental rate must be that in effect at time unit was withdrawn plus allowable annual adjustments.
* Ellis Act allows local ordinances requiring that landlord shall first offer withdrawn unit to displaced tenant if re-rents unit within 10 years.

Local ordinances may be more protective.

Local ordinances may impose landlord requirements such as registration of rental units or carrying a business license. These requirements will typically include a fee paid by the landlord.

RE-RENTAL & RIGHT TO RETURN

State

- Landlord's right to Withdraw units from rental market: The Ellis Act grants landlords the legal right to evict all tenants and remove rental properties from the market.
- Landlord must remove all units in the building from the market (may not single out a tenant).
- 2 years after withdrawal Landlord must offer unit to displaced tenant if tenant gave notice at the same rental rate. Landlord subject to actual and exemplary damages to displaced tenant.
- If re-rented within five years, rental rate must be that in effect at time unit was withdrawn plus allowable annual adjustments.
- Local ordinance may be adopted requiring that landlord must first offer withdrawn unit to displaced tenant if re-rents unit within 10 years.
- 120 day eviction notice period; longer for seniors and disabled persons. Landlord must follow required procedures to evict.

ITEM 2.1 - Attachment 1

- No restrictions if landlord converts property to ownership units.

RE-RENTAL & RIGHT TO RETURN

Fairfax

- Units withdrawn from the rental market pursuant to the Ellis act.
- If the Rental Unit is offered again for Rent or lease for residential purposes within two years and five years of the date the Rental Unit was withdrawn from Rent or lease various provisions apply.

RE-RENTAL & RIGHT TO RETURN

Larkspur

- It establishes that should the circumstances that justified a no fault, just cause eviction no longer exist and a landlord wishes to rent the subject unit within 12-months of the eviction, the landlord must first offer the unit to the tenant who was subjected to the eviction at the rent the tenant was paying at the time of the eviction.
- Withdrawal of the residential real property from the rental market under, and subject to, the provisions of the Ellis Act.
- Tenants shall be entitled to a minimum of 120-day notice for evictions pursuant to the Ellis Act. In the case that a tenant or member of tenant's household has resided in the unit for at least twelve (12) consecutive months and is sixty-two (62) years of age or older, disabled, or certified to be terminally ill by the treating physician, tenant shall be entitled to a minimum of one-year's notice.

RE-RENTAL & RIGHT TO RETURN

Petaluma

- If a dwelling unit to which this chapter applies that was withdrawn from the rental market is offered again for rent for residential purposes within 6 months of the date the dwelling unit was deemed withdrawn pursuant to this chapter, the owner must first notify the City Housing Manager.

- Tenants to whom this chapter applies that are provided notice of termination of a tenancy for a no-fault just cause may, within 30 days of date of the notice, provide the landlord written notice using the form provided by the City for that purpose of the tenant's desire to consider an offer to renew the tenancy.

- Tenants who provide the landlord such notice shall have the first right of refusal to return to the dwelling unit if the dwelling unit is returned to the rental market by the landlord or successor landlord within 6 months of the time that the dwelling unit is deemed withdrawn pursuant to this chapter.

RE-RENTAL & RIGHT TO RETURN

Oxnard

- Does not address

RE-RENTAL & RIGHT TO RETURN

Ojai

- Does not address

ITEMS TO NOTE

- Tenant Protection Act sunsets January 1, 2030
- City of Larkspur protections sunset December 31, 2023
- The Town of Fairfax ordinances are in effect, their provisions will not be implemented until sufficient agreements for support have been approved by the Town Council. The Fairfax Town Council voted unanimously on August 2, 2023 to certify a citizens' ballot initiative that seeks to repeal the town's rent control and just-cause-for-eviction ordinances. The measure will be placed on the November 5, 2024 ballot.
- The City of Larkspur Town Clerk's office received a referendum petition against the rent stabilization ordinance on September 28, 2023, which has been sent to the Registrar of Voters to verify signatures to be placed on a future ballot.
- County of Marin – upcoming public process

PUBLIC INPUT

- Tenant input primarily focused on the establishment of a rent cap.
- Landlords expressed that existing State law provides adequate renter protections while still allowing "mom and pop" landlords to stay in business.
- Landlords also expressed that if the Town were to consider local rent stabilization and eviction protection ordinances they should be enacted by the voters and not the Town Council.

OPTIONS

- Staff recommends that the Council discuss the following questions as a basis for providing direction about future agenda items.

1) Does the Council want to consider a rent stabilization ordinance?
- If yes, is there consensus on the Council about what the rent increase ceiling should be?

2) Does the Council want to consider eviction protections beyond those in the Tenant Protection Act?
-If yes, is there consensus on specific provisions to be addressed?

3) If yes to either or both of the above questions, does the Council wish to approve this ordinance at the Town Council level or put the draft ordinance(s) on a future ballot?

4) Does the Town Council want to direct staff to join in the County of Marin's efforts in 2024?

Residential Rental Policies – Summary of Community Engagement

August 2023:

- Website:
  - Special page created and updated regularly containing information on existing CA laws and examples of local CA towns/cities ordinances:
  - https://www.townofsananselmo.org/1620/San-Anselmo-Residential-Rental-Policie
  - Highlighted on Town Spotlight (beginning 8/21/23)

- Postcards created with QR code to webpage
  - Bulk mailed to all San Anselmo residential households and out of town landlords - qty 7,025 (week of 8/21/23)
  - Hand distribution to SA apartment buildings with 10+ units (week of August 28)
  - Extra postcards available in SA Library & counter lobby of Town Hall
  - Posted on Town Announcement Bulletin Boards

- Press Releases to Media contacts
  - First release sent 8/24/23

- Town Manager Newsletter (5700 subscribers)
  - Series of announcements in newsletter, weekly beginning: 8/26/23

- Social Media
  - Posted on Instagram (2150 followers): 8/29/23, 9/14/23, 10/2/23
  - Posted on Nextdoor (11K members, 5K households): 8/29/23, 9/14/23, 10/2/23

- Email Created: SanAnselmoRentalPolicies.org
  - Received emailed pubic comment

September 2023:

- Live on the Avenue staffed outreach table: Friday, September 8 - 5:30-7:30pm

- Community Discussion #1 - September 14, 6:00 pm in Council Chambers (Tenant Concerns & Questions)
  - In person Attendance: 50-60 people, 22 spoke
  - Zoom Attendance: 35-40, 17 spoke

October 2023:

- Community Discussion #2 - October 5, 6:00 pm in Council Chambers (Landlord Concerns & Questions)
  - In person Attendance: 30-35 people, 21 spoke
  - Zoom Attendance: 30, 6 spoke
- Town Council Meeting - October 24, 7:00pm

PARCELS with 3 or More Living Units in San Anselmo

APN	ADDRESS	TAX STATUS CODE	ZONING DISTRICT	NO. UNITS	CONSTRUCTION
007-051-20	1218 SAN ANSELMO AVE	Commercial - Improved	C-1	3	1932
005-121-15	1608 SIR FRANCIS DRAKE BLVD	Commercial - Improved	C-1	3	?
007-251-20	417 SAN ANSELMO AVE	Commercial - Improved	C-2	3	?
006-083-08	711 SIR FRANCIS DRAKE BLVD	Commercial - Improved	C-L	3	1906
007-212-11	51 TAMALPAIS AVE A	Exemption - Improved	R-3	3	1910
007-011-24	1509 SAN ANSELMO AVE	Multiple-Resid. - Improved	C-1	3	?
006-173-02	25 SPRING GROVE AVE UNIT 1	Multiple-Resid. - Improved	C-3	3	?
007-283-07	NO STREET ADDRESS	Multiple-Resid. - Improved	R-1	3	1979-2000
007-262-05	63 KENSINGTON RD	Multiple-Resid. - Improved	R-1	3	?
007-113-12	1008 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-1	3	?
007-062-10	40 CANYON RD	Multiple-Resid. - Improved	R-1	3	1978
007-053-14	104 MORTON LN	Multiple-Resid. - Improved	R-1	3	?
007-052-42	51 ELM AVE	Multiple-Resid. - Improved	R-1	3	?
007-052-05	1363 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-1	3	?
007-051-04	1374 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-1	3	?
007-023-05	23 HUMBOLDT AVE	Multiple-Resid. - Improved	R-1	3	?
007-012-22	17 LANSDALE AVE	Multiple-Resid. - Improved	R-1	3	?
006-211-14	409 GREENFIELD AVE	Multiple-Resid. - Improved	R-1	3	?
006-072-14	18 SAIS AVE	Multiple-Resid. - Improved	R-1	3	?
005-101-32	160 BUTTERFIELD RD	Multiple-Resid. - Improved	R-1	3	?
007-231-02	274 OAK AVE	Multiple-Resid. - Improved	R-1-C	3	1904-2000
007-141-14	405 REDWOOD RD	Multiple-Resid. - Improved	R-1-C	3	1935
007-284-28	42 MARIPOSA AVE	Multiple-Resid. - Improved	R-2	3	?
006-162-08	19 PARK WAY	Multiple-Resid. - Improved	R-2	3	1975
005-194-36	42 ASH AVE	Multiple-Resid. - Improved	R-2	3	1985
007-284-23	26 MARIPOSA AVE APT A	Multiple-Resid. - Improved	R-3	3	?
007-284-05	65 ROSS AVE APT A	Multiple-Resid. - Improved	R-3	3	?
007-162-09	837 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	3	1925
007-162-06	853 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	3	1980
006-161-02	23 ANCHO VISTA AVE	Multiple-Resid. - Improved	R-3	3	1975
006-081-07	821 SIR FRANCIS DRAKE BLVD APT 1	Multiple-Resid. - Improved	R-3	3	1965
005-222-16	1212 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	3	?
005-124-31	1590 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	3	1963
005-193-07	9 FERN LN	Multiple-Resid. - Improved	SPD	3	?
007-111-03	1107 SAN ANSELMO AVE	Multiple-Resid. - Improved	C-1	4	1975
007-113-05	964 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-1	4	?
007-023-03	17 HUMBOLDT AVE	Multiple-Resid. - Improved	R-1	4	?
006-083-29	19 MADRONE AVE APT A	Multiple-Resid. - Improved	R-1	4	1958
006-201-45	14 FORBES AVE	Multiple-Resid. - Improved	R-2	4	1958
005-153-04	1505 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-2	4	?
007-284-43	28 MARIPOSA AVE	Multiple-Resid. - Improved	R-3	4	?
007-283-05	111 ROSS AVE	Multiple-Resid. - Improved	R-3	4	1969-2000
007-282-15	60 ROSS AVE	Multiple-Resid. - Improved	R-3	4	1960
007-222-50	35 CEDAR ST	Multiple-Resid. - Improved	R-3	4	1970
007-222-49	39 CEDAR ST	Multiple-Resid. - Improved	R-3	4	?
007-222-04	43 CEDAR ST	Multiple-Resid. - Improved	R-3	4	?
007-213-48	192 TUNSTEAD AVE	Multiple-Resid. - Improved	R-3	4	1975
007-212-38	40 MAGNOLIA AVE	Multiple-Resid. - Improved	R-3	4	1962
007-162-04	859 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	4	?
007-014-17	3 OAK KNOLL AVE	Multiple-Resid. - Improved	R-3	4	1964
006-081-04	835 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	4	1975
006-081-03	839 SIR FRANCIS DRAKE BLVD APT 1	Multiple-Resid. - Improved	R-3	4	1950
005-224-06	1340 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	4	1980
005-222-15	1220 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	4	1979
006-171-04	122 GREENFIELD AVE	Commercial - Improved	C-3	5	1956
007-284-04	67 ROSS AVE APT 1	Multiple-Resid. - Improved	R-3	5	1964
007-213-49	194 TUNSTEAD AVE	Multiple-Resid. - Improved	R-3	5	1968
007-212-49	54 MAGNOLIA AVE	Multiple-Resid. - Improved	R-3	5	1985
007-162-11	829 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	5	1988
007-162-08	841 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	5	?
005-225-13	1374 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	5	?
005-194-22	10 ASH AVE	Multiple-Resid. - Improved	R-3	5	1966
005-129-05	1562 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	5	1963

APN	ADDRESS	TAX STATUS CODE	ZONING DISTRICT	NO. UNITS	CONSTRUCTION
006-162-13	250 RED HILL AVE	Multiple-Resid. - Improved	SPD	5	?
007-111-04	8 LAUREL AVE	Multiple-Resid. - Improved	C-1	6	1980
006-173-19	4 GREENFIELD CT	Multiple-Resid. - Improved	R-1	6	1950
006-121-18	19 BUENA VISTA	Multiple-Resid. - Improved	R-1	6	1980
006-091-54	20 LUNA LN	Multiple-Resid. - Improved	R-1	6	1972
006-162-11	252 RED HILL AVE	Multiple-Resid. - Improved	R-2	6	1970
007-284-36	75 ROSS AVE APT A	Multiple-Resid. - Improved	R-3	6	1964
007-212-35	26 MAGNOLIA AVE UNIT 1	Multiple-Resid. - Improved	R-3	6	1985
007-211-22	22 TAMALPAIS AVE UNIT 1	Multiple-Resid. - Improved	R-3	6	1964
007-211-21	20 TAMALPAIS AVE UNIT 1	Multiple-Resid. - Improved	R-3	6	1967
007-015-11	1516 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	6	1952
005-124-30	1598 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	6	?
007-301-07	151 SAN ANSELMO AVE	Commercial - Improved	C-3	7	1926
007-301-11	22 BELLE AVE	Commercial - Improved	R-3	7	1956
006-052-02	6 SAUNDERS AVE	Multiple-Resid. - Improved	C-1	7	1964
007-302-10	21 BELLE AVE	Multiple-Resid. - Improved	R-3	7	1959
007-302-08	29 BELLE AVE	Multiple-Resid. - Improved	R-3	7	1964
007-213-61	55 MAGNOLIA AVE	Multiple-Resid. - Improved	R-3	7	1970
007-212-44	60 MAGNOLIA AVE	Multiple-Resid. - Improved	R-3	7	1985
006-161-03	13 ANCHO VISTA AVE	Multiple-Resid. - Improved	R-3	7	?
005-195-02	1355 SIR FRANCIS DRAKE BLVD APT 14	Multiple-Resid. - Improved	R-3	7	1972
007-284-48	19 ROSS AVE	Multiple-Resid. - Improved	C-3	8	1906
007-284-18	211 SAN ANSELMO AVE	Multiple-Resid. - Improved	C-3	8	1970
007-282-06	24 ROSS AVE	Multiple-Resid. - Improved	R-1	8	1984
006-121-19	25 BUENA VISTA	Multiple-Resid. - Improved	R-1	8	1970
007-282-18	40 ROSS AVE	Multiple-Resid. - Improved	R-3	8	1970
007-282-03	53 WOODLAND AVE	Multiple-Resid. - Improved	R-3	8	1958
007-213-73	154 TUNSTEAD AVE	Multiple-Resid. - Improved	R-3	8	1973
007-211-09	15 SAN RAFAEL AVE	Multiple-Resid. - Improved	R-3	8	1975
005-224-20	1308 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	8	?
007-213-62	190 TUNSTEAD AVE	Multiple-Resid. - Improved	R-3	9	?
007-162-01	869 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	9	?
007-213-76	138 TUNSTEAD AVE	Multiple-Resid. - Improved	C-3	10	1962
007-302-11	19 BELLE AVE	Multiple-Resid. - Improved	R-3	10	1985
007-282-16	41 WOODLAND AVE	Multiple-Resid. - Improved	R-3	10	1955
007-114-25	917 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	10	1969
006-083-40	114 SYCAMORE AVE	Multiple-Resid. - Improved	R-3	10	1965
006-081-02	875 SIR FRANCIS DRAKE BLVD APT 1	Multiple-Resid. - Improved	R-3	10	1958
006-091-13	600 RED HILL AVE	Multiple-Resid. - Improved	SPD	10	1965
007-213-78	166 TUNSTEAD AVE	Multiple-Resid. - Improved	R-3	11	1990
005-124-32	1586 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	11	1975
007-212-10	57 TAMALPAIS AVE	Multiple-Resid. - Improved	R-3	12	1975
006-121-38	51 ESSEX ST	Multiple-Resid. - Improved	R-3	12	1974
007-281-26	108 ROSS AVE	Multiple-Resid. - Improved	R-3	13	1968-2000
005-243-05	1208 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	R-3	13	1965
007-284-06	57 ROSS AVE APT 11	Multiple-Resid. - Improved	R-3	15	1955
007-212-48	35 TAMALPAIS AVE UNIT 3	Multiple-Resid. - Improved	R-3	15	1961
006-254-47	1 LINCOLN PARK UNIT 203	Multiple-Resid. - Improved	C-3	16	2022
006-091-38	760 SIR FRANCIS DRAKE BLVD	Multiple-Resid. - Improved	C-L	16	1959
007-015-12	1520 SAN ANSELMO AVE	Multiple-Resid. - Improved	R-3	16	1962
007-282-21	36 ROSS AVE	Multiple-Resid. - Improved	R-3	19	?
005-195-03	1355 SIR FRANCIS DRAKE BLVD APT 14	Multiple-Resid. - Improved	R-3	21	1972
006-083-38	100 SYCAMORE AVE APT 1	Multiple-Resid. - Improved	R-3	24	1980
006-121-45	88 BUENA VISTA	Multiple-Resid. - Improved	R-3	34	?
006-061-26	101 SUNNY HILLS DR	Multiple-Resid. - Improved	SPD	70	1985
				839	

Links to State Law and local ordinances

- California Legislative Information AB-1482 (https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1482)
- Town of Fairfax Renter Protections Page (https://www.townoffairfax.org/renters-and-landlords/)
- City of Larkspur July 19, 2023 and September 6, 2023 Staff Reports (https://www.ci.larkspur.ca.us/DocumentCenter/View/17885/72-Rent-Stabilizataion-and-Eviction-Protections-Ordinances-for-July-19 & (https://www.ci.larkspur.ca.us/DocumentCenter/View/18144/81-Rent-Stabilization-Ordinance)
- City of Petaluma Guide to Tenant Protections Page (https://cityofpetaluma.org/guide-to-tenant-protections/)
- City of Oxnard Rent Stabilization and Tenant Protection Page (https://www.oxnard.org/city-department/housing/rso/)
- City of Ojai Rent Stabilization and Just Cause Tenant Protection Page (https://ojai.ca.gov/529/Rent-Stabilization-FAQ)

	Rent Stabilization - Community Discussion #1 - Tenant Concerns/Questions - September 14, 2023 - – In-Person and Zoom Public Comment								
	Name	Jurisdiction	Homeowner	Tenant	Landlord	Neither	Comment	Attendees in Chambers	
Rent Stabilization Items									
	Joey Davis	Marin?		x			My apartment complex 24 units, 20 single. All the gig workers are all renters. The people who bought our complex are from another state. They keep raising the rent. They don't seem to really care. SF was an amazing city, then corporate people moved in. 10% increase for me + adding utilities (sneaky way to raise rent) It's way too much if you are on a fixed income. I hope San Anselmo can keep it's charm.	50-60	6:00-7:00PM
	Reverend Lisa Marie	San Anselmo		x			I am a renter, my landlady is in the room and she has treated me so kindly.She rented to me when I was jobless when I didn't have a job. I am an employee at University of Redlands - event sales manager. Hard time for higher education - they laid off 10-12% of their staff recently or took a tiered pay cut for the lowest ranking. President took an 18% pay cut. I can barely afford to live here. I have a son in high school with two jobs. I would desperately like to buy a house so I don't need to worry so son can get through the next couple of years and know he can come home. I cannot do that now. I think there are many good landlords here and many good people. It takes a village. I thank this town for being a safe place		
	.	San Anselmo		x (20 years			Work in a local school as a special education aide. We are very lucky, we have an amazing landlord who charges everyone below market and keeps increases below __ % We live in fear of our rent going up. I recently heard a one bedroom apartment building is $2400/month. As renters we keep underlying fear that our rental will become unavailable or someone will buy the building and rent will increase. Everyone who works here should be able to live here. Thank you for considering this. I am for rent stabilization in Town.		
	Katherine Smith	San Anselmo (+30 years)		x			Moved into modest one bedroom that was $2400, now this month it was raised $200/month in anticipation of rent stabilization. If it doesn't happen landlord would credit back to me. But didn't say how. Said bringing up to market value. I have social security and a modest job. If she raises it again next year, then I won't be able to afford it. People don't know who our homeless population is - it's becoming our senior population. Quickest growing population. Rent being too high is the tipping point.		
	Sarah Chapelle	Grew up here SA		x			Many people are paying more than 1/2 of their income in rent. We are being displaced by corporations buying up the properties. Need a rent cap of no more than 5%, ideally 3-4%. 5% is still quite high. The 7% cap that Larkspur just passed is a horrible occurance, not much lower than the state. Some say it belongs on the ballot, but courageous legislatures are who we need. The people who build this town will continue to be displaced		
	man	San Anselmo		x			I really like this Town. I don't see it possible for us to stay here. As my child grows we will expand out of a 700 sq ft one bedroom apartment. It's no secret that there is a widening gap between who can afford to be here.		
	Mike Blakely	San Anselmo	x				I was a renter but now fortunate to be a homeowner. Encourage town to keep everyone informed. I received the postcard. We don't want a situation that Fairfax had. We need more information and data. What data do we have that says why the Town needs to intervene vs what the State has done. Please hold more of these forums.		
	Hughes	San Anselmo		x			I am a renter at the seminary. I am a student and staff. I am lucky I get a semi-subsidized rent since I am a student. It is 2/3 of my income. I love where I live, my kids are growing up in a great area. A lot of my co-workers can't live here. Same with my kids teachers. They live in Petaluma or further north. There aren't really subsidized options. I called the Housing coalition and all their lists were closed. There will be a lot more people without options without subsidizing		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	(in chamber or zoom)						6:00 PM	32	in chamber
								30	on zoom
	Man	SR resident (landlord in SA)			x		State has done an excellent job. Don't see need for more. Relocation expenses concerns me.Thank you for doing an excellent job in your research		
	Benedetto Cico	SA? (Owns Inn in SA)				Property Owner	Thank you for the presentation. My comments are as property owner. This process is a solution in search of a problem. Does the Town have a need to make the Town restrictions more than the State? Is there any data or complaints from tenants? At the Inn we get temporarily relocated tenants. If this is a big issue, then passing rent control will have consequences. I owned properties in NY for many years and Italy - rent control causes property owners to stop renting. So, wondering why doing this? Put on the ballot if you feel it's necessary.		
	Ford Greene	SA	x		x		For something of this importance the public should have more than 2 minutes. People want to vote on this. People are motivated to get a referendum. The issues are too important. The scope of current protections for the State they bite landlords. Mom/Pop landlords are not corporations. They often rent out space so they can stay in place - not right to gouge them further. Most important: rent control tends to set-up a relationship of hostility between tenants and landlords - we don't need that in San Anselmo. Landlords will take their units off the market rather than be tortured by the laws. And they can jack up the rates prior to laws taking effect.		
	Sue Ellen	SA			xx		I found the original State laws really confusing. Do you think the tenants understand how much their rights have been improved by just cause with AB 1482? They have a lot of rights. So good idea to let everyone get used to it now. I don't understand what the fair return of appeals is about? And retaliation - I raise the rent 2% and find that hard to do. I love my tenants		
	Katie Hogan	SA - 47 years				Realtor	Realtor. You've given us examples of 5 towns. 2 are going to have votes - so we are talking about 3 that have rent control. Apparently none of the other towns have rent control? Majority rules? In regards to a fair and reasonable return. Some people put down 30% to purchase a home, some pay in full. Taxes are high. Rates of return calculated. Is fair rate - a net rate of return? I'm assuming so. This should be tabled - and maybe brought up to a vote.		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	Ben Burto					?	Are the policies going to have the net effect of incentivizing or disincentivizing.... I would point out that governement does not provide housing, private people do. There is a housing shortage in Marin. Housing will always be more expensive here. If you start from zero you do not get a positive cash flow for a long time until rents rise enough to get a return on the investment. Expectations in CA: negative effect on housing production, know landlords who chose to sell vs dealing with issues regarding tenants with housing regulations. Intelligent alternatives - Housing Element, ADU's. New regulations will create additional beaucracy, increased cost to housing and with net result of opposite purpose		
	Alex	Grew up in SA			x		Landlord for one single house. Realtor. Had sellers who could not vacate their tenants. Prices remain high due to beaucratic red tape. Question the incentive. Imagine a fair share of revenue to the government comes from property taxes?		
	Man	35 year property owner in SA			x		Just paid off property bought 35 years ago last year. Nobody regulates accountants or grocery stores or plumbers, but why push for landlords. As if we are evil and trying to take advantage of our tenants. Seems immoral in an organized political way. There is clearly a lack of affordable housing in Marin. This regulation pushes the problem onto property owners - making rental properties the new low income housing. The whole county is responsible to address, not just property owners. Ask that this be tabled		
	Jeff Kroot		x		x?		Real life situations. If someone has a problem it can cost people $50-100K to get rid of an awful tenant. Council members should have the courage to be here to hear this. We owned a house in Berkeley before we moved here - we rented to graduate students - we started getting bad tenants. We sold it before rent control came in. In SF 60K units are off the market because of rent control. 2 minute time limit is not a requirement - please don't limit in the future.		
	Josh	SA				?	Tenant and landlord in SF in the past: the pattern there is one of escalation. Put in reasonable rent control. Bad actor landlords find loopholes - escalates rent control and system of bad blood. Unintended consequences: benefits tenants already there. Hurts tentants who are protected (age, etc.) Upkeep and investment. Chilling effect on building properties. Wanted to decarbonize but didn't because got negative feedback.		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	Nicolaus	SA	x		x		Thank you for putting this together. 3 minutes better. Who is the decider if it doesn't come to vote? If the councilmember is a tenant or a landlord then isn't that a conflict of interest? Taxes are way up, water is way up, garbage is up, sewer fees, the fees are all way up - the rent then has to go up too. Winning lottery ticket if you are already here if there is rent control. The high school kids now will be shut out if they want to come back		
	Margaret	SA - 48 years	x		in Fairfax		Owns duplex in Fairfax. Don't repeat their process. Go on the ballot. Shortterm relocation - 4 people - $900/day while landlord is spending money for contractors for a little remodel. Reasonable return: $1M duplex, put down 30%, $700K loan at 7% + taxes. The rent for one bedroom in Fairfax = $2000/month. Negative return. I feel sorry for the tenants, but landlords aren't in the charity business, do not punish them. Protected groups also suffer.		
	Derek	SA - 25 years	x		x		Mom/Pop landlords. Cost of being a landlord is not inexpensive.We haven't raised our rent in 6 years throught the pandemic. Our property taxes are over $1000/month. Villanizing the landlords is not a good idea. Uncle in Berkeley - wanted to give his brother a 6-plex property there. He had a squater and three people paying below market rate. Litagation fees too high to make it at all affordable. Brother walked away. We may not rent our unit if rent control passes here. All the utilities increasing hits us hard.		
	Wendy Todd	SA resident	x				Three questions: 1. Why are we doing this? Fineman had asked for data/demographics - can we see those? 2. Why were Ojai and Oxnard looked at? 3. What criteria is staff using to develop recommendations to Council? You are just gathering information? I've been a volunteer to go door to door to hear from tenants. I wanted to understand the issue myself. People like to tell their story. One example: Parkside - change of ownership, tenant concerned about increases. That's what I hear across the board - concerns and instability. Domenican University presentation just given had a lot of data. We need policies in place to preserve housing. A lot of unintended consequences. Encourage to determine what it would take to protect renters. And consider all multi-plexes.		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	Kurt Ries	SA renter					Co-chair of Marin chapter of ..... Clear up point 0 Marin DSA representatives are paid. I grew up here, and am fighting to survive here with my daughter. Truly baffling that people don't understand why this is being introduced. 1/2 rent burdened - paying 50% of salaries to rent. People cannot afford to live here. Policy provisions - urge Council to focus on a rental cap: % of CPI with ceiling above that. And adopt just cause eviction provisions. And mandate relocation payments 3-4 months rent. Lastly make policies as broadly inclusive as possible.		
	Rick					landlord elsewhere in the County	Landlords of a 5 unit place elsewhere in Marin. Rent stabilization is a local attempt to deal with a much larger problem. It's a temporary solution. Need to increase supply for workforce housing. Risk when you buy a rental property. No easy fixes. Fair and reasonable return definition has not been apparent.		
	Kyle	SA renter		x			Raised here. Child life expert. Work with kids on hospice care. Just cause eviction clauses. Housing insecurity is a public housing crisis. Women, people of color, and families with children are at high risk of eviction. And the threat of eviction can exact a physical toll. Protecting school aged children - will benefit. Every move - student loses 3-6 months of school, miss doctors appts. Quoted studies.		
	michael	SA	x		x		House and duplex over 20 years here in SA. lucky - had good tenants. I've heard a lot of horror stories: can't get rid of them or have to pay to get them out. It's a business agreement. Just cause is an interesting definition. I should have the right to give tenants ample notice when I would like to terminate our agreement. Sacred to home ownership. Renters who live on the same property as the owner should have rights.		
	Corrine	SA	x		x		22 years ago bought a duplex. Owner occupied. Never raised rent about 2-3%.I am concerned about just eviction. When I bought here I found something in the SA flats. I bought a duplex in case I needed a caregiver. But I'm older now, and I resent the fact that if I need my other unit for a caregiver then I can be financially penalized. Please exclude owner occupied situations.		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	Alison	SA		x			Tenant in SA for 27 years. I hope we can listen to each other and not hear us dismissing anyone. It's been interesting to hear about unintended consequences and people's stories. We rent because we can't afford to own a place around here. Hard to hear that it's a problem looking for a solution. I've had the same amazing landlord who gives minimal increases. Compromises that don't incentivize people. Listen and don't demonize people.		
	zoom - Donald				x		I'm a SA landlord who lives in Mill Valley - I didn't receive a notice. Needed for maintaining diversity. Socialism doesn't mean an individual subsidizes - the community. Own a complex in SA, we don't have a big pot of money, we've had tenants there for 38 years and 21 years. We are in our eighties. We pay $4300/year for sewer. Rent is driven by costs not by greed.		
	zoom - Veda			x			Thank you for the presentation. Currently a renter, but have been a homeowner and landlord. It's a people business - not necessarily a money making business. Dealing with people with a precarious commodity. If we continue to raise rents - there is not government agency that will fault you for that. Important to have protections in place for tenants. Trust our councilmembers.		
	zoom - Rick				x		Landlord in SA. I don't understand what is going on here - free marketplace isn't about screwing over one person to benefit another. When one of our tenants had trouble during Covid, we gave them free rent, we worked with them. I would ask to think of what they did with Sir Francis Drake Blvd - they didn't rename it because of the hardship for people. Think of that same level of leadership. We don't go to Safeway and tell them how to sell their canteloupes. Put it to a vote		
	zoom - Kate			x			Overwhelmed by the lack of discussion who talk about the importance of the community and diversity. It matters to have people who work here to live here too. I've been renting in SA for 8 years. It's hard, I don't have security - we live in fear. I'm a teacher for two decades. I want people to care about who lives here and protect them. We need rent control. Mom/Pop landlords seem to be fair. Let's work together and find an equitable solution.		

	Rent Stabilization - Community Discussion #2 - Landlord Concerns/Questions - October 5, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	Attendees	
	zoom - Victor		x		x		Lifelong resident of San Anselmo. We should call this rent control. 3 evictions in 30 years. My rents are low, everything goes up, but I don't pass all of that along to my tenants. We don't have tons of money. Oxnard is 200K people. Ojai has ...people. Look at Evictions that have occured in SA, they have to go to court - there aren't many in SA. We need a public/private enterprise to make this work. Landlords don't have a lot of money. Let the people vote.		
	zoom - Warren		x		x		Small ADU in San Anselmo. When bought the home - provided them access to ADU for 4 years after they had a tragedy. I don't think I could make that same allowance if these types of rules were so strict. I wouldn't rent. Issue needs to go to the voters.		

	Rent Stabilization - Community Discussion #1 - Tenant Concerns/Questions - September 14, 2023 - – In-Person and Zoom Public Comment								
	Name	Jurisdiction	Homeowner	Tenant	Landlord	Neither	Comment	Attendees in Chambers	
	dr don hart	SA	x				I have lived here 40 years. I am here to speak about what I think is right. The concept of liberty. The rent control thing is communist garbage. I've seen what it does in NY. Landlords cut off the heat - tenants and landlords need to benefit one another it's supposed to be a free market. Life liberty and property (vs pursuit of happiness). What if this Town adopted an ordinance that we had to bring homeless people into their home? You have no right to tell people		
	John Falcone	SA		x			Just moved here to move to the seminary. I hear rents are going up - the more we know why then we know what to do. It's useful to know the root cause. I'm a religious scholar - told story about a ship drilling a hole. It's important to have your own cabin, but do not to sink the ship.		
	Jonathan	SA	x				I'm a homeowner I feel the diversity of economic backgrounds is what makes this community and it is at threat. It's crucial to create stabilization for the community. And for the neighbors we value very much		
	Zoom Kay	? county		x			Teacher in County. Live under constant threat of having to leave the county due to rent increases regularly. Every 3-4 years ok, but recently mgmt company every year. I live under so much stress. We need to do the right thing. We don't get raises every year. I've been educating kids in Marin for 3 decades now, my kids grew up here. I urge SA to think about what we want. I hope we can do better than that. STabilization closer to 3-4 % please.		
	zoom michael	SA	?				I've been here for quite a while and I contribute to the community. We will lose creativity and the kids suffer when things go out of control. I teach art. We need to be artists, musicians, dancers - if you work all the time to pay the rent, that doesn't work. Good creativity is important and needed.		
	zoom Pat	San Anselmo	x		x		SA since 1978. Tenants since 1997 - never raised the rent, I have reduced the rent. We do need to approve rent stabilization at 5%. When I was a teacher other teachers had to move. Neighbors move because their kids can't afford to live here. When you build your lease, you know what your costs are then you base your rent on that. Your tenants hope you pay your bills and mortgage and taxes. The state left it open for municipalities to do what is needed for their community. There are bad actors out there so we need rules		
	zoom Skylar	? county				x	Political director of Marin County of Democrats. Thank you to Town for thoughful approach and thank to speakers. Advocating for rent control. Difficult for any young people to live here. I'm a student at COM as well and a lot of my fellow students come from a long way to get here. 5% is great, but even lower is even better. I make $30/hour at a law firm and have to live at my parent's house. Thank you		
	zoom Colin	San Anselmo	x		x		I've lived here for about 6 years. Can only afford because we rent out part of our house. That income is important. Same tenant for 4-5 years. Raised rent about $100. I dont like the idea being told how much we can increase rent. Because taxes go up. We are fair. We take care of our tenant. I don't like having the governement telling us what to do. If we think ti will stop gentrification we are fooling ourselves.		
	Ford Green	SA	x		x		Lived here in SA for 40 years first as a tenant and then as a homeowner and a landlord. Mom and pop landlords - there isn't a lot of difference between survival status for landlords and tenants vs corporate landlords. I would like to have that differentiation stated. The corporate concern has nothing to do with San Anselmo or this community. Water meter is an example. I have no control over rate increases. The liberty of managing your own property. Sometimes you might rent for someone who is difficult/crazy/hostile - to have to live with that is unfair. Hopefully we won't end up like Fairfax.		

	Rent Stabilization - Community Discussion #1 - Tenant Concerns/Questions - September 14, 2023 - – In-Person and Zoom Public Comment								
	Name	Jurisdiction	Homeowner	Tenant	Landlord	Neither	Comment	Attendees in Chambers	
	Tatiana	SA		x			Lived here since 2010. I love this town. I'm a local artist at SF Opera as a makeup artist and student at COM. I do children's face painting. I clean houses too. I've been a nanny. A teacher assistant. The rent and living here is expensive. I can survive here as an artist and single parent. I have a very kind church community - offering us subsidized rent ($800). My daughter just graduated from HS. I'm not sure I can stay here. I have to give up my housing now that my daughter is 18. Help us artists survive.		
	woman	SA?	x		x		Rent control. When communists took over in china- landlord couldn't survive the reduced rent. Homeowners become homeless. Her parents were. Mom/Pop landlords. My bank owns my house. I live in the basement and I have renters living in my house - if I lose my tenant, then I lose my house. During Covid we lost thousands $$. Gov't didn't give us property tax discounts.		
	William Conk	SA		x			If the rent goes up, I'm evicted immediately this year. That's all I have to say (tears)		
	NYC woman	SA?	x				Curious about Airbnb, regulated in Tahoe. I hope we put on guardrails - studies where there is Airbnb, there is homelessness. I hope we keep that in mind.		
	Anita mitchell	SA	x		x		landlady now - mom/pop. Small inlaw unit. I want to reiterate the sentiments of the difficulty for landlords like us to live here. We have been here 21 years. We rely on our rent to live here. Current tenant lived here 6 years. Never raised rent. New bathroom and major remodel. We gave her a break during Covid, and with a paymet plan she paid us back. We were in dire straits - since we still had all of our expenses with no breaks. I truly hope that you realize it's not just big corporations/greedy landlords. I am in favor of a cap, but I do hope everyone understands our side of the story as well.		
	Steve	SA		x			Renter been in SA for 20 years. I want to point out that people have been getting a mortgage reduction for many years. Renters do not get a break. When we talk about what is fair - there has been a long subsidy for homeowners not renters.		
	zoom hilary	SA	x				Ilved here for 17 years. We are homeowners. Great community. I agree on airbnb/short term rentals should be a focus. People are buying up houses all over and renting them out. The unintended consequences are very scary. I'm concerned about homelessness. We have social responsibilities here. I would like to see more protections		
	zoom anne	SA	x		x		I am a minority. I think there is a stigma about homeowners/landlords. I am new, been here 6 years. I have a roomate to be able to live here. There is no control for us over taxes or repairs. If there is a cap then it is hard because inflation is going up. All those costs are not 3-5%. I would like to see the data to see if this will fix the problem. Please don't put everything on the homeowner to subsidize.		
	zoom victor	SA	x				Lifelong resident of SA. We live in a democracy. My parents were imigrants and came here and lived the dream. Needs to come to a vote. Let the people decide.		
	zoom david	SA	x		x		SA renter and homeowner and landlord. Entire career in mortgage finance industry. I can tell you that at no point did we underwrite with an assumption that a landlord can raise the rent any time they want. Oneous of risk is on the landlord. We cannot pass off our bad decisions to the renters. Argument against stabilization is naive. If you		

	Rent Stabilization - Community Discussion #1 - Tenant Concerns/Questions - September 14, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	**Attendees in Chambers**	
	zoom joe	SA	x				I'm a new renter in SA. Moved here 3 months ago. Some bitter conflicts over rent control. I think the longterm solution is to build more housing and I hope the town council will focus on that. It did not fulfill it's housing element on time. Include dense/multi family buildings. We have good jobs but we are locked out of ownership. Decades of exclusionary housing. We need to build more housing at all different levels.		
	zoom Sarah	SA	x				10 year resident and homeowner. Speaking of the seniors in our community - it's clear the rent caps are a shortterm way to prevent homelessness. Need more affordable housing as a longterm solution. We see our older community members who are precarious and living on social security - it's possible to install rent caps. You can also consider income limits set into policy for protections. Happy medium using good data to make an equitable solution		
Eviction Protection Items								27 people	7:30 PM
	eddie	Marin/SA		x			Want to request add info into your communication. I have received 100% rent increase - granted a 60 day notice. Only protection. When renters move it's a pain in the ass. Security deposits are often kept in bad faith by landlords. It's part of the game of increasing income. You can go to court but you have to convince a judge and most renters don't. In my three situations it was mom/pop landlords	(37 on zoom)	
	woman/reverend	SA		x			My concerns: I have a woman who wants to sell her house and she wants me to leave. She has given me lots of notice - she has rented to me undermarket. SFTS is older than the town of SA. Univ of Redlands bought it which was necessary. They didn't do a very graceful job. Another graduate school is coming in.		
	chris braun	SA		x			Resident here in an apartment for 30 years. My landlord died and Tom Garbarino bought it two years ago and hired a large mgmt company that is a criminal organization. I have section 8 housing and legal aid shut them down. 8 Laurel Avenue. This is criminal and has happened over and over since they took over. They want people like me out and so people who can pay more can move in. Rent control is a vehicle to help the process of keeping SA from being overrun by the wealthy. There are a lot of controls involved. My family has lived here for over 90 years. I represent the history of this town.		
	Erin Hughes	SA		x			The cool postcards did not get to a lot of us. That can present problems if you want a wide represenation. Only about 1/2 in my complex received them.		
	zoom - Anh duong			x			Seattle rental market - larger corporation has the ability to spend thousands to relocate people. Not the mom/pop landlords. Why is the penalty so much on landlords with regards to renewals. Airbnb can put money into local economy - with restrictions. Not outside investors.		
	zoom - Joe						Thank you again to the Town for doing this. I feel like I'm locked out of ownership. I have a friend getting kicked out of his house and he's getting probably $20K to move out. It's not necessarily enough since it's dfficult to move out. Landlords should have to have just cause to evict. Not to discriminate against tenants. Build more housing at every income level. To allow a real diversity in Town		
	zoom - Michael Sexton						Marin Residents.org founder. Every community has the right to decide housing policy for their own community. It didn't happen in Fairfax. Regardless of policy - encourage to bring it to a vote of the people in 2024. CA does already have comprehensive rent control. Adding more adds more problems. This has been wonderful to see how you are doing it.		

	Rent Stabilization - Community Discussion #1 - Tenant Concerns/Questions - September 14, 2023 - – In-Person and Zoom Public Comment								
	Name	**Jurisdiction**	**Homeowner**	**Tenant**	**Landlord**	**Neither**	**Comment**	**Attendees in Chambers**	
	zoom - victor						We need housing in SA. 20% low income, we need more than that. We need to look at building housing. We are losing population it's over priced, especially for service workers. ADU's have to have 4' from property line - that stops a lot right there. Private/public organizations are needed. I think ADU's are the way to approach fair housing.		
	zoom - skylar						Marin County democrats. I do agree that longterm necessity is building more housing. In SR - northgate housing - 10% will be dedicated to low income (double requirement), but even at lowest level - it's 50% of median income ($50K). In the short/medium term, rent control is still needed.		
	zoom CC		x		x		No landlord wants to evict a good tenant. It's thousands of dollars to turn over a place.That's a misperception		

Dear Council members,

Please read our letter in opposition to rent control and tenant improvement ordinance.

Best,

Hassan Afrookteh

415-377-8442 Cell
afrookteh@comcast.net
www.domusbuilders.com

San Anselmo Town Council
towncouncil@townofsananselmo.org

I am writing to express my strong opposition to the proposed Rent Control and Eviction Protection Ordinance currently under consideration by the Town Council. While I understand the intentions behind this ordinance, I believe that it will have detrimental effects on both landlords and tenants, and ultimately, on our community.

First and foremost, I believe in the importance of property rights and the ability of property owners to make decisions about their own investments. Rent control measures interfere with this fundamental right by imposing arbitrary limits on rental prices. Such restrictions discourage property owners from maintaining and improving their properties, leading to a decline in housing quality over time. Moreover, they discourage new investment in rental properties, limiting the housing options available to our community.

Furthermore, rent control can lead to unintended consequences such as reduced housing supply and a decrease in the overall quality of housing stock. When property owners cannot realize fair market rents, they may be less inclined to invest in property maintenance and improvements, which can negatively impact the living conditions of tenants. This could result in a decrease in property values throughout our community. In a survey of 464 economists in a May 1992 issue of American Economic Review, 93% agreed that a ceiling on rents reduces both the quantity and the quality of available housing. It is an accepted economic principle that government-imposed price controls, i.e., rent control, always lead to price distortions. Many landlords may prefer to sell or otherwise remove their rental housing if faced with strict rent control.

Rent control can lead to inefficient allocation of housing. Since rents are artificially capped, some tenants may stay in larger or more desirable units than they need, while others may be unable to find suitable housing because available units are occupied by long-term renters. Too often, the well-off enjoy artificially low rents and stay in their rent control housing for years displacing the truly needy. This can result in a mismatch between housing supply and demand. Most importantly, rent control should be reserved for those who need it, and include effective means to determine need based on level of income.

Broad eviction protections may deter responsible property management. Landlords may find themselves unable to address issues such as non-payment of rent or disruptive behavior, sub-leasing without their consent, and perma-tenants. Cases of abusive tenants are all too real, yet are seldom reported in the media. One such case can be read here: https://lamag.com/news/airbnb-rental-squatter-bel-air-tenant-from-hell, as well as here: https://www.sfchronicle.com/realestate/article/airbnb-la-tenant-similar-dispute-oakland-home-18411423.php. Little or no safeguards are in place for the unfortunate homeowners who can find themselves caught in these types of situations. The consequences of ill-conceived eviction protections can lead to unjust victimization of homeowners in the short term, and a long-term deterioration of the living environment for other tenants and negative impact on the community's quality of life. Property owners provide the property taxes that are the lifeblood of our communities. The Town Council must find a way to avoid killing the goose that lays the golden egg if it wants to protect tenants.

In areas with strict rent control, black markets for housing can develop, where tenants pay additional, unofficial fees to landlords, or existing tenants, in exchange for renting or sub-letting a controlled unit. This can undermine the intended benefits of rent control and create an environment of illegal and unregulated housing transactions.

I believe that a more balanced approach, which encourages both property owners and tenants to uphold their responsibilities, would be a more effective way to address housing concerns in our community. This approach could include incentives for landlords to maintain and upgrade their properties and provide financial assistance to tenants facing financial hardship. Additionally, many mom-and-pop landlords who depend on their rental income can and will become the unintended victims of rent control. Any consideration of rent control and tenant protection must also include robust safeguards to protect homeowners from predatory practices of “Tenants from Hell.”

In conclusion, I respectfully request that the Town Council reconsider enacting a Rent Control and Eviction Protection Ordinance and instead explore alternative solutions that strike a fair balance between the rights of property owners and the needs of tenants. It is my hope that we can find ways to address housing challenges by re-examining our town’s zoning ordinance to encourage housing creation without resorting to measures that may harm our community in the long run.

Sincerely,

Hassan Afrookteh
Brooke Peterson
20 Lincoln Park
San Anselmo

From: Jennifer Asselstine <jennifer.m.asselstine@gmail.com>
Sent: Thursday, October 5, 2023 4:31 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: The Community meeting Oct 5 regarding rental policies in San Anselmo

CAUTION: External Sender

RE: The Community meeting Oct 5 regarding rental policies in San Anselmo

Hello,

I will be participating via Zoom tonight but I am neither a renter nor a landlord and I hope to listen to other comments. I am a member of the Planning Commission and my comments do not reflect the Planning Commissioners opinions. I am participating as a citizen of San Anselmo.

It is my understanding that San Anselmo has a heavy lift ahead in order to create the number of units required by the State of California within the next several years. Many people agree that small scale developments such as ADU's and second units are a significant and beneficial pathway toward meeting this goal while maintaining the architectural character of our town. In order to have built units result in additional housing for the town residents – today and in the future – it is important that we not only construct ADU's and second units, but that they are also implemented as permanent rental housing. Therefore we hope to continue to entice homeowners to consider creating permanent housing on their own property – perhaps adjacent to their own home.

I listened to the Fairfax Town Council meeting that took place after the rent control policies in Fairfax were recently implemented and the voices of the landlords suggested that many were considering taking units off of the town rolls based on their deep concerns about losing confidence in how the policies would affect their long term agency over their own homes.

While San Anselmo is not Fairfax, we hope that Town Council members will look deeply at concerns of local property owners who have experienced changes in rental policies. If our citizens do not remain confident that creating long term housing can be a benefit to themselves and the community and if they turn to less desirable options like AirBnb – San Anselmo will lose their ability to achieve goals that have been put in place by the most recent Housing Element.

Thank you

Jennifer Asselstine

1365 San Anselmo Ave

Rent Control in San Anselmo

Jonathan Bleier <jon.bleier@gmail.com>

Mon 8/28/2023 5:18 PM

To:**Town Council <towncouncil@townofsananselmo.org>**

CAUTION: External Sender

Hi San Anselmo Town Council,

Thank you for having a meeting to discuss rent control. I am a new resident of San Anselmo, I have been here for 1 year now and moved here for the fantastic Ross Valley School district.

My rent here is the maximum I can afford at $4100/ month plus utilities $250-$400/ month for a 2 bedroom 2 bathroom apt for me and my son.

About me and my son: I am a tech manager at a prominent tech company, working from home, and my son is a boyscout here in sleepy hollow, and he is in the top 10% of his class. He got top remarks on state testing. He achieved 4/4 on math and reading in the state testing. And he achieved a Top 10% lexile score. I am a very proud father!

It is increasingly worrying me that if rent goes up, I will not be able to afford to live here. I moved here to be close to my son's mom who lives on Butterfield rd, and my sons school, so that he can continue to be a part of this exemplary education system here and I can be a part of his life. I fear having to move away, not being able to take my son to school or having to tell him we can't afford to live here and I have to move farther away.

Please consider the renters in San Anselmo that are positive contributors to the community that would like to be able to stay here for our kids etc.

Thank you,

Jonathan Bleier

From: ConnieBorter
To: Rental Policies
Cc: Town Council
Subject: Re: Public Comment for 9/14/23 town council meeting
Date: Saturday, September 23, 2023 8:51:21 AM

CAUTION: External Sender

Sent from my iPhone

On Sep 20, 2023, at 8:07 PM, ConnieBorter <connieborter@hotmail.com> wrote:

My name is Connie Borter. I live in San Anselmo. I support the rental stabilization movement for San Anselmo.
I understand the pressure of making the rent payment. I was forced to move from my home in Sonoma County because of rental increases.I now live in San Anselmo with my daughter.
Rents are skyrocketing. My daughter is a teacher in San Anselmo and she talks of other teachers in our community that can't afford to live here because of the high rent.
The cooperate landlords have no interest in the community. Why should they? They don't even live here.Their interests are elsewhere, with their investors in perhaps North Carolina, maybe even China.
I want to support this community. Why should our citizens be forced to leave?
A community without some rent stabilization is a worried community.What happens when everyone is worried? Tension and Separation, and possibly an increase in crime.
Eviction should always be a fair action. No one should ever be forced out of their home because an out of town cooperation comes in with big business motives.
Other independent landlords, who rent their property and are dependent on that rent for themselves need to recognize their limitations and their part as part of our community. Everyone needs to be reasonable. Everyone needs to support each other and most of all keep everyone in their homes.

Sincerely,
Connie Borter
connieborter@hotmail.com
707 623 4282

From: louiedcat@earthlink.net <louiedcat@earthlink.net>
Sent: Thursday, October 5, 2023 10:46 AM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Cc: Town Council <towncouncil@townofsananselmo.org>
Subject: Eviction protection and rent control - from a resident

CAUTION: External Sender

Hello esteemed Council,

My name is Daniel Brogowski, and I live at 130 Woodside Drive in San Anselmo. Although this issue doesn't impact my current rental situation, I can't imagine that it won't impact me in the future, and for sure it's the right thing to promote and push for. As a renter, there are several things that worry me on a day-to-day basis, but the most pressing currently, which has the power to impact me more seriously than any other life upheaval might, would be that the owner of my house could pass on and his heirs could sell this property to an investor. Even though he has been generous with the rent and the current master tenant, there is no guarantee that anyone taking over for him would maintain that same loving relationship. I imagine it's even worse in situations where it is not a person's home that you rent a room in, but investment rental properties that are being profit-maximized efficiently.

I work at Good Earth, and I would estimate that 95% of my coworkers are renters, some of whom travel from places as far flung as Richmond and Petaluma because it's almost impossible to find affordable rentals in this area. Once the profit- maximizing corporations get control of rental units, they are required, by law, to maximize shareholder profit, which means that they will have to raise the rent the maximum amount allowable by law every time they are allowed to, or they will be at risk of being sued by shareholders for not making them enough money. This means that the only incentive in this equation is a push for higher rents that will continue to spiral up without some kind of brake on that acceleration.

I urge, implore, and beseech you all to carefully explore best practices that will maintain our lovely town as an accessible, family-friendly, working-class-friendly place to support all the people in our community who we love encountering on a daily basis. The people from whom we buy food, who teach our children, who are there to respond when we show up at the hospital in need, who take care of our pools, who clean our houses, and who want to raise their families in a healthy and safe place.

Please use the power you have to protect renters and their families and keep the nature of our town a lovely mix of people from many different income strata. Don't be bullied by the people with deep pockets and spare time who can make the most noise because they stand to lose their ever-increasing stream of revenue. There is a way that we can sustainably enjoy having rental properties and allow the people who own them to make a comfortable living from them!

Please seriously consider very strong rules about just cause eviction protection and rental increase caps that will show everyone the progressive and inclusive nature of our town.

I would love to come to the meeting, but unfortunately, I have to be at work, and rarely will have an opportunity to be at the Town Council meetings until and unless I buy in and become one of the owners at Good Earth, which is something I hope to do. I'm certain that, even moreso then, I will really appreciate having San Anselmo maintain an accessible inventory of rental properties for my fellow Good Earthlings.

Respectfully,

Daniel Brogowski

Sent from my cell phone - please forgive any typos.

From: Eileen Brown <eileen.cb.mft@gmail.com>
Sent: Wednesday, September 20, 2023 1:09 PM
To: Town Council <towncouncil@townofsananselmo.org>; Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rent Control Protects Families

CAUTION: External Sender

Dear Members of the Town Council,

Thank you for listening to the members of our community who need and support rent control. I appreciate you taking up this issue.

Strong rent control policies protect families, seniors, students, teachers and other members of our communities.

I urge you to pass an annual rental cap based on 60% of CPI, or 5%, whichever is lower. This would give renters and financially vulnerable members of our community a critical bulwark against the ever-rising seas of rent increases, and allow them to stay in our community.

I also urge you to create a minimum five year right of return policy following a no-fault eviction, so that tenants are able to return to their homes at their prior rent, *and* so that landlords do not abuse the no-fault eviction clauses.

As State Senator Mike McGuire said at a recent San Anselmo community meeting, the current state laws were created as a floor, with the intention that communities can create stronger protections based on local conditions. With exorbitant costs of housing in San Anselmo, I believe we are one of those communities which needs much stronger renter protections.

Thank you,

Eileen

--
Eileen Cohune Brown, LMFT
She/Her/Hers
Psychotherapy for Adults and Youth
On Coast Miwok Land
www.marintherapyworks.com
(415)887-8539

CONFIDENTIALITY NOTICE: This email is intended only for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. Access to this email by anyone other than the addressee is prohibited without prior approval. Please note that electronic communications cannot be considered either private or confidential, although every effort will be made to provide the highest security in sending/receiving and storage of your communications. If you received this email transmission in error, please notify the sender by reply email or by telephone and delete the transmission.

From: Charlotte Brown <cbrown94960@gmail.com>
Sent: Wednesday, September 20, 2023 3:03 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: San Anselmo Rent Stabilization

CAUTION: External Sender

Hello
I'm a senior renter residing in San Anselmo for the last 25 years and a Marin resident for the last 44 years. I am lucky enough to be residing in the same apartment for the last 25 years (had 4 previous owners) and the latest landlord has increased the rent steadily between 5% and 7% annually. Most recently in July 2023, there was a 7% increase. My landlord has been very generous with these high increases compared to other horror stories I've heard.

I continue to work full-time out of necessity and luckily just started collecting Social Security last year. My recent job raise in June 2023 was 3% and I would not be able to afford to stay in my place otherwise.

The new asking price for a recently vacant apartment in my building will be $2200 per month for the same 1 bedroom that I currently rent at $1800.

Thank you for listening.

From: Sara Chappelle <sarachap4@aol.com>
Sent: Friday, October 6, 2023 12:49 PM
To: Town Council <towncouncil@townofsananselmo.org>; Rental Policies <rentalpolicies@townofsananselmo.org>; Alexis Fineman <afineman@townofsananselmo.org>; Brian Colbert <bcolbert@townofsananselmo.org>; Eileen Burke (SA Council) <eileenburke@mindspring.com>; Steve Burdo <sburdo@townofsananselmo.org>; Tarrell Kullaway <tkullaway@townofsananselmo.org>
Subject: Important Rent Stabilization Information

CAUTION: External Sender

Good Afternoon -

I would like to point out that in the Thursday, Oct. 5th edition of the Marin IJ, there was a headline article that Marin Kaiser employees (radiology assistants, pharmacy staff, etc.) are striking for a living wage, causing non-essential services to be cancelled/postponed. Including some chemotherapy. They say the lack of a living wage here in Marin is resulting in a huge reduction in the quality of patient care.

A one-bedroom apartment in San Anselmo, if you're lucky, averages $2450 a month. According to rent.com, zumper.com, and similar sites, this is a 23% raise over last year. Since one is considered rent-burdened if their rent is more than one third of their income, one would have to earn $7350 a month, or about $45 an hour for a 40-hour week, to not be rent-burdened here. Further, most landlords renting require the tenant to earn three times the rent.

Kaiser, a facility which serves many San Anselmo residents, is offering $23 an hour, so it is obviously less now.

Several of the Kaiser employees mentioned in the article live quite far away, and have to travel in cars (which affects climate) to get here to work, because they cannot afford to live here.

They say expressly in the article that they should be able to and need to be able to live where they work.

I ask you to bear this in mind as an important example when considering our request for a timely San Anselmo rent stabilization ordinance limiting yearly rent increases to 60% of inflation with a cap of no more than 5% (hopefully 3 or 4%), whichever is less.

Thank you -

Sara Chappelle

Serge Avila

From: Sara Chappelle <sarachap4@aol.com>
Sent: Saturday, September 30, 2023 1:30 PM
To: Town Council; Alexis Fineman; Brian Colbert; Steve Burdo; Tarrell Kullaway; Eileen Burke (SA Council); Dave Donery; Rental Policies
Subject: San Anselmo Rent Stabilization

CAUTION: External Sender

Hello-

When I and others spoke on 9-14 on the rent control issue, many of us referred to 3 and 4% caps, which have been enacted recently in other Bay Area towns, and in other places throughout the State. 5% is awfully high ($100 a month more, every year, on a $2000 apartment). That said, I want to be sure the Council understands that while we are asking for a decent cap, that is AFTER language stating that it be 60% of inflation or the cap, whichever is lower. That, I presumed, the Council already understood is the first part of what is required, not just the cap. But since I did not say it out loud on 9-14, I want to reiterate it clearly in this email.

Also. It is really vital that included in the staff report and in the rent control ordinance is the requirement that is in the Fairfax rent control ordinance (I don't think Larkspur put this in); language requiring individual metering if water is charged. This is so important, as corporations are using the one-meter inequitable division with administration fees, etc. (which ends up including double-payment for washers, the main water usage in the building, as we already pay for the water when we pay to use them) to circumvent rent-control ordinances.

This practice, usually called RUBS (Ratio Utility Billing System), has been banned as a clear attempt to circumvent rent-control ordinances in several places in CA.

Please refer to the wording in the Fairfax rent control ordinance requiring individual metering if the landlord wants the tenant to pay for water. I have heard NO complaints about that part of the ordinance from any landlords. If you look on Craigslist, you will see that 90% of SA/Marin landlords still pay water/trash, which has historically been the case in apartment buildings. Including this language does not require them to not have the tenant pay for water, it just requires individual metering so the tenant is actually paying for the water they use, rather than the landlord using this shady system, which can never be equitable (people conserve differently, people are out of town for different amounts of time, some lengthy, etc.). And they are also generally using a third-party billing company, usually the company Conservice, which has itself had lawsuits against it for lack of transparency, added fees, difficult to understand formulas, etc. And the one-meter inequitable division is added to the rent as one thing. The corporation that bought my own building on Sycamore has done this, and actually puts it together with the rent as one charge, saying the water part is collected "first", so if not paid (if, for instance, the tenant has reason to think the water amount billed is not correct), it will make it look like part of the rent is unpaid, resulting in possible eviction. So, right there, there are circumventing rent control caps by making the utility and rent one thing. They also will not disclose what percentage THEY are paying of the one-meter water bill for grounds maintenance, leaks outside our units, and washers, which we have already paid for on a per-use basis. So, this is already happening in San Anselmo and needs to stop.

I'm sure if the Council passes a rent control ordinance, you want it to be respected and not have landlords trying to find ways, like this billing, to get around it.

Please read this link; it is an example of one decision to ban this billing in California.

https://smdp.com/2018/08/30/court-declares-that-landlords-cant-circumvent-rent-limits-by-charging-extra-for-water/

Again, this is an issue for Council legislation, and not the ballot. One-third of your constituents are renters, and one half of those are rent-burdened. That is fully one sixth of your constituents. Traditionally, vulnerable minorities have needed to be protected through the American way of legislation. If, for instance, as an example, de-segregating schools in the South had been put up for a vote on the ballot, there would have remained a lot of segregated schools. Some issues simply need courageous legislators or courts.

Income from rental property is a business. Every business in Town has their regulations. This is no different. Before the greedy corporations who have already taken over many San Anselmo apartment buildings, this regulation wasn't needed so much, but it is now. The landlords who say they don't raise the rent this much anyway will, of course, be unaffected. Only the companies who don't care about anything but extremely high profit, who don't care about San Anselmo at all, will be affected.

And, really, the Council can gather data about who is and is not one of these corporations (I personally know of 3 or 4 who have bought in San Anselmo and displaced community members of decades), but I hope valuable time is not taken in doing this. People can and will sell to who they want to, and these corporations will be known by their deeds; by the attempt to raise rents yearly to the full extent of the ridiculous State "rent control", which is set to expire in 6 years, anyway.

I see in the Town newsletter the Town has accepted a State grant for an Age and Disability Friendly plan. So presumably, the Town cares about its older residents. Many, many of the SA renters facing displacement by out of control rents are older. And make a smidge too much to qualify for subsidized senior housing, but not nearly enough to keep up with these insanely rising rents, after a lifetime of being able to pay the rent in San Anselmo. If San Anselmo cares about its older community members, it should certainly care to enact real, effective rent stabilization.

Finally, time is really of the essence here. Every day without rent stabilization is a day a long-time community member, your neighbor, can lose their home.

Thank you -

Sara Chappelle

San Anselmo Renter and Life-long Community Member.

From: sarachap4 <sarachap4@aol.com>
Sent: Saturday, August 26, 2023 12:37 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Cc: Dave Donery <ddonery@townofsananselmo.org>; Serge Avila <savila@townofsananselmo.org>; Town Council <towncouncil@townofsananselmo.org>
Subject: Rental Policies facts excluded

CAUTION: External Sender

Hello -

On the Rental Policies Webpage that was sent to all in this week's newsletter, I am upset to see that in the description of current State law, it says rent may be raised no more than twice a year. Separately, it explains that the cap is 10%, but does not say 10% YEARLY. Combined, these two things give the impression that it can be 10% twice a year, which isn't so.

Secondly, as has happened when describing AB 1482 previously, at Council meetings, etc. it is left out that this State law expires in 6 years to NO State rent control, VERY important for landlords/homeowners to know. It has been mentioned once or twice, but that fact is usually omitted when talking about the State law, as it is omitted in the online description of the law by the Town on the Rental Policies Webpage. For instance, when reading the State law facts at the first Town Council meeting on the subject this year, Mr. Donery did not read this fact, though it was on the screen in very small lettering, and really everyone was listening to him, rather than reading the screen. An honest mistake, I'm sure, but a fact that needs to be right out in front.

These are important facts, and I would like to see a correction of both of these things written into next week's newsletter and also in the description of the State law that is on the the Rental Policies Webpage, as fact, to clarify these things.

Also, I did not receive a postcard, myself, and I have lived at this San Anselmo address for 17 years.

Thank you -

Sara Chappelle

From: Bridget Clark <msbridgetaclark@gmail.com>
Sent: Thursday, October 5, 2023 4:33 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Cc: Steve Burdo <sburdo@townofsananselmo.org>; Alexis Fineman <afineman@townofsananselmo.org>
Subject: Rent Control & policies to consider for tenants

CAUTION: External Sender

Hi, as a home owner, I do believe we should consider some form of rent control in San Anselmo. The high cost of housing is a problem. There are landlords that are greedy. Please consider some policies that cap the rent increases.

I hope as leaders of our community, you will look at this with an equity lens. I can share examples of tenants in my neighborhood that have had nightmarish experiences in San Anselmo. There are some very unreasonable landlords in our area.

As our community ages, we should try and help to enable workers of all kinds to live in our area who can support our aging population. We need to consider reasonable policies for the common good of all people who are trying to live in Marin.

Thank you for your consideration.

Bridget Clark

From: Eileen Brown <eileen.cb.mft@gmail.com>
Sent: Wednesday, September 20, 2023 1:09 PM
To: Town Council <towncouncil@townofsananselmo.org>; Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rent Control Protects Families

CAUTION: External Sender

Dear Members of the Town Council,

Thank you for listening to the members of our community who need and support rent control. I appreciate you taking up this issue.

Strong rent control policies protect families, seniors, students, teachers and other members of our communities.

I urge you to pass an annual rental cap based on 60% of CPI, or 5%, whichever is lower. This would give renters and financially vulnerable members of our community a critical bulwark against the ever-rising seas of rent increases, and allow them to stay in our community.

I also urge you to create a minimum five year right of return policy following a no-fault eviction, so that tenants are able to return to their homes at their prior rent, *and* so that landlords do not abuse the no-fault eviction clauses.

As State Senator Mike McGuire said at a recent San Anselmo community meeting, the current state laws were created as a floor, with the intention that communities can create stronger protections based on local conditions. With exorbitant costs of housing in San Anselmo, I believe we are one of those communities which needs much stronger renter protections.

Thank you,

Eileen

--
Eileen Cohune Brown, LMFT
She/Her/Hers
Psychotherapy for Adults and Youth
On Coast Miwok Land
www.marintherapyworks.com
(415)887-8539

CONFIDENTIALITY NOTICE: This email is intended only for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. Access to this email by anyone other than the addressee is prohibited without prior approval. Please note that electronic communications cannot be considered either private or confidential, although every effort will be made to provide the highest security in sending/receiving and storage of your communications. If you received this email transmission in error, please notify the sender by reply email or by telephone and delete the transmission.

Serge Avila

From: Marin DSA <marindemsoc@gmail.com>
Sent: Thursday, October 5, 2023 8:37 PM
To: Rental Policies; Town Council
Cc: suzeenglish@comcast.net
Subject: Fwd: Thursday's public forum on San Anselmo rent control

CAUTION: External Sender

Hello town council and town staff,

I believe Susan (cc'd) intended to send this email to you all.

Thank you

---------- Forwarded message ---------
From: **SUSAN ENGLISH** <suzeenglish@comcast.net>
Date: Thu, Oct 5, 2023 at 12:29 PM
Subject: Re: Thursday's public forum on San Anselmo rent control
To: <marindemsoc@gmail.com>

To Whom it May Concern;

I cannot attend this evening's discussion but I would like to chime in from the point of view of a senior. I love where I live. I've been at El Paseo for the last 6 years. I am close to work and long time friends. My rent is being raised yet again next month. 5%! My salary is guaranteed until my 70th birthday and then just my social security. That covers very little and being in an expensive state, will cover less. If I am guaranteed a secure, homey environment, familiar to my needs, I would like to continue living where I am. I am sure there are many seniors in my situation trying to remain close to family and friends and the towns we love.

Please consider my words and that the rent hikes limit all our living conditions and well being.

Have a productive evening discussion. I hope to be at the next one!

Suze English
1355 SFD Blvd, #9
San Anselmo, CA

From: G.R Fariwar
To: Town Council; Rental Policies
Subject: Rent Control
Date: Saturday, September 23, 2023 2:41:41 PM

CAUTION: External Sender

To whom it may concern,

As a renter i would like to suggest:

1. strong rental cap based on inflation: A rent stabilization policy is only as strong as its cap on annual rent increases. It's important that San Anselmo's cap be tied to a percentage of the Consumer Price Index (CPI), so that it's fair for both tenants and landlords. ***We're asking for a rental cap set at 60% of CPI or 5%, whichever is lower.*** That means that during normal inflation years, annual rent increases would be limited to around 2%, while during high inflation years, annual rent increases would still hit a 5% ceiling.

2. Right of return: A key component of just cause eviction protections is to grant tenants the right to return to their unit if they are evicted due to no fault of their own and the reason for their eviction is no longer relevant. For example, if a tenant is evicted because the landlord or their family member wants to move into the unit, then the tenant should have the opportunity to move back into that unit—at their former rent—when the landlord or family member moves out. ***We are asking that tenants' right of return lasts for at least five years following a no-fault eviction.*** This would help prevent landlords from abusing no-fault evictions to circumvent rent control by evicting long-term tenants and jacking up rents.

3. Relocation payments: Another crucial part of just cause eviction protections is to require landlords who evict tenants who have done nothing wrong to pay relocation payments that allow those tenants to land on their feet and find a new place to live in the community. ***We are asking for relocation payments equal to at least 3-4 months rent*** so that tenants can cover first and last month's rent, a security deposit, and moving fees.

4. Applicability: We want San Anselmo's rent stabilization and just cause eviction policies to apply to as many renters as possible, while providing reasonable exemptions for small owner-occupied units. State law already prohibits local rent control from applying to single-family homes, condos, and buildings constructed after 1995. And with most of San Anselmo's renters living in small-to-medium-sized apartment buildings, **it's crucial that both rent stabilization and just cause evictions apply to *all* multi-unit buildings, including duplexes and triplexes.**

Best,

Ghulam R Fariwar

875 Sir Francis Drake San Anselmo,

FW: I support renter protections.

Rental Policies <rentalpolicies@townofsananselmo.org>
Mon 9/11/2023 3:48 PM
To:Serge Avila <savila@townofsananselmo.org>

Jeff Zuba
Finance & Administrative Services Director
Town of San Anselmo | 525 San Anselmo Ave | San Anselmo, CA 94960
Mobile (262) 989-2208 | Email jzuba@townofsananselmo.org

TOWN OF
SAN ANSELMO
EST. 1907

From: Kaytee Fink <kayteelady2@gmail.com>
Sent: Monday, September 11, 2023 1:58 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: I support renter protections.

CAUTION: External Sender

To whom it may concern,

Protecting renters means protecting both current residents and making San Anselmo more appealing and safer for new community members, which could bring much-needed diversity. San Anselmo has an opportunity to do better than Fairfax and Larkspur did.
In taking this up voluntarily, San Anselmo is showing good faith in supporting renters.

Do not attempt to turn this into a town referendum / vote, as Fairfax will -- the town can protect renters without needing to turn it into a voting issue. Voting would also be inherently unfair, as landlords have more resources, financially and to organize, than renters do.

Please support renters protections,

Kaytee Fink, she/her

I support renter protections.

Kaytee Fink <kayteelady2@gmail.com>

Mon 9/11/2023 12:57 PM

To:Rental Policies <rentalpolicies@townofsananselmo.org>

CAUTION: External Sender

To whom it may concern,

Protecting renters means protecting both current residents and making San Anselmo more appealing and safer for new community members, which could bring much-needed diversity. San Anselmo has an opportunity to do better than Fairfax and Larkspur did.
In taking this up voluntarily, San Anselmo is showing good faith in supporting renters.

Do not attempt to turn this into a town referendum / vote, as Fairfax will -- the town can protect renters without needing to turn it into a voting issue. Voting would also be inherently unfair, as landlords have more resources, financially and to organize, than renters do.

Please support renters protections,

Kaytee Fink, she/her

From: Stephenie Hendricks <stephdh@gmail.com>
Sent: Saturday, August 26, 2023 10:36 AM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Unique Input from a Landlord

CAUTION: External Sender

Hello,

We are long time San Anselmo residents, now living temporarily in British Columbia as I complete. a graduate studies program. Years ago I served on the Quality of Life Commission.

I wanted to reach out because I may hold a view that might be unpopular with landlords, yet is one that needs to be considered for the preservation of Quality of Life in San Anselmo..

I am a landlord, and have been one in Marin as well as up here in Canada.

I believe that landlords need to go through a vetting process to become landlords.

Landlords must begin to understand that they are providing homes for people who comprise the fabric of the neighborhood and of the larger community, and thus society as a whole. It is a huge responsibility. To me, this is far more important than profit from home rentals or equity from home sales.

I believe that landlords must sign a binding contract that guarantees the stability of their tenants' lives. Up here, we were required to have a property manager by law, for example. Evictions are a complex process

that require generous amounts of time and financial assistance for tenants. They were banned during the pandemic.

I also think that there must be some sort of way an algorithm can be fashioned that factors in the landlord's economic circumstances, the tenants' economic circumstances, the condition of the property, property taxes, insurance, potential equity growth, etc. and come up with a fair rent. **There is such a thing as "enough."**

We've always based the rent we charge on our expenses and offered below market rate so as to enable families or others who might be vulnerable to gentrification a chance to live in San Anselmo. Our current tenants, for example, were forced out of their previous 3 bedroom 1 bath rental when the rent rose to $6000/month. That's just plain greed and shouldn't have been allowed to happen. They had three kids in local schools and they would have been uprooted and moved to a new community. I had a friend who was in a basement studio apartment that had mold and no door on the bathroom and she was charged $3,000/month. Again, I believe this is the type of greed that ruins our community and it should be criminalized.

Home sellers need to take into account what works best for their community. When we sold a rental up here, where gentrification is also a threat, we had our property manager go to the tenants (it was a duplex, one couple expecting a baby) to see if they were interested in buying, and if so, what their price point was. One of the tenants who had been there eight years did want to buy it and so we started at his price point. We ended up selling it below market rate. We could have made more money, but to us, the value of not uprooting two families in the community combined with the equity we did make was enough. That extra money would not have enabled us to sleep better at night

knowing two families would have had to move out of the town, as rents and home sales are rising here, too. The new owner has repainted the house and is constantly working on updating it - the place is shining in the neighborhood. Every time I drive by I am joyful with the decision we made.

I've taken note of this proposal from a government official in the Netherlands : https://www.cbc.ca/news/canada/netherlands-housing-income-dutch-home-ownership-1.6899951
https://www.theguardian.com/world/2023/mar/15/netherlands-housing-crisis-dutch-elections
https://www.jchs.harvard.edu/blog/peoples-housing-non-profit-social-housing-netherlands

Up here they have other creative ways to house people. For example there is a "strata" process where a group of people decide to create an intentional living community with some shared responsibilities. https://www2.gov.bc.ca/gov/content/housing-tenancy/strata-housing

I believe that there has to be clear and strong policy for not only landlords, but also for land speculators, developers, "flippers," - especially those who live outside of the community - to curb greed; to codify sustainable business practices that provide housing while protecting a community equanimity that comes with stable housing.

If San Anselmo wants to be an enclave for the rich who will be themselves vulnerable as the middle class shrinks with no place to live (inviting crime and a narcissistic community culture), then the Town Council can continue the status quo.

If you want to create an innovative policy that is sustainable for an enduring healthy community full of families and retirees, that is inclusive of people making less than millions of dollars per year, you'll need to be courageous and strong. If there is a way I can help support efforts in this direction, I am happy to participate by Zoom.

I have to say, if San Anselmo continues on its gentrification spiral, we'll be seeing if our tenants are interested in buying and we will seek a more altruistic community in which to live upon our return to the U.S. For that matter, think of all the interesting, productive, and valuable, community centered people who aren't living in San Anselmo because it has proved impossible for them - particularly for young people who grew up there. These are great losses for San Anselmo.

I appreciate that you are making efforts to make things better, and I wish you the best.

Warm Regards

Stephenie

-

Stephenie Hendricks
250 777-7065

Without courage we cannot practice any other virtue with consistency. We can't be kind, true, merciful, generous, or honest. Maya Angelou

DONALD AND GLORIA HERZOG

From: Donald Herzog <donaldherzog@gmail.com>
Sent: Tuesday, October 3, 2023 3:34 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rent Control Forum

CAUTION: External Sender

Please provide this letter to each member of the City Rent Control Policy committee before the October 5, 2023 Forum.

If possible, please have the letter read at the forum.

Please send me the Zoom link for the meeting. I did not receive a postcard about the Forum.

Thanks,

Donald Herzog
Owner, 859 San Anselmo Avenue

October 3, 2023

Dear Members of the City of San Anselmo Rental Policies Forum:

My wife and I have owned the fourplex at 859 San Anselmo Avenue since 1973. We used every penny we could scrape together to purchase the building and didn't have a positive cash flow for over 5 years. We are now in our eighties and rely on the property income to pay our bills. Our net income is about the same as we would have if we sold the property and invested the proceeds in risk-free and carefree government bonds.

We pride ourselves on maintaining the building, keeping the rents reasonable, and having a long-term relationship with our tenants. One tenant has been there since 1985

45 EAST MANOR DR. • MILL VALLEY, CA • 94941
PHONE: (415) 302-0572
DonaldHerzog@gmail.com

(38 years) and another has been there 21 years. We have never evicted anyone in the 50 years we have owned the building. A Section 8 tenant got ill and lost her job. We worked with her and deferred her rent for several months until she got back on her feet. We do everything possible to keep the rents affordable and our tenants happy.

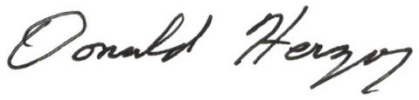
We previously owned a nice rental property in San Francisco. The rents were below market rates when rent control began, and we were unable to raise the rents enough to properly maintain the building while earning a reasonable return on our investment. Our tenant relations changed from very positive to the point where every action required appearing before a Rent Control Board. We ultimately gave up and sold the property to a religious order that evicted the tenants and converted the building into a tax-exempt facility. We don't want to be forced to sell this building.

Rent increases are driven by the real increases in the cost of utilities, appliances, maintenance, roof replacements, sewer lateral replacement, outrageous sewer taxes, government fees, painting, and everything else. Just as the San Anselmo Town Hall Project is double the estimated cost, so does everything for my apartment. Rent Control that doesn't allow increases reflecting real inflationary costs requires cutting maintenance and upkeep of our very nice building. It starts with the gardener being cut back from weekly to monthly, appliances being repaired instead of replaced, and carpets being replaced only when completely worn out. Paint will be touched-up instead of repainted. The roof will be patched instead of replaced. Maintenance will be deferred, and the resultant deterioration accepted. Our wonderful relationship with our tenants will deteriorate as a Rent Control Board inserts itself between us. If the situation becomes too onerous and unprofitable, we will sell the property to a corporate property owner with the staff and resources to game the system, and will invest the proceeds in a risk-free and carefree government bond. In our eighties, we do not have the stamina or the willingness to deal with a rent control board.

Rent subsidies are necessary in order to maintain a diverse community. However, subsidies are a community wide responsibility. Mandating that property owners subsidize rents is no different than mandating that a grocery store or any other business subsidize their customers. Rent subsidies should be provided by the entire community, just like food stamps and health clinics.

Rent control is the fastest way to destroy housing stock without using a bomb. Please resist the temptation of short-term political gain by pandering to those who think they can overturn economic reality. There are no free rides, and the results will be disastrous.

Yours truly,



Donald and Gloria Herzog

From: Nicole Heslip <nicolerheslip@gmail.com>
Sent: Tuesday, September 26, 2023 1:47 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: San Anselmo Rent Control

CAUTION: External Sender

Dear Town Staff of San Anselmo,

I am a renter and longtime San Anselmo resident and am writing to ask the council to develop strong local rent control and just cause eviction ordinances in San Anselmo.

The cost of housing has exploded in Marin. With the average home costing about $1.5 million, the only way that thousands of working families, young people, and seniors are able to make it here is to rent. Marin rents have skyrocketed to some of the highest in the nation, far outpacing wages. With almost no local protections in place, more than a third of all Marin residents—our friends, families, and neighbors—are one rent hike away from being forced out of their homes and out of our communities.

We need rent control.

A rent stabilization policy is only as strong as its cap on annual rent increases. It's important that San Anselmo's cap be tied to a percentage of the Consumer Price Index (CPI), so that it's fair for both tenants and landlords. *A rental cap set at 60% of CPI or 5%, whichever is lower, feels like a fair and just policy.* This would mean that during normal inflation years, annual rent increases would be limited to around 2%, while during high inflation years, annual rent increases would still hit a 5% ceiling.

A key component of just cause eviction protections is to grant tenants the right to return to their unit if they are evicted due to no fault of their own and the reason for their eviction is no longer relevant. A tenant's "right of return" should last for at least 5 years following a no-fault eviction. This would help prevent landlords from abusing no-fault evictions to circumvent rent control by evicting long-term tenants and jacking up rents.

Another crucial part of just cause eviction protections is to require landlords who evict tenants (who have done nothing wrong) to pay relocation payments that allow those tenants to land on their feet and find a new place to live in the community. Relocation payments should be equal to at least 3-4 months rent so that tenants can cover first and last month's rent, a security deposit, and moving fees.

San Anselmo's rent stabilization and just cause eviction policies should apply to as many renters as possible, while providing reasonable exemptions for small owner-occupied units. State law already prohibits local rent control from applying to single-family homes, condos, and buildings constructed after 1995. And with most of San Anselmo's renters living in small-to-medium-sized apartment buildings, it's crucial that both rent stabilization and just cause evictions apply to *all* multi-unit buildings, including duplexes and triplexes.

In summary, please develop and pass a local rent control ordinance in San Anselmo, with a strong rental cap based on 60% of CPI, as well as just cause eviction ordinances.

Thank you for your attention and consideration of these matters.

Regards,

Nicole Heslip

San Anselmo resident & renter

To: San Anselmo Town Council 10/5/23

I have lived here in San Anselmo since 1967 and raised my children as well as helped in raising my grandchildren. I have a right to continue living here in my own home without tenants having more rights than I do.

Unfortunately I had a house fire in January of this year and I am a tenant in a rental house, thus I consider myself a tenant and a home owner. There is strong possibility that when I return to my home, I may not be able to live there without renting out part of my home.

I understand how hard it is to live now for everyone, tenants and landlords.

Inflation is a killer; increases in water bills, PGE, home insurance and possibility of property tax increase as well as everything we buy, loom over our head.

Many people are a crisis away from being able to afford their homes. If seniors have to sell, they will also be renters and if wealthier people buy the homes, there will be less places for renters, possibly myself included, to rent thus increasing the housing problems. The strict rules Fairfax intended to pass is not equitable. It is not equitable if passed in San Anselmo either. If rules are so strict in favor of the renters, home owners will not rent out their homes, thus less housing for renters. By and large, Mom and Pop rental homes are not the same as corporate rentals and are simply trying to survive. It seems like a game of musical chairs to give tenants too much power over home owners and owners have to leave and leave the chair for someone else. It is outrageous to make mom and pop homeowners who have tenants pay 2 or 3 times the rent to a renter if they have to leave their tenancy. Who has that kind of money? I am not in favor of relinquishing my rights to renters, even if I may end up being one. The speaker the other night was correct when he said the housing problem should not be on the backs of home owners. It is a county, state and national problem that should be financed to provide more housing.

I urge our San Anselmo town council to avoid the mess in Fairfax and find an equitable solution for landlords as well as tenants. I do not think this equitable solution should include landlords having to support tenants. I do also want to add, I think the corporations that are building and renting large buildings should be considered on a different level than "mom and pop" rentals.

Thank you for receiving my letter.

Sincerely,

Joan kaul
joankaul@gmail.com

Received
OCT 18 2023
Town of San Anselmo

From: Amy Knapp <amy@amyknappdesign.com>
Sent: Thursday, October 5, 2023 3:51 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Additional rent control

CAUTION: External Sender

Town Council:

It has come to my attention that San Anselmo is considering imposing additional rent control measures on all San Anselmo landlords and I am really concerned about this idea.

I have an ADU unit that I rent for average to below market price. I believe I am a fair and good landlord and have in turn had several wonderful tenants.
Having the right tenant is important when you are sharing your property with others.

I added the ADU to help me stay in my home as I slowly retire and my income is decreasing. The ADU serves two purposes, offering much needed housing in a beautiful neighborhood and helping me stay in my home by generating income.

The cost to construct, maintain and pay property tax on these are not inexpensive, and after all is said and done it take years to break even.
Not to mention Marin County high property taxes and ever increasing utility prices.

After hearing about the Fairfax debacle and reading through your materials, I am saddened to say I would most likely NOT rent my unit if this would pass into law. It is way too risky and frankly not feasible for me to provide someone with endless months of rent if I decided I wanted to make a change. This gives the tenet so much power over my property.

I understand the issues of high rent in our area, my own adult children cannot afford to live here. That said, these new laws would take rentals off the market and decrease the supply of housing because people like me will be very wary to continue with rentals. Such a shame after the city was literally forced to add more housing and this is going to cause the reverse.

Rent control might make sense for properties with over 3 rental units, or owned by corporations, but for people like me who are retiring and just trying to stay in our homes it is a disaster.

It would decrease property values if folks see a rental unit as potential income but then see these laws in place. Would you even want to wade into the potential mess as a new home owner?

Do the right thing, add additional housing, not implementation of ideas from the socialist party of marin.

Amy Knapp
54 Scenic Ave
San Anslemo

FW: In Favor Renters Protection

Rental Policies <rentalpolicies@townofsananselmo.org>
Mon 9/11/2023 3:49 PM
To:Serge Avila <savila@townofsananselmo.org>

Jeff Zuba
Finance & Administrative Services Director
Town of San Anselmo | 525 San Anselmo Ave | San Anselmo, CA 94960
Mobile (262) 989-2208 | Email jzuba@townofsananselmo.org

TOWN OF
SAN ANSELMO
EST. 1907

From: Jonathan Knight <knight.jonathan@gmail.com>
Sent: Monday, September 11, 2023 1:08 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: In Favor Renters Protection

CAUTION: External Sender

I'm writing as a proud San Anselmo resident to encourage the adoption of strong renter protections. San Anselmo has a large renter population and they add crucial economic and racial diversity to our town. The vitality of our businesses, downtown, and cultural life depend on the stability of our renters. A fair system is very possible, but it must be effective in providing stability from sudden rent hikes or evictions.

Thank you!

--

Jonathan Knight

From: ylovell@sbcglobal.net <ylovell@sbcglobal.net>
Sent: Friday, October 13, 2023 1:42 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: FW: What does economic evidence tell us about the effects of rent control? | Brookings

CAUTION: External Sender

https://www.brookings.edu/articles/what-does-economic-evidence-tell-us-about
-the-effects-of-rent-control/

This is a link to a Brookings Institution article reviewing the effects of rent control in the housing market over a 20 plus year period in both San Francisco and Cambridge, MA. I hope the Town of San Anselmo will review this article before making any decisions.

Regards,
Yvonne Lovell-Lawrence

From: Rental Policies
To: Serge Avila; Dave Donery
Subject: Fwd: Rental Ordinances under Consideration
Date: Friday, October 13, 2023 6:01:58 AM

From: Yvonne Lovell-Lawrence <ylovell338@gmail.com>
Sent: Thursday, October 12, 2023 4:16 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rental Ordinances under Consideration

CAUTION: External Sender

I was not able to make the Community Discussion meeting on October 5th for landlords. I am very concerned about the proposed ordinances regarding rent control, because it will create a financial hardship on "mom and pop" landlords such as myself.
The single family home we purchased in 1986 was done as a partnership with my mother who lived in the property until her death in 2022. My husband and I were silent partners with my mother. My mother had been a majority owner, but we bought her interest in the property in order to supply her with an infusion of cash in the last years of her life. Beginning in 2018 we were planning to start repairs on the house, but my mother was diagnosed with cancer and it wasn't the time to start a major project.

The house has a lot of deferred maintenance, and as a result is currently rented at a below market rate of $2,550 per month. We were planning to start renovating the house, starting with a new roof and skylights which will total about $35,000. In addition, the siding has to be replaced on two sides of the building and a new deck built, etc. In other words, a lot of money has to be invested in this property in the near future. If the Town of San Anselmo adopts policies similar to Fairfax, it will be difficult to justify investing so much money into a single property to rent it with so many restrictions. If San Anselmo proceeds with proposed restrictions, we will probably just do the improvements and then sale it. So, San Anselmo will have sabotaged its goal of maintaining rental stock in the town.
The state has put in place protections for tenants. Maybe San Anselmo needs to consider tax incentives, zoning and density revisions to encourage affordable housing. However, if the town wants to drive forward more protections for tenants, I think it should be put before the voters.

Regards,
Yvonne Lovell-Lawrence

Sent from Mail for Windows

From: Beth Mahar <bethvisavis@mac.com>
Sent: Wednesday, September 20, 2023 10:09 AM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rent control

CAUTION: External Sender

Dear Sirs,

I just want to add my voice to all the beautiful people who are living and thriving in the lovely community of

San Anselmo.

I am a senior citizen who has rented homes here in San Anselmo for many years and I love living here. I feel safe. I feel seen.

But I am very concerned about the rising cost to live here and combined with inflation and my fixed income I worry that I can continue to enjoy this Community and continue to thrive.

I believe if the town passes a rent control ordinance with a strong rental cap based on 60% of CPI that it would be extremely helpful and put my mind at ease in regards to continuing to live and rent here in this great town.

Thank you for your time.

Peace and Love,

Beth Mahar

140 Tunstead Ave.

San Anselmo, Ca. 94960

Rent Increase Moratorium

Andrew Pederson <soundharma@yahoo.com>

Wed 8/30/2023 10:50 AM

To:**Town Council <towncouncil@townofsananselmo.org>**

Cc:pgoetzinsr@gmail.com <pgoetzinsr@gmail.com>

CAUTION: External Sender

To - Town Council Of San Anselmo, California

Dear Council members. Renters in San Anselmo, are increasingly
being burdened by growing rental costs.

Almost half of San Anselmo renters are paying 30% of their monthly income on housing.
A quarter of them are encumbered with 50% of their income.

We are asking you to offset this burden, with rent control,
so that a majority of San Anselmo residents, don't have to make choices between,
food, transportation and other necessities, and having a roof over their heads.

Please don't allow those living from pay check to paycheck, or Social Security,
to possibly end up, on the street, homeless. This could be the result,
if rent control/stabilization is not allocated.

I am a San Anselmo renter, since 2017, and Marin County resident, since 2010,
and if it were not for financial assistance, I would not be able to live in Marin County.

Thank you, for your consideration,
Sincerely,
Andrew Pederson

From: Gavin Pugsley <birddog001@gmail.com>
Sent: Wednesday, September 13, 2023 12:39 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>; Town Council <towncouncil@townofsananselmo.org>; Galyna Iakovenko <galynaiakovenko@aol.com>
Subject: A comment supporting rent control and tenant protections

CAUTION: External Sender

Greetings,

We have been residents of San Anselmo since 2012. We have many friends who live in San Anselmo and have been active in the community, including at local non profits and the local community garden at Robson Harrington park.

Our family belongs to a category of renters who can't afford to purchase a home for 1.5 or 2 million dollars, so our only option is to rent. We have been very fortunate to have been able to live in the apartment we have called home together for the past 8 years in downtown San Anselmo. The town is our absolute favorite place to live in. We are a middle aged multicultural family and have both lived in different parts of the world at one point or another. As single adults and later as a married family with a child, we have both rented rooms or apartments from early on in our lives including in San Anselmo.

The current apartment we live in could not be in a better location on Magnolia Ave. However, after our original landlord passed away and a rental management company took over, the rent has steadily increased every year, and has come with additional fees on top of the rent. It's worth mentioning that our annual rent increase is the highest amount allowed by law. We are worried that we will soon be priced out and our child will not be able to grow up in the place that we have called home for so long.

Throughout the time we have lived here, we have had many, many friends with families who were forced to leave San Anselmo due to the exponentially rising cost of living here.

We welcomed our first child a couple of months ago and we would love to raise him in this safe and welcoming community.

We welcome any tools the city can provide to protect us and our modest lifestyle in the community we call home.

Thank you for your consideration.

Gavin Pugsley & Galyna Iakovenko
26 Magnolia Ave. #5

Serge Avila

From: Rental Policies
Sent: Thursday, September 21, 2023 5:32 AM
To: MICHAEL SEXTON
Cc: Serge Avila
Subject: RE: video of meeting

Good morning Michael,

We are currently experiencing an issue with the video that was posted on the Town website. Here is a temporary link to the recording from 9/14 https://us02web.zoom.us/rec/share/lgtBoPMK1UttJOReO8Enk5Ah74CnR5jPno2fjXd97Fpt4OLgPb_LpXqw-QMWRnQN.HXCi1UTRAXbzvHCn. We have submitted this issue to our website provider to assist in getting the error corrected.

Thank you,

Jeff Zuba
Finance & Administrative Services Director
Town of San Anselmo | 525 San Anselmo Ave | San Anselmo, CA 94960
Mobile (262) 989-2208 | Email jzuba@townofsananselmo.org

TOWN OF
SAN ANSELMO
EST. 1907

From: MICHAEL SEXTON <sextonarts@comcast.net>
Sent: Wednesday, September 20, 2023 4:39 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: video of meeting

CAUTION: External Sender

The link to the video of the rental meeting is not working on the site. There is a link, but when clicked, the resource can not be found.

Thank you.

Michael@sextonarts.com



Michael Sexton
Photographer, Video Producer
www.sextonarts.com
michael@sextonarts.com
415.309.4560

From: Kathrin Smith
To: Rental Policies; Town Council
Subject: Rent Stabilization and Tenant Protection in San Anselmo
Date: Sunday, September 24, 2023 3:27:58 PM

CAUTION: External Sender

Dear San Anselmo Town Council and Town Staff,

Thank you for giving me the opportunity to speak at the recent renters forum. I appreciate all of the consideration and work that the town of San Anselmo is doing to address this critical issue. I am proud of San Anselmo for being one of the leaders in Marin to seriously address an issue that is complicated, multi-layered, divisive and yet here to stay. I understand that San Anselmo cannot solve the homeless crisis in this country, no one person or town can. But if each town and each one of us do what we can, as a collective we may be able to ease the burden of others. San Anselmo could set the bar high for other towns in Marin to do the same.

I have always been curious as to how much responsibility for the housing crisis is placed on the housing developers and corporate landlords. I never hear anything about them in the conversations to find solutions. I truly believe that housing is a human right. In my opinion, housing, like health care, should not be something that some make millions off of at the detriment of those who cannot afford it. But folks cry out "socialism" when this point of view is presented. I believe that regulations regarding the cost of housing must be implemented and enforced. There is just not enough housing, not enough affordable housing, and the wealth divide in this country will eventually take us all down if it is not reined in sooner than later.

As you know, one way San Anselmo can help ease this tenant (for example, teachers, firefighters, gardeners, caretakers, child care workers, restaurant workers, etc) burden is through a rent stabilization policy.

1. A strong rental cap based on inflation: A rent stabilization policy is only as strong as its cap on annual rent increases. It's important that San Anselmo's cap be tied to a percentage of the Consumer Price Index (CPI), so that it's fair for both tenants and landlords. ***We're asking for a rental cap set at 60% of CPI or 5%, whichever is lower.*** That means that during normal inflation years, annual rent increases would be limited to around 2%, while during high inflation years, annual rent increases would still hit a 5% ceiling.

In addition, tenant protections are instrumental in preventing homelessness. While working in Oakland from 2002-2018, I watched what happened when housing developers came into Oakland. Folks who lived for years in single occupancy hotel rooms, or modest affordable apartments, were forced out with nowhere to go but the streets. Year after year, I watched the homeless encampments grow up around every neighborhood in Oakland. Many of these newly homeless folks were lifelong Oakland residents. I saw individuals and families sleeping in their cars every night right outside my office building. They would wake up in the mornings, go to their jobs, and come back in the evening, spending the night again in their cars. Just cause eviction is crucial to keeping folks in their homes or compensating them so they don't end up on the streets.

2. Right of return: A key component of just cause eviction protections is to grant tenants the right to return to their unit if they are evicted due to no fault of their own and the reason for their eviction is no longer relevant. For example, if a tenant is evicted because the landlord or their family member wants to move into the unit, then the tenant should have the opportunity to move back into that unit—at their former rent—when the landlord or family member moves out. ***We are asking that tenants' right of return lasts for at least five years following a no-fault***

eviction. This would help prevent landlords from abusing no-fault evictions to circumvent rent control by evicting long-term tenants and jacking up rents.

I urge the town of San Anselmo to enact a strong rent stabilization policy and a strong tenant protection policy.

I appreciate you taking the time to read my letter and I look forward to hearing from you.

Sincerely,

Kathrin Smith

From: josopko
To: Town Council
Subject: Rent control
Date: Friday, September 22, 2023 7:03:36 AM

CAUTION: External Sender

Hello
I am a renter in san Anselmo .I am a senior on a fixed income. I am joining with other in the request for the town to pass a rent control ordinance, with a strong rental cap based on 60% of CPH is extremely helpful
Thank you
Jo Sopko

And don't feel like you have to cover all the information provided above! Even a short and sweet email calling for the town to pass a rent control ordinance with a strong rental cap based on 60% of CPI is extremely helpful.
Sent from my Galaxy

From: Marjorie Sun <msunusa@gmail.com>
Sent: Thursday, August 24, 2023 9:11 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: rental hearings recorded?

CAUTION: External Sender

SA staff,

Will the upcoming hearings on possible rent control be recorded? If so, will the recordings be accessible to the public a day or two after the hearing?

Regards,
Marjorie Sun
San Anselmo resident

Sent from my iPhone--
Best,
Marjorie

Marjorie Sun
m 415.261.8786

From: Shervin Talieh <stalieh@gmail.com>
Sent: Tuesday, September 12, 2023 6:37 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: rent control for San Anselmo

CAUTION: External Sender

Hello from a resident in San Anselmo.

My name is Shervin Talieh, and I live at 210 San Francisco Blvd. Having lived in Boise Idaho for the past five years, I moved back to my beloved California and to the town of San Anselmo specifically because of my experience in Idaho, specifically, the lack of diversity.

What makes any community great is the diversity of the people within it, and the convergence of interests in building something sustainable. Sustainability means that we must be able to provide housing that is affordable and accessible for people who want to work in the stores we shop at, the people who make the food we eat, and the people who take care of our children, our parents and our homes. Sustainability means that we should reduce the need for people to commute for hours, burning more fossil fuel and congesting our roads, further adding to our climate change. Sustainability means systemic protections against frivolous evictions and other punitive measures against the housing insecure.

Compassion is not the job of others; it is the duty of the citizens of each community, for each other. Rent control is at the heart of what is needed, right now, so that people are not living in poverty once they've paid their rent, or forced to uproot themselves in search of shelter and inclusion.

Rent control means creating disincentives for large, corporate landlords, and localizing our housing supply chain. As a homeowner, I welcome meaningful rent control (not performative 7% caps) and other safety measures that have real teeth. If we do not act now, our younger generation will be driven out of the community, and then we will slowly turn into a dying, privileged enclave with no growth, no future, and no soul.

I urge you to protect us from such a bleak future, and to do the right thing. Thank you.

Shervin

FW: YES on Renter Protections

Rental Policies <rentalpolicies@townofsananselmo.org>
Mon 9/11/2023 3:48 PM
To:Serge Avila <savila@townofsananselmo.org>

Jeff Zuba
Finance & Administrative Services Director
Town of San Anselmo | 525 San Anselmo Ave | San Anselmo, CA 94960
Mobile (262) 989-2208 | Email jzuba@townofsananselmo.org

TOWN OF
SAN ANSELMO
EST. 1907

From: Debbie Toizer <dtoizer@gmail.com>
Sent: Monday, September 11, 2023 1:05 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: YES on Renter Protections

CAUTION: External Sender

I am encouraged to hear that San Anselmo is looking into renter protections, and I'm writing today to urge you to move forward with it.

It is important to me, as a white resident of Marin, that our county be welcoming to a wide diversity of people and especially to more people of color. As things stand now, Marin County is not affordable for most people, with a rental rate that I understand is the highest of any county in California.

I applaud you for moving forward with reasonable but effective protections for renters in San Anselmo.

Thank you. Debbie

YES on Renter Protections

Debbie Toizer <dtoizer@gmail.com>

Mon 9/11/2023 1:05 PM

To:Rental Policies <rentalpolicies@townofsananselmo.org>

CAUTION: External Sender

I am encouraged to hear that San Anselmo is looking into renter protections, and I'm writing today to urge you to move forward with it.

It is important to me, as a white resident of Marin, that our county be welcoming to a wide diversity of people and especially to more people of color. As things stand now, Marin County is not affordable for most people, with a rental rate that I understand is the highest of any county in California.

I applaud you for moving forward with reasonable but effective protections for renters in San Anselmo.

Thank you. Debbie

From: Penny <kayakqueen@msn.com>
Sent: Saturday, September 2, 2023 4:20 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Meetings

CAUTION: External Sender

Hello:
I am a landlady in San Anselmo and would appreciate getting a link to these meetings.
Thank you.
Penny Wells
kayakqueen@msn.com
415-457-6094

Serge Avila

From: Ms Angela Gott <angelagott@yahoo.com>
Sent: Saturday, October 21, 2023 5:06 PM
To: Town Council
Subject: Support rent stabilization and tenant protections in San Anselmo on 10/24

CAUTION: External Sender

October 21, 2023

Dear San Anselmo Town Council Members,

I waited to age 70 to finally draw Social Security because I knew it would be very low based on my 53 years of low paid jobs. I was set at $1,254/month to start in May 2021, despite getting 32% more because I waited and maximized it at age 70. Many women of the boomer generation either never married or had short multiple marriages, each less than 10 years duration so they do not qualify for spousal support or widow survivor's SSA benefit from a former much higher earning spouse and these women also begin collecting Social Security at age 62 which is a huge mistake. Ronald Reagan in 1983 made our full retirement age 66 and those born in 1960 and later it is 67, so these women get a lifetime penalty of losing 25% to 30% off an already low check for life.

Social Security is based on the highest earnings of 35 years of working and so boomer generation women who were in and out of the labor pool raising kids and taking care of sick relatives have wound up with very low benefits for their old age years. I never married, never had children and never left the labor pool and always had multiple jobs, and still, even with 32% more, my SSA benefit was set to just $1,402 in May 2021 and with Part B Outpatient Premium taken off the top I wound up with just $1,254 a month to live on. I would be homeless and most women get far less than this amount because they did not even work the 35 years and have lots of zero earning years and they began collecting at age 62 and lose the $25% to 30% off an already very low benefit amount. This is why boomer generation women (born 1946-1964) wind up homeless in old age.

MARIN county and its individual towns have built very little low income housing. There are categories defined by HUD of poverty--acutely low, extremely low income, very low income, low income, and moderate. For years developers could pay money in lieu of building low income housing units in multifamily developments. When they did build affordable housing, it was usually for those in the low income and moderate income ranges. Almost no housing is ever built for the category of extremely low income and very low income levels. Because of inequality in pay, women wind up in the acutely low income and extremely low income categories and no housing is being built for this level of poverty.

Marin's seniors of the boomer generation are falling into homelessness. Minimum wage when I was 18 was $1.55/hour. These boomers entered the job market when wages were very low and women were paid the absolute lowest. We were the last hired and first fired. Women of the boomer generation never caught a break. Those who married and then divorced prior to 10 years of marriage are forever barred from inheriting their former spouse's Social Security survivor's benefit or access to spousal support and yet in most cases there were 2 to 3 kids born into these marriages and these women raised these children as single mothers and many never got child support or just sporadic child support and as seniors they are

deprived of the higher social security benefits their former spouses accrued based on their much higher earnings.

Society owes these boomer generation women who raised the next generation in the 1970s and 1980s and some of these women even raised grandchildren too. They need affordable housing and they deserve it. Marin County has just got to look at this. Marin County needs to have a discussion with the Social Security Administration to find out how many boomer generation women, residents of Marin County are on Social Security who are getting less than $1000 a month in benefits. Marin County needs to recognize the reality these boomer generation women face and build housing for their income stream so they can spend their final years living in dignity and security of having shelter in old age. San Anselmo simply has to build low income housing for this demographic. It is morally the right thing to do.

This is one of the wealthiest counties in CA and San Anselmo is one of the wealthiest towns so it needs to be compassionate and build low income apartments for boomer generation women. I managed to get on a waitlist at age 62 and I got extremely lucky and got into public housing at age 66. I am still working part-time to supplement my Social Security too. I use a rolling walker and I have a desk job in Larkspur-Greenbrae 20 hours a month at minimum wage. I will be fine because 30% subsidized rent is a gamechanger. All of Marin's senior women deserve to obtain what I have though. Marin has got to get busy and build this critically needed housing.

Sincerely,
Angela Gott, age 72, resident of Kruger Pines Retirement Home in Strawberry CA 94941

Serge Avila

From: Paul Gray <grayspaul@gmail.com>
Sent: Monday, October 23, 2023 2:31 PM
To: Town Council
Subject: Please support tenant protections, our community members are at risk!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges.

I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.

Sincerely,

Paul Gray (Kentfield)

Serge Avila

From: Rental Policies
Sent: Tuesday, October 24, 2023 5:23 AM
To: Serge Avila; Dave Donery
Subject: Fwd: Proposed San Anselmo Rent Control Ordinance

From: Bill Johnson <Bill@gothomes.com>
Sent: Monday, October 23, 2023 11:37 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Cc: Steve Burdo <sburdo@townofsananselmo.org>
Subject: Proposed San Anselmo Rent Control Ordinance

CAUTION: External Sender

Dear Council Members and Mayor Steve Burdo,

My wife and I are long time San Anselmo residents and property owners since 1981. We all live in a small town with limited land and houses. The idea of an additional rent control ordinance on top of the states 2021 rent control seems very hasty. When we think about the covid years and these new rental laws, has enough time passed to see what effect these laws will have on our housing? If you limit people's property rights will that increase or decrease their motivation to create more housing with our limited existing properties? We need more housing not less housing. Will putting the 'affordability burden' on a few property owners backs solve the problem? Or is this a simple solution 'band aid' to try to just do something?
These are serious questions and issues here. It would be good to have a more concerted effort to develop incentives to create more housing, ADU's , tax incentives for low cost units, find unused public land for affordable housing and more . Why not do the work to get community ownership and involvement in some realistic solutions. The rent control efforts have been used in other places and have not had the desired effects or positive outcomes.
Please, please take the time to review our thoughts and questions. Let us not be hasty in jumping at a solution with out getting all the people involved. At the least these type of community milestones need a vote of the people you represent and those most affected by the decision you are making.

Here's how more restrictive rent control has impacted other cities and can negatively impact San Anselmo.

1. The rental housing stock will decline as some landlords elect to sell properties to homebuyers rather than continuing to rent them .
2. Affordable ADUs will be withdrawn from the rental market to avoid eviction conflicts and expenses. A lower supply will put upward pressure on rental prices.

3. Elders and family members who want or need to move back into their homes may be required to pay tenants to vacate their property.
4. Landlords will be incentivized to maximize annual rent increases to cover higher insurance and maintenance costs and avoid falling too far below market rates.
5. Property maintenance will suffer as landlords minimize these expenses until their tenant moves out. Since tenants will not be likely to abandon below-market rents, depreciation will accelerate for the property and the surrounding neighborhood.

6. Some of the Town's limited financial resources will be diverted to pay for establishing and operating a rent control bureaucracy to enforce the local ordinance, hold rent board hearings, and arbitrate tenant/landlord disputes.

- Seventy percent 70 % of San Anselmo resident are property owners, only

30% are tenants

- Measure will give this minority a legal claim on the properties they are renting,
- Eviction for cause will be restricted
- Penalties to property owners to sell or use their property to meet their needs may be affected by this ordinance.

EFFECTS ON PROPERTY USE
1. Many owners will choose not to rent out their homes or ADU spaces
2. Elder homeowners cannot afford to keep their homes as rentals with the thought of moving back in if they or the family choose to.
3. There is little motivation to improve the property other than health and safety until a tenant moves out.

The outcome as shown on other severely restricted rent controlled cities have shown: as demonstrated will be

- Less rental inventory
- More expensive rentals
- No new units built
- Existing rental stock poorly maintained
- A declining in the real estate values overall
- The loss of homeowners property rights to use their property to fit their financial and the families' needs.

Thank you for your consideration ,
See you at the Council Meeting
Sincerely

Bill Johnson & Janet Franklin
348 Oak Ave
San Anselmo

Serge Avila

From: Greg Knell <greg.breakpoint@gmail.com>
Sent: Saturday, October 21, 2023 2:39 PM
To: Town Council
Subject: Please support tenant protections, our community members are at risk!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges.

I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.

Sincerely,
Greg Knell

Serge Avila

From: Rental Policies
Sent: Monday, October 23, 2023 3:22 PM
To: Dave Donery; Serge Avila
Subject: FW: 118-120 sycamore San anselmo

Jeff Zuba
Finance & Administrative Services Director
Town of San Anselmo | 525 San Anselmo Ave | San Anselmo, CA 94960
Mobile (262) 989-2208 | Email jzuba@townofsananselmo.org

TOWN OF
SAN ANSELMO
EST. 1907

From: Natasha Najafi <nnajafi2@gmail.com>
Sent: Monday, October 23, 2023 3:13 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Cc: Dennis Morrow <morrowden@comcast.net>; Brendan McDevitt <bpmcdevitt@aol.com>; Reza Najafi <rnajafi@paradisep.com>
Subject: 118-120 sycamore San anselmo

CAUTION: External Sender

Hi there- we are writing on behalf of many of our clients, but in this particular email, we write in behalf of our own investment. As
Property owners for many years, we had a plan. The plan was to invest in property so that one day we could retire and enjoy life. At this moment, there's almost no value or pride in owning property. We as owners are having so many or our rights taken away. Today, we own property so our tenants and bureaucracy can override and eliminate everything we have worked so hard for.

We do know there are a few that have taken advantage of increasing rents dramatically, but that's just a certain population. That's not everyone. We just try minimally increase rent to keep up with the increasing taxes, utilities, attorneys to protect our investment etc.

It feels sad and discouraging to have every part of our lively hood controlled. Just because we're owners, doesn't mean we have deep pockets. We have to keep up with the crazy interest rates, demands of entitled tenant covid etc. Not all of them are entitled, but it's becoming more of a trend.

We really are at the point of pleading to please reconsider all of these jurisdictions that is really hurting owners financially.

Thank you for your time.

Natasha Najafi BRE# 01269763
Paradise Properties BRE# 00654880
1001 Bridgeway Suite B4
Sausalito CA 94965
nnajafi@paradisep.com
415-332-7900 ext 112

Please always add
Elin Hyytinen ehyytinen@paradisep.com

Serge Avila

From: MICHAEL SEXTON <sextonarts@comcast.net>
Sent: Monday, October 23, 2023 9:26 PM
To: Town Council
Subject: Extra Rent Control Discussion

CAUTION: External Sender

Please add to your public comments for the Oct 24 meeting. Thank you.

It is not shocking to anyone to hear that housing in Marin is expensive. But far from a crisis, or far from this being a new situation, housing in Marin and San Anselmo has been expensive for several decades.

When I moved to Marin from SF in the mid 90s, rental housing was expensive. I was using about 50% of my income to rent in Sausalito. Was it a 'crisis' for me, no. Was it expensive, yes. But I choose to live in Marin for the same reasons that so many of us live in Marin, because of the weather, access to open space and quiet compared to SF and the East Bay. This is also what makes Marin and San Anselmo expensive - it is the demand to live here and the restricted supply of any housing, not the greed of the housing providers.

Contrary to what the DSA or Marin Environmental Community Housing (MECH) or any other publicly subsidized housing organization tells you, it is not greedy mom & pop landlords or corporate entities that set initial prices, it is the marketplace - the balance of supply and demand.

What is disturbing is that these organizations want to artificially curb prices by setting up extra rent control, but 1. It doesn't work, and 2. It actually makes rentals less available and with higher initial rents.

Many people believe the myth that housing providers can charge anything they want and raise rents year after year to astronomical levels. No. Housing providers are governed by the same economic rules which means that initial rents can decrease or stay level in tough years and increase due to other factors. No housing provider can charge more than what someone is willing to pay.

A September 19 2023 Marin IJ article: Marin Median Rent Declines Mirroring Bay Area Trend states that Marin rents declined by 6.1% in the last year, the largest in the Bay Area. This was a result of the decreased demand for housing because people are moving out of the area, and was well before any extra rent control in Marin.

It may be a surprise to some that San Anselmo rentals are already governed by comprehensive statewide rent control - AB1482. Will extra rent control in San Anselmo make rentals cheaper? - no. In fact, due to the extra liability hidden in 'Just Cause' regulations, many mom & pop landlords, like in neighboring Fairfax are just not renting out their spaces. Fewer rental options means that initial rents for spaces could be more expensive compared to non extra rent control communities. This is exactly what is not needed.

In considering what is best for San Anselmo, I would ask several things: 1. Don’t do what Fairfax did! 2. Let the citizens of San Anselmo vote to determine what is best for them. 3. Consider that San Anselmo already has comprehensive rent control. 4. Consider that extra local rent control actually makes initial rents rise because it decreases rental options. 5. Ask who does extra rent control hurt? - seniors, young families - the people who rely on rental income to stay in their homes. Don't penalize homeowners who are lucky enough to live here.

The real addressable solutions are, what can you do to incentivize the renting out of additional spaces - how can you make it easier and safer for homeowners and housing providers to increase supply?

That is how you make San Anselmo more diverse, make it less expensive for essential workers make the voting public happier.

Thank you.

Michael Sexton
Marin Residents
michael@marinresidents.org

Serge Avila

From: Jody Timms <jodytimms@comcast.net>
Sent: Monday, October 23, 2023 2:17 PM
To: Town Council
Cc: info@marinmehc.org
Subject: Please support tenant protections, our community members are at risk!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges.

I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.

Sincerely,

Jody Timms, Ph.D.

Serge Avila

From: VICTOR TURKAN <vturkan@aol.com>
Sent: Tuesday, October 24, 2023 1:04 PM
To: Town Council
Subject: Rent control

CAUTION: External Sender

Hello All,

I have been following the rent control debacle in three different towns. It's not rent stabilization, it's RENT CONTROL. What I have observed:
Five elected officials should not make decisions on this matter, it's too big of an issue. Two of these towns, now face referendums on theses ordinances. I really think a town committee should be created using tenants and landlords. SA isn't Fairfax or Larkspur. The committee's ideas should then be given to the VOTERS of SA to decide what is best. Why haven't the rent control advocates pushed this issue to a vote of the people? Let the people decide!

Why is SA looking at rent control? Wasn't AB 1482, adequate? If rent control is implemented will the town create food and fuel cost ordinances to help alleviate the price shock?

Rent control is actually not a town issue but a state issue. We NEED more affordable housing! State legislators have now created laws which facilitate more housing. SA has space to build or buy low to moderate housing. Look at Sorich Park or the El Paseo apartments. Why are we not looking at building or purchasing land? Rental properties under rent control will become the new town's low to moderate income housing policy. Mom and pop landlords will not receive a fair return and rentals will be sold. This type of ordinance will help deplete SA's housing stock. Will SA step in when unexpected costs arise such as, fire insurance going up 30% or more or when insurance providers start raising prices because of inflation and canceling high risk policies?
Some renters think all landlords are greedy and are profiting from their rentals. Well, this just isn't true.

No Fault Just Cause, wait, a landlord is suppose to pay a tenant for:
Reclaiming their own property;
Removing a rental from the market;
Remodeling their own property. I hope people realize the rental stock will shrink.
I really hope SA looks closely at the no fault just cause evictions. Again, mom and pop landlord's cannot afford this practice. Why own a rental if it becomes such a hassle? Why don't the towns
create a fund to assist landlords to pay for renters moves instead of expecting landlords to.

Rent control is not the answer. We need affordable new housing built. ADU's will help but when the town makes an ADU ordinance of 4' from a neighbor's property line. That becomes a game changer with placing an ADU on small SA lots. I truly think ADU's are one of the answers in helping alleviate this housing issue. I appreciate and applaud your efforts in looking at this issue but feel the voters need to decide.

Thank you

Victor

Sent from my iPhone

Sent from my iPhone

Serge Avila

From: Wong, Wendy <Wendy.Wong@jud.ca.gov>
Sent: Tuesday, October 24, 2023 10:24 AM
To: Town Council
Subject: TOWN COUCIL MEETING PUBLIC COMMENT (OCTOBER 24, 2023, 6:30PM)

CAUTION: External Sender

Dear San Anselmo Town Council:

I noticed that the e-mail (see below) that I had sent on September 14, 2023, as my input for the Tenant Community Forum, was not included in Item 2.1, Attachment 6 – Public Comments on the Agenda for the Town Council Meeting that will be held today. If that could be added, before this evening's meeting, I would appreciate it.

Since I will be at work and unable to attend this evening's meeting, I wanted to share with you the Living Wage Calculator for Marin County and the Pew Research Center article about housing affordability. Both clearly show how wages have not kept up with rental housing costs.

https://livingwage.mit.edu/counties/06041

https://www.pewresearch.org/short-reads/2022/03/23/key-facts-about-housing-affordability-in-the-u-s/

The model where what renters pay provides the owner of a property all the income needed to maintain that property is no longer feasible. We must deal with the reality that everyone is being squeezed financially over the most basic thing, housing, that we all need for stability in our lives. Providing rent stabilization and tenant protections for **ALL** renters would be a step in the right direction. A registry to track all rental properties in San Anselmo that is audited annually would provide accountability. Creating a town rental board that can come up with ways to provide financial assistance to help small rental property owners with their property expenses, would provide the balance needed to deal with this overwhelming situation that we are all in. We must work together to find a new model that can work.

Thank you for your time!

Warm Regards,

Wendy Wong
San Anselmo Resident

From: Wong, Wendy
Sent: Thursday, September 14, 2023 3:28 PM
To: towncouncil@townofsananselmo.org
Subject: TENANT COMMUNITY FORUM (SEPTEMBER 14, 2023, 6PM)

Dear San Anselmo Town Council:

As mentioned in my July 25, 2023 written public comment, regarding the proposed process to solicit public input on options for tenant protections, we must consider that many lower income residents, who are renters, tend to work odd hour jobs or sometimes two jobs that do not offer paid time off, and should be provided a means to communicate their input on the subject of tenant protections in a written manner, since they most

likely would not be able to attend an in-person meeting or by Zoom. Since no written option was given, besides for questions at rentalpolicies@townofsananselmo.org, I am writing in my public comment for the Tenant Community Forum, since I fall into that category.

Like many San Anselmo renters, I do not work in San Anselmo. I endure a very long commute (3+ hours roundtrip), with endless traffic, to and from San Francisco on public transportation, in order to pay rent for an apartment that takes up 45% of my take home income. Each weekday, I only have a few hours (3 hours) to enjoy time in my home, while awake, because if I plan to get enough sleep (8 hours), get up on time to get to work, work an 8 hour workday with an additional hour for lunch, and commute back home, this is all I can allot for myself. Every year in December, I dread the letter in the mail from property management notifying me how much more money I'm going to have to pay for the same apartment starting in January. Eventually, there will come a point where there is nothing left to cut back on in the personal budget to make up for the extra rent increase. The current California 10% maximum rent control increase is far higher than what most renters ever receive in an annual pay raise. This has caused the current unhoused situation we see all over California. How is someone supposed to afford a place to live, when wages can't keep up with rental housing costs? Preventative measures, such as a local rent control in San Anselmo, can help keep people housed and allow them to save some of those hard earned wages, so that they don't end up in a dire financial situation where they fear becoming unhoused. We must be proactive and come up with solutions that will truly help because the current model is unsustainable.

Thank you for your time!

Warm Regards,

Wendy Wong
San Anselmo Resident

Serge Avila

From: Rental Policies
Sent: Tuesday, October 24, 2023 5:22 AM
To: Serge Avila; Dave Donery
Subject: Fwd: Rental restrictions

From: Radhi Ahern <radhi@outpostrealestate.com>
Sent: Monday, October 23, 2023 6:59 PM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rental restrictions

CAUTION: External Sender

HI there

I am a resident of San Anselmo at 130 Barber Avenue. We have raised our kids in this community for over 10 years and consider San Anselmo to be our "forever home". As a real estate agent our property is our primary investment vehicle for retirement. We have always planned on renting our home out and moving to a smaller home in the community when our kids graduate high school. Rental restrictions would make this a near impossibility. With the cost of maintaining a property through the roof, interest rates at all-time highs and the fluxation in the market it is imperative we are able to increase rents in a reasonable manner as needed to survive.

We implore the Town to consider the needs of homeowners that may in the future need to become landlords.

--
Wfimr&Fmjws
685%Gfwgjw&F{jszj%
Xfs%Fsxjqr t%
96:3:8637>=6

Serge Avila

From: Carlo Berg <Carlo@bergholdings.com>
Sent: Monday, October 23, 2023 10:14 AM
To: Town Council
Subject: Please support tenant protections, our community members are at risk!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, which is most people given where rates are these days, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

I urge the Town of San Anselmo to implement the twin remedies of rent stabilization/tenant protection with ordinances that expand supply boldly to force Landlords to compete for Tenants and not the other way around.

Sincerely,

Carlo *Carlito* Berg

Serge Avila

From: Nancy Carlston <nancycarlston@gmail.com>
Sent: Monday, October 23, 2023 4:23 PM
To: Town Council
Subject: Protect our renters!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. The state caps at CPI plus 5% allow rents to be increased far above the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges.

I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.

Sincerely,

Nancy Carlston, Trustee
Mt. Tam Community Land Trust

Serge Avila

From: Owen Clapp <owenclapp@gmail.com>
Sent: Sunday, October 22, 2023 11:53 AM
To: Town Council
Cc: info@marinmehc.org
Subject: Please support tenant protections, our community members are at risk!

CAUTION: External Sender

Dear Town Council Members,

I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation.

San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town.

The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges.

I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.

Sincerely,
Owen Clapp

Serge Avila

From: Rental Policies
Sent: Sunday, October 22, 2023 8:54 AM
To: Serge Avila; Dave Donery
Subject: Fwd: Rent stabilization limits

Get Outlook for iOS

From: Fred Coito <fcoito@yahoo.com>
Sent: Sunday, October 22, 2023 8:48:45 AM
To: Rental Policies <rentalpolicies@townofsananselmo.org>
Subject: Rent stabilization limits

CAUTION: External Sender

I've lived in San Anselmo for 33 years. I am currently neither a landlord or a renter but have been both in the past. I may consider creating an ADU in the future.

I have no objections to rent control, but I think the cap must be reasonable. Allowing for caps below the general inflation rate doesn't seem reasonable for landlords.

Using the Fairfax example where the cap is set at 75% of the CPI: if the landlord's costs are increasing with inflation at $1000 per year, and they can only raise rents by $750 per year, they are eventually out of business. They lose $250 the first year, $500 the next year, $750 the third year, etc.

(And this ends up hurting generous landlords the most. They have minimal profit margins to absorb the ongoing and escalating losses.)

Thanks for your time. Hopefully you'll take these comments into consideration.

Fred Coito
54 Oakland Ave.
San Anselmo

Serge Avila

From: anne engert <engertanne@gmail.com>
Sent: Tuesday, October 24, 2023 12:29 PM
To: Town Council
Subject: I am a provider of reasonable sfh rent and a resident that is concerned about implementing extra rent control in San Anselmo

CAUTION: External Sender

As a member of the community in Marin, I ask you to consider the terrible negative effects of extra rent control.

San Anselmo already has comprehensive rent control - statewide through AB 1482. The idea that extra rent control is needed, wanted or will make housing in our community more affordable is a myth. In fact, extra rent control leads to less rentals available and higher initial rents for new and transitioning renters.

Please do not go down the path of Fairfax and create a divisive, contentious issue. Extra Rent Control does not work.

Help make Marin more affordable by not implementing extra rent control in San Anselmo.

Thank you.

Please delete and do not share this message if you are not the intended recipient. Thanks

Serge Avila

From: G.R Fariwar <fariwar13@gmail.com>
Sent: Monday, October 23, 2023 8:06 PM
To: Town Council
Subject: In Support of Rent Control in San Anselmo

CAUTION: External Sender

Dear Town council members, as a renter I strongly support rent control and would like to expressed below points for your considerations,

WHY WE NEED RENT CONTROL & JUST CAUSE EVICTIONS

- More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades.
- San Anselmo, like all of Marin, has some of the highest rents and highest home prices in the entire country. Most ordinary working people can't afford to purchase a home, so our only option is to rent. But with rents going through the roof, thousands of our neighbors are at risk of being forced out of their homes and out of town.
- Corporate landlords are buying up San Anselmo rental properties and jacking up rents. This is hitting long-term senior tenants on fixed incomes particularly hard.
- San Anselmo prides itself on being welcoming and inclusive. But if nothing is done to stabilize rents and protect our diverse, working-class tenants, then it will quickly become a town that's only available to the wealthy and privileged.
- Our teachers, nurses, public workers, and service workers are all disproportionately renters. The people who make San Anselmo such a great place to live should be able to afford to live here.
- Rent control and tenant protections are common-sense, time-tested policies that will keep families in their homes and provide real housing security for thousands of San Anselmo renters.

RENT STABILIZATION / RENT CAP

- **San Anselmo tenants need a strong rent control policy with a cap on annual rent increases that's tied to inflation.** This will provide a fair and rational standard for both landlords and tenants.
- **Please adopt a rental cap set at 60% of the Consumer Price Index or 5%, whichever is less.** This will ensure affordable rent increases year-after-year for the town's long-term renters, especially seniors and working families who rely on consistent, manageable rents. It will also protect renters against excessive rent increases during high inflation years.

WHO'S COVERED (APPLICABILITY)

- San Anselmo's rent stabilization and just cause eviction policies **should apply to as many renters as possible**, while providing reasonable exemptions for small owner-occupied units.
- **Most of San Anselmo's renters live in small-to-medium-sized apartment buildings.** That's why it's crucial that both rent stabilization and just cause evictions apply to **all multi-unit buildings, including duplexes, triplexes, and fourplexes.**
- Exempting these smaller buildings would **carve out more than a third** of all rentals in San Anselmo, leaving hundreds of families without protections.

EVICTION PROTECTIONS

- **Right of Return:** A key component of just cause eviction protections is to grant tenants the right to return to their unit if they are evicted due to no fault of their own and the reason for their eviction is no longer relevant. For example, if a tenant is evicted because the landlord or their family member wants to move into the unit, then the tenant should have the opportunity to move back into that unit—at their former rent—when the landlord or family member moves out. We are asking that tenants' right of return lasts for **at least five years** following a no-fault eviction. This would help prevent landlords from abusing no-fault evictions to circumvent rent control by evicting long-term tenants and jacking up rents.

Relocation Payments: Another crucial part of just cause eviction protections is to require landlords who evict tenants who have done nothing wrong to pay relocation payments that allow those tenants to land on their feet and find a new place to live in the community. We are asking for **relocation payments equal to four months rent** so that tenants can cover first and last month's rent, a security deposit, and moving fees.

Best,
Ghulam Fariwar
875 Sir Francis Drake Blvd,

Serge Avila

From: Lorrie Goldin <lorriegoldin@sbcglobal.net>
Sent: Monday, October 23, 2023 5:14 PM
To: Town Council
Subject: Letter of Support for Tenant Protections and Rent stabilization

CAUTION: External Sender

Dear Town Council Members,
I urge your support for tenant protections and rent stabilization in San Anselmo. More than half of San Anselmo renters are rent-burdened, paying more than 30% of their income on rent. Rent increases have been outpacing wage increases for decades. California law caps rent increases but the level permitted is far too high: CPI + 5% allows rents to be increased way beyond the rate of inflation. San Anselmo, like all of Marin, has some of the highest housing costs in the US. For those who can't afford to purchase a home, the only option is to rent. With rapidly increasing rents, many -- maybe hundreds -- of our neighbors are at risk of being forced out of their homes and out of town. The life of every displaced person is disrupted in profound ways, impacting schooling, employment options, transportation, mental and physical health and of course, shelter. Every displaced worker forced to commute adds to our traffic and emissions challenges. I urge the Town of San Anselmo to implement rent stabilization and tenant protection ordinances. As town council members, you have the responsibility to protect the diversity and social equity of our community. Thank you.
Sincerely,
Lorrie Goldin
San Anselmo

Town of San Anselmo Council Meeting Oct. 24, 2023

I read your packet of information attached to the agenda on rent control and just cause evictions in Fairfax and in Larkspur. I understand that both towns are now going to vote on these issues since there has been such an uproar of concern by townspeople. The complexities of these topics need careful review to be understood by the public and council. The fact that those town councils had the audacity to pass such ominous ordinances by the town councils without a public vote incurred a swift backlash by town voters. I hope you will not make the same mistake.

I have friends who own rental properties, and they have done so by sacrificing in other areas of their budget. To purchase a non-owner occupied piece of rental property lenders generally want to see a 30% down payment. No easy feat with prices in Marin. Often the rents do not offset the costs of ownership for years.

Some did this as their way of supplementing Social Security, which is not adequate to retire on and not having pension or 401(k)s from their jobs.

I find it interesting that a lot of the discussion seems to be about "work force housing, including police, firemen, and teachers and people who work for the towns, all of which do have substantial pension plans, funded in part by the taxpayers that own real estate in the towns.

I can think of retired bus drivers, school secretaries, retired firemen, retired salesmen, retired contractors, who spent a lot of time, energy and money keeping their rental properties, safe and well kept so that they can bringing in a little extra money to supplement their retirement. This is not passive income, though they could have put their money into the stock market instead with no money, upkeep or hours of work required.

It seems by freezing the rents that are now in effect, after coming off of a few years of Covid and California rules that had landlords reducing their rents by 20% to obtain some reimbursements of rents that had not been paid them, is in effect isolating landlords to be the subsect of society that is supposed to fix the imbalance of renters to properties available.

It will do the contrary. Fewer landlords will risk their financial security on renting to tenants that will require them to lose money by not allowing the rents to keep up with inflation. Fewer landlords will agree to pay an annual fee, fill out forms and allow invasion of their privacy so a town rent control czar can oversee their properties. Fewer landlords would be willing to come to the town, and lay out their personal finances to request an increase of rents of their unit(s) to a fair and reasonable return.

It is a goal of proud people who have worked their whole life to be able to retire without government intervention.

Larkspur passed a just cause eviction rule that landlords would have to pay tenants three months rent to leave. I owned a duplex for 15 years and 3 months of rent for one unit would have been 2 ¼ years of the net income that I received from the duplex's income from both units. In other words, I would not have cleared any money, after having to payout that type of onerous and arbitrary penalty, to obtain permission from my tenant to sell my property. If the tenant was over 62, or under 17, or mentally ill, it would have been over three years of my net income from both units to have them leave. Does anyone really think it's reasonable for a landlord to lose 3 years of net income on the two units?

The lack of reasonable housing will not be solved on the backs of landlords. The towns have for years made developing property, extremely expensive and difficult. The fees they've extracted from land owners to build out their property, or add an ADU is excessive and has contributed to the lack of housing we now find ourselves with.

I think your time would be better spent by going over your fees, and looking at the ADUs you've already granted and seeing how many thousand of dollars the homeowners have had to pay, not only to your town but to MMWD, Ross Valley Sanitary, PG&E, the school districts, fire districts, town employee pensions, etc. It seems that everyone wants a piece of action if somebody has the thought of adding a little granny unit to their property.

To foist off the financial responsibility to landlords to subsidize tenants is not fair or reasonable.

Sincerely, Katie Hogan Katie Hogan

Long Term Relocation Assistance in Larkspur:

RENT:	***X3 RENT:***	***Over $5,000.? Choose greater #***	***Over 62 years of age or older, disabled or certified to be terminally ill increase $3,000.***
$2,000.	$6,000.	----	$6,000. + $3,000. = $9,000.

$9,000. Is 450% of $2,000. To pay $9,000., it will take the owner 3.214 years of net income to payoff the tenant, with the landlord having no net income during this time.

But wait, how is this a "Fair and reasonable return on their property"? Or is a "Fair and reasonable return on their property" only allowed to those who never have to sell their property where a tenant is residing?

The above example used a duplex, and Owner was netting annually $2,800. for a number of years.

Fair Return/Appeals Process:

An owner of a residential property may petition for a rent increase in excess of that provided in the rent cap in order to obtain a fair and reasonable return on their property.

Such a petition shall be decided by the City Manager or their designee. An appeal of the City Manager's decision may be filed with the rent review board.

Rent Cap in Larkspur:

5% plus inflation or 7% whichever figure is lower.

From: Kathrin Smith
To: Town Council
Subject: Rent stabilization and renters protection
Date: Wednesday, October 25, 2023 1:19:39 PM

CAUTION: External Sender

Dear Councilmembers,

I was at the Town Council meeting last night and was prepared to speak at public comment time. However, the Mayor requested that those of us who have stood up at past meetings to address this issue please not do so again.

Here is what I wanted to say:

I urge you to vote to cap rent increases at 60% of CPI or 5%, whichever is less and to pass just cause eviction protections.

I very much appreciate the Town Council and staff members for the incredible work that they have done to date on this issue. It is such a complex situation. I realize that San Anselmo alone can not solve the huge problem of housing shortages and homelessness. No one town or city can.

But I feel like every town needs to do what they can do. If we don't address it now, it will only be worse next year. Sadly, this problem will not go away any time soon.

San Anselmo is the amazing town that it is because of the people that live here and contribute through their hard work and sacrifice and service to make it a place we all want to be. Those of us who have raised or are raising our families here, the firefighters, police, teachers, caretakers, nannys, gardeners, restaurant workers, health care workers, shop owners, we are all citizens of San Anselmo and deserve to be able to afford to stay here.

Thank you for your time and for your consideration of my request.

SIncerely,
Kathrin Smith
Tenant

To the San Anselmo Town Council:

MEHC recently sent out what I can only call a propaganda piece regarding their views on the Rent Control, Rent Stabilization, and Just Cause Eviction ordinances they are pushing throughout Marin. It struck me how similar the verbiage, tone, and attitude about these proposed laws are to what the DSA peddled in Fairfax, with disastrous results.

The paragraph that stood out most to me as completely untrue was this:

- Many folks oppose anti-displacement measures based on the poor outcomes of old-school rent control programs that had problematic outcomes on rental supply and maintenance. No one is proposing these old-school programs. Modern anti-displacement policy is far more nuanced and mindful of unanticipated consequences. It has been proven in communities world-wide, and given the current rate of displacement, they are an important tool to protect our community character.

I wanted to point out that neither this organization nor the DSA understands what nuanced means or how it might translate into housing policy. It is their way or the highway – an attitude that was on display when the DSA came out in support of Hamas recently. These Ordinances are more severe than the so-called "old-school programs" to which they refer. They are not at all mindful of "unanticipated consequences" and eschew any and all data that does not support their ideological underpinnings.

The fact remains that the cities in the US that have even less severe Ordinances than the ones they propose have the highest rents in the United States (New York City, San Francisco, Santa Monica, where a prospective renter can expect to pay $7500-$10,000 month for a 2 bedroom house, Berkeley, and Oakland. They do nothing to promote diversity. The people who are renting these units now and who will have no motivation to move in the future actually represent an impediment to our goals of diversity, equity, and inclusion in our communities. Additionally, there is simply no data (except perhaps what has occurred in neighboring Fairfax) about what rent control does to small communities like San Anselmo and Fairfax because Fairfax is the canary in the coal mine. There is no data because these policies do not exist in small towns.

I urge the Town Council to stop these proposed ordinances in their tracks. The MEHC piece states that large corporations are buying up housing in San Anselmo. They do not mention mom-and-pop housing providers, and yet, if what happened in Fairfax is any indication of what is on the horizon for San Anselmo, these so called "nuanced" Ordinances they are pushing will put a dagger into the heart of mom-and-pop housing providers throughout Marin County, many of whom are elderly and who provide valuable and fairly priced housing to renters throughout Marin.

Claire Armitage



STAFF REPORT

TOWN OF SAN ANSELMO Item #: 2.2

MEETING DATE: October 24, 2023

AGENDA TITLE: Receive Staff Report Presented to Ross Valley Fire Board and Consider Recommendation from Fire Board's Labor Management Subcommittee Relating to Increased Staffing per the "2022 Staffing/Deployment" Side Letter and Provide Direction to the Town's Fire Board Representatives

FROM: Administration and Fire Department

RECOMMENDATION: Staff recommends that the Town Council consider the recommendation from the Ross Valley Fire Board's Labor Management Subcommittee to fund a third person on one of the Ross Valley Fire Department's engine companies beginning on July 1, 2024 and provide direction to the Town's Fire Board representatives.

BACKGROUND

In February of 2022, the Town Council approved the Third Amendment to the Amended and Restated Ross Valley Fire Department Joint Powers Agreement (Attachment 1). This amendment outlines a plan for closing Fire Station 18 in Ross and amending the details regarding ongoing staffing levels and requiring that two of the three remaining RVFD stations be staffed with no fewer than three-person engine companies beginning in July of 2025.

As part of the Fire Board's process in determining the newest JPA amendment, a side letter (Attachment 4) was developed containing the following provisions:

The Ross Valley Fire Department (hereinafter Department) and the Ross Valley Firefighters' Association (hereinafter Association) have mutually agreed to the following:

• Upon the closure of Fire Station 18 located in Ross, California, scheduled for July 1, 2025, the six assigned personnel (three Fire Captains and three Firefighter Engineers) shall be moved West to increase staffing from two to three personnel at Fire Stations 19 and 21;

• The parties further agree the third person on each engine will be converted to a Firefighter/Paramedic Position through attrition.

• Nothing in this letter agreement shall affect the minimum number of personnel required for daily staffing under the parties' MOU.

• The parties agree that the labor-management sub-committee will meet at minimum quarterly, beginning the first quarter of 2022, with the goal of determining how to also increase the staffing to three personnel at Fire Station 20 in Sleepy Hollow. This subcommittee will include at least one Association member representing labor, a Board member from each member agency, and the management committee.

DISCUSSION/ANALYSIS

At their meeting on October 5, 2023 the Labor Management Subcommittee discussed options for funding the 3rd person on the engine companies at Station 20. Below are the proposed options presented:

From Attachment 2:

The chart below represents a fully-burdened cost of three Firefighter Paramedic positions, taking into consideration the following: monthly salary/benefits were calculated using the Boards agreed (on 1/8/22) amounts from the Firefighter Paramedic "Side Letter Of Agreement" and salary schedule/benefits were adjusted to match the negotiated increase/benefit changes since 2020, overtime costs are based on the negotiated leave days (sick/vacation), and one time equipment costs are based on outfitting a Firefighter with protective clothing (one time equipment costs only included in 24/25 and 25/26).

COST BY MEMBER AGENCY				
FY	Fairfax	Ross	San Anselmo	Sleepy Hollow FPD
Percent Share	23.30%	23.37%	40.53%	12.80%
24/25	$147,262	$147,705	$256,161	$80,900
25/26	$156,034	$156,503	$271,420	$85,719
26/27	$164,114	$164,607	$285,473	$90,157

FUNDING OPTIONS

Option 1: Each Member agency will begin paying their respective "percentage share" from the position date of hire, which is proposed to be on July 1, 2024.

Option 2: Authorize one-time use from undesignated reserves to fund the first year from the position date of hire. Each Member agency will begin paying their respective "percentage share" after year one.

Option 3: Authorize one-time use from undesignated reserves to fund a phased approach using a combination of undesignated reserves and member agency respective "percentage share" for the first two years of the position. The Department would use undesignated reserves to pay the difference of the actual cost and the amount being billed to the member agencies. Member agencies would be charged 50% in year one, 75% in year 2, and 100% in year 3.

Fire Board Discussion

At their meeting on October 11, 2023 the Ross Valley Fire Board received a staff report (Attachment 2) outlining the recommendation from the Ross Valley Fire Department's Labor Management Subcommittee to consider funding options for a three-person engine company. The Labor Management Subcommittee recommended Option 1.

The Fire Board was in favor of selecting Option 1 but because it implements the upstaffing a year earlier than anticipated, staff and Board members thought it prudent to bring the item for review by each Town Council for discussion and direction to the members of the Fire Board. The decision will come before the Fire Board at their December meeting.

CONCLUSION

As stated in the attached staff report, the Ross Valley Fire Department is currently the only department in Marin County that has two-person engine companies. Marin County fire agencies have a combined 31 staffed fire engines, 26 of which are staffed with three personnel. Of the remaining five engines not staffed with three personnel, four of those engines are the Departments. The fifth station is located in rural West Marin (Hicks Valley/Cheese Factory).

FISCAL IMPACT

If the Town Council directs the Town's Fire Board members to approve the recommendation to upstaff one engine company beginning in July of 2024, the cost of San Anselmo's portion of this would amount to $256,161 for FY 2024/25. This cost would be funded through Measure J funding. The existing FY2023-25 Measure J

Expenditure Plan will be coming back to Council in early 2024 for discussion and direction on potential updating and cost adjustments.

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

Providing direction to the Town's Fire Board representatives on this matter is not considered a "project" under the California Environmental Quality Act (CEQA), because it does not involve an activity which has the potential to cause a direct or reasonably foreseeable indirect physical change in the environment. (Cal. Pub. Res. Code § 21065).

ATTACHMENTS

Attachment 1 – Third Amendment for RVFD JPA

Attachment 2 – Staff Report presented to the Ross Valley Fire Board on 10/11/23

Attachment 3 – 2020 Side Letter between Ross Valley Fire Department and Ross Valley Professional Firefighters' Association Local 1775

Attachment 4 – 2022 Side Letter Staffing/Deployment Agreement between Ross Valley Fire Department and Ross Valley Professional Firefighters' Association Local 1775

Attachment 5 – 2019 Citygate Standards of Coverage Assessment

Attachment 6 – 2010 National Institute of Standards and Technology (NIST) Report om Residential Field Experiments

Attachment 7 – 2010 National Institute of Standards and Technology (NIST) Report on EMS Field Experiments

THIRD AMENDMENT TO AMENDED AND RESTATED JOINT POWERS AGREEMENT

This Third Amendment to the Amended and Restated Joint Powers Agreement ("Third Amendment") is entered into as of January 1, 2022 (the "Third Amendment Effective Date"), and is made by and among the Town of Fairfax, a municipal corporation ("Fairfax"), the Town of San Anselmo, a municipal corporation ("San Anselmo"), the Sleepy Hollow Fire Protection District, an independent special district of the State of California ("Sleepy Hollow"), and the Town of Ross, a municipal corporation ("Ross"), each a "Member," and collectively referred to as the "Members."

RECITALS

A. Fairfax, San Anselmo and Sleepy Hollow entered into that certain Amended and Restated Joint Powers Agreement dated as of July 1, 2010 (the "Agreement"). All capitalized terms used herein without definition shall have the same meanings assigned to them in the Agreement.

B. The Agreement governs the operations of the Ross Valley Fire Department (the "Authority").

C. The Members entered into the First Amendment to the Amended and Restated Joint Powers Agreement, effective as of July 1, 2012 (the "First Amendment"), to (i) include Ross as a Member of the Authority; (ii) modify the composition of the Board; (iii) revise the Members' cost sharing and ownership rights; and (iv) address certain other issues agreed upon among the Members.

D. The Members entered into the Second Amendment to the Amended and Restated Joint Powers Agreement, effective as of February 13, 2014 (the "Second Amendment"), to: (i) establish a Management Committee and (ii) implement the provisions of Government Code § 54956.96, permitting the disclosure of certain closed session information in an authorized closed session of a Member.

E. The Members desire to enter into this Third Amendment to the Amended and Restated Joint Powers Agreement to: (1) provide for the closure of the Ross Fire Station and (ii) allocate Authority resources, savings and costs attributable to the Ross Fire Station closure.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Members agree as follows:

AGREEMENT

1. Section 9.2, **Fire Station Maintenance,** is hereby amended by adding subsections d., e. and f. to read as follows:

> **"9.2 Fire Station Maintenance**
>
> **d. Closure of the Ross Fire Station**. Fire Station 18, located at 33 Sir Francis Drake Boulevard in Ross, CA (the "Ross Fire Station") shall be closed on July 1,

2025, or upon a written agreement among all Members to close on an earlier date (such closure date being the "Ross Fire Station Closure Date").

e. One Time Cost For Remodel of Fire Station 21. On or before the Ross Fire Station Closure Date, the Town of Fairfax shall contribute one-time costs not to exceed $210,000 to fund the interior remodel of Fire Station 21, located at 10 Park Road in Fairfax, CA ("Station 21") to accommodate additional staffing.

f. **Shared Costs for Station 19**. Commencing in the first fiscal year following the Ross Fire Station Closure Date, and in each fiscal year thereafter, the Town of Ross and the Town of San Anselmo shall share the maintenance costs of Fire Station 19, located at 777 San Anselmo Avenue in San Anselmo, CA ("Station 19") for which the Town of San Anselmo is responsible pursuant to Section 9.2 a. The Town of Ross shall contribute twenty-seven percent (27%) and the Town of San Anselmo shall contribute seventy-three percent (73%) toward maintenance costs; provided, however, that the Town of San Anselmo and the Town of Ross shall agree upon an annual budget for such costs for the ensuing fiscal year. The foregoing requirement to agree upon an annual budget is intended to obtain an agreement for the total annual maintenance costs to be shared by the parties and in no event shall such agreement modify the annual percentage obligations for Station 19 maintenance costs of either the Town of Ross or the Town of San Anselmo. Subsequent to adopting the annual budgets for the Town of Ross and Town of San Anselmo, and prior to incurring any unbudgeted cost under Section 9.2 a. in excess of $10,000 for Fire Station 19, the Town of San Anselmo shall notify the Town of Ross, and the parties shall meet and confer and agree on any such cost to be incurred.

2. Effective on the Ross Fire Station Closure Date, Section 9.4, **Certain Service Levels**, shall be deleted in its entirety and replaced with the following:

"9.4, Certain Service Levels. The Authority's three fire stations will be routinely open, fully staffed and equipped for 24-hour continuous operation by not less than three (3) full-time sworn trained firefighters at two of the three fire stations and not less than two (2) full-time sworn trained firefighters at the third fire station. Notwithstanding the foregoing, the Fire Chief shall have the sole discretion as to the most effective manner of handling and responding to calls for service. This includes positioning both equipment and staffing between and among the fire stations to meet conflicting demands. Consequently, the Members acknowledge that there may be times when equipment or personnel may not be available from all three fire stations."

3. A new Section 9.5, **Closure of Ross Fire Station**, is hereby added to the Agreement to read as follows:

"9.5 Closure of Ross Fire Station and Movement of Personnel. As of the Ross Fire Station Closure Date, the Fire Chief shall move personnel from the Ross Fire Station to Station 19 and Station 21 as the Fire Chief deems appropriate."

4. Section 24.5, **Existing Capital Assets**, subsection a., **Ross Fire Station**, is hereby amended by restating subsection a. to read as follows:

a. Ross Fire Station. Beginning on the Ross Fire Station Closure Date, the Authority's annual operations costs will be reduced (the "Savings") due to the closure of the Ross Fire Station, the elimination of one engine from the Authority's vehicle replacement schedule, the planned transition of three (3) Captain positions to three (3) Firefighter/Paramedic positions, and the planned transition of three (3) Engineer positions to three (3) Firefighter/ Paramedic positions, with such personnel changes occurring upon the resignation or retirement of the current Captain and Engineer personnel. The annual amount of Savings shall be detailed in the annual budget prepared pursuant to Section 6.2, with the portion of the Savings attributable to personnel changes determined at the time the changes occur, based on the difference in salary and fully loaded benefits of such personnel. The annual amount of the Savings, as shown on the annual budget, shall be credited to the amount of the annual contribution owed by the Town of Ross pursuant to Section 7.1. After the full Savings, by the elimination of one engine from the Authority's vehicle replacement schedule, the planned transition of three (3) Captain positions to three (3) Firefighter/Paramedic positions, and the planned transition of three (3) Engineer positions to three (3) Firefighter/Paramedic positions has been realized, the Members' Percentage Shares (Section 8.1) shall be adjusted to reflect the savings attributed to Ross. In addition, The Town of Ross will be billed by the Authority for actual legal costs (not to exceed $15,000) incurred by the Authority in connection with the preparation of this Third Amendment.

5. Except as expressly modified by this Third Amendment, all other terms and conditions of the Agreement are hereby ratified and confirmed and shall remain in full force and effect and binding on the parties.

6. This Third Amendment may be executed on behalf of the respective Members in one or more counterparts, all of which collectively shall constitute one document and agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Third Amendment as of the date first written above.

TOWN OF SAN ANSELMO, a municipal corporation

By: _____
Alexis Fineman, Mayor

ATTEST:

_____
Town Clerk

TOWN OF FAIRFAX, a municipal corporation

By: _____
Stephanie Hellman, Mayor

ATTEST:

_____
Town Clerk

SLEEPY HOLLOW FIRE PROTECTION DISTRICT, an independent special district of the State of California

By: _____
Name: _____
Title: _____

ATTEST:

_____
Secretary

TOWN OF ROSS, a municipal corporation

By: _____
Elizabeth Robbins, Mayor

ATTEST:

_____
Town Clerk

ROSS VALLEY FIRE DEPARTMENT
STAFF REPORT

For the Meeting of October 11, 2023

To: Board Of Directors

From: Dan Mahoney, Interim Fire Chief

Subject: Receive Staff Report Presented to Labor Management Subcommittee and Consider Recommendation From Labor Management Subcommittee Relating to Increased Staffing per The "2022 Staffing/Deployment" Side Letter. Recommendation Includes a Funding Plan and a Position Start Date.

RECOMMENDATION:

Staff recommends the Board receive the staff report (see below) presented to the "Labor Management Subcommittee" and consider the recommendation from the "Labor Management Subcommittee" relating to increased staffing per the "2022 Staffing/Deployment" side letter. The recommendation includes a funding plan and position start date.

At the October 5, 2023 "Labor Management Subcommittee" meeting, a motion was passed, by unanimous vote, to provide a recommendation to the Board.

The recommendation is as follows:

1. **Funding Plan:** Option 1 was chosen and states "Each Member agency will begin paying their respective "percentage share" from the position date of hire."

2. **Position Start Date**: July 1, 2024

This recommendation was based on the following staff report presented at the October 5, 2023 Labor Management Subcommittee meeting.

BACKGROUND:

Since the creation of the Joint Powers Authority (JPA) in 1982, the Ross Valley Fire Department's (Department) response model formerly relied on and was augmented by a large group of local volunteer firefighters who responded to incidents, such as structure or vegetation fires, to provide assistance to the Department's two-person engine company deployment model. Additionally, many of our full-time personnel lived in the communities our department serves and they too would respond to incidents off-duty. The ability to use

off-duty personnel and volunteer firefighters provided some operational relief to the Department's two-person engine companies. This model was less than ideal, creating a delayed and inconsistent response force. The Department's Volunteer Program no longer exists due to lack of interest and most full-time personnel have moved away from the community we serve primarily due to high housing costs.

Community expectations of the Department have increased, and external factors have created challenges and demands that have put our Department at the forefront of mitigating complex and challenging emergency responses of all kinds. Examples include flooding; swift water rescue; violent encounters / active shooter response; a "new normal" of intensely destructive Wildland Urban Interface fires; and extension of wildland fire season from a few months (formerly) to potentially almost year round. These realities, particularly from the fire prevention and risk reduction standpoints, have led the Department to enhance our fire hazard and life safety inspections of businesses and residential apartment buildings. The Department, with the help of funding through Measure C, has also increased our neighborhood defensible space efforts, working with communities to reduce fuels, improve emergency access and egress, and plan for potential evacuations. Since the Departments JPA was formed 41 years ago, the Department has hired two Fire Inspectors (JPA Funds) to increase service demands relating to fire prevention, one Emergency Preparedness Coordinator (Measure C funds) and one Defensible Space Coordinator (Measure C funds). No additional firefighters have been hired to meet these increased operational demands of the Department's engine company, as the minimum fire engine company staffing still remains at two-personnel.

In 2001, the National Fire Protection Association (NFPA), a leader in the development of industry standards for the fire service, issued its first edition of the "Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments" known as NFPA 1710. The document identifies minimum staffing for fire engines along with identifying the number of personnel that shall be deployed to a structure fire.

In 2019, Citygate Associates conducted a comprehensive Standards of Coverage Assessment of the Department to provide a foundation for future fire service planning. The goal of this assessment was to identify both current services and desired service levels, and to assess the Department's ability to provide them. This data-driven report strongly suggests that the RVFD should staff three-person engine companies.

At the January 2020 Board meeting, a "Staffing/Deployment" side letter was approved to enhance the current "Labor Management Subcommittee" (subcommittee) with additional members. The sub committee's goal was " how to increase staffing".

The subcommittee held its first meeting on April 20, 2022. Discussion was held regarding the need to identify future funding if the Department was awarded its grant application for the 2021 "Staffing for Adequate Fire and Emergency Response" (SAFER) Grant. It was explained that the grant would provide funding for the first 36 months of the proposed Firefighter position (three Firefighters in total), however, on month 37, the member agencies would need to begin funding the position. Staff was given direction to provide an

ongoing cost estimate after the first 36 months and present it to the Board for discussion at the June 2022 Board meeting. Staff presented the cost estimate at the June 2022 Board meeting. No direction to Staff or action was taken other than for Staff to keep the Board informed on the SAFER grant application. Ultimately the SAFER Grant was not awarded to the Department. The Subcommittee has not met since, and there has been no further formal discussions at the Board level.

At the September 2023 Board Meeting, Staff recommended filling a vacancy in the Subcommittee and holding another Subcommittee meeting before the October 2023 Board meeting.

The Subcommittee met on October 5, 2023. A staff report was presented and a discussion was held regarding increased staffing to three-person engine companies. A motion was passed to bring a recommendation to the Board that included a funding plan and start date for the new firefighter position.

DISCUSSION:

When evaluating the need to increase staffing, this staff report will refer to the industry standard set forth by the National Fire Protection Association 1710. The Departments 2019 Standards Of Coverage Assessment will also be a guiding document as to how the Department compares to the standard. Below is a brief background of these documents and key points within them relating to the Department's current staffing.

National Fire Protection Association 1710 (NFPA 1710) - A U.S.-based international nonprofit organization devoted to eliminating death, injury, property, and economic loss due to fire. In 2001, the first edition of NFPA 1710 was issued. The development of that benchmark standard was the result of a considerable amount of hard work and tenacity by the technical committee members and the organizations they represented. This standard was the first organized approach to defining levels of service, deployment capabilities, and staffing levels for career fire departments. Research work and empirical studies in North America were used by the committee as a basis for developing response times and resource capabilities for those services, as identified by the fire department.

The following two NFPA 1710 industry standards will be referred to within this staff report:

NFPA 1710 ENGINE COMPANY STANDARDS
5.2.3.1.1 These companies shall be staffed with a minimum of four on-duty members (NFPA 1710 p.11)
NFPA 1710 INITIAL ALARM ASSIGNMENT STANDARDS
5.2.4.1.1

(9) Single family Dwelling Initial Alarm Assignment Capability - Total effective response force with a minimum of 16 firefighters. (NFPA 1710 p.12)

**Initial Alarm Assignment = number of firefighters initially deployed to a structure fire*

2019 Standards Of Coverage Assessment (2019 SOC) - In 2019, Citygate Associates conducted a comprehensive Standards of Coverage Assessment of the Department to provide a foundation for future fire service planning. The goal of this assessment was to identify both current services and desired service levels, and to assess the Department's ability to provide them. Citygate utilized various NFPA and Insurance Services Office publications as best practice guidelines, along with the self-assessment criteria of the Commission on Fire Accreditation International.

The following are recommendations, opinions and excerpts from the 2019 SOC that correlate with how the Department meets the NFPA 1710 industry standards:

Recommendation #3: Consider providing a third firefighter per day on the three engines other than Engine 18. (2019 SOC p.7)

Citygates Overall Opinion: "Citygate is, however, concerned about the overall limited Department staffing per day and its ability to respond with more "weight of attack*" to keep emerging serious emergencies controlled. Even Countywide mutual aid resources are not quickly available in this part of Marin County, as they would be in an urban area with flat terrain and interconnected roads." (2019 SOC p.4)

2.5.1 Critical Firefighting Tasks: "Table 8 illustrates the critical tasks required to control a typical single-family dwelling fire with six response units (engines/chief), for a total Effective Response Force* of 16 personnel, where the Ross Valley Fire Department initially sends 12. A confirmed serious fire additionally receives a second Battalion Chief and a fourth engine raising this to 15 personnel. However, in many locations these additional units come from much farther away. These tasks are taken from typical fire departments' operational procedures, which are consistent with the customary findings of other agencies using the Standards of Coverage process. No conditions exist to override the Occupational Safety and Health Administration two-in/two-out safety policy, which requires that firefighters enter Immediately Dangerous to Life and Health atmospheres, such as building fires, in teams of two, while two more firefighters are outside and immediately ready to rescue them should trouble arise." (2019 SOC p.26)

2.5.3 Critical Task Analysis and Effective Response Force Size - A question one might ask is, "If fewer firefighters arrive, such as does occur in the Ross Valley Department, what from the list of tasks mentioned would not be completed?" This is also critical given the two firefighter staffing. The initial force is a smaller count as it takes the third and

fourth-due units much longer to arrive. Most likely, the search team would be delayed, as would ventilation. The attack lines would only consist of two firefighters, which does not allow for rapid movement of the hose line above the first floor in a multiple-story building. Rescue is conducted with at least two person teams. Thus, when rescue is essential, other tasks are not completed in a simultaneous, timely manner. Effective deployment is about the **speed** (travel time) and the **weight*** (number of firefighters) of the response. (2019 SOC p.30)

This staff report will also reference various field studies.

**Weight of attack - refers to multiple-unit responses (Effective Response Force, or ERF, commonly also called a First Alarm) for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents.*

The Department's current response model relies on a two-person engine company consisting of a Captain and Engineer for emergency (including Emergency Medical Services EMS) and non-emergency response, for fire prevention efforts, to provide public education, and to perform every other task that is required for the Department to function at the highest level and meet the needs of the community. Unlike other Fire Departments, and the NFPA 1710 industry standard (5.2.3.1.1), the Department does not have a Firefighter position within our ranks. Rather, the roles and assignments that typically fall on a person in this position at the scene of an incident instead fall to the Engineer or Captain. Below are the typical duties of a Captain, Engineer and Firefighter at a structure fire incident:

TYPICAL DUTIES AT A STRUCTURE FIRE		
CAPTAIN	**ENGINEER**	**FIREFIGHTER**
Engine Company Supervisor *Crew Safety Officer* *In charge of crew accountability* *Makes decisions quickly/accurately to limit loss of life* *Command's emergency situations until relieved* *<u>COORDINATES</u> fire*	*Operates and pumps fire engine at fire* *Responsible for maintaining and driving apparatus to emergency incidents* *Functions as a Firefighter when assigned to other functions on the fire when not the pumping Engine* *<u>CONDUCTS</u> fire control/search and rescue/ventilation/salvage/*	*Responsible for stretching hose lines* *Operating all tools and equipment on the Engine used for various types of emergency fire and rescue operations* *<u>CONDUCTS</u> fire control/search and rescue/ventilation/salvage/ overhaul/ventilation operations* *Provides EMS care*

control/search and rescue/ventilation/salvage/ overhaul/ventilation operations, *Provides EMS care*	*overhaul/ventilation operations* *Provides EMS care*	

All of the above are critical life saving tasks that need to be accomplished on the fire ground. You will notice the compaction of responsibilities that our Engineers and Captains experience at every incident due to no Firefighter position. Functioning with a two-person engine company negatively impacts our safety, capacity, and operational effectiveness as noted in the 2019 SOC "Critical Task Analysis" mentioned above.

The following section identifies common engine company workloads and quantifies the difference between a two-person and three-person engine company through National Institute of Standards and Technology (NIST) field experiments. Even an increase in staffing on one of our four fire engines will have an immediate impact as seen below:

Structure Fire Fighting Impacts - As mentioned in the Departments 2019 SOC, one of the two contributing factors to an effective deployment model is *weight* (number of firefighters) of the response. The Department currently has 15 firefighters on its Initial Alarm Response, one less Firefighter than the industry standard. Increasing staffing on one fire engine per the "Staffing/Deployment" agreement will allow the Department to comply with the following NFPA 1710 standard:

NFPA 1710 5.2.4.1.1: (9) Single family Dwelling Initial Alarm Assignment Capability Total effective response force with a minimum of 16 firefighters. (NFPA 1710 p.12)

Fire extinguishment and search/rescue operations are time critical and can be a matter of life or death. The following "National Institute of Standards and Technology Fireground Field Experiments" (NIST Fire) quantifies the time differences between two and three person engine companies. You will notice a faster "Hose Stretch" that equates to a more rapid fire extinguishment and a faster "Search/Rescue Start Time." All that equates to an increased survivability rate for fire victims.

NIST FIREGROUND FIELD EXPERIMENTS

Hose Stretch	A two-person crew took 57 seconds longer than a three-person crew to stretch a line. (NIST Fire p.38)
Search/Rescue Start Time	The three-person crew started a primary search/rescue more than 25 % faster than the two-person crew. (NIST Fire p.41)

Emergency Medical Care Impacts - Engine companies are usually the first on scene during Emergency Medical Service (EMS) calls. The following "National Institute of Standards and Technology EMS Field Experiments" (NIST EMS) quantifies the time differences between two and three person engine companies. Notice a three-person engine company provides faster "Patient Access" and a "Patient Removal " start time. All that equates to improved medical care on routine EMS incidents.

PATIENT ACCESS
Two-person crews finished the patient access tasks approximately half a minute later than larger first responder crews.(NIST EMS p.33) **(Note: Our two-person engine companies are sometimes tasked with carrying 94.6 lbs of medical equipment while gaining "patient access".)*
PATIENT REMOVAL
Two-person first responder crews completed patient removal between (1.2 – 1.5) minutes slower than larger crews, depending on crew size. This is largely the result of work load in carrying equipment, supplies and the patient with fewer crew members. (NIST EMS p.33)

One of the most challenging EMS calls a firefighter responds too is a cardiac arrest (not breathing/no pulse). Providing efficient CPR is vital to reversing the effects of cardiac arrest and saving a life. Providing chest compressions, rescue breathing and operating a defibrillator are three core tasks that must take place simultaneously. A two-person engine company cannot perform these three tasks simultaneously. Additional fire engines from further away subsidize our two-person engine company, thus delaying efficient CPR by minutes, when seconds count.

The "Chain Of Survival" identifies four factors that will increase the survivability rate of someone in cardiac arrest. Increasing to a three-person engine company will improve speed of patient access/patient removal, and allow the first engine company on scene to provide immediate CPR (chest compressions/rescue breathing) and defibrillation, resulting in an improved survivability rate within the community.

CHAIN OF SURVIVAL		
1.	Early Access	Patient Access
2.	Early CPR	Chest Compressions and rescue breathing are core CPR tasks
3.	Early Defibrillation	Core CPR task
4.	Early Advanced Medical Care	Part of Patient Removal

Physiological Effects - Reports on firefighter fatalities consistently document overexertion/overstrain as the leading cause of line-of-duty fatalities. There is strong epidemiological evidence that heavy physical exertion can trigger sudden cardiac events. Therefore, information about the effect of crew size on physiological strain is very valuable.

Danger is increased for small crews because the stress of fire fighting keeps heart rates elevated beyond the maximum heart rate for the duration of a fire response. (NIST Fire pg 50)
Average Heart Rates
● Higher for members of small crews. ○ Particularly two-person crews. ● Higher heart rates were maintained for sustained time intervals.

CONCLUSION

The Department needs a paradigm shift to maintain effective operational readiness in this modern world. In order to meet all of these new demands, we need to increase our engine company staffing as soon as possible. The Department is currently the only department in Marin County that has two-person engine companies. Marin County fire agencies have a combined 31 staffed fire engines, 26 of which are staffed with three personnel. Of the remaining five engines not staffed with three personnel, four of those engines are the Departments.

It has been a long term goal of the Fire Board to make the transition to a three-person engine company. The “2022 Staffing/Deployment” Side Letter provides an opportunity for the Department to begin staffing its engines with one three-person engine company prior to July 1, 2025 if the Board so chooses. The remaining two engine companies will be staffed with three personnel after the closure of Station 18 on July 1. 2025.

MEMBER AGENCY COSTS

The chart below represents a fully-burdened cost of three Firefighter Paramedic positions, taking into consideration the following: monthly salary/benefits were calculated using the Boards agreed (on 1/8/22) amounts from the Firefighter Paramedic "Side Letter Of Agreement" and salary schedule/benefits were adjusted to match the negotiated increase/benefit changes since 2020, overtime costs are based on the negotiated leave days (sick/vacation), and one time equipment costs are based on outfitting a Firefighter with protective clothing (one time equipment costs only included in 24/25 and 25/26).

COST BY MEMBER AGENCY				
FY	Fairfax	Ross	San Anselmo	Sleepy Hollow FPD
Percent Share	23.30%	23.37%	40.53%	12.80%
24/25	$147,262	$147,705	$256,161	$80,900
25/26	$156,034	$156,503	$271,420	$85,719
26/27	$164,114	$164,607	$285,473	$90,157

FUNDING OPTIONS

Option 1: Each Member agency will begin paying their respective "percentage share" from the position date of hire. (*This is the funding option chosen by the subcommittee)

Option 2: Authorize one-time use from undesignated reserves to fund the first year from the position date of hire. Each Member agency will begin paying their respective "percentage share" after year one.

Option 3: Authorize one-time use from undesignated reserves to fund a phased approach using a combination of undesignated reserves and member agency respective "percentage share" for the first two years of the position. The Department would use undesignated reserves to pay the difference of the actual cost and the amount being billed to the member agencies. Member agencies would be charged 50% in year one, 75% in year 2, and 100% in year 3.(See chart below).

OPTION 3: COST BY MEMBER AGENCY (PHASED APPROACH)					
FY	Fairfax	Ross	San Anselmo	Sleepy Hollow FPD	Reserve Funds
Percent Share	23.30%	23.37%	40.53%	12.80%	
24/25 (50%)	$73,631	$73,852	$128,080	$40,450	$316,014
25/26 (75%)	$117,026	$117,377	$203,565	$64,289	$167,419
26/27 (100%)	$164,114	$164,607	$285,473	$90,157	$0

FISCAL IMPACT:

If the Board supports the subcommittees recommendation of a funding plan that entails "Option 1: Each Member agency will begin paying their respective "percentage share" from the position date of hire" and a start date of July 1, 2024 the fiscal impact would include a $632,028 increase to the FY 24/25 Budget.

ENCLOSED REFERENCES/ATTACHMENTS:

Ross Valley Fire Department 2022 Side Letter Staffing/Deployment Between Ross Valley Fire Department And Ross Valley Firefighters' Association Local 1775.

Ross Valley Fire Department 2020 Side Letter of Agreement between the Ross Valley Fire Department and the Ross Valley Professional Firefighters' IAFF Local 1775.

(2019 SOC): Citygate Associates, LLC. 2019. Ross Valley Fire Department Standards of Coverage Assessment Volume 1 of 2: Technical Report.

(NIST Fireground): National Institute of Standards and Technology. 2010. Report Residential Fireground Field Experiments. 56.

(NIST EMS): National Institute of Standards and Technology. 2010. Report on EMS Field Experiments. 60.

(NFPA1710): National Fire Protection Association. 2020. NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.

Side letter of Agreement between the Ross Valley Fire Department and the Ross Valley Professional Firefighters' IAFF Local 1775

Whereas the Ross Valley Fire Department is in the process of analyzing facilities and staffing, the parties agree to the following:

1. The parties agree on the importance of maintaining filled positions to allow necessary time for entry level training prior to being placed on emergency apparatus. Additionally, parties agree on the importance of long-term planning for facilities and staffing that must be done in a collaborative and thoughtful way to ensure quality, sustainable services.

2. The parties agree to move forward with the creation of a Firefighter Paramedic position. Additionally, the parties agree to place on hold the Firefighter/Engineer Paramedic recruitment to allow a reasonable timeframe to work collaboratively on staffing options.

3. The parties agree that the Firefighter Paramedic position will be dissolved and incumbents holding those positions will be automatically transferred into the existing Firefighter/Engineer Paramedic position after successfully passing a probationary period or 12mos whichever is first if parties do not reach mutually agreeable terms related to position restructuring.

4. This agreement shall hereby be incorporated by this reference into the parties' MOU.

5. The Firefighter Paramedic position will be entitled to the same benefits and provisions as others in the Ross Valley Firefighters' Association according to the current MOU.

6. The monthly Salary for the Firefighter Paramedic position shall be:

Step A	$7,986
Step B	$8,385
Step C	$8,805

Ross Valley Fire Department

By: _____
Name: _____
Title: _____
Date _____

By: _____
Name: _____
Title: _____
Date _____

Ross Valley Fire Firefighters' Association IAFF Local 1775

By: _____
Name: _____
Title: _____
Date _____

Ratified: IAFF Local 1775
By: _____
Name: _____
Title: _____
Date _____

SIDE LETTER

STAFFING / DEPLOYMENT
BETWEEN

ROSS VALLEY FIRE DEPARTMENT
AND
ROSS VALLEY FIREFIGHTERS' ASSOCIATION LOCAL 1775

The Ross Valley Fire Department (hereinafter Department) and the Ross Valley Firefighters' Association (hereinafter Association) have mutually agreed to the following:

- Upon the closure of Fire Station 18 located in Ross, California, scheduled for July 1, 2025, the six assigned personnel (three Fire Captains and three Firefighter Engineers) shall be moved West to increase staffing from two to three personnel at Fire Stations 19 and 21;
- The parties further agree the third person on each engine will be converted to a Firefighter Paramedic Position through attrition.
- Nothing in this letter agreement shall affect the minimum number of personnel required for daily staffing under the parties' MOU.
- The parties agree that the labor-management sub-committee will meet at minimum quarterly, beginning the first quarter of 2022, with the goal of determining how to also increase the staffing to three personnel at Fire Station 20 in Sleepy Hollow. This sub-committee will include at least one Association member representing labor, a Board member from each member agency, and the management committee.

If the foregoing is in accordance with your understanding, please sign below:

For the Department

Date: 24 Jan 22

For the Association

Date: 01/10/2022

Item 5f
Attachment #1
Page **2** of **2**

Ross Valley Fire Department

By: _____
Name: _____
Title: _____
Date _____

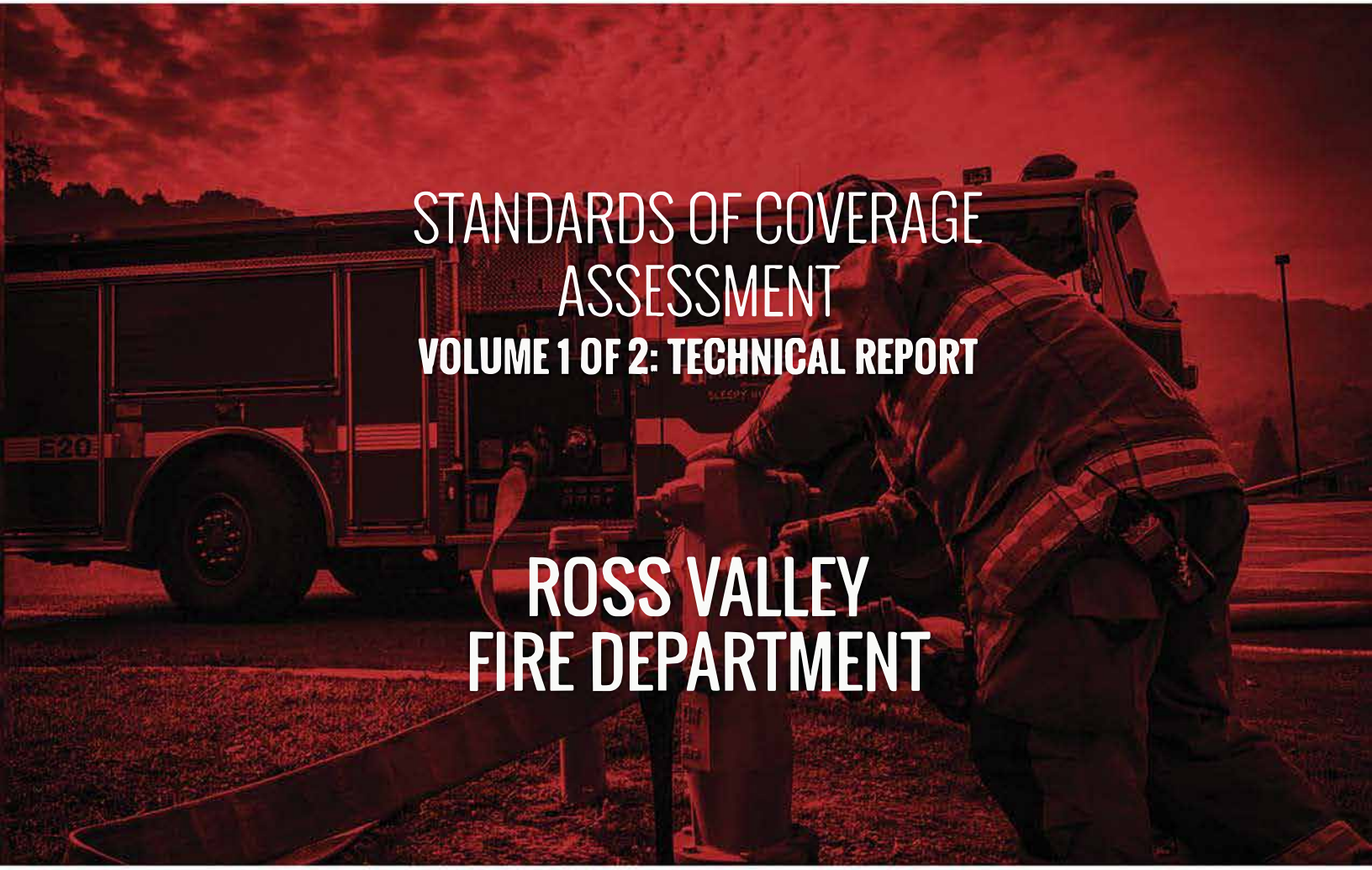
By: _____
Name: _____
Title: _____
Date _____

Ross Valley Fire Firefighters' Association IAFF Local 1775

By: _____
Name: _____
Title: _____
Date _____

Ratified: IAFF Local 1775
By: _____
Name: _____
Title: _____
Date _____

CITYGATE ASSOCIATES, LLC
PUBLIC SAFETY SERVICES



STANDARDS OF COVERAGE ASSESSMENT

VOLUME 1 OF 2: TECHNICAL REPORT

ROSS VALLEY FIRE DEPARTMENT

SEPTEMBER 2019

CITYGATE ASSOCIATES, LLC
WWW.CITYGATEASSOCIATES.COM
600 COOLIDGE DR., STE. 150
FOLSOM, CA 95630
PHONE: (916) 458-5100
FAX: (916) 983-2090

This page was intentionally left blank

TABLE OF CONTENTS

VOLUME 1 of 2 – Technical Report (this volume)

Section **Page**

Executive Summary **1**
Policy Choices Framework 1
Overall Summary of Current Ross Valley Fire Crew Deployment 1
Citygate's Overall Opinions 3
Deployment Key Findings and Recommendations 4
Next Steps 8

Section 1—Introduction and Background **9**
1.1 Report Organization 9
1.1.1 Goals of the Report 9
1.1.2 Limitations of Report 10
1.2 Project Approach and Scope of Work 10
1.2.1 Project Approach and Research Methods 10
1.2.2 Project Scope of Work 11
1.3 Communities Served Overview 11
1.4 Fire Department Overview 13
1.4.1 Facilities and Resources 13

Section 2—Standards of Coverage Assessment **15**
2.1 Standards of Coverage Process Overview 15
2.2 Current Deployment 17
2.2.1 Current Deployment Model 19
2.3 Outcome Expectations 20
2.4 Community Risk Assessment 23
2.4.1 Risk Assessment Methodology 23
2.4.2 Risk Assessment Summary 24
2.5 Critical Task Time Measures—What Must Be Done over What Time Frame to Achieve the Stated Outcome Expectation? 25
2.5.1 Critical Firefighting Tasks 26
2.5.2 Critical Medical Emergency Tasks 28
2.5.3 Critical Task Analysis and Effective Response Force Size 29
2.6 Distribution and Concentration Studies—How the Location of First-Due and First Alarm Resources Affects Emergency Incident Outcomes 31
2.6.1 Deployment Baselines 31
2.7 Statistical Analysis 34
2.7.1 Demand for Service 34
2.7.2 Simultaneous Emergency Incident Activity 38
2.7.3 Operational Performance 40
2.7.4 Call Processing 41
2.7.5 Turnout Time 41
2.7.6 Travel Time 42
2.7.7 Call to Arrival 44

2.7.8 Effective Response Force (First Alarm) Concentration Measurements 45

Section 3—Town of Ross Focused Study 47
3.1 Questions Regarding Station 18 47
3.2 Impact if Fire Station 18 Closes 54

Section 4—Overall Evaluation 59
4.1 Deployment Recommendations 60

Appendix A—Risk Assessment 65
A.1 Community Risk Assessment 65
A.1.1 Risk Assessment Methodology 65
A.1.2 Risk Assessment Summary 66
A.1.3 Planning Zones 67
A.1.4 Values at Risk to Be Protected 68
A.1.5 Hazard Identification 72
A.1.6 Service Capacity 74
A.1.7 Probability of Occurrence 75
A.1.8 Impact Severity 76
A.1.9 Overall Risk 77
A.1.10 Building Fire Risk 78
A.1.11 Vegetation Fire Risk 81
A.1.12 Medical Emergency Risk 88
A.1.13 Hazardous Material Risk 91
A.1.14 Technical Rescue Risk 94

Table of Tables

Table 1—Call to Arrival Performance to 90 Percent of Fire and EMS Incidents (Taken from Table 16) 2
Table 2—Travel Time Performance to 90 Percent of Fire and EMS Incidents (Taken from Table 15) 3
Table 3—Fire Department Facilities and Assigned Resources 13
Table 4—Standards of Coverage Process Elements 16
Table 5—Fire Service Deployment Paradigm 17
Table 6—Response Plan by Incident Type 20
Table 7—Overall Risk by Hazard 25
Table 8—First Alarm Residential Fire Critical Tasks – 16 Personnel 27
Table 9—Cardiac Arrest Critical Tasks – Three Engine Personnel + Two Personnel ALS Ambulance 29
Table 10—Incidents: Quantity by Incident Type – 2018 37
Table 11—Incidents: Quantity by Property Use – 2018 38
Table 12—Percentage by Number of Simultaneous *Emergency* Incidents 39
Table 13—Call Processing Performance to 90 Percent of Fire and EMS Incidents 41
Table 14—Turnout Time Performance to 90 Percent of Fire and EMS Incidents 42
Table 15—Travel Time Performance to 90 Percent of Fire and EMS Incidents 43
Table 16—Call to Arrival Performance to 90 Percent of Fire and EMS Incidents 44
Table 17—Distribution – Structure Fire Initial Response – Fourth-Due Unit Travel Time Performance to 90 Percent of Fire and EMS Incidents 45
Table 18—Incidents: Quantity – Year by Incident Type for Station 18 – 2017 and 2018 48
Table 19—Station 18 Response Times to All Calls at 90 Percent Compliance 50
Table 20—Responses by Vehicle ID – 2017 and 2018 52

Table 21—EMS Responses by Station 18 Apparatus by Destination Station Area 52
Table 22—Station 19 Response Times to All Calls at 90 Percent Compliance....54
Table 23—Distribution Travel Time Analysis of Fire and EMS Responses from 01/01/17 to 12/31/18 55
Table 24—Overall Risk by Hazard 67
Table 25—Key Demographic Data – Ross Valley Fire Department....69
Table 26—High Risk Building Occupancy Inventory by Risk Category 71
Table 27—High Risk Occupancy Inventory by Planning Zone 71
Table 28—Marin County Hazards....73
Table 29—Probability of Occurrence Scoring Criteria 76
Table 30—Impact Severity Scoring Criteria 77
Table 31—Overall Risk Score and Rating....78
Table 32—Building Fire Service Demand 80
Table 33—Building Fire Probability Scoring....80
Table 34—Building Fire Impact Severity Scoring 81
Table 35—Overall Building Fire Risk....81
Table 36—Vegetation Fire Service Demand....87
Table 37—Vegetation Fire Probability Scoring 88
Table 38—Vegetation Fire Impact Severity Scoring....88
Table 39—Overall Vegetation Fire Risk 88
Table 40—Medical Emergency Service Demand....90
Table 41—Medical Emergency Probability Scoring....91
Table 42—Medical Emergency Impact Severity Scoring 91
Table 43—Overall Medical Emergency Risk....91
Table 44—Hazardous Material Service Demand 93
Table 45—Hazardous Material Probability Scoring....93
Table 46—Hazardous Material Impact Severity Scoring 94
Table 47—Overall Hazardous Material Risk 94
Table 48—Technical Rescue Service Demand....98
Table 49—Technical Rescue Probability Scoring....98
Table 50—Technical Rescue Impact Severity Scoring 98
Table 51—Overall Technical Rescue Risk....99

Table of Figures

Figure 1—Fire Station Districts and General Geography....12
Figure 2—Fractile versus Average Response Time Measurements 21
Figure 3—Overall Risk 24
Figure 4—Annual Service Demand by Year....35
Figure 5—Number of Incidents by Year – All Incident Types 35
Figure 6—Service Demand by Hour of Day and Year....36
Figure 7—Number of Incidents by Station – 2018....37
Figure 8—Number of Simultaneous Incidents by Year....39
Figure 9—Number of Single-Station Simultaneous Incidents by Station by Year....40
Figure 10—Fractile for Incidents Turnout (CAD)....42
Figure 11—Fractile for Incidents Travel (CAD) 43
Figure 12—Fractile for Incidents Call to First Arrival 44
Figure 13—Number of Incidents by Year by Incident Type – Station 18....48
Figure 14—90 Percent Response Times by Distance for All Department Stations....51

Figure 15—Overall Risk 66
Figure 16—Risk Planning Zones....68
Figure 17—Commission on Fire Accreditation International Hazard Categories 74
Figure 18—Building Fire Progression Timeline 79
Figure 19—SRA Wildland Fire Hazard Severity Zones – Marin County 82
Figure 20—Wildland Fire Hazard Map....83
Figure 21—Areas of Wildfire Concern – Marin County CWPP 84
Figure 22—Marin County Wildfire History....86
Figure 23—Survival Rate versus Time to Defibrillation....89
Figure 24—Earthquake Faults....96
Figure 25—Flood Hazard Areas....97

VOLUME 2 of 2 – Map Atlas (separately bound)

EXECUTIVE SUMMARY

The Ross Valley Fire Department (Department) is a consolidated department protecting lives, property, and the environments of Ross, San Anselmo, Sleepy Hollow, and Fairfax. The Department retained Citygate Associates, LLC (Citygate) to conduct a comprehensive Standards of Coverage (SOC) assessment to provide a foundation for future fire service planning. The goal of this assessment is to identify both current services and desired service levels, and then to assess the Department's ability to provide them. As part of this study, the Town of Ross (Town) requested an analysis of the impact on the current level of services if the fire engine in the Town was relocated, and alternatively, the fire engine and ambulance were relocated from their present location in the Town. After understanding any possible gaps in operations and resources, Citygate has provided recommendations to improve Department operations and services over time.

This assessment is presented in several parts, including this Executive Summary outlining the most significant findings and recommendations; the fire station/crew deployment analysis supported by maps and response statistics; and an assessment of specific fire crew deployment choices for the Town of Ross. A separate Map Atlas (**Volume 2**) contains all the maps referenced throughout this report. Overall, there are 18 findings and 3 specific action recommendations.

POLICY CHOICES FRAMEWORK

There are no mandatory federal or state regulations directing the level of fire service staffing, response times, or outcomes. Thus, the level of fire protection services provided are a *local policy decision* and communities have the level of fire services that they can afford, which may not always be the level desired. However, if services are provided at all, local, state, and federal regulations relating to firefighter and citizen safety must be followed.

OVERALL SUMMARY OF CURRENT ROSS VALLEY FIRE CREW DEPLOYMENT

Citygate finds that that the Department is well organized being a partnership of several agencies to accomplish its mission to serve a suburban population in a municipal land-use pattern although in hilly terrain with few cross-connecting roads aside from the main roads on the valley floor. The Department serves mostly residential and small downtown populations with a mixed land-use pattern typical of Marin County communities. The small towns and the road to West Marin attract a high number of visitors that also must be protected. However, the hilly geography and the limited road network, which is dependent on one main connector road, makes the area very difficult to serve efficiently from a small number of fire stations.

Fire service deployment, simply stated, is about the *speed* and *weight* of the response. *Speed* refers to initial response (first-due) of all-risk intervention resources (engines, trucks, and/or ambulances) strategically deployed across a jurisdiction for response to emergencies within a time interval to

achieve desired outcomes. *Weight* refers to multiple-unit responses (Effective Response Force, or ERF, commonly also called a First Alarm) for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents. In these situations, a sufficient number of firefighters must be assembled within a reasonable time interval to safely control the emergency and prevent it from escalating into a more serious event.

Most suburban communities desire outcomes to include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent impairment resulting from a medical emergency. To do so, the initial units should arrive within 7:30 minutes from 9-1-1 notification and a multiple-unit ERF should arrive within 11:30 minutes of 9-1-1 notification at the Marin County Sheriff's Dispatch Center (Comm Center), all at 90 percent or better reliability. Total response time to emergency incidents includes three distinct components: (1) 9-1-1 call processing/dispatch time; (2) crew turnout time; and (3) travel time. Recommended best practices for these response components are 1:30 minutes, 2:00 minutes, and 4:00/8:00 minutes respectively for first-due and multiple-unit ERF responses in urban/suburban areas.

In the Department, the current fire station system provides the following first-due unit response time performance across a variety of population density/risk areas for emergency medical and fire incident types. As Table 1 shows, *all* station areas receive service *longer* than a best practices goal point of 7:30 minutes.

Table 1—Call to Arrival Performance to 90 Percent of Fire and EMS Incidents (Taken from Table 16)

Station Area	2018
Department-Wide	08:45
Station 18	07:55
Station 19	07:45
Station 20	08:47
Station 21	09:07

The Department's dispatch times are *excellent*. Crew turnout times need modest improvement. The times in Table 1 do, however, reflect a longer *travel* time slower than an urban/suburban preferred 4:00 minutes for 90 percent of the incidents, as Table 2 displays.

Table 2—Travel Time Performance to 90 Percent of Fire and EMS Incidents (Taken from Table 15)

Station Area	2018
Department-Wide	06:09
Station 18	04:40
Station 19	05:38
Station 20	06:24
Station 21	06:30

The overall longer-than-desired first-due unit travel times are *not* the result of a lack of fire stations. They are the result of the non-grid street network design, simultaneous incidents at peak hours of the day, and traffic congestion—particularly rush hour and tourism on weekends.

CITYGATE'S OVERALL OPINIONS

The Department is very difficult to serve efficiently from a small number of fire stations due to the hilly geography and the limited road network, which is dependent on one main connector road. Over time, each population cluster opened a fire station for a minimum single first unit response and knew they were co-dependent on each other for multiple-unit serious emergencies. The geography cannot be changed and improving the road network is not politically feasible or cost-effective. Thus, reducing coverage by removing any one or more fire engines or the paramedic ambulance will increase response times to the local community receiving reduced coverage.

While the state fire code now requires fire sprinklers even in residential dwellings, it will be many more years before the vast majority of homes are replaced or remodeled with automatic fire sprinklers. If the communities' desired outcomes include limiting building fire damage to only part of the inside of an affected building, minimizing permanent impairment resulting from a medical emergency, and keeping wildland fires small to a few acres at the ignition point, then the communities served by the Ross Valley Fire Department will need first-due unit coverage in all neighborhoods.

However, even with maintaining the current four-station spacing, given the topography, not all hillside areas can receive response time coverage consistent with suburban best practice incident outcomes and a Citygate performance recommendation of a first-due arrival within 7:30 minutes from 9-1-1 dispatch notification and a multiple-unit Effective Response Force (ERF) arrival occurring within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability.

The Department's call processing performance is excellent. The crew turnout time needs modest improvement but even such attainable improvement cannot substantially lower the fire unit travel

times which are longer than desired. Department resources and equipment are appropriate to protect against the hazards likely to impact the Department's service area, but the daily staffing of eight firefighters on four engines, plus a two-firefighter/paramedic ambulance from the Ross Valley Paramedic Authority (RVPA) and a Duty Chief Officer only provides a *minimum* total response force sufficient to begin controlling a single emerging to serious fire incident, or to provide care at an EMS incident with one to five patients.

In terms of emergency incident workload per unit, no single fire unit or station area is approaching workload saturation. The level of simultaneous incidents is not high enough to warrant another unit at peak hours of the day. Citygate is, however, concerned about the overall limited Department staffing per day and its ability to respond with more "weight of attack" to keep emerging serious emergencies controlled. Even Countywide mutual aid resources are not quickly available in this part of Marin County, as they would be in an urban area with flat terrain and interconnected roads.

The quantity of calls in the Town of Ross (or any other single historic population cluster in the joint Department's service area) is too small and too volatile from which to use historical incidents as the only criteria to maintain the fire station. Providing fire services is akin to purchasing fire insurance, and it is important to consider the desired level of protection. The public policy issue is whether to have access to a fire station nearby or farther away, knowing that a station farther away, even with its unit(s) available for response, cannot offer more than edge suburban or emerging rural area response times to much of the Town of Ross.

DEPLOYMENT KEY FINDINGS AND RECOMMENDATIONS

The following are findings and recommendations presented throughout the report.

Finding #1: The Department has legacy response performance objectives partially consistent with best practice recommendations as published by the Commission on Fire Accreditation International. However, they should be updated to reflect current risks and desired outcomes for all types of emergency risk outcomes.

Finding #2: The Department has a standard response plan that considers risk and establishes an appropriate initial response for each incident type. Each type of call for service receives the combination of engines, specialty units, and command officers customarily needed to begin to control that type of incident based on Department experience.

Finding #3: The mapping analysis shows the need for neighborhood-based first response units for fire and EMS incidents.

Finding #4: The risk assessment maps show there are risks to be protected from fire besides just single-family homes, and some areas have lower fire flow capacity for serious or conflagration size fires.

Finding #5: The Department's service demand is consistent, indicating the need for a 24-hours-per-day, seven-days-per-week fire and EMS emergency response system.

Finding #6: The number of simultaneous incidents is volatile. However, in a four-station department, it is very rare that more than two incidents occur at once.

Finding #7: Call processing performance at 1:04 minutes is *better than* a best practice recommendation of 1:30 minutes.

Finding #8: Crew turnout performance at 2:41 minutes is *slower* than a Citygate-recommended goal of 2:00 minutes or less.

Finding #9: First-due unit travel time performance to 90 percent of the incidents Department-wide at 6:09 minutes is well past the Department's likely goal of 4:00 minutes, a goal consistent with best practices.

Finding #10: The Department's call to arrival time to 90 percent of the incidents at 8:45 is slower than a Citygate's recommended goal of 7:30 minutes in developed suburban areas. The principal reason is the longer travel times, reflective of the topography and road network in the Department's service area.

Finding #11: The Effective Response Force (First Alarm) *travel* times are only modestly longer than a best practices goal of 8:00 minutes and are reflective of the good, central placement of the four fire stations.

Finding #12: In the Town of Ross, on EMS emergencies, Engine 18 responded 214 times and Medic 18 responded 169 times in a two-year period.

Finding #13: In the Town of Ross, adjoining Engines 17 (Kentfield) and Engine 19 each arrived first over a two-year period 19 and 20 times, totaling 39. Thus, the outside units only arrived/were needed first 12.6 percent of the time.

Finding #14: In a two-year period, Engines 18 and 17 (Kentfield) were assigned to incidents at the same time 78 times or 16 percent of Engine 18's total responses. Stated this way, if Engine 18 was closed, there are approximately 1.5 incidents per week to which Engine 17 will not be available to respond.

Finding #15: Closing Station 18 will add about 2:00 minutes *minimum* of travel time into that station area.

Finding #16: In the Ross Valley Fire Department, Station 18 has the best travel time of any of the four station areas at 4:40 minutes, only 40 seconds longer than an urban/suburban best practice recommendation of 4:00 minutes. Adding 2:00 minutes travel, plus dispatch and turnout time of at least 3:00 minutes, moves a Town of Ross total response time from 7:40 to 9:40 which would be more like an edge suburban area or emerging rural area. First unit response times of 10:00 minutes-plus means small fires will become larger and critical EMS patients may not receive lifesaving care.

Finding #17: If the Engine 18 daily firefighter count of two were transferred to Engine 19, or reduced to one being transferred, they would be joining an engine that serves a much larger area and is more exposed to simultaneous incident demand. Due the dynamic nature of 9-1-1 emergencies, there is no way to predict if all of the Town of Ross Engine 18 and Medic 18 first arrivals would be covered by just Engines 19 and 17 (Kentfield) or by other units even farther away.

Finding #18: Covering the Town of Ross from either Station 19 or 17 (Kentfield) depends on essentially one road being open and not congested with traffic. Any one accident or natural emergency could close the road, effectively making the Town of Ross a cul-de-sac served from one direction and, in a sub-regional emergency, either Engine 19 or 17 would be shared with a larger service area.

Recommendation #1: **Adopt Updated Deployment Policies:** The Ross Valley Fire Department governing Board should adopt *updated*, complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients medically salvageable upon arrival and to keep small but serious fires from becoming more serious. With this is mind, Citygate recommends the following measures:

1.1 Distribution of Fire Stations: To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 8:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call at dispatch; this equates to a 90-second dispatch time, a 2:00-minute company turnout time, and a 5:00-minute travel time.

1.2 Multiple-Unit Effective Response Force for Serious Emergencies: To confine building fires near the room of origin, keep vegetation fires under one acre in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least 12 personnel, including at least one Duty Chief Officer, should arrive within 12:30 minutes from the time of 9-1-1 call receipt in dispatch, 90 percent of the time; this equates to a 90-second dispatch time, 2:00-minute company turnout time, and 9:00-minute travel time.

1.3 Hazardous Materials Response: Provide hazardous materials response designed to protect the Department's service areas from the hazards associated with uncontrolled release of hazardous and toxic materials. The fundamental mission of the Fire Department's response is to isolate the hazard, deny entry into the hazard zone, and notify appropriate officials/resources to minimize impacts on the community. This can be achieved with a first-due total response time of 8:30 minutes or less to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request additional resources from the regional hazardous materials team.

1.4 Technical Rescue: Respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue with a first-due total response time of 8:30 minutes or less to evaluate the situation and/or initiate rescue actions. Following the initial evaluation, assemble additional resources as needed within a total response time of 12:30 minutes to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

Recommendation #2: Consider maintaining the current location of all four engines and keeping Medic 18 in the Town of Ross to balance its coverage area to the west and east.

Recommendation #3: Consider providing a third firefighter per day on the three engines other than Engine 18. Doing so would raise the daily weight of attack from 12 to 15 and, with Kentfield's three personnel, to 18. This force would be sufficient to provide the weight of attack and simultaneous incident

redundancy for suburban positive outcomes. Especially on serious building and wildland fire ignitions, there is no second chance to stop the fire. This is a local policy decision to be made by the affected communities to determine the level of fire service that they can afford.

NEXT STEPS

- Review and absorb the content, findings, and recommendations of this report.
- Adopt revised response performance goals as recommended.
- Request staff to return with a community engagement plan to discuss adding up to three more firefighters per day, one on each of the three engines other than Engine 18.

SECTION 1—INTRODUCTION AND BACKGROUND

The Ross Valley Fire Department (Department) retained Citygate Associates, LLC (Citygate) to conduct a comprehensive Standards of Coverage (SOC) assessment to provide a foundation for future fire service planning. The goal of this assessment is to identify both current services and desired service levels and then to assess the Department's ability to provide them. Citygate's scope of work and corresponding Work Plan were developed consistent with Citygate's Project Team members' experience in fire administration and deployment. Citygate utilizes various National Fire Protection Association (NFPA) and Insurance Services Office (ISO) publications as best practice guidelines, along with the self-assessment criteria of the Commission on Fire Accreditation International (CFAI).

1.1 REPORT ORGANIZATION

This report is organized into the following sections. **Volume 2** (Map Atlas) is separately bound.

Executive Summary: Summary of current services and significant future challenges.

Section 1 Introduction and Background: An introduction to the study and background facts about the Department.

Section 2 Standards of Coverage Assessment: An overview of the SOC process and detailed analysis of existing deployment policies, outcome expectations, community risk, critical tasks, distribution and concentration effectiveness, reliability and historical response effectiveness, and overall deployment evaluation.

Section 3 Town of Ross Focused Study: An assessment of the effectiveness of locating one of the Department's engines and/or ambulances in the Town of Ross.

Section 4 Overall Evaluation: An overall deployment evaluation with concluding recommendations.

Appendix A Risk Assessment

1.1.1 Goals of the Report

This report cites findings and provides recommendations, as appropriate, related to each finding. Findings and recommendations throughout this report are sequentially numbered. A complete list of all these same findings and recommendations is provided in the Executive Summary.

This document provides technical information about the way fire services are provided and legally regulated and the way the Department currently operates. This information is presented in the form of recommendations and policy choices for consideration by the Department's leadership.

The result is a solid technical foundation upon which to understand the advantages and disadvantages of the choices facing Department's partners regarding the best way to provide fire services and, more specifically, at what level of desired outcome and expense.

1.1.2 Limitations of Report

In the United States, there are no federal or state regulations requiring a specific minimum level of fire services. Each community, through the public policy process, is expected to understand the local fire and non-fire risks and its ability to pay, and then choose its level of fire services. *If* fire services are provided at all, federal and state regulations specify how to do so safely for the public and for the personnel providing the services.

While this report and technical explanation can provide a framework for the discussion of Department services, neither this report nor the Citygate team can make the final decisions, nor can they cost out every possible alternative in detail. Once final strategic choices receive policy approval, Department staff can conduct any final costing and fiscal analysis as typically completed in its normal operating and capital budget preparation cycle.

1.2 Project Approach and Scope of Work

1.2.1 Project Approach and Research Methods

Citygate utilized multiple sources to gather, understand, and model information about the Department. Citygate requested a large amount of background data and information to better understand current costs, service levels, history of service level decisions, and other prior studies.

In subsequent site visits, Citygate performed focused interviews of the Department's project team members and other project stakeholders. Citygate reviewed demographic information about the Department's service area and the potential for future growth and development. Citygate also obtained map and response data from which to model current and projected future fire service deployment, with the goal to identify the location(s) of stations and crew quantities required to best serve the Department as it currently exists and to facilitate future deployment planning.

Once Citygate gained an understanding of the Department's service area and its fire and non-fire risks, the Citygate team then developed a model of fire services that was tested against the travel time mapping and prior response data to ensure an appropriate fit. Citygate also evaluated future service area growth and service demand by risk types. This resulted in Citygate proposing an approach to both address current needs with effective and efficient use of existing resources and long-range needs. The result is a framework for enhancing Fire Department services while meeting reasonable community expectations and fiscal realities.

1.2.2 Project Scope of Work

Citygate's approach to this Standards of Coverage assessment involved:

- Reviewing information provided by the Department and the Town along with conducting stakeholder listening sessions with project stakeholders.
- Utilizing a geographic mapping software program to model fire station travel time coverage.
- Using an incident response time analysis program called StatsFD™ to review the statistics of prior incident performance, plotting the results on graphs and geographic mapping exhibits.
- Identifying and evaluating future Department population and related development growth.
- Projecting future service demand by risk type.
- Identifying and evaluating potential alternate service delivery models.
- Recommending appropriate risk-specific response performance goals.
- Identifying a long-term strategy, including incremental short- and mid-term goals to achieve desired response performance objectives.
- Utilizing the CFAI self-assessment criteria and other NFPA standards as the basis for evaluating the deployment services provided.

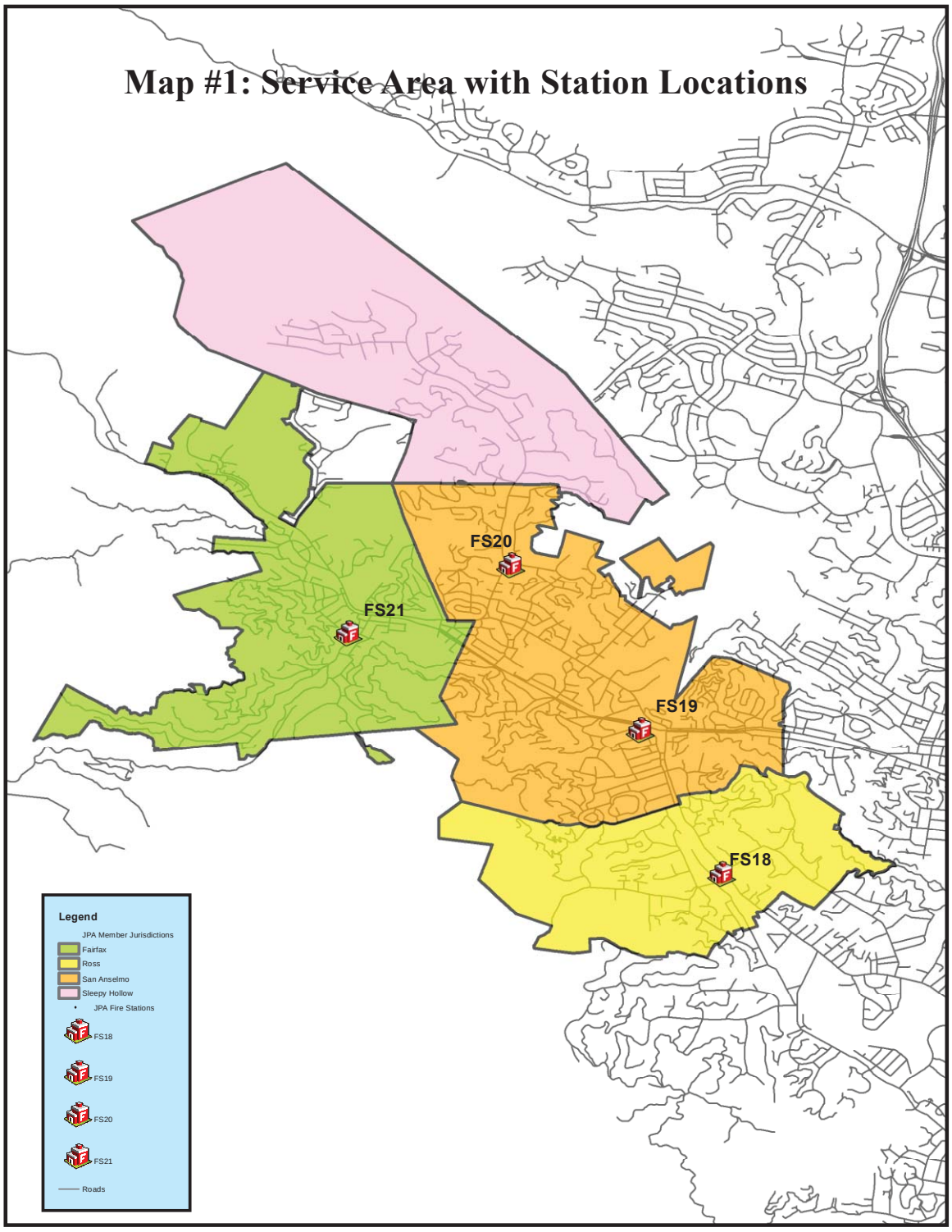
1.3 Communities Served Overview

The Department is a consolidated department protecting lives, property, and the environments of Ross, San Anselmo, Sleepy Hollow, and Fairfax. Ross Valley fire departments trace their history to the early 1900s, with the formation of small volunteer fire departments in the newly formed towns of Ross, San Anselmo, and Fairfax. Built near the wildfire prone slopes of Mount Tamalpais, these communities were and continue to be acutely aware of the risk of fire.

In 1982, the Fairfax Fire Department and the San Anselmo Fire Department joined forces and became known as the Ross Valley Fire Service. At the time Sleepy Hollow was receiving fire protection from the Town of San Anselmo through a contract for service and Sleepy Hollow chose not to become a member of the joint powers authority (JPA) while maintaining a non-voting seat on the Board. In 2010, the JPA was expanded to make Sleepy Hollow a full member of the JPA, ending its contract for service with the Town of San Anselmo. With the expansion of the JPA, the name was changed to the Ross Valley Fire Department. In 2012, Ross Valley Fire Department's Board of Directors voted to consolidate fire services with the Town of Ross, incorporating the

Town of Ross Fire Station 18 into the Ross Valley Fire Department. The current aggregate population of the Department's service area is estimated to be 24,785.

Figure 1—Fire Station Districts and General Geography



1.4 Fire Department Overview

The Department's service capacity for building fire, wildland fire, medical emergency, hazardous materials, and technical rescue risk consists of eight personnel on duty daily staffing four Type-1 fire engines and one Duty Battalion Chief, operating from the Department's four fire stations. In addition, Medic 18 with two paramedic/firefighters from the Ross Valley Paramedic Authority (RVPA) is located at Station 18 in the Town of Ross.

All response personnel are trained to either the Emergency Medical Technician (EMT) level—capable of providing Basic Life Support (BLS) pre-hospital emergency medical care—or EMT-Paramedic (Paramedic) level—capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. Ground paramedic ambulance service is provided by the RVPA in the Department's service area.

Response personnel are also trained to the U.S. Department of Transportation Hazardous Material First Responder Operational (FRO) level to provide initial hazardous material incident assessment, hazard isolation, and for support for the Countywide hazardous material response team.

The Department also operates a cross-staffed Office of Emergency Services (OES) Type-1 (Structural Fire) engine from Station 20, a cross-staffed Type-3 (Wildland Fire) engine from Station 21, plus two reserve structure fire engines, one breathing air resupply unit, one hazardous materials response unit, and one utility truck. Technical rescue personnel and heavy rescue equipment would come from the County mutual aid system.

1.4.1 Facilities and Resources

The Department provides the aforementioned services from four fire stations as shown in Table 3.

Table 3—Fire Department Facilities and Assigned Resources

Station	Location	*Primary* Assigned Resources	*Minimum* Staffing
18	33 Sir Francis Drake Blvd., Ross	Engine	2
19	777 San Anselmo Ave., San Anselmo	Engine Battalion Chief	2 1
20	150 Butterfield Rd., San Anselmo	Engine	2
21	10 Park Road, Fairfax	Engine	2
Total *Per Day*			9

Source: Fire Department

This page was intentionally left blank

SECTION 2—STANDARDS OF COVERAGE ASSESSMENT

This section provides a detailed, in-depth analysis of the Department's current ability to deploy and mitigate emergency risks within its service area. The response analysis uses prior response statistics and geographic mapping to help the Department and the community to visualize what the current response system can and cannot deliver.

2.1 STANDARDS OF COVERAGE PROCESS OVERVIEW

The core methodology used by Citygate in the scope of its deployment analysis work is *Standards of Cover*, 5th and 6th editions, which is a systems-based approach to fire department deployment published by the Commission on Fire Accreditation International (CFAI). This approach uses local risk and demographics to determine the level of protection best fitting a community's needs.

The Standards of Coverage (SOC) method evaluates deployment as part of a fire agency's self-assessment process. This approach uses risk and community expectations on outcomes to help elected officials make informed decisions on fire and emergency medical services deployment levels. Citygate has adopted this multi-part systems approach as a comprehensive tool to evaluate fire station locations. Depending on the needs of the study, the depth of the components may vary.

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

While working with multiple components to conduct a deployment analysis is admittedly more work, it yields a much better result than using only a singular component. For instance, if only travel time is considered, and frequency of multiple calls is not considered, the analysis could miss over-worked companies. If a risk assessment for deployment is not considered, and deployment is based only on travel time, a community could under-deploy to incidents.

Table 4 describes the eight elements of the Standards of Coverage process.

Table 4—Standards of Coverage Process Elements

SOC Element		Description
1	Existing Deployment Policies	Reviewing the deployment goals the agency has in place today.
2	Community Outcome Expectations	Reviewing the expectations of the community for response to emergencies.
3	Community Risk Assessment	Reviewing the assets at risk in the community. (For this report, see Appendix A—Risk Assessment.)
4	Critical Task Analysis	Reviewing the tasks that must be performed and the personnel required to deliver the stated outcome expectation for the ERF.
5	Distribution Analysis	Reviewing the spacing of first-due resources (typically engines) to control routine emergencies.
6	Concentration Analysis	Reviewing the spacing of fire stations so that more complex emergencies can receive sufficient resources in a timely manner (First Alarm Assignment or the ERF).
7	Reliability and Historical Response Effectiveness Analysis	Using prior response statistics to determine the percent of compliance the existing system delivers.
8	Overall Evaluation	Proposing Standard of Coverage statements by risk type as necessary.

Source: CFAI *Standards of Cover*, 5th Edition

Fire service deployment, simply summarized, is about the *speed* and *weight* of the response. *Speed* refers to initial response (first-due), all-risk intervention resources (engines, trucks, and/or ambulances) strategically deployed across a jurisdiction for response to emergencies within a specified time interval to control routine to moderate emergencies without the incident escalating to greater size or severity. *Weight* refers to multiple-unit responses for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents. In these situations, a sufficient number of firefighters must be assembled within a reasonable time interval to safely control the emergency and prevent it from escalating into a more serious event. Table 5 illustrates this deployment paradigm.

Table 5—Fire Service Deployment Paradigm

Element	Description	Purpose
Speed of Response	Travel time of initial response of all-risk intervention units strategically located across a jurisdiction.	Controlling routine to moderate emergencies without the incident escalating in size or complexity.
Weight of Response	Number of firefighters in a multiple-unit response for serious emergencies.	Assembling enough firefighters within a reasonable time frame to safely control a more complex emergency without escalation.

Thus, smaller fires and less complex emergencies require a single-unit or two-unit response (engine and/or specialty resource) within a relatively short response time. Larger or more complex incidents require more units and personnel to control. In either case, if the crews arrive too late or the total number of personnel is too few for the emergency, they are drawn into an escalating and more dangerous situation. The science of fire crew deployment is to spread crews out across a community or jurisdiction for quick response to keep emergencies small with positive outcomes, without spreading resources so far apart that they cannot assemble quickly enough to effectively control more serious emergencies.

2.2 CURRENT DEPLOYMENT

SOC ELEMENT 1 OF 8
EXISTING DEPLOYMENT POLICIES

Nationally recognized standards and best practices suggest using several incremental measurements to define response time. Ideally, the clock start time is when the 9-1-1 dispatcher receives the emergency call. In some cases, the call must then be transferred to a separate dispatch center. In this setting, the response time clock starts when the dispatch center receives the 9-1-1 call into its computer-aided dispatch (CAD) system. Response time increments include dispatch center call processing, crew alerting and response unit boarding (commonly called turnout time), and actual driving (travel) time.

The Department's response time goals are somewhat dated and not completely up to best practice recommendations. They were most recently discussed in a 2005 Standards of Cover (adopted March of 2005) done by staff as a companion to the 2005 Strategic Plan:

- First unit on-scene within total reflex time of 7-minutes to all areas served with a high potential for life loss, economic value or fire flow. Further 8-minutes for areas with a moderate or low potential for life loss, economic value or fire flow. Time was to be from the 911 call receipt to 90% of the incidents.

- Confine 90% of all structure fires within 30-minutes of arrival after 911 call receipt to the area of involvement as reported by the first arriving fire units, using an Effective Response Force of 14 firefighters with a fire flow stream(s) application of 1,500 gallons per minute (GPM).
- Maintain an emergency response capability, measured from 911 call receipt to arrival, that will ensure initiation of wildland structural fire protection with the first arriving unit within 8-minutes, and the first alarm companies within 12-minutes to 90% of all responses in all areas.
- Maintain an Emergency Medical Response of EMT-Ds,[1] measured from 911 call receipt to arrival, within 8-minutes to 90% of the incidents in all areas served.

Cities, towns, and counties in California have General Plans for land use regulation. One required chapter is a Safety Element. In reviewing the Ross Valley Fire Department's partners General Plans, none of them mention response times. As would be expected in the Marin County region, all of the General Plans contain significant goals and policies for the mitigation of wildfire, including vegetation management, structure resistance to fires, and road access.

The Department does not appear to regularly report measures of response time performance, per the 2005 criteria, to itself and its partner local governments. Internally, Service Level Objectives were reviewed on a regular basis until 2013.

Having adopted performance measures pertaining to all types of risks beside fire and EMS, such as hazardous materials and technical rescues, is considered a best practice today. The Department does have a service level history that can be documented in retrospective response times, number of response companies, and minimum staffing.

Currently, National Fire Protection Association (NFPA) Standard 1710,[2] a recommended deployment standard for career fire departments in urban/suburban areas, recommends initial (first-due) intervention unit arrival within 4:00 minutes *travel* time and recommends arrival of all the resources comprising the multiple-unit First Alarm within 8:00 minutes *travel* time, at 90 percent or better reliability.

As the Department's 2005 goals properly cited, response time begins with the receipt of the 9-1-1 call. The most recent published best practices by the NFPA for dispatching have increased the dispatch processing time up to 90 seconds and, if there are language barriers, 120 seconds. Further,

[1] Emergency Medical Technician – Defibrillator capable.

[2] NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016 Edition).

for crew turnout time, 60-80 seconds is recommended depending on the type of protective clothing that has to be donned.

If the travel time measures recommended by the NFPA (and Citygate) are added to dispatch processing and crew turnout times recommended by Citygate and best practices, then a realistic 90 percent first unit arrival goal is now 7:30 minutes from the time of the Marin County Sheriff's Dispatch Center (Comm Center) receiving the call. This is comprised of 90 seconds dispatch + 2:00 minutes crew turnout + 4:00 minutes travel.

Finding #1:	The Department has legacy response performance objectives partially consistent with best practice recommendations as published by the Commission on Fire Accreditation International. However, they should be updated to reflect current risks and desired outcomes for all types of emergency risk outcomes.

2.2.1 Current Deployment Model

Resources and Staffing

The Department's current deployment model consists of four engines staffed with a minimum of two personnel each and one Battalion Chief, for a total daily minimum year-round continuous staffing of at least 9 personnel operating from four fire stations, plus a two-firefighter/paramedic ambulance from the Ross Valley Paramedic Authority (RVPA). The Department has automatic and mutual aid agreements with all the fire agencies in Marin County and is also a signatory to the State of California Mutual Aid Agreements.

Response Plan

The Department is an all-risk fire agency providing the people it protects with services that include fire suppression, pre-hospital paramedic (ALS) EMS, hazardous material and technical rescue response, and other non-emergency services, including fire prevention, community safety education, and other related services.

Given these risks, the Department utilizes a tiered response plan calling for different types and numbers of resources depending on incident/risk type. The Sheriff's Dispatch Center (Comm Center) process selects and dispatches the closest and most appropriate resource types pursuant to the Department's response plan, as shown in Table 6.

Table 6—Response Plan by Incident Type

Incident Type	Resources Dispatched	Total Personnel*
Single-Patient EMS	1 Engine + 1 Paramedic Ambulance	**4**
Vehicle Fire	1 Engine	**2**
Building Fire, Initial Response**	3 Engines, 1 Ladder Truck, 1 Paramedic Ambulance, 1 Battalion Chief	**12**
Wildland Fire	4 Engines or Wildland Engines, 1 Paramedic Ambulance, 1 Battalion Chief	**12**
Rescue	3 Engines, 1 Ladder Truck, 1 Paramedic Ambulance, 1 Battalion Chief	**12**
Hazardous Material	4 Engines, 1 Paramedic Ambulance, 1 Battalion Chief	**12**

* Personnel were calculated as follows: engines = 2 personnel (except if Engine 17 (Kentfield) staffs 3 personnel); ladder truck = 3 personnel from outside the Department; paramedic ambulance = 2 personnel.
** Confirmed serious fires receive a second Battalion Chief and a fourth engine
Source: Fire Department

Finding #2: The Department has a standard response plan that considers risk and establishes an appropriate initial response for each incident type. Each type of call for service receives the combination of engines, specialty units, and command officers customarily needed to begin to control that type of incident based on Department experience.

2.3 Outcome Expectations

SOC Element 2 of 8
Community Outcome Expectations

The Standards of Coverage process begins by reviewing existing emergency services outcome expectations. This includes determining for what purpose the response system exists and whether the governing body has adopted any response performance measures. If so, the time measures used must be understood and good data must be available.

Current national best practice is to measure percent completion of a goal (e.g., 90 percent of responses) instead of an average measure. Mathematically, this is called a fractile measure.[3] This is because measuring the average only identifies the central or middle point of response time

[3] A *fractile* is that point below which a stated fraction of the values lies. The fraction is often given in percent; the term percentile may then be used.

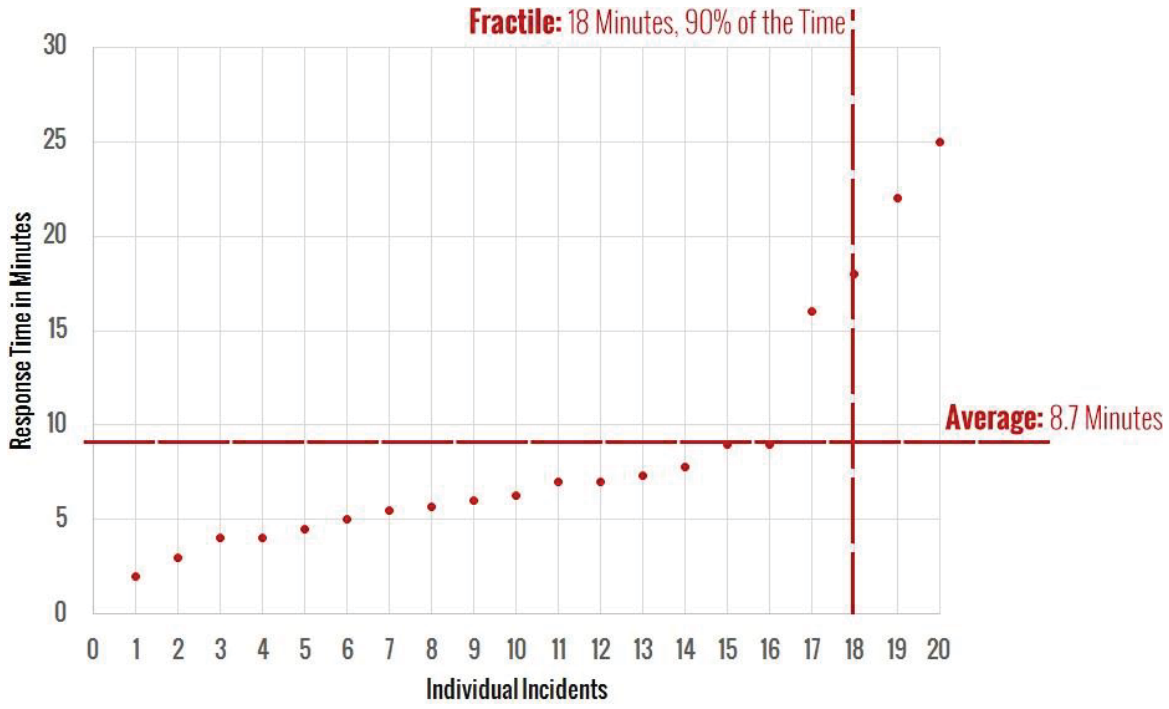
performance for all calls for service in the data set. Using an average makes it impossible to know how many incidents had response times that were way above the average or just above.

For example, Figure 2 shows response times for a fictitious fire department. This agency is small and receives 20 calls for service each month. Each response time has been plotted on the graph from shortest response time to longest response time.

Figure 2 shows that the average response time is 8.7 minutes. However, the average response time fails to properly account for four calls for service with response times far exceeding a threshold in which positive outcomes could be expected. In fact, it is evident in Figure 2 that 20 percent of responses are far too slow and that this jurisdiction has a potential life-threatening service delivery problem. Average response time as a measurement tool for fire services is simply not sufficient. This is a significant issue in larger cities if hundreds or thousands of calls are answered far beyond the average point.

By using the fractile measurement with 90 percent of responses in mind, this small jurisdiction has a response time of 18:00 minutes, 90 percent of the time. This fractile measurement is far more accurate at reflecting the service delivery situation of this small agency.

Figure 2—Fractile versus Average Response Time Measurements



More importantly, within the Standards of Coverage process, positive outcomes are the goal, and from that crew size and response time can be calculated to allow appropriate fire station spacing (distribution and concentration). Emergency medical incidents include situations with the most

severe time constraints. The brain can only survive 4:00 to 6:00 minutes without oxygen. Cardiac arrest and other events can cause oxygen deprivation to the brain. Cardiac arrests make up a small percentage; drowning, choking, trauma constrictions, or other similar events have the same effect. In a building fire, a small incipient fire can grow to involve the entire room in a 6:00- to 8:00-minute time frame. If fire service response is to achieve positive outcomes in severe emergency medical situations and incipient fire situations, *all* responding crews must arrive, assess the situation, and deploy effective measures before brain death occurs or the fire spreads beyond the room of origin.

Thus, from the time of 9-1-1 receiving the call, an effective deployment system is *beginning* to manage the problem within a 7:00- to 8:00-minute total response time. This is right at the point that brain death is becoming irreversible and the fire has grown to the point of leaving the room of origin and becoming very serious. Thus, most urban/suburban population density communities desire a first-due response goal that is within a range to give the situation hope for a positive outcome. It is important to note the fire or medical emergency continues to deteriorate from the time of inception, not the time the fire engine starts to drive the response route. Ideally, the emergency is noticed immediately and the 9-1-1 system is activated promptly. This step of awareness—calling 9-1-1 and giving the dispatcher accurate information—takes, in the best of circumstances, 1:00 minute. Then crew notification and travel time take additional minutes. Upon arrival, the crew must approach the patient or emergency, assess the situation, and deploy its skills and tools appropriately. Even in easy-to-access situations, this step can take 2:00 minutes or more. This time frame may be increased considerably due to long driveways, apartment buildings with limited access, multiple-story apartments or office complexes, or shopping center buildings.

Unfortunately, there are times when the emergency has become too severe, even before the 9-1-1 notification and/or fire department response, for the responding crew to reverse; however, when an appropriate response time policy is combined with a well-designed deployment system, then only anomalies like bad weather, poor traffic conditions, or multiple emergencies slow the response system down. Consequently, a properly designed system will give citizens the hope of a positive outcome for their tax dollar expenditure.

For this report, total response time is the sum of Marin County Sheriff's Dispatch Center (Comm Center) dispatch processing plus crew turnout, and road travel time steps. This is consistent with CFAI and NFPA and Citygate best practice recommendations.

2.4 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

The third element of the SOC process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

- Identify the values at risk to be protected within the community or service area.
- Identify the specific hazards with the potential to adversely impact the community or service area.
- Quantify the overall risk associated with each hazard.
- Establish a foundation for current/future deployment decisions and risk-reduction/hazard mitigation planning and evaluation.

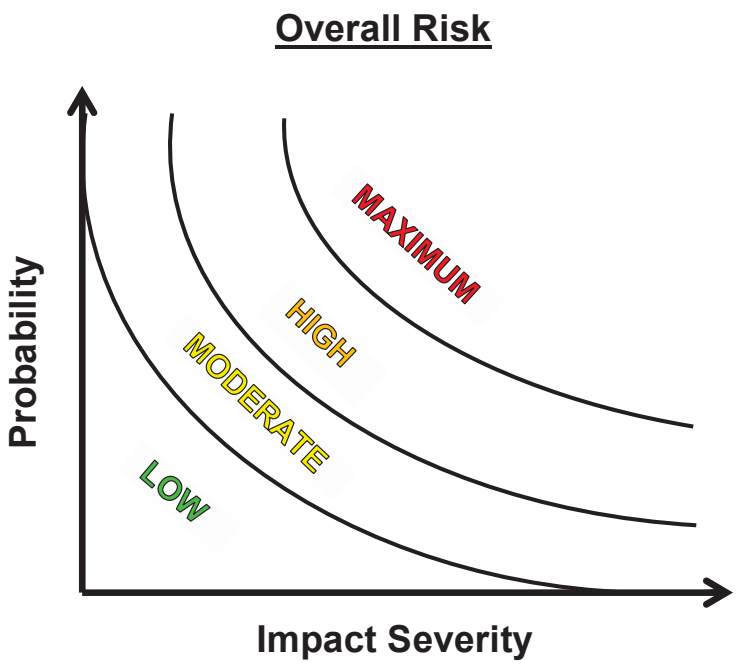
A *hazard* is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. *Risk* is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community as a whole.

2.4.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC study incorporates the following elements:

- Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- Identification of the fire and non-fire hazards to be evaluated.
- Determination of the probability of occurrence for each hazard.
- Identification and evaluation of multiple relevant impact severity factors for each hazard by planning zone using agency/jurisdiction-specific data and information.
- Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity as shown in Figure 3.

Figure 3—Overall Risk



2.4.2 Risk Assessment Summary

Citygate's comprehensive risk assessment is contained in Appendix A of this study. Citygate's evaluation of the values at risk and hazards likely to impact the Ross Valley Fire Department service area yields the following:

1. The Department serves a diverse population, with densities ranging from less than 500 people per square mile to approximately 5,000 per square mile, over a varied land use pattern.
2. The Department's service area population is projected to grow by only 7.7 percent over the next 11 years to 2030, or an average annual growth of approximately 0.7 percent.
3. The service area includes nearly 11,000 housing units, as well as a large inventory of non-residential occupancies.
4. Marin County has a mass emergency notification system to effectively communicate emergency information to the public in a timely manner.
5. The Department's overall risk for five hazards related to emergency services provided range from **Low** to **High**, as summarized in Table 7.

The values in the summary table *do not* place a severity measure on any one risk type; they reflect a composite formula of the probability of occurrence in combination with probable impact severity. For example, while the Department's service area has significant wildland fire risks, the Department experienced only 19 vegetation fires over this study's two-year period, comprising 0.34 percent of total service demand. However, EMS is a daily occurrence, ranging from low- to high-risk individual medical events.

Table 7—Overall Risk by Hazard

Hazard	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Building Fire	*Low*	*Low*	*Moderate*	*Moderate*
Vegetation Fire	*Low*	*Low*	*Low*	*Low*
Medical Emergency	*High*	*High*	*High*	*High*
Hazardous Material	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Technical Rescue	*Low*	*Low*	*Low*	*Low*

2.5 Critical Task Time Measures—What Must Be Done over What Time Frame to Achieve the Stated Outcome Expectation?

SOC Element 4 of 8
Critical Task Time Study

Standards of Coverage (SOC) studies use critical task information to determine the number of firefighters needed within a timeframe to achieve desired objectives on fire and emergency medical incidents. Table 8 and Table 9 illustrate critical tasks typical of building fire and medical emergency incidents, including the minimum number of personnel required to complete each task. These tables are composites from Citygate clients in urban/suburban departments similar to Ross Valley, *but with the more typical* unit staffing of three personnel per engine and two personnel per ambulance. It is important to understand the following relative to these tables:

- It can take a considerable amount of time after a task is ordered by command to complete the task and arrive at the desired outcome.
- Task completion time is usually a function of the number of personnel that are *simultaneously* available. The fewer firefighters available, the longer some tasks will take to complete. Conversely, with more firefighters available, some tasks are completed concurrently.

- Some tasks must be conducted by a minimum of two firefighters to comply with safety regulations. For example, two firefighters are required to search a smoke-filled room for a victim.
- Given the two-firefighter staffing on the Department units, the time to completion will be longer, at times significantly depending on task complexity or a hard to access patient or fire location.

2.5.1 Critical Firefighting Tasks

Table 8 illustrates the critical tasks required to control a typical single-family dwelling fire with six response units (engines/chief), for a total Effective Response Force of *16* personnel, where the Ross Valley Fire Department initially sends **12**. A confirmed serious fire additionally receives a second Battalion Chief and a fourth engine raising this to 15 personnel. However, in many locations these additional units come from much farther away. These tasks are taken from typical fire departments' operational procedures, which are consistent with the customary findings of other agencies using the Standards of Coverage process. No conditions exist to override the Occupational Safety and Health Administration two-in/two-out safety policy, which requires that firefighters enter Immediately Dangerous to Life and Health atmospheres, such as building fires, in teams of two, while two more firefighters are outside and immediately ready to rescue them should trouble arise.

Scenario: *Simulated approximately 2,000 square-foot, two-story residential fire with unknown rescue situation. Responding companies receive dispatch information typical for a witnessed fire. Upon arrival, they find approximately 50 percent of the second floor involved in fire.*

Table 8—First Alarm Residential Fire Critical Tasks – 16 Personnel

Critical Task Description		Personnel Required
1st-Due Engine (3 personnel)		
1	Conditions report	1
2	Establish supply line to hydrant	2
3	Deploy initial fire attack line to point of building access	1–2
4	Operate pump and charge attack line	1
5	Establish incident command	1
6	Conduct primary search	2
2nd-Due Engine (3 personnel)		
7	If necessary, establish supply line to hydrant	1–2
8	Deploy a backup attack line	1–2
9	Establish Initial Rapid Intervention Crew (IRIC)	2
1st-Due Truck (3 personnel)		
10	Conduct initial search and rescue if not already completed	2
11	Deploy ground ladders to roof	1–2
12	Establish horizontal or vertical building ventilation	1–2
13	Open concealed spaces as required	2
Chief Officer		
14	Transfer of incident command	2
15	Establish exterior command and scene safety	1
3rd Due Engine and Rescue Unit (3 personnel each)		
16	Establish Initial Rapid Intervention Crew (IRIC)	3
17	Secure utilities	2
18	Deploy second attack line as needed	2
19	Conduct secondary search	2

The duties in Table 8, grouped together, form an Effective Response Force (ERF) or First Alarm Assignment. These distinct tasks must be performed to effectively achieve the desired outcome; arriving on scene does not stop the emergency from escalating. While firefighters accomplish these

tasks, the incident progression clock keeps running. These tasks are also consistent with nationally published research studies.[4]

Fire in a building can double in size during its free-burn period before fire suppression is initiated. Many studies have shown that a small fire can spread to engulf an entire room in less than 4:00 to 5:00 minutes after free burning has started. Once the room is completely superheated and involved in fire (known as flashover), the fire will spread quickly throughout the structure and into the attic and walls. For this reason, it is imperative that fire suppression and search/rescue operations commence before the flashover point occurs if the outcome goal is to keep the fire damage in or near the room of origin. In addition, flashover presents a life-threatening situation to both firefighters and any occupants of the building.

2.5.2 Critical Medical Emergency Tasks

The Department responds to more than 1,407 EMS incidents annually, including vehicle accidents, strokes, heart attacks, difficulty breathing, falls, childbirths, and other medical emergencies.

For comparison, Table 9 summarizes the critical tasks required for a cardiac arrest patient, typically with at least five personnel responding, where the Department sends four.

[4] Report on Residential Fireground Field Experiments, National Institute of Standards and Technology Technical Note 1661, April 2010. NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2016 Edition.

Table 9—Cardiac Arrest Critical Tasks – Three Engine Personnel + Two Personnel ALS Ambulance

Critical Task		Personnel Required	Critical Task Description
1	Chest compressions	1–2	Compression of chest to circulate blood
2	Ventilate/oxygenate	1–2	Mouth-to-mouth, bag-valve-mask, apply O_2
3	Airway control	1–2	Manual techniques/intubation/cricothyroidomy
4	Defibrillate	1–2	Electrical defibrillation of dysrhythmia
5	Establish I.V.	1–2	Peripheral or central intravenous access
6	Control hemorrhage	1–2	Direct pressure, pressure bandage, tourniquet
7	Splint fractures	2–3	Manual, board splint, HARE traction, spine
8	Interpret ECG	2	Identify type and treat dysrhythmia
9	Administer drugs	2	Administer appropriate pharmacological agents
10	Spinal immobilization	2–5	Prevent or limit paralysis to extremities
11	Extricate patient	3–4	Remove patient from vehicle, entrapment
12	Patient charting	1–2	Record vitals, treatments administered, etc.
13	Hospital communication	1–2	Receive treatment orders from physician
14	Treat en route to hospital	2–3	Continue to treat/monitor/transport patient

2.5.3 Critical Task Analysis and Effective Response Force Size

What does a deployment study derive from a critical task analysis? The time required to complete the critical tasks necessary to stop the escalation of an emergency (as shown in Table 8 and Table 9) must be compared to outcomes. As shown in nationally published fire service time vs. temperature tables, after approximately 4:00 to 5:00 minutes of free burning a room fire will escalate to the point of flashover. At this point, the entire room is engulfed in fire, the entire building becomes threatened, and human survival near or in the room of fire origin becomes impossible. Additionally, brain death begins to occur within 4:00 to 6:00 minutes of the heart stopping. Thus, the ERF must arrive in time to prevent these emergency events from becoming worse.

The Department's daily staffing plus automatic aid is sufficient to deliver a single ERF of **12** personnel to a building fire—if they can arrive in time, which the statistical analysis of this report will discuss in depth. Mitigating an emergency event is a team effort once the units have arrived. This refers to the *weight* of response analogy; if too few personnel arrive too slowly, then the emergency will escalate instead of improving. The outcome times, of course, will be longer and yield less desirable results if the arriving force is later or smaller.

The quantity of staffing and the arrival timeframe can be critical in a serious fire. Fires in older and/or multiple-story buildings could well require the initial firefighters needing to rescue trapped or immobile occupants. If the ERF is too small, rescue and firefighting operations *cannot* be conducted simultaneously.

Fires and complex medical incidents require that additional units arrive in time to complete an effective intervention. Time is one factor that comes from *proper station placement*. Good performance also comes from *adequate staffing* and training. But where fire stations are spaced too far apart, and one unit must cover another unit's area or multiple units are needed, these units can be too far away and the emergency will escalate and/or result in less-than-desirable outcomes.

Previous critical task studies conducted by Citygate, the National Institute of Standards,[5] and NFPA Standard 1710 find that all units need to arrive with 15+ firefighters within 11:30 minutes (from the time of 9-1-1 call) at a building fire to be able to *simultaneously and effectively* perform the tasks of rescue, fire suppression, and ventilation.

A question one might ask is, "If fewer firefighters arrive, such as does occur in the Ross Valley Department, *what* from the list of tasks mentioned would not be completed?" This is also critical as given the two-firefighter staffing, the initial force is a smaller count as it takes the third- and fourth-due units much longer to arrive. Most likely, the search team would be delayed, as would ventilation. The attack lines would only consist of two firefighters, which does not allow for rapid movement of the hose line above the first floor in a multiple-story building. Rescue is conducted with at least two-person teams; thus, when rescue is essential, other tasks are not completed in a simultaneous, timely manner. Effective deployment is about the **speed** *(travel time)* and the **weight** *(number of firefighters)* of the response.

Sixteen initial personnel could handle a moderate-risk, confined residential fire; however, even an ERF of 16 personnel will be seriously slowed if the fire is above the first floor in a low-rise apartment building or commercial/industrial building. This is where the capability to add additional personnel and resources to the standard response becomes critical.

The Department has to initially dispatch extra units via mutual aid to deliver more personnel, given the two-firefighter per unit staffing, but doing so to deliver the "weight of attack" comes at two disadvantages—first, it takes longer (speed of attack) and second, more units are out of service should another simultaneous incident occur.

Given that the Department's ERF plan delivers **12** personnel to a moderate-risk building fire, it reflects a goal to confine serious building fires to the *building of origin, not* the room of origin or

[5] Report on Residential Fireground Field Experiments, National Institute of Standards and Technology Technical Note #1661, April 2010.

to prevent the spread of fire to adjoining buildings or wildland areas. This is a lesser desired outcome for urban/suburban areas, where the goal is to confine a building fire to or very near to the room of origin. That goal requires more firefighters more quickly.

The Department's current physical response to building fires is, in effect, its de-facto deployment measure to its populated areas—*if those areas are within a reasonable travel time from a fire station*. Thus, this becomes the baseline policy for the deployment of firefighters.

2.6 Distribution and Concentration Studies—How the Location of First-Due and First Alarm Resources Affects Emergency Incident Outcomes

SOC Element 5 of 8
Distribution Study

SOC Element 6 of 8
Concentration Study

The Department is served today by four fire stations deploying four engine companies and one Battalion Chief as the duty Incident Commander. It is appropriate to understand using geographic mapping tools what the existing stations do and do not cover for both risks to be protected and the geography that units must travel over.

In brief, there are two geographic perspectives to fire station deployment:

- **Distribution** – the spacing of first-due fire units to control routine emergencies before they escalate and require additional resources.
- **Concentration** – the spacing of fire stations sufficiently close to each other so that more complex emergency incidents can receive sufficient resources from multiple fire stations quickly. As indicated, this is known as the **Effective Response Force**, or, more commonly, the First Alarm Assignment—the collection of a sufficient number of firefighters on scene, delivered within the concentration time goal to stop the escalation of the problem.

To analyze first-due fire unit risks to be protected and coverage, Citygate used a geographic mapping tool to produce the maps described in the following subsection, which can be found in **Volume 2**.

2.6.1 Deployment Baselines

Map #1 – General Geography, Station Locations, and Response Resource Types

Map #1 shows the Department boundary, communities, and fire station service areas. This is a reference map for other maps that follow.

Map #2a – Risk Assessment: Planning Zones

Map #2a shows the four risk planning zones, as recommended by the CFAI, used for this study, which are the same as each station's initial (first-due) response area.

Map #2b – Risk Assessment: High Risk Occupancies

Map #2b displays the locations of the higher-risk building occupancies within the Department, as defined by the CFAI. These building occupancies typically require a larger initial ERF (staffing) due to the higher risks associated with these specific occupancies. It is apparent that there are high-risk occupancies in every planning zone.

Map #2c – Risk Assessment: Hazardous Materials Use/Storage Occupancies

Map #2c displays the locations of the higher-risk commercial building occupancies that use and/or store regulated Hazardous Materials. The regulations for these uses are enforced by the County Department of Public Works as the State-designated Certified Unified Program Agency (CUPA) for the County.

Map #2d – Risk Assessment: Wildland Fire Severity Zones

Map #2d displays the California Department of Forestry and Fire Protection (CAL FIRE) State Responsibility Areas for wildland fire protection, where the state has primary fiscal responsibility for wildfires through the Marin County Fire Department.

Map #2e – Risk Assessment: Lower Fire Flow (Water) Locations

Map #2e displays the locations of fire hydrants on older, smaller water mains that can only provide up to 500 or 1,000 gallons per minute of firefighting flow. Most newer communities can provide neighborhood fire flows substantially higher than this and most current fire department pumpers can easily pump 1,500-2,000 gallons per minute. Larger commercial building fires can require 2,000 to 5,000 gallons per minute, provided by several pumpers and hydrants.

Map #3 – Distribution: First-Due Travel Distance Coverage

This map displays the Insurance Service Office (ISO) recommendation that fire stations in developed areas cover a 1.5-mile *distance* response area. Depending on a jurisdiction's road network, the 1.5-mile measure usually equates to a 3:30- to 4:00-minute travel time. Thus the 1.5-mile measure is a reasonable indicator of station spacing and overlap. This map shows first-due unit coverage distance of 1.5 miles across the public road network from the Department's current fire station locations. The 1.5-mile coverage goes from very light meaning a single unit to very dark where three units overlap. The coverage also assumes all units are in station and available for response.

The purpose of response coverage modeling is to determine response time coverage across a jurisdiction's geography and station locations. This geo-mapping design is then validated against dispatch time data in the next section of this study to reflect actual response times. There should be some overlap between station areas so that a second-due unit can have a chance of an acceptable response time when it responds to a call in a different station's first-due response area. As can be seen, there is some overlap coverage in the more built-up areas of the Department.

Map #4 – Medic 18 Ambulance Coverage Areas

This map displays the service area assigned to Medic 18, where the goal is to cover the most populated areas within 8:00 minutes *travel* time. This map shows the importance for Medic 18 to be centrally located to cover from Greenbrae west to Sleep Hollow and Fairfax.

Map #5 – All Incident Locations

Map #5 shows the location of all incidents from 2017 through 2018. It is apparent that incidents occur in most all areas of the Department and to other areas for mutual aid.

Map #6 – Emergency Medical Services and Rescue Incident Locations

Map #9 illustrates only the emergency medical and rescue incident locations over the last two years. With the majority of the calls for service being medical emergencies, virtually all areas of the Department need pre-hospital emergency medical services. The greatest population density also incurs the highest EMS demand patterns. Medic 18 responses are not located on this map.

Map #7 – All Fire Locations

This map identifies the location of all fires within the Department over the last two years. All fires include any type of fire call, from vehicle to dumpster to building. There are obviously fewer fires than medical or rescue calls. Even given this, it is evident that fires occur in all fire station areas.

Map #8 – Structure Fire Locations

Map #8 displays the location of the structure fire incidents over the last two years. While the number of structure fires is a smaller subset of total fires, there are two meaningful findings from this map. First, there are structure fires in every fire station area, and second, there are a relatively small number of building fires in the Department overall, which in Citygate's experience is consistent with other similar smaller communities in the western United States.

Finding #3:	The mapping analysis shows the need for neighborhood-based first response units for fire and EMS incidents.

Finding #4: The risk assessment maps show there are risks to be protected from fire besides just single-family homes, and some areas have lower fire flow capacity for serious or conflagration size fires.

2.7 STATISTICAL ANALYSIS

SOC ELEMENT 7 OF 8
RELIABILITY & HISTORICAL RESPONSE EFFECTIVENESS STUDIES

The map sets described in Section 2.6 above and presented in **Volume 2** show the ideal situation for response times and the response effectiveness given perfect conditions with no competing calls, traffic congestion, units out of place, or simultaneous calls for service. Examination of the actual response time data provides a picture of actual response performance with simultaneous calls, rush hour traffic congestion, units out of position, and delayed travel time for events such as periods of severe weather.

The following subsections provide summary statistical information regarding the Department and its services.

2.7.1 Demand for Service

The Department provided both federal National Fire Reporting System (NFIRS) version 5 incident and computer-aided dispatch (CAD) apparatus response data for two complete years from January 1, 2017 through December 31, 2018.

In 2018, the Department responded to 2,685 incidents, which is a daily demand of 7.36 incidents. During this same period, there were 7,503 individual apparatus responses. This means there was an average of 2.8 apparatus responses per incident, which is considered high and is likely due to the low staffing levels on each apparatus. The number of incidents has been calculated from NFIRS 5 records furnished for 2017 and 2018. According to these records, the Department experienced a decline in the number of incidents from 2017 through 2018.

Figure 4—Annual Service Demand by Year

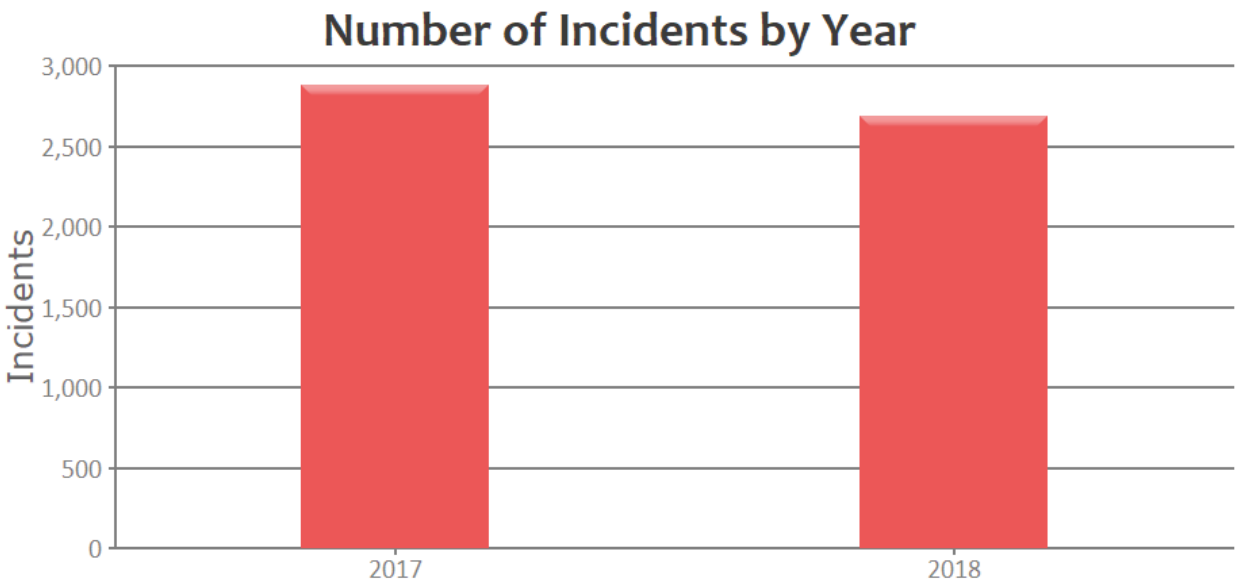


Figure 5 illustrates the number of incidents by incident type. While fire and EMS incidents remained relatively constant, there was a decrease in the number of other incident types. A reduction in the number of "other" incidents was most responsible for the decline in the total number of incidents.

Figure 5—Number of Incidents by Year – All Incident Types

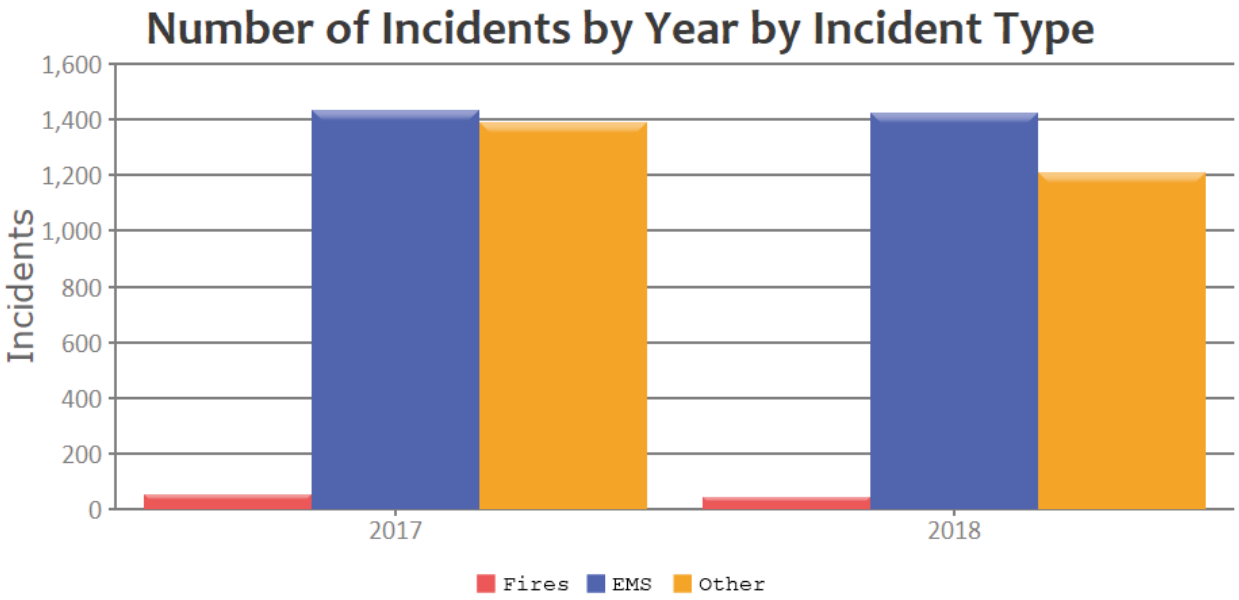
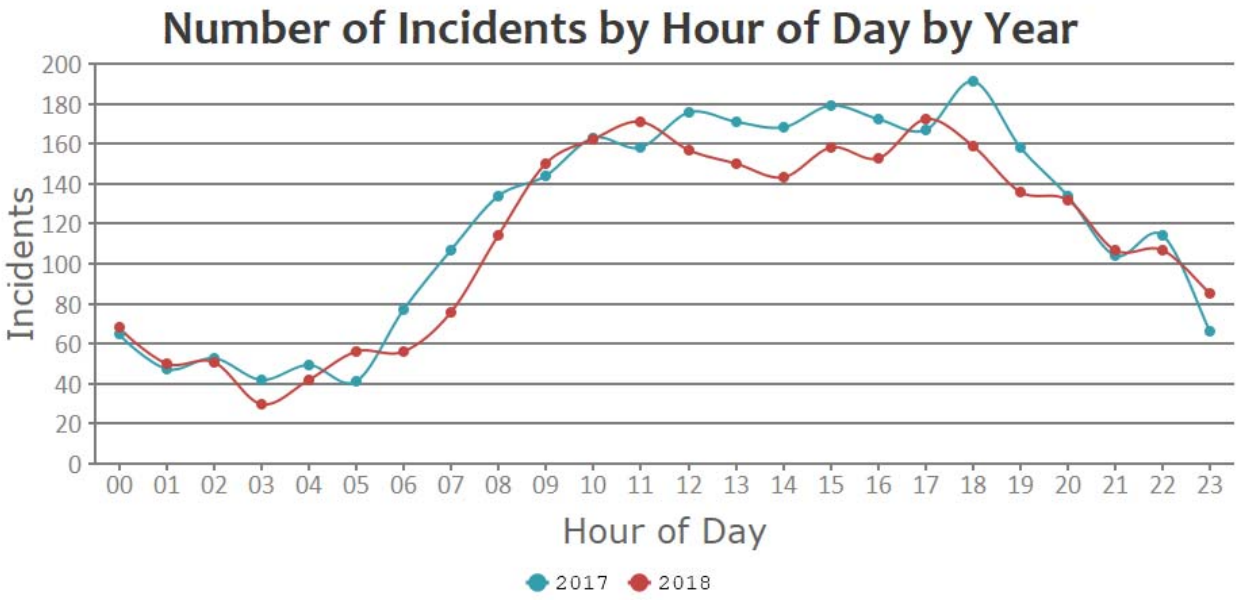


Figure 6 shows service demand by hour of day, illustrating that calls for service occur at every hour of the day and night, requiring fire and EMS response capability 24 hours per day, every day of the year. There was also a pattern of increased activity in 2017 during the morning, afternoon, and early evening hours.

Figure 6—Service Demand by Hour of Day and Year



Finding #5: The Department's service demand is consistent, indicating the need for a 24-hours-per-day, seven-days-per-week fire and EMS emergency response system.

The next figure illustrates the number of incidents by station area in 2018. Station 21 had the highest volume of activity.

Figure 7—Number of Incidents by Station – 2018

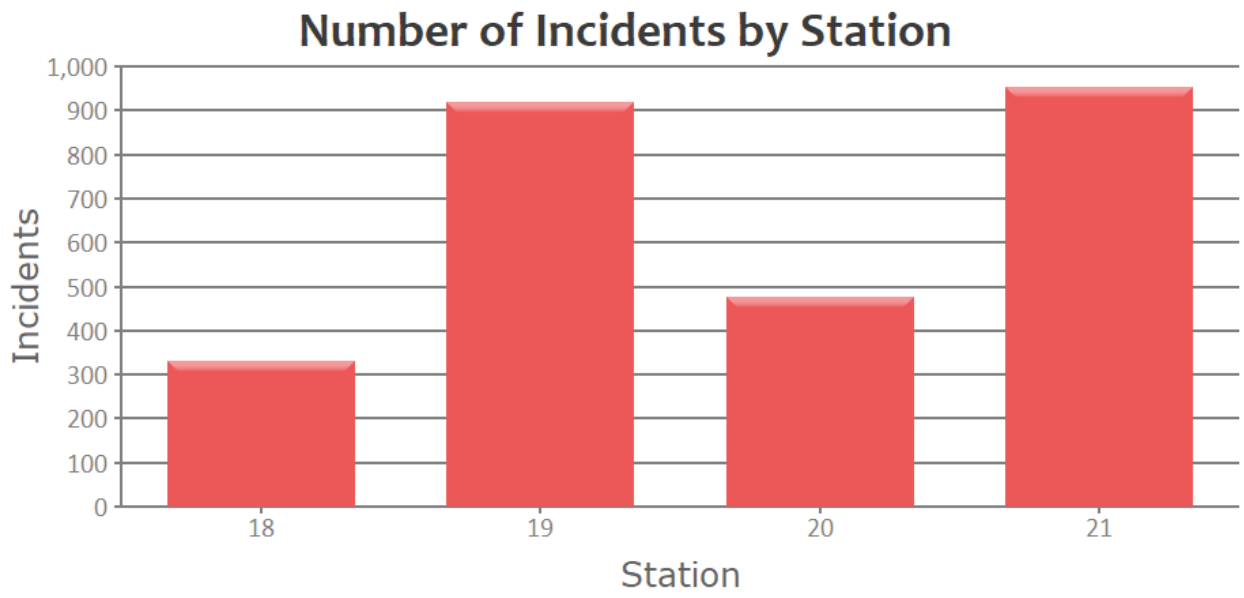


Table 10 lists the activity rankings of incidents by incident quantity, for more than 15 occurrences in a year. Note the strong ranking for EMS incidents.

Table 10—Incidents: Quantity by Incident Type – 2018

Incident Type	2018
321 EMS call, excluding vehicle accident with injury	1,343
611 Dispatched and canceled en route	232
553 Public service	197
554 Assist invalid	135
651 Smoke scare, odor of smoke	126
550 Public service assistance, other	75
322 Vehicle accident with injuries	51
743 Smoke detector activation, no fire – unintentional	49
700 False alarm or false call, other	41
745 Alarm system sounded, no fire – unintentional	35
412 Gas leak (natural gas or LPG)	32
444 Power line down	31

Incident Type	2018
600 Good intent call, other	30
622 No incident found on arrival of incident address	22
733 Smoke detector activation due to malfunction	20
740 Unintentional transmission of alarm, other	17
324 Motor vehicle accident no injuries	16
500 Service call, other	16
111 Building fire	16
735 Alarm system sounded due to malfunction	16
736 CO detector activation due to malfunction	15

Table 11 illustrates the ranking of incidents by property types. The highest rankings for incidents by property type are residential dwellings. Only those property types with 25 or more incidents are shown.

Table 11—Incidents: Quantity by Property Use – 2018

Property Use (NFIRS Code/Description)	2018
419 1 or 2 family dwelling	1,338
429 Multifamily dwellings	271
962 Residential street, road or residential driveway	218
960 Street, other	157
963 Street or road in commercial area	80
900 Outside or special property, other	72
311 24-hour care nursing homes, 4 or more persons	58
215 High school/junior high school/middle school	39
965 Vehicle parking area	34
161 Restaurant or cafeteria	29
888 Fire station	29
519 Food and beverage sales, grocery store	26
931 Open land or field	25

2.7.2 Simultaneous Emergency Incident Activity

Simultaneous incidents occur when other incidents are underway at the time a new incident develops. In the Department's response area during 2018, 16.05 percent of incidents occurred

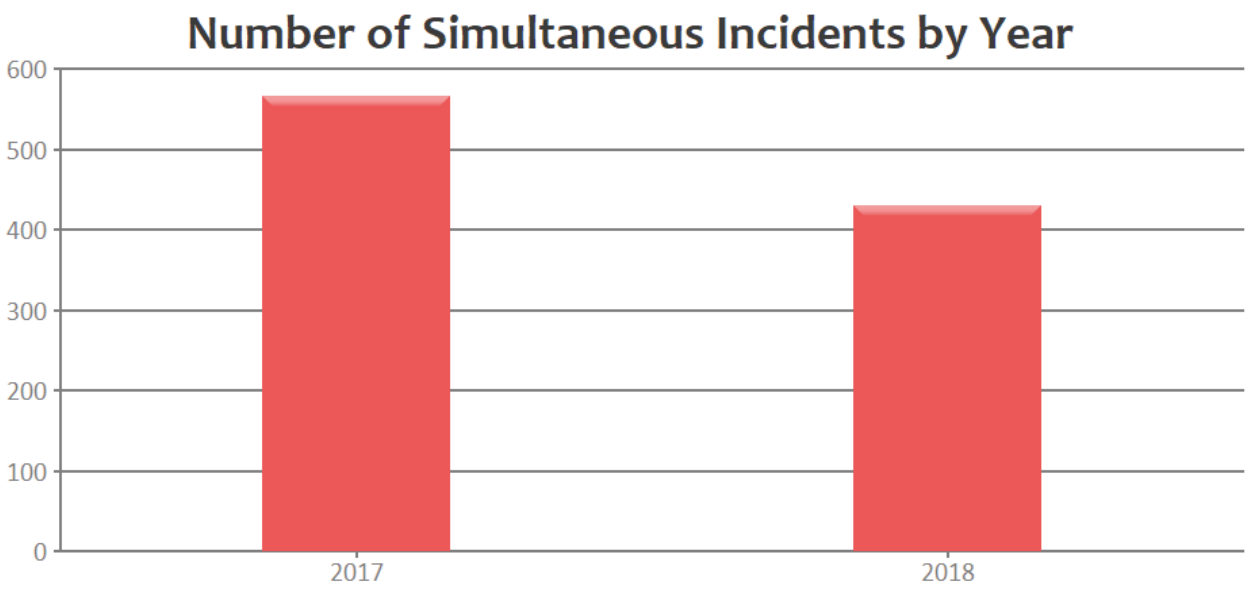
while one or more other incidents were underway. The following is the percentage of simultaneous emergency incidents broken down by the number of simultaneous incidents. Non-emergency incidents are not included as a unit can be re-dispatched to a serious emergency.

Table 12—Percentage by Number of Simultaneous *Emergency* Incidents

Number of Simultaneous Incidents	Percentage
1 or more simultaneous incidents	16.05%
2 or more simultaneous incidents	01.30%
3 or more simultaneous incidents	00.01%

The following graph shows the number of simultaneous incidents can be volatile and recently decreased.

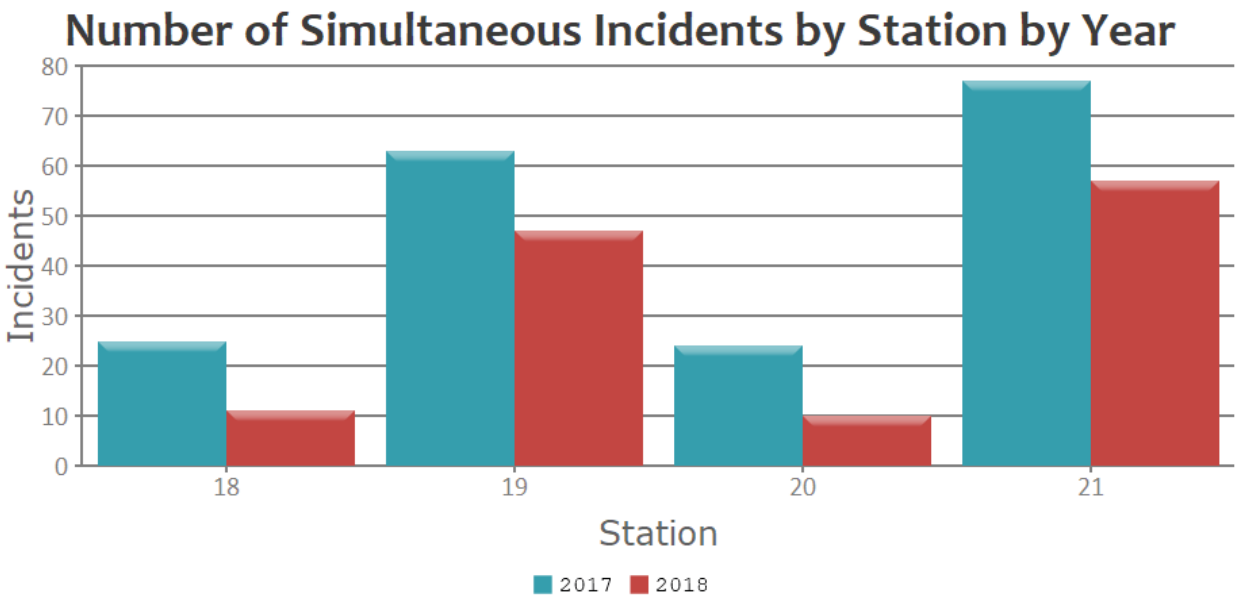
Figure 8—Number of Simultaneous Incidents by Year



In a larger region, simultaneous incidents in different station areas have very little operational consequence. However, when simultaneous incidents occur within a single station area, there can be significant delays in response times.

Figure 9 illustrates the number of single-station simultaneous incidents by station area by year. Station 21 has the highest number of in-station-area simultaneous incidents. Each station area experienced a significant drop in the number of simultaneous incidents from the previous year.

Figure 9—Number of Single-Station Simultaneous Incidents by Station by Year



Finding #6: The number of simultaneous incidents is volatile. However, in a four-station department, it is very rare that more than two incidents occur at once.

2.7.3 Operational Performance

Measurements for the performance for the first apparatus to arrive on the scene of emergency incidents are the number of minutes and seconds necessary for 90 percent completion of the following components:

- Call processing
- Turnout
- Travel
- Dispatch to arrival
- Call to arrival

Each one of these components starts with a year-to-year comparison followed by a representation of performance over incremental time segments. Finally, each section includes a graph breaking down compliance with a stated goal by hour of day.

2.7.4 Call Processing

Call processing measures the time from the first incident time stamp in the Marin County Sheriff's Dispatch Center (Comm Center) until apparatus are notified of the request for assistance.

Table 13 shows call processing is 1:04 minutes for 90 percent compliance.

Table 13—Call Processing Performance to 90 Percent of Fire and EMS Incidents

Station	2018
Department-Wide	**01:04**
Station 18	01:12
Station 19	01:03
Station 20	01:01
Station 21	01:04

Finding #7: Call processing performance at 1:04 minutes is *better than* a best practice recommendation of 1:30 minutes.

2.7.5 Turnout Time

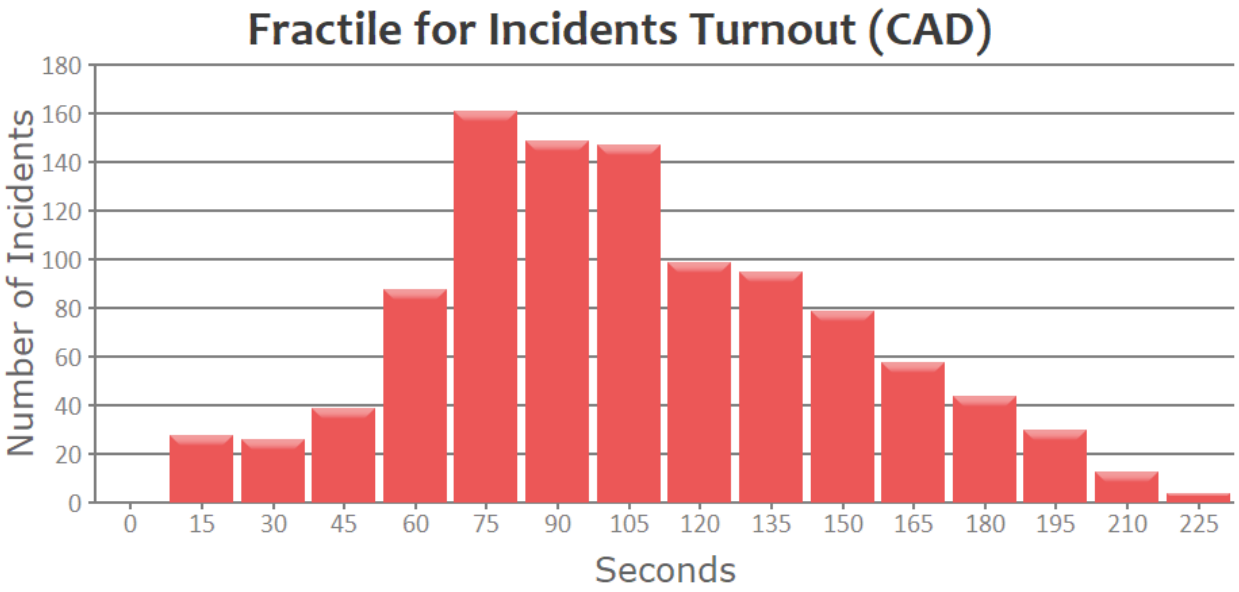
Turnout time measures the time from apparatus notification until apparatus starts traveling to the scene. In Table 14, a 2:00-minute Citygate recommended goal is used for measurement. Only one fire station is less than 30 seconds from a 2:00-minute turnout time.

Table 14—Turnout Time Performance to 90 Percent of Fire and EMS Incidents

Station	2018
Department-Wide	**02:41**
Station 18	02:19
Station 19	02:50
Station 20	02:38
Station 21	02:40

Figure 10 illustrates fractile turnout time performance. The peak segment for turnout performance is 75 seconds.

Figure 10—Fractile for Incidents Turnout (CAD)



Finding #8: Crew turnout performance at 2:41 minutes is *slower* than a Citygate-recommended goal of 2:00 minutes or less.

2.7.6 Travel Time

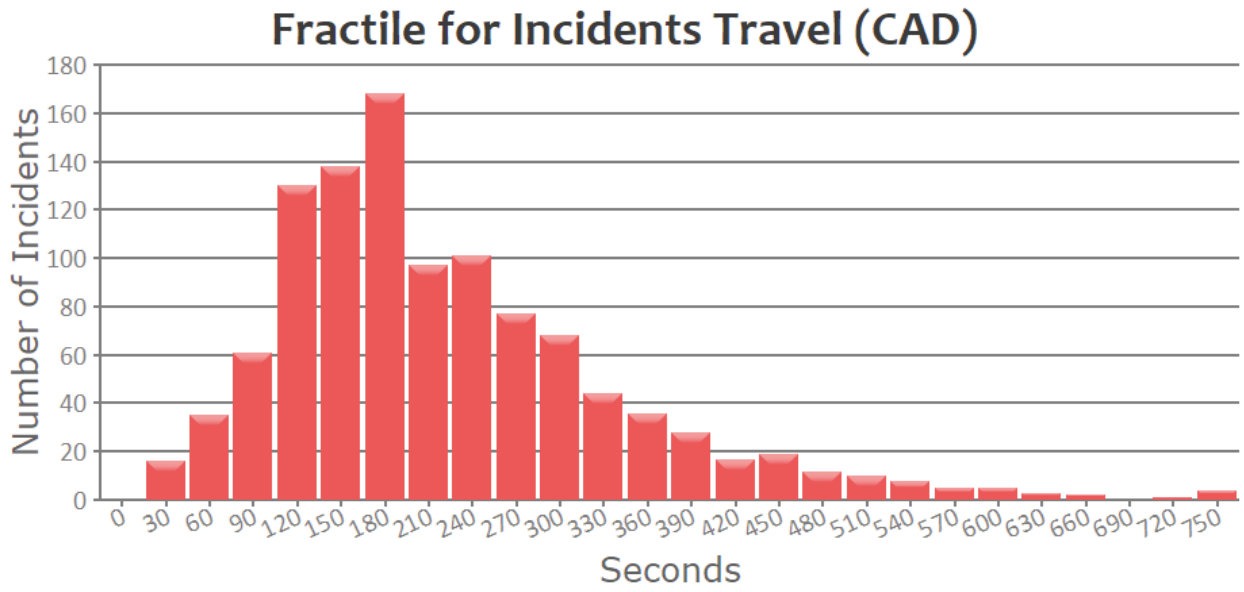
Travel time measures time to travel to the scene of the emergency. In most urban and suburban fire departments, a 4:00-minute travel time 90 percent of the time would be considered highly desirable. Table 15 shows that no stations achieve that goal.

Table 15—Travel Time Performance to 90 Percent of Fire and EMS Incidents

Station	2018
Department-Wide	**06:09**
Station 18	04:40
Station 19	05:38
Station 20	06:24
Station 21	06:30

The following graph illustrates fractile travel time performance. The peak segment for travel time performance is 180 seconds, or 3:00 minutes. There is a rapid drop-off in volume after the 180-second mark.

Figure 11—Fractile for Incidents Travel (CAD)



Finding #9: First-due unit travel time performance to 90 percent of the incidents Department-wide at 6:09 minutes is well past the Department's likely goal of 4:00 minutes, a goal consistent with best practices.

2.7.7 Call to Arrival

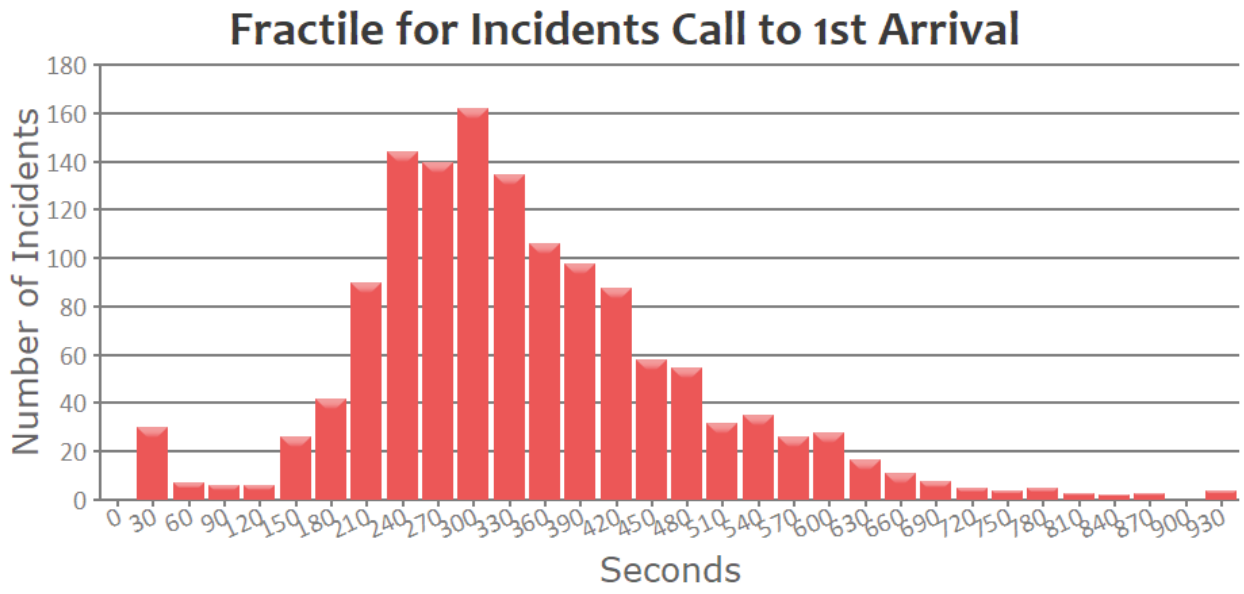
Call to arrival measures time from receipt of the request for assistance until the apparatus arrives on the scene. The existing Department total response time goal is 7:00 minutes to 90 percent of the emergency incidents.

Table 16—Call to Arrival Performance to 90 Percent of Fire and EMS Incidents

Station	2018
Department-Wide	**08:45**
Station 18	07:55
Station 19	07:45
Station 20	08:47
Station 21	09:07

The following graph illustrates fractile call to arrival performance. The peak segment is 300 seconds, or 5:00 minutes. The right-shifted graph indicates a number of incidents with longer travel times.

Figure 12—Fractile for Incidents Call to First Arrival



Finding #10: The Department's call to arrival time to 90 percent of the incidents at 8:45 is slower than a Citygate's recommended goal of 7:30 minutes in developed suburban areas. The principal reason is the longer travel times, reflective of the topography and road network in the Department's service area.

2.7.8 Effective Response Force (First Alarm) Concentration Measurements

The minimum (not including the Chief Officer or ambulance) ERF for structure fires from the Department is three engines and one ladder truck. Additionally, an ambulance unit and one Chief Officer are sent. A best practices goal is for the last arriving unit's travel time to be less than 8:00 minutes in developed areas.

Table 17—Distribution – Structure Fire Initial Response – Fourth-Due Unit Travel Time Performance to 90 Percent of Fire and EMS Incidents

Station	2018
Station 18	08:50
Station 19	08:19
Station 20	10:20
Station 21	10:21

Finding #11: The Effective Response Force (First Alarm) *travel* times are only modestly longer than a best practices goal of 8:00 minutes and are reflective of the good, central placement of the four fire stations.

This page was intentionally left blank

SECTION 3—TOWN OF ROSS FOCUSED STUDY

As part of the overall Standards of Cover assessment for the Ross Valley Fire Department partnership, the Town of Ross requested a focused study for the need to maintain the fire engine and/or Medic Ambulance 18 in the Town's fire station which dates to 1926. As all the partners know, replacing or relocating this station will be very difficult due to land use limitations. To evaluate the need for a station in the Town of Ross a series of questions must be considered. These questions are all answered in this section. After this section and Citygate's resultant findings, the last section of this study will provide a set of comprehensive recommendations.

The incident data range used in this section (except for items #1 and #2 below) is the same as the overall analysis in Section 2.7—January 1, 2017 through December 31, 2018.

3.1 QUESTIONS REGARDING STATION 18

1. How many fires have there been in the Town in each of the last six years? How many of them were structure versus non-structural?

   - One structure fire; 25 non-significant structure fires such as arcing wires or smell of smoke from equipment.

2. What is the fire loss estimate in the Town for the last six years?

   - $198,107

3. What is the breakdown of calls by year in the Town for two or three years?

Figure 13—Number of Incidents by Year by Incident Type – Station 18

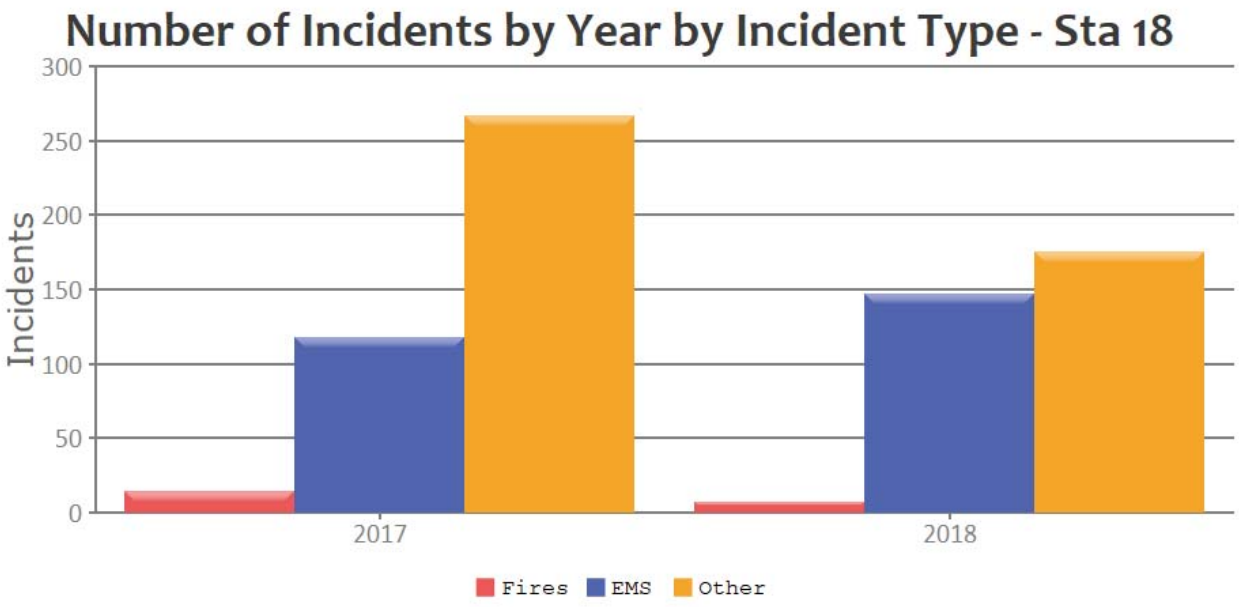


Table 18—Incidents: Quantity – Year by Incident Type for Station 18 – 2017 and 2018

Incident Type	2017	2018
321 EMS call, excluding vehicle accident with injury	114	133
611 Dispatched and canceled en route	71	38
553 Public service	28	20
554 Assist invalid	25	6
550 Public service assistance, other	11	15
651 Smoke scare, odor of smoke	10	11
412 Gas leak (natural gas or LPG)	11	9
571 Cover assignment, standby, move-up	8	11
743 Smoke detector activation, no fire – unintentional	8	10
745 Alarm system sounded, no fire – unintentional	10	7
400 Hazardous condition, other	13	2
444 Power line down	7	6
322 Vehicle accident with injuries	2	10
700 False alarm or false call, other	8	3
744 Detector activation, no fire – unintentional	5	5
622 No incident found on arrival of incident address	7	3

Incident Type	2017	2018
733 Smoke detector activation due to malfunction	6	3
735 Alarm system sounded due to malfunction	5	3
111 **Building fire**	**7**	
736 CO detector activation due to malfunction	3	3
740 Unintentional transmission of alarm, other	1	4
324 Motor vehicle accident no injuries	2	3
500 Service call, other	2	2
900 Special type of incident, other	1	2
730 System malfunction, other	2	1
650 Steam, other gas mistaken for smoke, other	1	2
600 Good intent call, other	1	2
531 Smoke or odor removal	1	2
440 Electrical wiring/equipment problem, other	3	
812 Flood assessment	2	
800 Severe weather or natural disaster, other	2	
746 Carbon monoxide detector activation, no CO	2	
734 Heat detector activation due to malfunction	2	
653 Barbecue, tar kettle	1	1
551 Assist police or other governmental agency	1	1
520 Water problem, other	1	1
463 Vehicle accident, general cleanup	1	1
131 Passenger vehicle fire	1	1
118 Trash or rubbish fire, contained	2	
100 Fire, other		2
813 Wind storm, tornado/hurricane assessment	1	
621 Wrong location	1	
552 Police matter	1	
522 Water or steam leak		1
521 Water evacuation	1	
462 Aircraft standby		1
461 Building or structure weakened or collapsed	1	
441 Heat from short circuit (wiring), defective/worn	1	
422 Chemical spill or leak	1	

Incident Type	2017	2018
354 Trench/below grade rescue		1
162 Outside equipment fire	1	
160 Special outside fire, other		1
151 Outside rubbish, trash or waste fire		1
142 Brush, or brush and grass mixture fire	1	
141 Forest, woods or wildland fire		1
140 Natural vegetation fire, other	1	
130 Mobile property (vehicle) fire, other	1	
116 Fuel burner/boiler malfunction, fire confined	1	
113 Cooking fire, confined to container		1
Total	**400**	**330**

4. What is the service call comparison between each of the four stations? Are there industry averages or norms with which that can be compared?

   - There are no comparisons; all communities are different and "purchase" fire protection stand-by as "fire insurance" if they use it once a year or once a day.
   - See Figure 7 on page 37 for volume by station.

5. In the Town, what is the 90 percent response time to fire calls, emergency calls, and all calls – anywhere Station 18 went?

   - The following table shows the Station 18 response times to emergency incidents. The time listed is the time to completion, 90 percent of the time; the number in parenthesis is the number of records included in the calculation.

Table 19—Station 18 Response Times to All Calls at 90 Percent Compliance

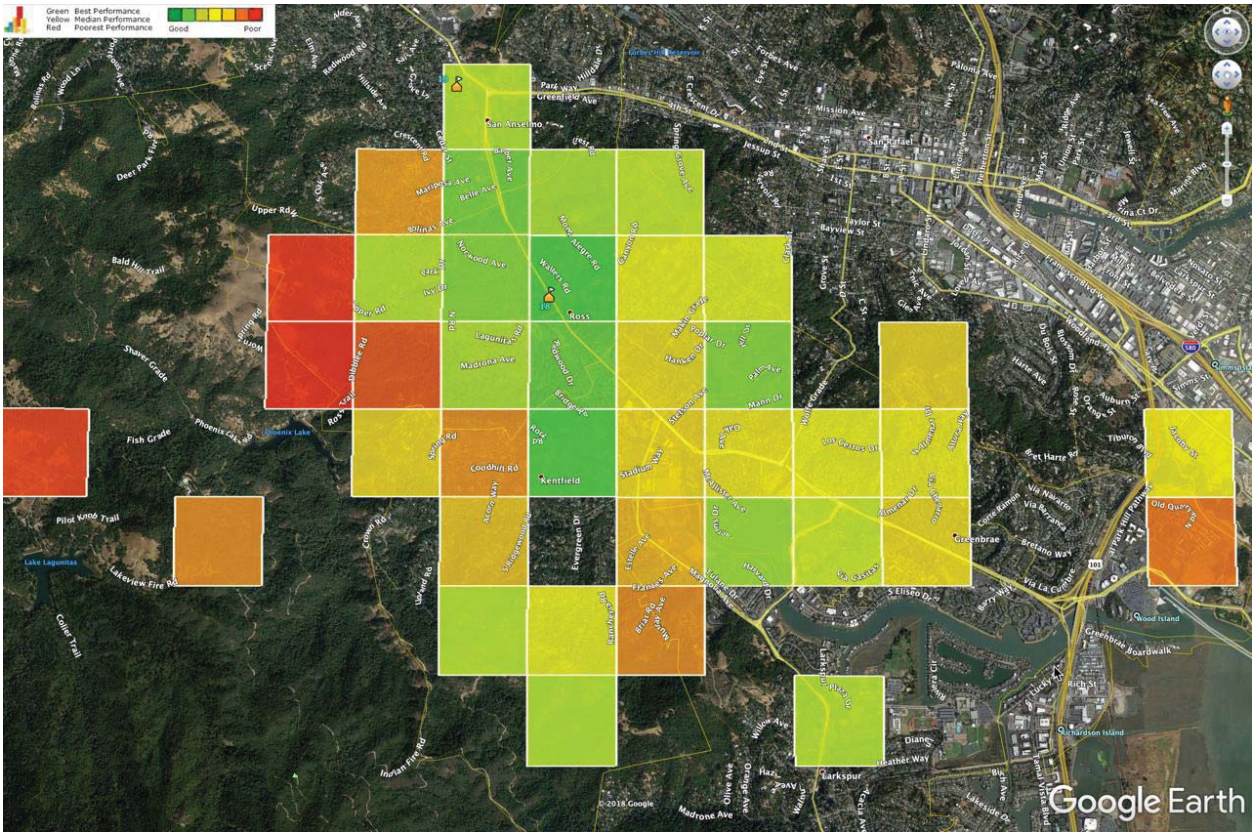
Response Element—Station 18	Overall	2017	2018
Dispatch Processing	01:12 (214)	00:52 (93)	01:12 (121)
Crew Turnout	02:32 (170)	02:38 (77)	02:19 (93)
Travel Time	05:05 (174)	05:14 (78)	04:40 (96)
Call to Arrival	08:28 (226)	08:40 (100)	07:55 (126)

6. What does the map that shows 90 percent response times by Station 18 look like?

   ➢ As would be expected, the better response times tend to be closer to the stations and along the main road network. However, given the low quantity of incidents (small sample size math) and that some incidents are covered by units not in the station, or are responded to by a station farther away due to simultaneous incidents, the following map is not a static picture year over year.

   The following map shows in green where travel time is the fastest—at or near the desired goal point of 4:00 minutes. Orange to red indicates the longest travel times of 5:00 to 9:00 minutes.

Figure 14—90 Percent Response Times by Distance for All Department Stations



7. What is the number of events that Station 18 responded to in the response areas for Stations 19, 20, and 21?

   ➢ The following table lists the responses by vehicle ID.

- The table also includes multiple-unit responses as some complex incidents require more staffing.

Table 20—Responses by Vehicle ID – 2017 and 2018

City	E18	E19	E20	E21	M14	M18
San Anselmo	133	1,550	761	117	188	1,012
Fairfax	12	29	213	1,733	22	707
Ross	**287**	15		3	38	187
Sleepy Hollow			95	11		42
Kentfield	**44**	3				804
Woodacre				7		
Fallon				4		2
Larkspur	2	1		2		131
Greenbrae	2					756
Forest Knolls				2		
San Rafael		1				
San Geronimo				1		
Point Reyes Station				1		
Corte Madera	1					151
Total	**481**	**1,599**	**1,069**	**1,881**	**248**	**3,792**

8. What is the number of medical emergencies the Ross Valley Paramedic Authority responds to in the Town per year?

   - The following table shows the number of responses by apparatus by destination station area.

Table 21—EMS Responses by Station 18 Apparatus by Destination Station Area

Station	E18	M18	Total
18	214	169	383
19	60	862	922
20	12	192	204
21	12	707	719
Total	**298**	**1,930**	**2,228**

The previous table shows Medic 18's most frequent destination is Station 19, followed by Station 21. The station least likely to require a medic unit is Station 18. However, Medic 18 is a regional unit and, as such, is properly located in the middle of its response area east to west. This table also shows Engine 18 is more likely to remain inside Station 18's area but, if drawn outside, is most likely to travel into Station 19's area.

The following list shows which engine arrived first to EMS events in the Town of Ross. When both Station 18 units respond from inside the Town, arriving first is only a matter of seconds. The purpose of this table is to also show units other than those at Station 18 which arrive first:

- Engine 18 arrived first 165 times
- Engine 23 arrived first 40 times
- Engine 19 arrived first 6 times
- Engine 17 arrived first 3 times (Kentfield)
- Engine 21 arrived first 1 time
- Medic 18 arrived first 33 times
- Medic 14 arrived first 2 times

These numbers were calculated for all apparatus responding to EMS incidents and tend to mimic actual operational arrivals. If the search from the regional CAD data for the last two years is for where Station 18 EMS incidents involved both Engine 18 and Medic 18, there were 224 incidents.

9. How often was Station 17 (Kentfield) first on scene to a Town call? What is Station 17's response time to a Town call?

   - In 2017 and 2018, **Engine 17** arrived first in Station 18's area 19 times for *all* incident types. The 90 percent travel time was a little over 8:00 minutes, but this figure is highly volatile and ranges from 5:00 minutes to 21:00 minutes travel time across the various areas of the Town.

10. How often was Station 19 (San Anselmo) first on scene to a Town call?

    - In 2017 and 2018, **Engine 19** arrived first in Station 18's area 20 times to *all types* of incidents. The 90 percent travel time was about 9:45 minutes; again, this figure is highly volatile.

11. What is Station 19's average response time to a Town call?

    ➢ By national best practices, response times are not reported as averages, but as a fractile percent of a goal point. The following table lists anywhere Station 19 responded. The time listed is the time to completion 90 percent of the time; the number in parenthesis is the number of records included in the calculation.

Table 22—Station 19 Response Times to All Calls at 90 Percent Compliance

Response Element—Station 19	Overall	2017	2018
Dispatch Processing	01:02 (971)	01:01 (481)	01:03 (490)
Crew Turnout	02:44 (773)	02:40 (383)	02:50 (390)
Travel Time	05:50 (788)	06:00 (387)	05:38 (401)
Call to Arrival	08:03 (991)	08:23 (490)	07:45 (501)

3.2 Impact if Fire Station 18 Closes

12. Provide a current map of the first response for Stations 17, 18, 19, 20, and 21.

    ➢ Please refer to Map #3 in the Map Atlas of this report in **Volume 2**.

13. If Station 18 closed, what is the first response map for Stations 17, 19, 20, and 21? What is the zone of coverage map for the back-up initial response with closure of Station 18?

    ➢ Station 17 is outside of Citygate's historical statistical and geographic analysis. The Marin County Fire Chiefs Association would have to create a response matrix based on fire reporting districts to create a map. Based on existing station locations for 17 and 19, the Town of Ross would not receive the same coverage as from Station 18.

14. What is the impact to response times in Stations 19, 20, and 21 areas without Station 18?

    ➢ Simultaneous incidents occur when other incidents are underway at the time a new incident begins. In the entire Ross Valley Fire Department's response area during 2018, 16.05 percent of incidents occurred while one or more other incidents were underway.

    In 2017, Station 17 was on an incident *at the same time as Station 18* **45** times. In 2018, Engines 17 and 18 were on incidents at the same time **33** times.

In 2017 and 2018 combined, Engine 18 had 481 responses anywhere. Across two years, Engines 17 and 18 were active at the same time 78 times, or **16** percent of all of Engine 18's responses.

Stated this way, if Engine 18 was closed, there are approximately 1.5 incidents per week to which Engine 17 will not be available to respond.

Then for Engine 18 and Engine 19 from the other direction, based on year 2018 data, both units are committed together approximately 109 times, or two times per week. This is higher than the Engine 18/17 measure. Most occurrences average a joint co-commitment time of 38 minutes.

So, when Engine 18 is busy there is a small chance every week that either or both Engines 17 and 19 also will not be available. This makes sense as all units have more calls for service during peak daylight hours of the day, versus after midnight.

Table 23—Distribution Travel Time Analysis of Fire and EMS Responses from 01/01/17 to 12/31/18

Station Area	Apparatus Arrivals	Home Resources	Outside Resources	Outside Percent	Overall Travel	Home Travel	Outside Travel	Delta Home/Out
18	969	881	88	9.08%	07:03 (602)	06:43 (550)	08:44 (52)	2:01
19	2,586	1,859	727	28.11%	06:38 (1,913)	06:29 (1,385)	07:13 (528)	0:44
20	1,248	903	345	27.64%	07:05 (1,022)	06:33 (756)	08:28 (266)	1:55
21	2,627	1,992	635	24.17%	07:22 (1,629)	06:46 (1,303)	08:31 (326)	1:45

Closing Station 18 will add about 2:00 minutes of travel time into that station area. Overall medic travel times will be reduced to some incidents if Medic 18 were to be moved west, as the unit is located closer to a higher medic demand area.

15. What is the impact of having first response from Station 19 with a three-person engine and Station 17 with a four-person engine versus Station 18 as a two-person engine?

    - Total staff (weight) is the same firefighter count of eight. But the Town firefighters are now located in and serving two other areas and are thus subject to simultaneous incident use in Stations 19 and 17's areas.

16. If RVPA stays in the Town, is there a response time change to medical emergencies?

- No, if the ambulance is available. Otherwise response time depends on Engine 19 or Engine 17 being available to respond.
- Other medic units needed in the Town of Ross when Medic 18 was not available were Medic 14 (53 times), Medic 95 (eight times), and one each for Medic 97, Medic 94, Medic 59, and Medic 13. This means other medic units needed to respond into Station 18's territory 65 times in two years.

17. If RVPA moves to Station 17 or Station 19, what is the average change in response time to a medical emergency?

- Per Table 23, without a Station 18 resource, there are an additional 2:00 minutes of travel time, meaning total response time (dispatch processing, turnout, and travel time) is almost 12:00 minutes from 9-1-1, which is the same as a rural level of response.
- Moving Medic 18 to Station 17 would also move it farther away from the highest incident densities that it serves.

Finding #12: In the Town of Ross, on EMS emergencies, Engine 18 responded 214 times and Medic 18 responded 169 times in a two-year period.

Finding #13: In the Town of Ross, adjoining Engines 17 (Kentfield) and Engine 19 each arrived first over a two-year period 19 and 20 times, totaling 39. Thus, the outside units only arrived/were needed first 12.6 percent of the time.

Finding #14: In a two-year period, Engines 18 and 17 (Kentfield) were assigned to incidents at the same time 78 times or 16 percent of Engine 18's total responses. Stated this way, if Engine 18 was closed, there are approximately 1.5 incidents per week to which Engine 17 will not be available to respond.

Finding #15: Closing Station 18 will add about 2:00 minutes *minimum* of travel time into that station area.

Finding #16: In the Ross Valley Fire Department, Station 18 has the best travel time of any of the four station areas at 4:40 minutes, only 40 seconds longer than an urban/suburban best practice recommendation of 4:00 minutes. Adding 2:00 minutes travel, plus dispatch and turnout time of at least 3:00 minutes, moves a Town of Ross total response time from 7:40 to 9:40 which would be more like an edge suburban area or emerging rural area. First unit response times of 10:00 minutes-plus means small fires will become larger and critical EMS patients may not receive lifesaving care.

Finding #17: If the Engine 18 daily firefighter count of two were transferred to Engine 19, or reduced to one being transferred, they would be joining an engine that serves a much larger area and is more exposed to simultaneous incident demand. Due the dynamic nature of 9-1-1 emergencies, there is no way to predict if all of the Town of Ross Engine 18 and Medic 18 first arrivals would be covered by just Engines 19 and 17 (Kentfield) or by other units even farther away.

Finding #18: Covering the Town of Ross from either Station 19 or 17 (Kentfield) depends on essentially one road being open and not congested with traffic. Any one accident or natural emergency could close the road, effectively making the Town of Ross a cul-de-sac served from one direction and, in a sub-regional emergency, either Engine 19 or 17 would be shared with a larger service area.

This page was intentionally left blank

SECTION 4—OVERALL EVALUATION

SOC ELEMENT 8 OF 8
OVERALL EVALUATION

The Department serves mostly residential and small downtown populations with a mixed land-use pattern typical of Marin County communities. However, the hilly geography and the limited road network dependent on one main connector road, is very difficult to serve efficiently from a small number of fire stations.

Over time, each population cluster opened a fire station for a minimum single first unit response and knew they were co-dependent on each other for multiple-unit serious emergencies. The geography cannot be changed and improving the road network is not politically feasible or cost-effective. Thus, reducing coverage by removing any one or more fire engines or the paramedic ambulance will increase response times to the local community receiving reduced coverage.

While the state fire code now requires fire sprinklers even in residential dwellings, it will be many more years before the vast majority of homes are replaced or remodeled with automatic fire sprinklers. If the communities' desired outcomes include limiting building fire damage to only part of the inside of an affected building, minimizing permanent impairment resulting from a medical emergency, and keeping wildland fires small to a few acres at the ignition point, then the communities served by the Ross Valley Fire Department will need first-due unit coverage in all neighborhoods.

However, even with maintaining the current four-station spacing, given the topography, not all hillside areas can receive response time coverage consistent with suburban best practice incident outcomes and a Citygate performance recommendation of a first-due arrival within 7:30 minutes from 9-1-1 dispatch notification and a multiple-unit Effective Response Force (ERF) arrival occurring within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability.

The Department's call processing performance is excellent. The crew turnout time needs modest improvement but even such attainable improvement cannot substantially lower the fire unit travel times which are longer than desired over the challenging geography and road network.

Department resources and equipment are appropriate to protect against the hazards likely to impact the Department's service area, but the daily staffing of eight firefighters on four engines, plus a two-firefighter/paramedic ambulance from the Ross Valley Paramedic Authority (RVPA) and a Duty Chief Officer only provides a *minimum* total response force sufficient to begin controlling a single emerging to serious fire incident, or to provide care at an EMS incident with one to five patients.

In terms of emergency incident workload per unit, no single fire unit or station area is approaching workload saturation. The level of simultaneous incidents is not high enough to warrant another unit at peak hours of the day. Citygate is, however, concerned about the overall limited Department

staffing per day and its ability to respond with more "weight of attack" to keep emerging serious emergencies controlled. Even Countywide mutual aid resources are not quickly available in this part of Marin County, as they would be in an urban area with flat terrain and interconnected roads.

In reviewing the Town of Ross questions about the utility of its fire station, while maintaining a fire crew in town is expensive, any alternative solution will raise response times beyond suburban best practice goals and come at the cost of sharing staffing with a larger service area. Relocating the crews out of the Town of Ross impacts more than just the Town. As an example, even if the Town paid Kentfield for fire coverage, Kentfield would be serving the entire Town of Ross in addition to its own community, which would mean the Kentfield fire unit would occasionally not be available to respond to an emergency call in its primary area.

The quantity of calls in the Town of Ross (or any other single historic population cluster in the joint Department's service area) is too small and too volatile from which to use historical incidents as the only criteria to maintain the fire station. Providing fire services is akin to purchasing fire insurance, and it is important to consider the desired level of protection. The public policy issue is whether to have access to a fire station nearby or farther away, knowing that a station farther away, even with its unit(s) available for response, cannot offer more than edge suburban or emerging rural area response times to much of the Town of Ross.

4.1 DEPLOYMENT RECOMMENDATIONS

Based on the technical analysis and findings contained in this Standards of Coverage assessment, Citygate offers the following deployment recommendations:

Recommendation #1:	**Adopt Updated Deployment Policies:** The Ross Valley Fire Department governing Board should adopt *updated*, complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients medically salvageable upon arrival and to keep small but serious fires from becoming more serious. With this is mind, Citygate recommends the following measures:

1.1 Distribution of Fire Stations: To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 8:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call at dispatch; this equates to a 90-second dispatch time, a 2:00-minute company turnout time, and a 5:00-minute travel time.

1.2 Multiple-Unit Effective Response Force for Serious Emergencies: To confine building fires near the room of origin, keep vegetation fires under one acre in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least 12 personnel, including at least one Duty Chief Officer, should arrive within 12:30 minutes from the time of 9-1-1 call receipt in dispatch, 90 percent of the time; this equates to a 90-second dispatch time, 2:00-minute company turnout time, and 9:00-minute travel time.

1.3 Hazardous Materials Response: Provide hazardous materials response designed to protect the Department's service areas from the hazards associated with uncontrolled release of hazardous and toxic materials. The fundamental mission of the Fire Department's response is to isolate the hazard, deny entry into the hazard zone, and notify appropriate officials/resources to minimize impacts on the community. This can be achieved with a first-due total response time of 8:30 minutes or less to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request additional resources from the regional hazardous materials team.

1.4	Technical Rescue: Respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue with a first-due total response time of 8:30 minutes or less to evaluate the situation and/or initiate rescue actions. Following the initial evaluation, assemble additional resources as needed within a total response time of 12:30 minutes to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.
Recommendation #2:	Consider maintaining the current location of all four engines and keeping Medic 18 in the Town of Ross to balance its coverage area to the west and east.
Recommendation #3:	Consider providing a third firefighter per day on the three engines other than Engine 18. Doing so would raise the daily weight of attack from 12 to 15 and, with Kentfield's three personnel, to 18. This force would be sufficient to provide the weight of attack and simultaneous incident redundancy for suburban positive outcomes. Especially on serious building and wildland fire ignitions, there is no second chance to stop the fire. This is a local policy decision to be made by the affected communities to determine the level of fire service that they can afford.

APPENDIX A

RISK ASSESSMENT

This page was intentionally left blank

APPENDIX A—RISK ASSESSMENT

A.1 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

The third element of the Standards of Coverage (SOC) process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

- Identify the values at risk to be protected within the community or service area.
- Identify the specific hazards with the potential to adversely impact the community or service area.
- Quantify the overall risk associated with each hazard.
- Establish a foundation for current/future deployment decisions and risk-reduction/hazard-mitigation planning and evaluation.

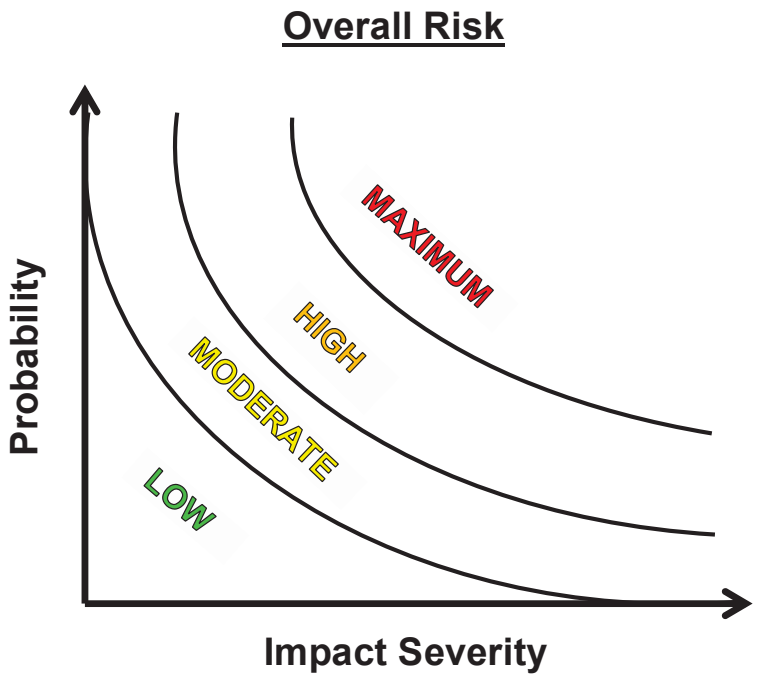
A hazard is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. Risk is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community as a whole.

A.1.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC study incorporates the following elements:

- Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- Identification of the fire and non-fire hazards to be evaluated.
- Determination of the probability of occurrence for each hazard.
- Identification and evaluation of multiple relevant impact severity factors for each hazard by planning zone using agency/jurisdiction-specific data and information.
- Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity, as shown in Figure 15.

Figure 15—Overall Risk



Citygate used the following data sources for this study to understand the hazards and values to be protected in the District:

- U.S. Census Bureau population and demographic data
- District Geographical Information Systems (GIS) data
- Marin County General Plan and Zoning information
- Marin County Multi-Jurisdictional Local Hazard Mitigation Plan
- Fire Department data and information.

A.1.2 Risk Assessment Summary

Citygate's evaluation of the values at risk and hazards likely to impact the Ross Valley Fire Department service area yields the following:

1. The Department serves a diverse population, with densities ranging from less than 500 people per square mile to approximately 5,000 per square mile over a varied land use pattern.
2. The Department's service area population is projected to grow by only 7.7 percent over the next 11 years to 2030, or an average annual growth of approximately 0.7 percent.

3. The service area includes nearly 11,000 housing units as well as a large inventory of non-residential occupancies.

4. Marin County has a mass emergency notification system to effectively communicate emergency information to the public in a timely manner.

5. The Department's overall risk for five hazards related to emergency services provided range from **Low** to **High**, as summarized in Table 24.

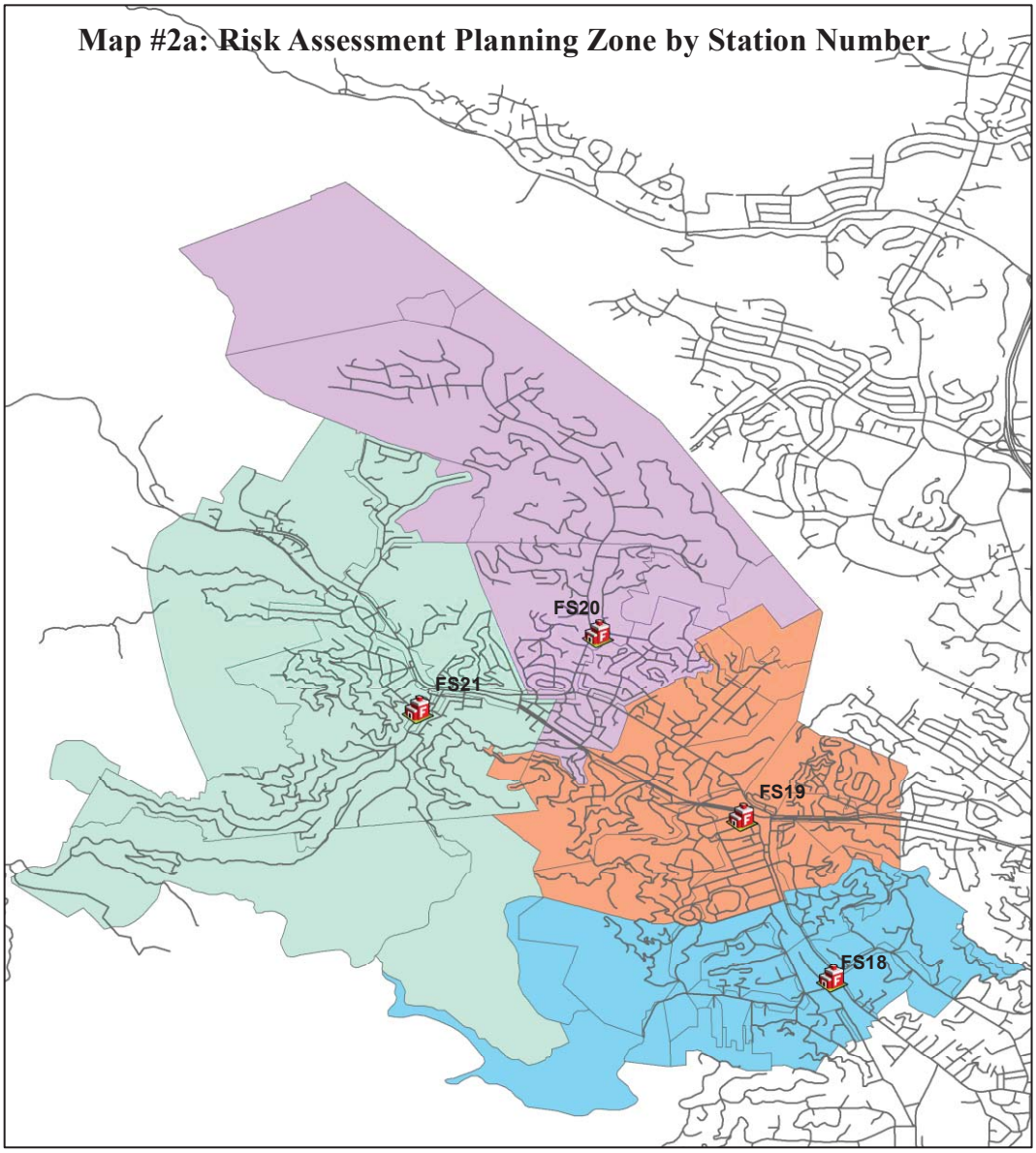
Table 24—Overall Risk by Hazard

Hazard	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Building Fire	*Low*	*Low*	*Moderate*	*Moderate*
Vegetation Fire	*Low*	*Low*	*Low*	*Low*
Medical Emergency	*High*	*High*	*High*	*High*
Hazardous Material	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Technical Rescue	*Low*	*Low*	*Low*	*Low*

A.1.3 Planning Zones

The Commission on Fire Accreditation International (CFAI) recommends that jurisdictions establish geographic planning zones to better understand risk at a sub-jurisdictional level. For example, portions of a jurisdiction may contain predominantly moderate risk building occupancies, such as detached single-family residences, while other areas contain high- or maximum-risk occupancies, such as commercial and industrial buildings with a high hazard fire load. If risk were to be evaluated on a jurisdiction-wide basis, the predominant moderate risk could outweigh the high or maximum risk and may not be a significant factor in an overall assessment of risk. If, however, those high- or maximum-risk occupancies are a larger percentage of the risk in a smaller planning zone, then it becomes a more significant risk factor. Another consideration in establishing planning zones is that the jurisdiction's record management system must also track the specific zone for each incident to be able to appropriately evaluate service demand and response performance relative to each specific zone. For this assessment, Citygate utilized four planning zones, incorporating each fire station's first-due response area, as shown in Figure 16.

Figure 16—Risk Planning Zones



A.1.4 Values at Risk to Be Protected

Values at risk, broadly defined, are tangibles of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, and/or natural resources.

People

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children less than 10 years of age, the elderly, and people housed in institutional settings. Table 25 summarizes key demographic data for the Ross Valley Fire Department's service area.

Table 25—Key Demographic Data – Ross Valley Fire Department

Demographic	2017	Percentage
Population	**24,785**	
Under 10 years	2,150	**8.67%**
10 – 19 years	3,483	**14.05%**
20 – 64 years	14,217	**57.36%**
65-74 years	3,111	**12.55%**
75 years and older	1,824	**7.36%**
Median age	**48.4**	**N/A**
Housing Units	**10,813**	
Owner-Occupied	7,683	**71.05%**
Renter-Occupied	2,534	**23.43%**
Average Household Size	**2.53**	**N/A**
Ethnicity		
Caucasian	22,492	**90.75%**
Asian	910	**3.67%**
Other	1,383	**5.58%**
Education (population over 24 yrs. of age)	**18,158**	**73.26%**
High School Graduate	17,546	**96.63%**
Undergraduate Degree	11,134	**61.32%**
Graduate/Professional Degree	5,309	**29.24%**
Employment (population over 15 yrs. of age)	**20,261**	**81.75%**
In Labor Force	13,816	**68.19%**
Unemployed	626	**4.53%**
Population Below Poverty Level	1,091	**4.40%**
Population without Health Insurance Coverage	487	**1.96%**

Source: U.S. Census Bureau (2017)

Of note from Table 25 is the following:

- More than 28.5 percent of the population is under 10 years or over 65 years of age.

- The Department's service area population is predominantly Caucasian (91 percent), followed by Asian (3 percent), and other ethnicities (6 percent).
- Of the population over 24 years of age, more than 96 percent has completed high school or equivalency.
- Of the population over 24 years of age, more than 61 percent have a college degree.
- Slightly more than 68 percent of the population 15 years of age or older is in the workforce; of those, 4.5 percent are unemployed.
- The population below the federal poverty level is 4.4 percent.
- Only two percent of the population does not have health insurance coverage.

The service area population is projected to increase by approximately 1,900 (7.7 percent) to nearly 27,000 over the next 11 years to 2030,[6] for an average annual growth of approximately 175 (0.7 percent).

Buildings

The service area includes nearly 11,000 housing units, as well as a large inventory of non-residential occupancies, including office, research, professional service, retail sales, restaurants/bar, motel, church, school, government facility, healthcare, and other non-residential uses.

Building Occupancy Risk Categories

The CFAI identifies the following four risk categories that relate to building occupancy:

Low Risk – includes detached garages, storage sheds, outbuildings, and similar building occupancies that pose a relatively low risk of harm to humans or the community if damaged or destroyed by fire.

Moderate Risk – includes detached single-family or two-family dwellings; mobile homes; commercial and industrial buildings less than 10,000 square feet without a high hazard fire load; aircraft; railroad facilities; and similar building occupancies where loss of life or property damage is limited to the single building.

High Risk – includes apartment/condominium buildings; commercial and industrial buildings more than 10,000 square feet without a high hazard fire load; low-occupant load buildings with high fuel loading or hazardous materials; and similar occupancies with potential for substantial loss of life or unusual property damage or financial impact.

[6] Reference: Marin County Housing Element 2015-2023, Figure II-2

Maximum Risk – includes buildings or facilities with unusually high risk requiring an Effective Response Force (ERF) involving a significant augmentation of resources and personnel and where a fire would pose the potential for a catastrophic event involving large loss of life and/or significant economic impact to the community.

Evaluation of the service area building inventory reveals 174 high risk building uses as they relate to the CFAI building fire risk categories as summarized in Table 26, Table 27, and Map #2B in **Volume 2** (Map Atlas).

Table 26—High Risk Building Occupancy Inventory by Risk Category

Building Occupancy Classification[2]		Number	Risk Category[1]
A-1	Assembly	5	***High***
H	Hazardous	0	***High***
I-4	Institutional	1	***High***
R-1	Hotel/Motel	2	***High***
R-2	Multi-Family Residential	148	***High***
R-2.1	Assisted Living Facilities	4	***High***
R-3.1	Residential Care Facilities	9	***High***
R-4	Care Facilities – Greater than 6 Persons	5	***High***
Total		**174**	

[1] CFAI *Standards of Cover* (5th Edition)
Source: Ross Valley Fire Department

Table 27—High Risk Occupancy Inventory by Planning Zone

Occupancy Classification	Planning Zone				Total
	Sta. 18	Sta. 19	Sta. 20	Sta. 21	
A-1	1	2	1	1	**5**
I-4		1			**1**
R-1		1	1		**2**
R-2	1	110	37		**148**
R-2.1	2	1	1		**4**
R-3.1	1	5	2	1	**9**
R-4		4	1		**5**
Total	**5**	**124**	**43**	**2**	**174**

Source: Ross Valley Fire Department

Critical Infrastructure / Key Resources

The U.S. Department of Homeland Security defines Critical Infrastructure / Key Resources (CIKR) as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services. No critical facilities or key resources were identified by the Department for this assessment.

Economic Resources

No economic resources were identified for this assessment.

Natural Resources

No natural resources were identified for this assessment.

A.1.5 Hazard Identification

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency/jurisdiction-specific data and information to identify the hazards to be evaluated for this study.

The 2018 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan (LHMP) identifies the following 13 hazards for the County.

Table 28—Marin County Hazards

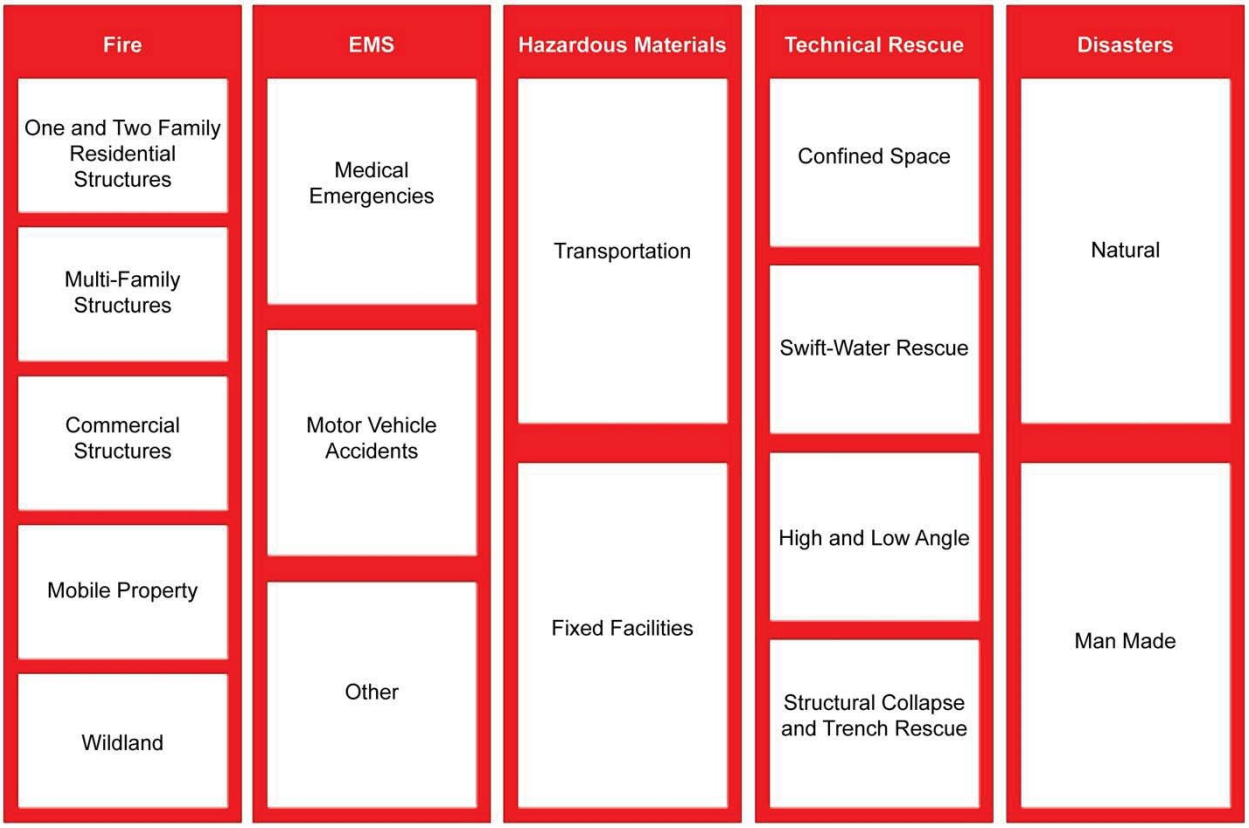
Hazard	
1	Coastal erosion
2	Dam failure
3	Drought
4	Earthquake
5	Flood
6	Heat
7	Landslide/mudslide/debris flow
8	Levee failure
9	Liquefaction
10	Severe wind/tornado
11	Severe storm
12	Tsunami/seiche
13	Wildfire

Reference: 2018 Marin County LHMP, Table 3-1

Although the Fire Department has no legal authority or responsibility to mitigate any of these hazards other than wildfire, it does provide services related to all these hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

The CFAI groups hazards into fire and non-fire categories, as shown in Figure 17. Identification, qualification, and quantification of the various fire and non-fire hazards are important factors in evaluating how resources are or can be deployed to mitigate those risks.

Figure 17—Commission on Fire Accreditation International Hazard Categories



Source: CFAI *Standards of Cover* (5th Edition).

Subsequent to review and evaluation of the hazards identified in the 2018 Marin County Multi-Jurisdictional LHMP and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the Department, Citygate evaluated the following five hazards for this risk assessment:

- Building Fire
- Vegetation Fire
- Medical Emergency
- Hazardous Material Release/Spill
- Technical Rescue

A.1.6 Service Capacity

Service capacity refers to the Department's available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities

and competencies; resource distribution and concentration; availability of automatic and/or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

The Department's service capacity for building and vegetation fire, medical emergency, hazardous materials, and technical rescue risk consists of eight firefighters on four engines, plus a two-firefighter/paramedic ambulance from the Ross Valley Paramedic Authority (RVPA) and a Duty Chief Officer.

All response personnel are trained to either the Emergency Medical Technician (EMT) level, capable of providing Basic Life Support (BLS) pre-hospital emergency medical care, or EMT-Paramedic (Paramedic) level, capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. Ground paramedic ambulance service is provided by the Ross Valley Paramedic Authority (RVPA). Air ambulance services, when needed, are provided by Reach Air Medical Services (Concord, Santa Rosa, or Napa), LifeFlight (Palo Alto), the California Highway Patrol, or Sonoma County Sheriff. Three regional hospitals provide emergency medical services, including Marin General Hospital, Kaiser Permanente Medical Center San Rafael, and Novato Community Hospital. Marin General Hospital is also a Level-III trauma center.

Response personnel are also trained to the U.S. Department of Transportation Hazardous Material First Responder Operational (FRO) level to provide initial hazardous material incident assessment, hazard isolation, and support for a hazardous material response team. Additional hazardous materials response capacity is available from the Marin County Hazardous Materials Response Team. The Hazardous Materials Response Unit is housed at the Ross Valley Fire Department and is cross-staffed by Ross Valley personnel as needed for regional response.

Technical rescue services are provided by the Marin County Urban Search and Rescue (US&R) Regional Task Force, a multi-agency/discipline team with the tools, equipment, and training to conduct confined space, low/high-angle rope rescue, breaching, shoring, excavation, trench, and water rescue operations.

A.1.7 Probability of Occurrence

Probability of occurrence refers to the probability of a future hazard occurrence during a specific period. Because the CFAI agency accreditation process requires annual review of an agency's risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence evaluation. Table 29 describes the five probability of occurrence categories and related scoring criteria used for this analysis.

Table 29—Probability of Occurrence Scoring Criteria

Score	Probable Occurrence	Description	General Criteria
0–1.0	***Very Low***	Improbable	Hazard occurrence is *unlikely*
1.25–2.0	***Low***	Rare	Hazard *could occur*
2.25–3.0	***Moderate***	Infrequent	Hazard *should occur* infrequently
3.25–4.0	***High***	Likely	Hazard *likely to occur* regularly
4.25–5.0	***Very High***	Frequent	Hazard is *expected to occur* frequently

Citygate's SOC assessments use recent multiple-year hazard response data to determine the probability of hazard occurrence for the ensuing 12-month period.

A.1.8 Impact Severity

Impact severity refers to the extent a hazard occurrence impacts people, buildings, lifeline services, the environment, and the community as a whole. Table 30 describes the five impact severity categories and related scoring criteria used for this analysis.

Table 30—Impact Severity Scoring Criteria

Score	Impact Severity	General Criteria
0 – 1.0	**Insignificant**	• No serious injuries or fatalities • Few persons displaced for only a short duration • None or inconsequential damage • None or very minimal disruption to community • No measurable environmental impacts • Little or no financial loss
1.25 – 2.0	**Minor**	• Some minor injuries; no fatalities expected • Some persons displaced for less than 24 hours • Some minor damage • Minor community disruption; no loss of lifeline services • Minimal environmental impacts with no lasting effects • Minor financial loss
2.25 – 3.0	**Moderate**	• Some hospitalizations; some fatalities expected • Localized displacement of persons for up to 24 hours • Localized damage • Normal community functioning with some inconvenience • Minor loss of critical lifeline services • Some environmental impacts with no lasting effects, or small environmental impact with long-term effect • Moderate financial loss
3.25 – 4.0	**Major**	• Extensive serious injuries; significant number of persons hospitalized • Many fatalities expected • Significant displacement of many people for more than 24 hours • Significant damage requiring external resources • Community services disrupted; some lifeline services potentially unavailable • Some environmental impacts with long-term effects • Major financial loss
4.25 – 5.0	**Catastrophic**	• Large number of severe injuries and fatalities • Local/regional hospitals impacted • Large number of persons displaced for an extended duration • Extensive damage • Widespread loss of critical lifeline services • Community unable to function without significant support • Significant environmental impacts and/or permanent environmental damage • Catastrophic financial loss

A.1.9 Overall Risk

Overall hazard risk is determined by multiplying the *probability of occurrence score* by the *impact severity score*. The resultant total determines the overall *risk rating* as shown in Table 31.

Table 31—Overall Risk Score and Rating

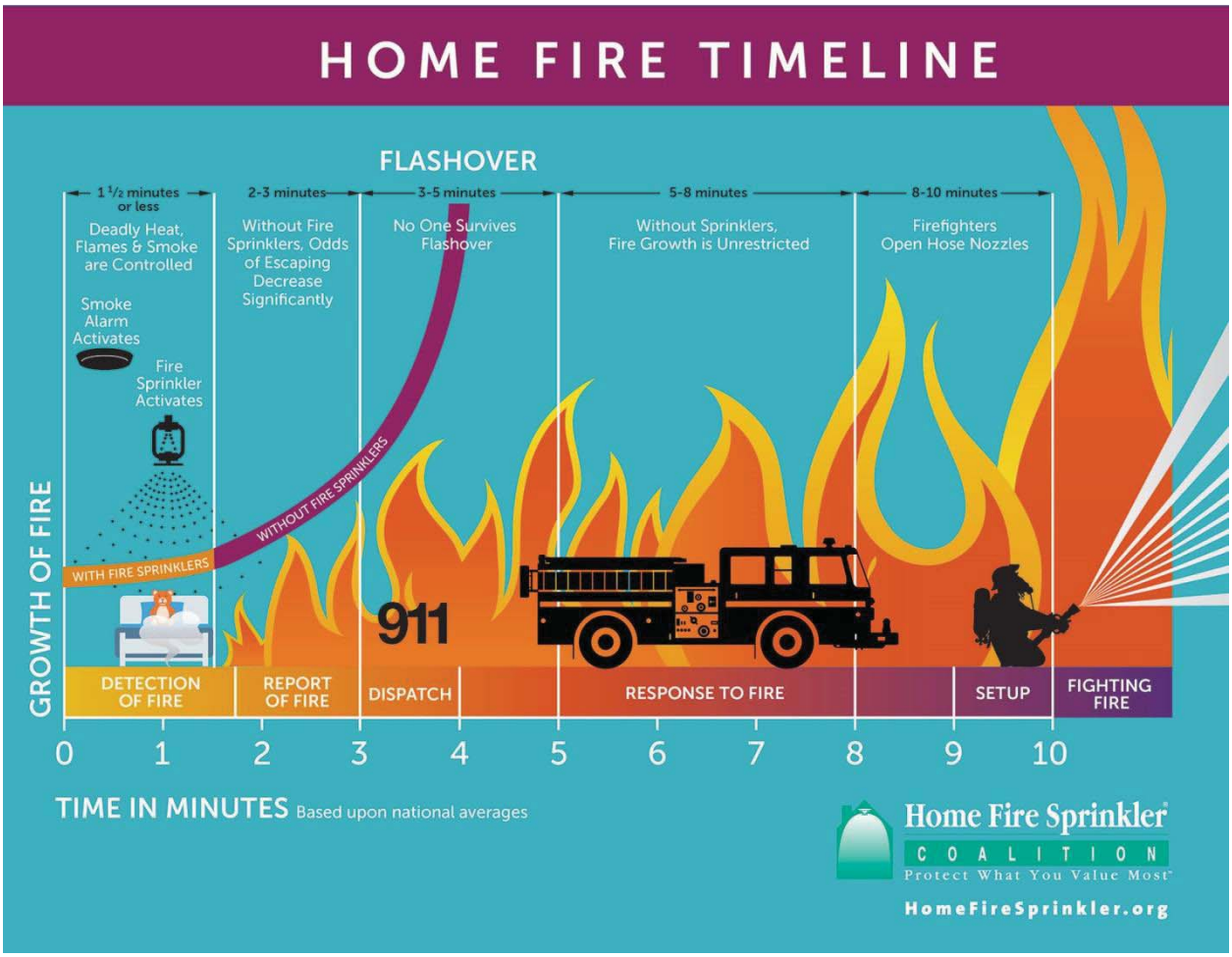
Overall Risk Score	Overall Risk Rating
0–5.99	***LOW***
6.0–11.99	***MODERATE***
12.0–19.99	***HIGH***
20.0–25.0	***MAXIMUM***

A.1.10 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, number of stories above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the Department and the U.S. Census Bureau to assist in determining the Department's building fire risk.

Figure 18 illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as 3:00 to 5:00 minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

Figure 18—Building Fire Progression Timeline



Source: http://www.firesprinklerassoc.org

Population Density

Population density within the service area ranges from less than 500 to approximately 5,000 people per square mile. Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire *occurrence*, it is reasonable to conclude that building fire *risk* relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

Water Supply

A reliable public water system providing adequate volume, pressure, and flow duration in close proximity to all buildings is a critical factor in mitigating the potential impact severity of a community's building fire risk. Potable water is provided by the Marin Municipal Water District,

and according to Fire Department staff, available fire flow is insufficient in several sections of the service area as shown in Map #2E in **Volume 2** (Map Atlas).

Building Fire Service Demand

For calendar years 2017 and 2018, the Department experienced 44 building fire incidents comprising 1 percent of total service demand over the same period, as summarized in Table 32.

Table 32—Building Fire Service Demand

Risk	Year	Planning Zone				Total	Percent Total Service Demand
		Sta. 18	Sta. 19	Sta. 20	Sta. 21		
Building Fire	2017	3	3	7	11	**24**	0.83%
	2018	0	5	7	8	**20**	0.75%
Total		**3**	**8**	**14**	**19**	**44**	**0.79%**
Percent of Total Service Demand		.79%	0.42%	1.46%	0.97%	**0.79**%	

Source: Ross Valley Fire Department incident data

As Table 32 illustrates, building fire service demand was consistent across the two-year study period, with the highest volume of incidents occurring at Station 21 and the lowest at Station 19. Overall, the Department's building fire service demand is very low, comprising less than one percent of all calls for service, which is consistent with other California jurisdictions of similar size and demographics.

Probability of Building Fire Occurrence

Table 33 summarizes Citygate's scoring of building fire probability by planning zone based on building fire service demand from Table 32.

Table 33—Building Fire Probability Scoring

Building Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Probability Score	1.25	1.50	2.0	2.25

Building Fire Impact Severity

Table 34 summarizes Citygate's scoring of the Department's probable building fire impact severity by planning zone.

Table 34—Building Fire Impact Severity Scoring

Building Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Impact Severity Score	3.0	3.0	3.0	3.0

Overall Building Fire Risk

Table 35 summarizes the Department's overall building fire risk scores and ratings by planning zone.

Table 35—Overall Building Fire Risk

Building Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Total Risk Score	3.75	4.50	6.00	6.75
Risk Rating	***Low***	***Low***	***Moderate***	***Moderate***

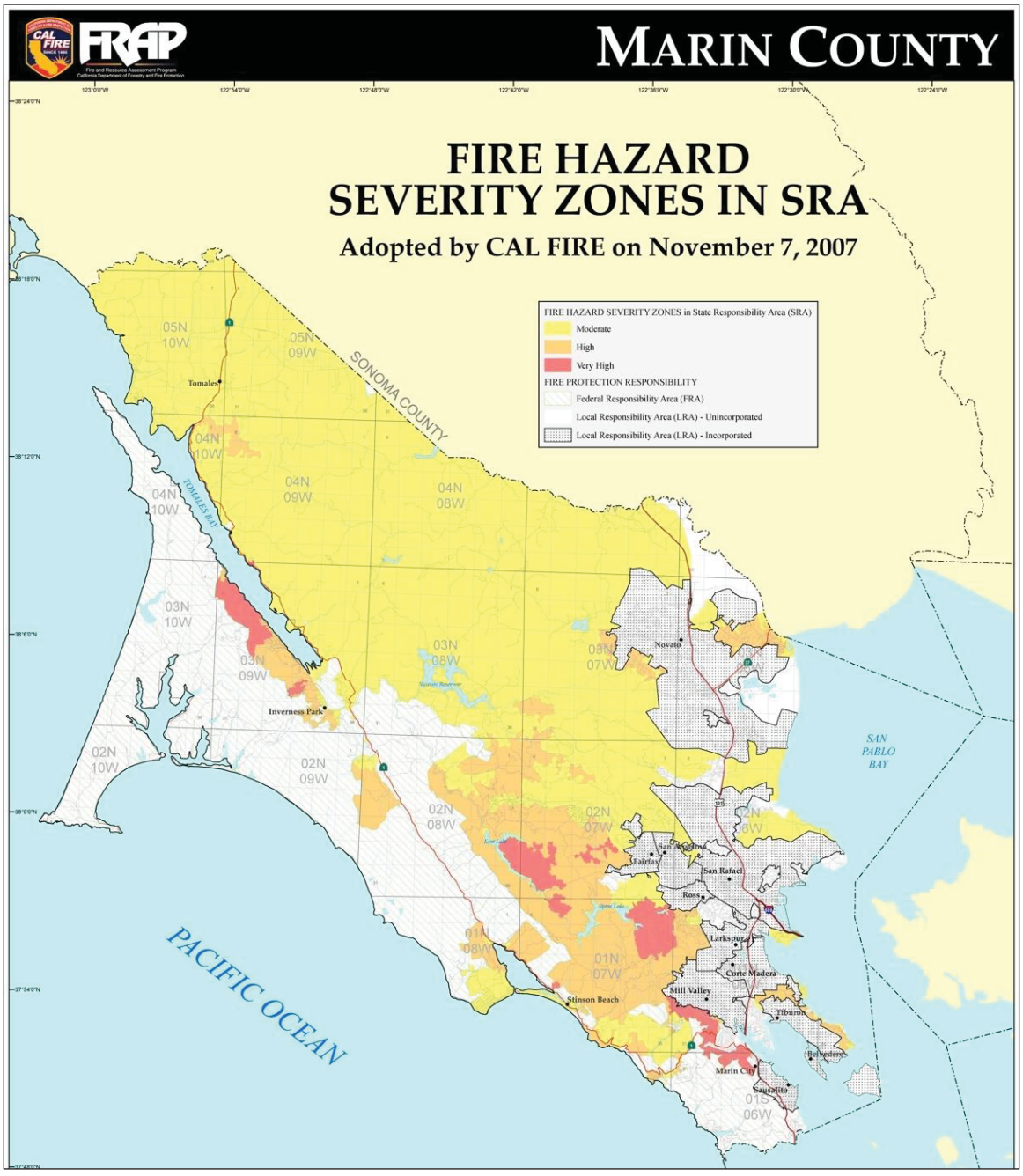
A.1.11 Vegetation Fire Risk

Most of the service area is susceptible to a vegetation fire, particularly along the northern and western edges abutting the Mount Tamalpais watershed.

Wildland Fire Hazard Severity Zones

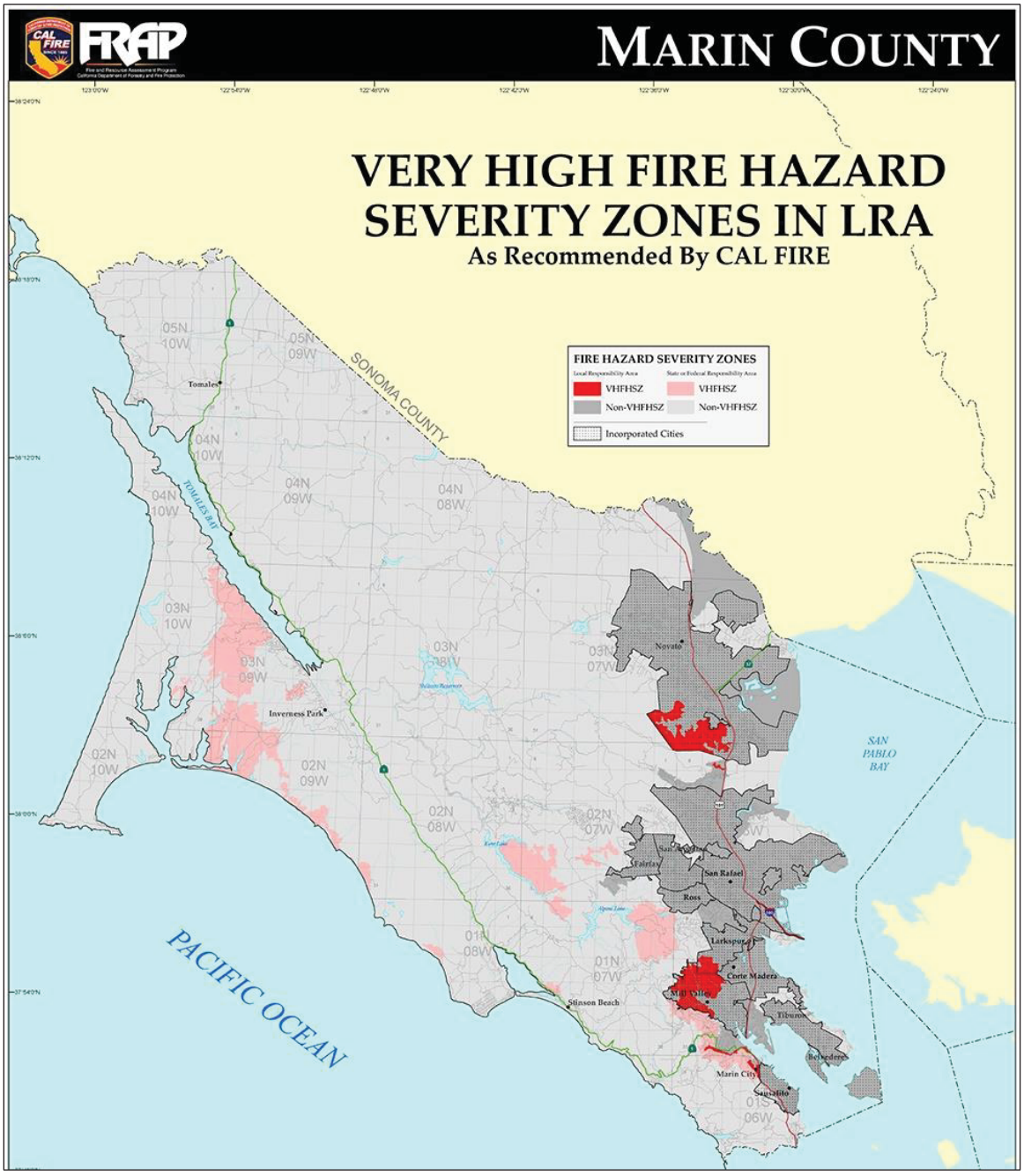
The California Department of Forestry and Fire Protection (CAL FIRE) designates wildland Fire Hazard Severity Zones (FHSZ) throughout the State based on analysis of multiple wildland fire hazard factors and modeling of potential wildland fire behavior. For State Responsibility Areas (SRAs) where CAL FIRE has fiscal responsibility for wildland fire protection, CAL FIRE designates Moderate, High, and Very High FHSZs by county, as shown in Figure 19 for Marin County. Note the ***Moderate***, ***High***, and ***Very High*** FHSZs immediately to the north, northeast, and west of the service area.

Figure 19—SRA Wildland Fire Hazard Severity Zones – Marin County



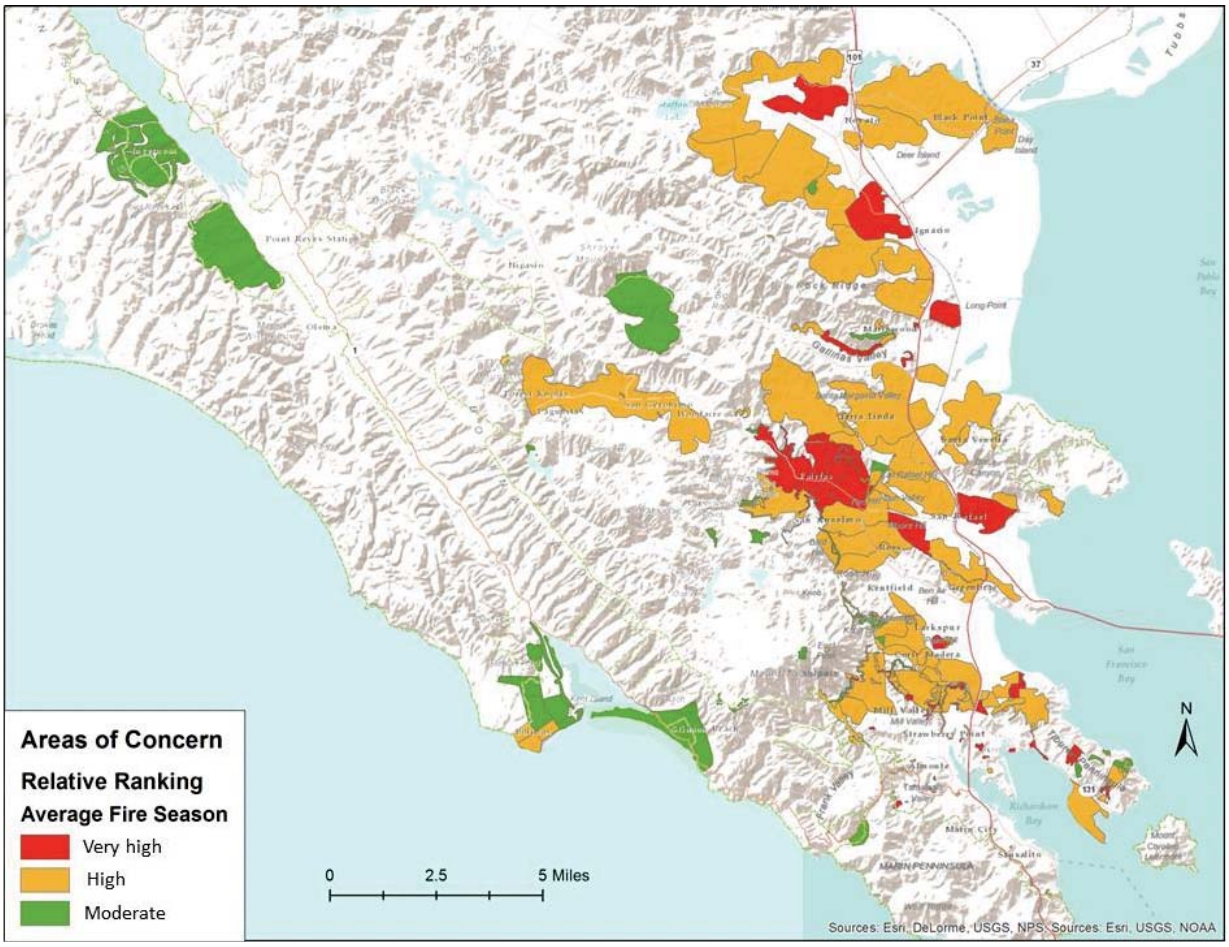
CAL FIRE also identifies recommended FHSZs for Local Responsibility Areas (LRAs), where a local jurisdiction bears the fiscal responsibility for wildland fire protection, including incorporated cities, as shown in Figure 20 for Marin County.

Figure 20—Wildland Fire Hazard Map



Note that there are no recommended FHSZs within the Department's service area. The 2016 Marin County Fire Department Community Wildfire Protection Plan (CWPP), however, identifies significant sections of the service area as **Moderate**, **High** and **Very High** Areas of Concern based on composite geospatial modeling of population density, potential flame length, and potential rate of spread as shown in Figure 21.

Figure 21—Areas of Wildfire Concern – Marin County CWPP



Reference: 2016 Marin County CWPP, Figure 15

Vegetative Fuels

Vegetative fuel factors influencing fire intensity and spread include fuel type (species), height, arrangement, density, and moisture. Vegetative fuels within the service area, in addition to decorative landscape species, include both native and non-native annual and perennial plant species, including grasses, weeds, shrubs, and chamise, and mostly hardwood trees including bay, eucalyptus, madrone, and oak. The majority of the service area has moderate to high vegetative fuel density. Once ignited, vegetation fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions.

Weather

Weather elements such as temperature, relative humidity, wind, and lightning also affect vegetation fire potential and behavior. High temperatures and low relative humidity dry out vegetative fuels, creating a situation where fuels will more readily ignite and burn more intensely.

Wind is the most significant weather factor influencing vegetation fire behavior; higher wind speeds increase fire spread and intensity. Wildland fire season, when vegetation fires are most likely to occur due to fuel and weather conditions, occurs from approximately June through October in Marin County. Summer weather within the service area typically includes cool mornings, warm afternoons and evenings, and west/northwest breezes that can reach 15-25 miles per hour. Occasional summer gradients can produce temperatures in the high 90s to low 100s, low relative humidity, and offshore winds as high as 40 miles per hour. These weather conditions create the potential for a large, damaging wildfire.

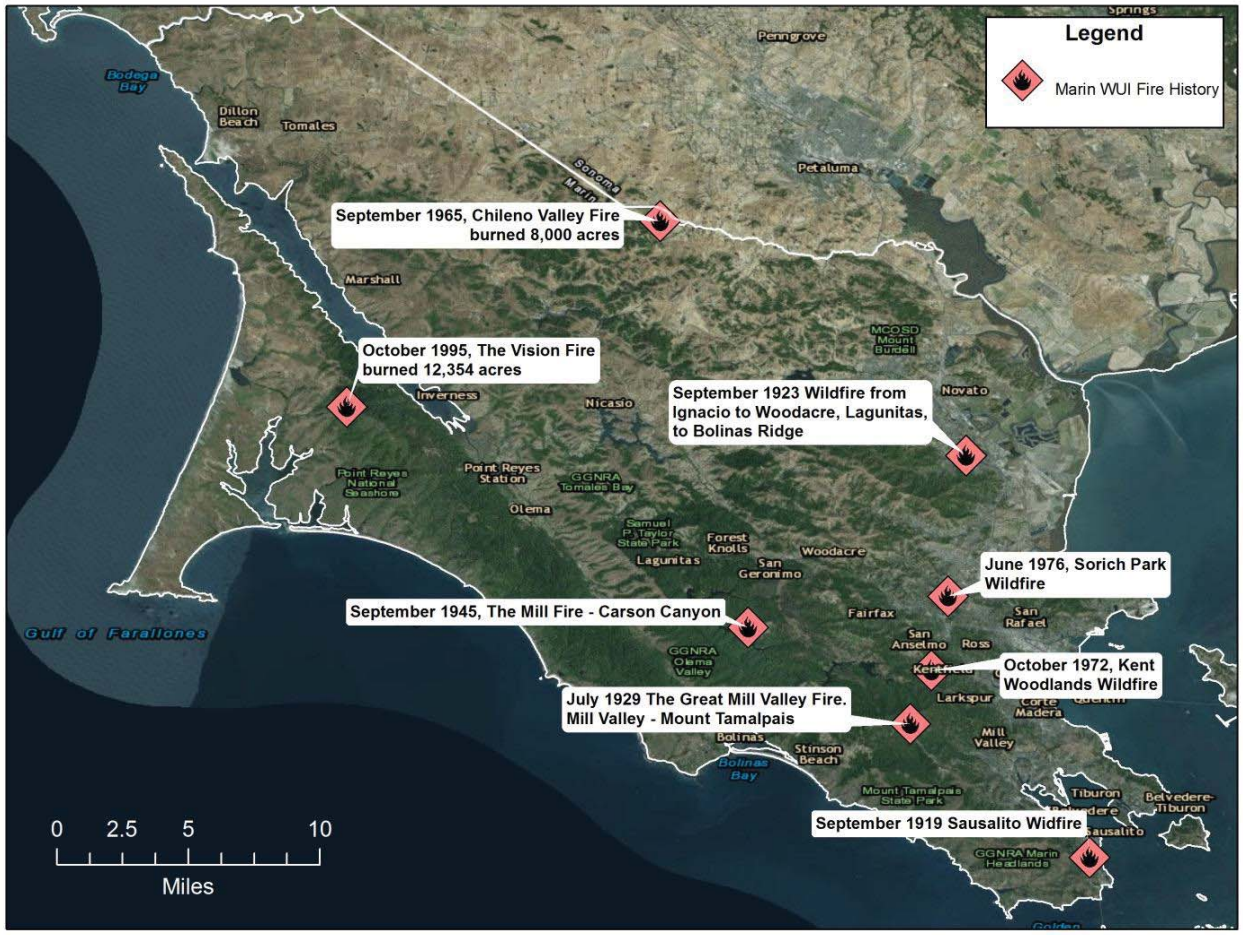
Topography

Vegetation fires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire. The service area's terrain varies from flat to steep slopes, which can contribute significantly to wildfire behavior and spread.

Wildfire History

Since the early 1900s, there have been several large wildland fires in Marin County, including the 1972 Kent Woodlands Fire, 1976 Scorich Park Fire, and 1995 Vision Fire (12,354 acres) as shown in Figure 22.

Figure 22—Marin County Wildfire History



Source: Marin County CWPP, Figure 6

Water Supply

Another significant vegetation fire impact severity factor is water supply immediately available for fire suppression. According to Department staff, available fire flow is insufficient in several sections of the service area as shown in Map #2E in **Volume 2** (Map Atlas).

Wildland Fire Hazard Mitigation

Hazard mitigation refers to specific actions or measures taken to prevent a hazard from occurring and/or to minimize the severity of impacts resulting from a hazard occurrence. While none of the hazards subject to this study can be entirely prevented, measures *can* be taken to minimize the consequences or impacts when those hazards do occur.

The Towns of Ross, San Anselmo, and Fairfax, and the Sleepy Hollow Fire Protection District, have adopted the 2016 California Fire Code and the 2015 International Wildland Urban Interface Code with amendments.

The 2016 Marin County CWPP identifies the following wildfire hazard mitigation strategies, in addition to building codes, ordinances, and standards, and defensible space enforcement and public education strategies:

- Residential chipper programs
- Increasing dedicated staffing for vegetation management programs
- Annual weed abatement program
- Implementing an enhanced County Vegetation Management Program (conditional on voter approval of a Municipal Service Tax)
- Fuel breaks
- Eucalyptus and pine tree removal
- Roadside fuel reduction
- Evacuation route fuel reduction
- Creation of shaded fuel breaks in WUI transition zones

Vegetation Fire Service Demand

The Department experienced only 19 vegetation fires over the two-year study period, comprising 0.34 percent of total service demand over the same period, as summarized in Table 36.

Table 36—Vegetation Fire Service Demand

Risk	Year	Planning Zone				Total	Percent Total Service Demand
		Sta. 18	Sta. 19	Sta. 20	Sta. 21		
Vegetation Fire	2017	2	3	1	5	**11**	0.38%
	2018	1	3	2	2	**8**	0.30%
Total		**3**	**6**	**3**	**7**	**19**	**0.34%**
Percent of Total Service Demand		0.41%	0.32%	0.31%	0.36%	0.34%	

Source: Ross Valley Fire Department incident data

As Table 36 shows, overall vegetation fire service demand is extremely low.

Probability of Vegetation Fire Occurrence

Table 37 summarizes Citygate's scoring of vegetation fire probability by planning zone based on vegetation fire service demand from Table 36.

Table 37—Vegetation Fire Probability Scoring

Vegetation Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Probability Score	1.25	1.50	1.25	1.50

Vegetation Fire Impact Severity

Table 38 summarizes Citygate's scoring of probable vegetation fire impact severity by planning zone.

Table 38—Vegetation Fire Impact Severity Scoring

Vegetation Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Impact Severity Score	3.0	3.0	3.0	3.0

Overall Vegetation Fire Risk

Table 39 summarizes the Department's overall vegetation fire risk scores and ratings by planning zone.

Table 39—Overall Vegetation Fire Risk

Vegetation Fire	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Total Risk Score	3.75	4.50	3.75	4.50
Risk Rating	***Low***	***Low***	***Low***	***Low***

A.1.12 Medical Emergency Risk

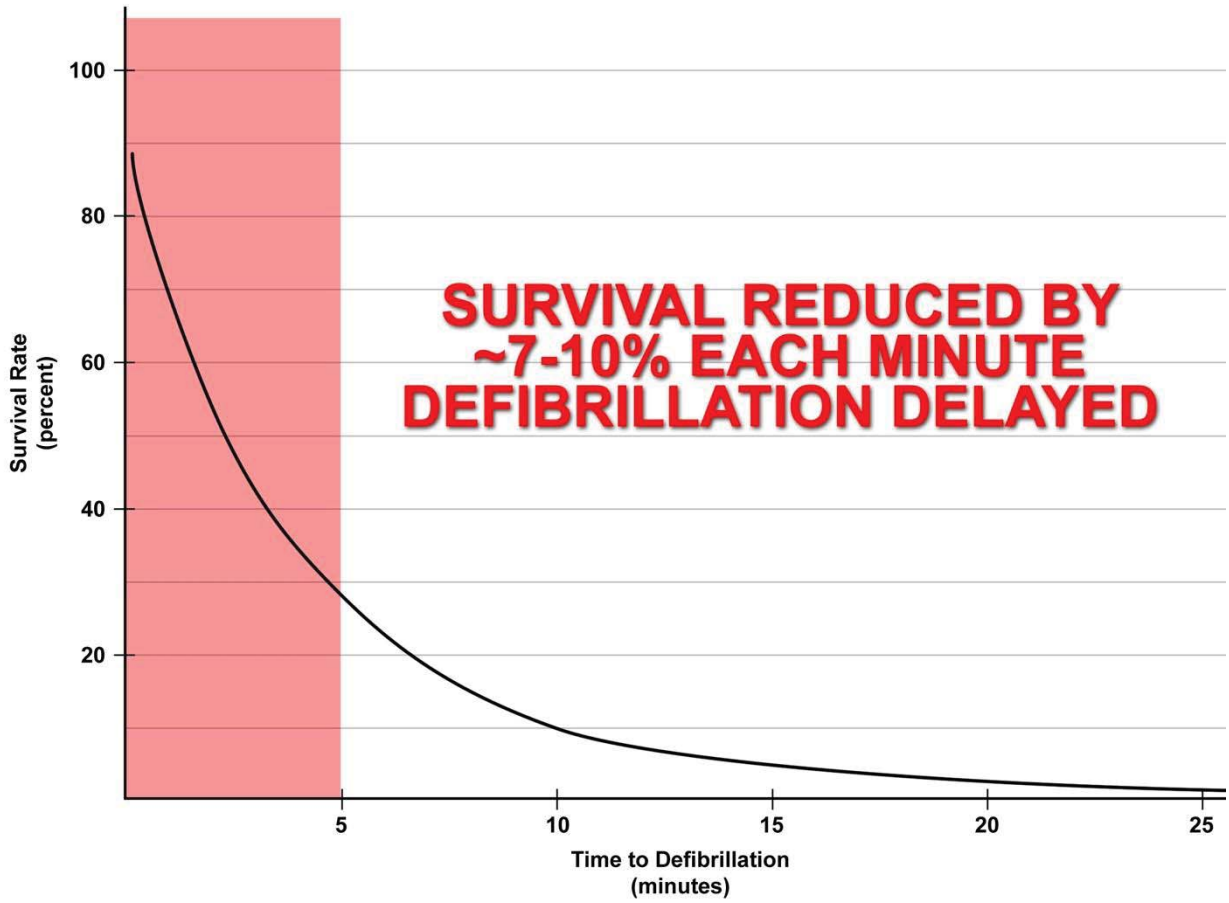
Medical emergency risk in most communities is predominantly a function of population density, demographics, violence, health insurance coverage, and vehicle traffic.

Medical emergency risk can also be categorized as either a medical emergency resulting from a traumatic injury or a health-related condition or event. Cardiac arrest is one serious medical emergency among many where there is an interruption or blockage of oxygen to the brain.

Figure 23 illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. While early defibrillation is one factor in cardiac arrest survivability, other factors can

influence survivability as well, such as early CPR and pre-hospital advanced life support interventions.

Figure 23—Survival Rate versus Time to Defibrillation



Source: www.suddencardiacarrest.org

Population Density

The Department's service area population density ranges from less than 500 people per square mile to approximately 5,000 per square mile. Risk analysis across a wide spectrum of other Citygate clients shows a direct correlation between population density and the *occurrence* of medical emergencies, particularly in high urban population density zones.

Demographics

Medical emergency risk tends to be higher among older, poorer, less-educated, and uninsured populations. According to the U.S. Census Bureau, nearly 20 percent of the service area population is 65 and older; 4.4 percent of the population is at or below poverty level; only 3.4 percent of the population over 24 years of age has less than a high school education or equivalent; and only two

percent of the population does not have health insurance coverage.[7] Overall, this indicates a well-educated and employed population with good health insurance coverage, all factors that can contribute to reducing medical emergency service demand.

Vehicle Traffic

Medical emergency risk tends to be higher in those areas of a community with high daily vehicle traffic volume, particularly those areas with high traffic volume traveling at high speeds. The service area transportation network includes Sir Francis Drake Boulevard, the primary two-lane regional thoroughfare with a very high daily traffic volume, particularly during weekday commute hours and on weekends.

Medical Emergency Service Demand

Medical emergency service demand over the two-year study period includes more than 2,800 calls for service comprising slightly more than 51 percent of total service demand over the same period, as summarized in Table 40.

Table 40—Medical Emergency Service Demand

Risk	Year	Planning Zone				Total	Percent Total Service Demand
		Sta. 18	Sta. 19	Sta. 20	Sta. 21		
Medical Emergency	2017	118	488	243	584	**1,433**	49.81%
	2018	146	499	240	539	**1,424**	53.10%
Total		**264**	**987**	**483**	**1,123**	**2,857**	**51.39%**
Percent of Total Service Demand		36.16%	51.98%	50.21%	57.06%	51.39%	

Source: Ross Valley Fire Department incident data

As Table 40 shows, medical emergency service demand varies by planning zone and is trending consistently over the past two years. Overall, the Department's medical emergency service demand is similar to other California jurisdictions of similar size and demographics.

Probability of Medical Emergency Occurrence

Table 41 summarizes Citygate's scoring of medical emergency probability by planning zone based on medical emergency service demand from Table 40.

[7] Source: U.S. Census Bureau (2017)

Table 41—Medical Emergency Probability Scoring

Medical Emergency	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Probability Score	4.0	4.5	4.25	4.75

Medical Emergency Impact Severity

Table 42 summarizes Citygate's scoring of probable medical emergency impact severity by planning zone.

Table 42—Medical Emergency Impact Severity Scoring

Medical Emergency	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Impact Severity Score	3.0	3.0	3.0	3.0

Overall Medical Emergency Risk

Table 43 summarizes the Department's overall medical emergency risk scores and ratings by planning zone.

Table 43—Overall Medical Emergency Risk

Medical Emergency	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Total Risk Score	12.0	13.5	12.75	14.25
Risk Rating	***High***	***High***	***High***	***High***

A.1.13 Hazardous Material Risk

Hazardous material risk factors include fixed facilities that store, use, or produce hazardous chemicals or waste; underground pipelines conveying hazardous materials; aviation, railroad, maritime, and vehicle transportation of hazardous materials into or through a jurisdiction; vulnerable populations; emergency evacuation planning and related training; and specialized hazardous material service capacity.

Fixed Hazardous Materials Facilities

The Marin County Department of Public Works, serving as the State-designated Certified Unified Program Agency for the County, identified 38 facilities within the Department's service area requiring a State or County hazardous material operating permit as shown on Map #2C in **Volume 2** (Map Atlas).

Transportation-Related Hazardous Materials

The Department also has transportation-related hazardous material risk due to hazardous materials transported into or through its service area, primarily on Sir Francis Drake Boulevard.

Population Density

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. The service area population density ranges from less than 500 people per square mile to approximately 5,000 per square mile.

Vulnerable Populations

Persons vulnerable to a hazardous material release/spill include those individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they are unable to leave voluntarily. Almost 29 percent of the service area population is under age 10 years or is 65 years of age and older.

Emergency Evacuation Planning, Training, Implementation, and Effectiveness

Another significant hazardous material impact severity factor is a jurisdiction's shelter-in-place / emergency evacuation planning and training. In the event of a hazardous material release or spill, time can be a critical factor in notifying potentially affected persons, particularly at-risk populations, to either shelter-in-place or evacuate to a safe location. Essential to this process is an effective emergency plan that incorporates one or more mass emergency notification capabilities, as well as pre-established evacuation procedures. It is also essential to conduct regular, periodic exercises involving these two emergency plan elements to evaluate readiness and to identify and remediate any planning and/or training gaps to ensure ongoing emergency incident readiness and effectiveness.

The Office of Emergency Services (OES), within the Marin County Sheriff's Office, is responsible for disaster/emergency preparedness and management in the unincorporated areas of the County, including hazard information, coordination with other local/regional emergency management organizations, emergency preparedness, and disaster response, communications, and recovery. OES also manages AlertMarin, a free, subscription-based, mass emergency notification system that can provide emergency alerts, notifications, and other emergency information to email

accounts, cell phones, smartphones, tablets, and landline telephones. AlertMarin notifications can be initiated by designated fire or law enforcement agency personnel.

The Sheriff's Office is also responsible for initiating emergency evacuations in the unincorporated areas of the County. No information was identified for this assessment relative to pre-planned evacuation routes, evacuation procedures, or evacuation exercises.

Hazardous Material Service Demand

The Department responded to 91 hazardous material incidents over the two-year study period, comprising 1.64 percent of total service demand over the same period, as summarized in Table 44.

Table 44—Hazardous Material Service Demand

Risk	Year	Planning Zone				Total	Percent Total Service Demand
		Sta. 18	Sta. 19	Sta. 20	Sta. 21		
Hazardous Material	2017	12	18	7	**12**	**49**	**53.8%**
	2018	9	14	10	**9**	**42**	**46.2%**
Total		**21**	**32**	**17**	**21**	**91**	**100%**
Percent of Total Service Demand		2.88%	1.69%	1.77%	1.07%	1.64%	

Source: Ross Valley Fire Department incident data

As Table 44 indicates, hazardous material service demand is relatively consistent across all planning zones and years. While this service demand seems high for this size agency and jurisdiction, it is most likely due to Department personnel cross-staffing the Hazardous Materials Response unit for responses to other regional jurisdictions, rather than hazardous materials incidents within the service area. Overall, the Department's hazardous material service demand is low.

Probability of Hazardous Material Occurrence

Table 45 summarizes Citygate's scoring of hazardous materials probability by planning zone based on hazardous material service demand from Table 44.

Table 45—Hazardous Material Probability Scoring

Hazardous Material	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Probability Score	2.50	2.75	2.25	2.50

Hazardous Material Impact Severity

Table 46 summarizes Citygate's scoring of probable hazardous material impact severity by planning zone.

Table 46—Hazardous Material Impact Severity Scoring

Hazardous Materials	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Impact Severity Score	3.0	3.0	3.0	3.0

Overall Hazardous Material Risk

Table 47 summarizes the Department's overall hazardous material risk scores and ratings by planning zone.

Table 47—Overall Hazardous Material Risk

Hazardous Materials	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Total Risk Score	7.50	8.25	6.75	7.50
Risk Rating	***Moderate***	***Moderate***	***Moderate***	***Moderate***

A.1.14 Technical Rescue Risk

Technical rescue risk factors include active construction projects; structural collapse potential; confined spaces, such as tanks and underground vaults; bodies of water, including rivers and streams; industrial machinery use; transportation volume; and earthquake, flood, and landslide potential.

Construction Activity

There is ongoing residential, commercial, and/or infrastructure construction activity occurring within the Department's service area.

Confined Spaces

There are multiple tanks, vaults, and temporary open trenches within the Department's service area.

Bodies of Water

Bodies of water within the Department's service area include Corte Madera, Fairfax, Ross, San Anselmo, and Sleepy Hollow creeks.

Transportation Volume

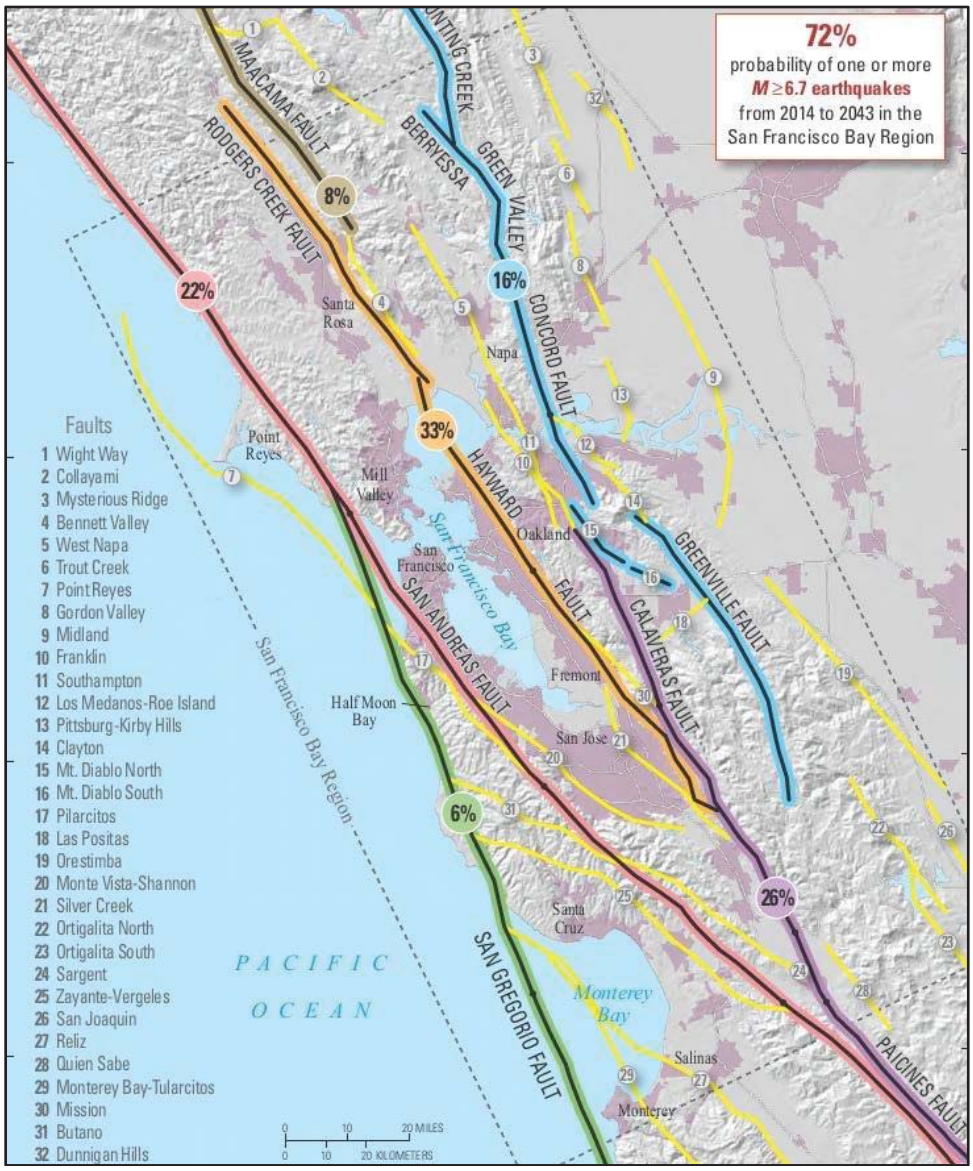
Another factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the service area, with Sir Francis Drake Boulevard carrying a high daily traffic volume.

Earthquake Risk[8]

The potential for earthquake damage exists throughout Marin County due to the combination of the number of active faults within and near the County and the presence of soils vulnerable to liquefaction. Active faults include the Hayward, Rodgers Creek, and San Andreas as shown in Figure 24. According to the Working Group on California Earthquake Probabilities, there is a 72 percent probability of at least one earthquake of magnitude 6.7 or greater within the Bay Area before 2043. The Association of Bay Area Governments (ABAG) Resilience Program projects a 52 percent chance of a magnitude 6.7 or greater earthquake on one of the faults affecting Marin County by 2036.

[8] Reference: 2018 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan, Section 3

Figure 24—Earthquake Faults



Flood Risk[9]

All of Marin's watersheds are small and largely prone to flash flooding. Several Marin communities, including Ross Valley, are protected by levees. Flooding has historically resulted in extensive damage in many County communities, including most of the Department's service area, from significant flood events in 1955, 1958, 1964, 1969, 1970, 1982, 1983, 1986, 1995, 1997,

[9] Reference: 2018 Marin County Multi-Jurisdictional Local Hazard Mitigation Plan, Section 3

1998, 2005, 2006, and 2017. Figure 25 shows the flood hazard zones within the Department's service area as identified by the Federal Emergency Management Agency (FEMA).

Figure 25—Flood Hazard Areas



Technical Rescue Service Demand

Over the two-year study period, there were a total of six technical rescue incidents comprising 0.11 percent of total service demand for the same period, as summarized in Table 48.

Table 48—Technical Rescue Service Demand

Risk	Year	Planning Zone				Total	Percent Total Service Demand
		Sta. 18	Sta. 19	Sta. 20	Sta. 21		
Technical Rescue	2017	0	0	0	3	**3**	0.10%
	2018	1	1	0	1	**3**	0.11%
Total		**1**	**1**	**0**	**4**	**6**	**0.11%**
Percent of Total Service Demand		0.14%	0.05%	0.00%	0.20%	0.11%	

Source: Ross Valley Fire Department incident data

As Table 48 shows, technical rescue service demand is extremely low.

Probability of Technical Rescue Occurrence

Table 49 summarizes Citygate's technical rescue probability scoring by planning zone based on service demand from Table 48. These probability scores are based predominantly on known historical flood data rather than recent service demand history.

Table 49—Technical Rescue Probability Scoring

Technical Rescue	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Probability Score	1.25	1.25	1.25	1.25

Technical Rescue Impact Severity

Table 50 summarizes Citygate's scoring of probable technical rescue impact severity by planning zone.

Table 50—Technical Rescue Impact Severity Scoring

Technical Rescue	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Impact Severity Score	3.0	3.0	3.0	3.0

Overall Technical Rescue Risk

Table 51 summarizes the Department's overall technical rescue risk scores and ratings by planning zone.

Table 51—Overall Technical Rescue Risk

Technical Rescue	Planning Zone			
	Sta. 18	Sta. 19	Sta. 20	Sta. 21
Total Risk Score	3.75	3.75	3.75	3.75
Risk Rating	***Low***	***Low***	***Low***	***Low***

NIST

Report on Residential Fireground Field Experiments



NIST Technical Note 1661

Jason D. Averill
Lori Moore-Merrell
Adam Barowy
Robert Santos
Richard Peacock
Kathy A. Notarianni
Doug Wissoker

Edited by Bill Robinson

U.S. Department of Commerce
Gary Locke, Secretary

National Institute of Standards and Technology
Patrick D. Gallagher, Director

April 2010

April 2010

NIST Technical Note 1661

Report on Residential Fireground Field Experiments

Jason D. Averill
Lori Moore-Merrell
Adam Barowy
Robert Santos
Richard Peacock
Kathy A. Notarianni
Doug Wissoker

Edited by Bill Robinson



U.S. Department of Commerce
Gary Locke, Secretary

National Institute of Standards and Technology
Patrick D. Gallagher, Director

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

**National Institute of Standards and Technology Technical Note 1661,
104 pages (March 2010) CODEN:**

Produced with the Cooperation of
Montgomery County
Fire and Rescue
Chief Richard Bowers

Produced with the Cooperation of
Fairfax County
Fire and Rescue
Chief Ronald Mastin

Funding provided through DHS/FEMA Grant Program Directorate for FY 2008
Assistance to Firefighters Grant Program – Fire Prevention and Safety Grants
(EMW-2008-FP-01603)


NIST
National Institute of
Standards and Technology
U.S. Department of Commerce


IAFC
INTERNATIONAL
FIRE CHIEFS
ASSOCIATION


A
I
F
F
AFL-CIO
CLC


WPI


CFAI RISK

Table of Contents

Abstract 9

Executive Summary 10

Background 12

Problem 13

Review of Literature 14

Purpose and Scope of the Study 16

A Brief Overview of Fire Department Fireground Operations 17

The Relation of Time-to-Task Completion and Risk 18

Standards of Response Cover 18

Part 1: Planning for the Field Experiments 20

Part 2: Time-to-Task Experiments 24

Field Experiment Methods 21

Field Site 21

Overview of Field Experiments 22

Instrumentation 22

Safety Protocols 23

Crew Size 24

Department Participation 24

Crew Orientation 24

Tasks 25

Data Collection: Standardized Control Measures 27

Task Flow Charts and Crew Cue Cards 27

Radio communications 27

Task Timers 27

Video records 27

Crew Assignment 28

Response Time Assumptions 28

Part 3: Room and Contents Fires 29

Fuel Packages for the Room and Contents Fires 29

Experimental Matrix for Room and Contents Fires 30

Procedure for Minimizing the Effect of Variance in Fire Growth Rate 31

Analysis of Experimental Results 33

Time-to-task Analysis 33

Data Queries 33

Statistical Methods - Time to Task 33

Regression Analysis 33

Measurement Uncertainty 34

How to Interpret Time-to-Task Graphs 34

Time-to-Task Graphs 35

Part 4: Fire Modeling 43

Time to Untenable Conditions: Research Questions 45

Fire Modeling Methods 45

Fire Growth Rates 46

Fractional Effective Dose (FED) 47

Results from Modeling Methods 48

Interior Firefighting Conditions and Deployment Configuration 49

Physiological Effects on Firefighters: Comparison by Crew Size 50

Study Limitations 51

Conclusions 52

Future Research 53

Acknowledgments 55

References 56

Abstract

Service expectations placed on the fire service, including Emergency Medical Services (EMS), response to natural disasters, hazardous materials incidents, and acts of terrorism, have steadily increased. However, local decision-makers are challenged to balance these community service expectations with finite resources without a solid technical foundation for evaluating the impact of staffing and deployment decisions on the safety of the public and firefighters.

For the first time, this study investigates the effect of varying crew size, first apparatus arrival time, and response time on firefighter safety, overall task completion, and interior residential tenability using realistic residential fires. This study is also unique because of the array of stakeholders and the caliber of technical experts involved. Additionally, the structure used in the field experiments included customized instrumentation; all related industry standards were followed; and robust research methods were used. The results and conclusions will directly inform the NPFA 1710 Technical Committee, who is responsible for developing consensus industry deployment standards.

This report presents the results of more than 60 laboratory and residential fireground experiments designed to quantify the effects of various fire department deployment configurations on the most common type of fire — a low hazard residential structure fire. For the fireground experiments, a 2,000 sq ft (186 m^2), two-story residential structure was designed and built at the Montgomery County Public Safety Training Academy in Rockville, MD. Fire crews from Montgomery County, MD and Fairfax County, VA were deployed in response to live fires within this facility. In addition to systematically controlling for the arrival times of the first and subsequent fire apparatus, crew size was varied to consider two-, three-, four-, and five-person staffing. Each deployment performed a series of 22 tasks that were timed, while the thermal and toxic environment inside the structure was measured. Additional experiments with larger fuel loads as well as fire modeling produced additional insight. Report results quantify the effectiveness of crew size, first-due engine arrival time, and apparatus arrival stagger on the duration and time to completion of the key 22 fireground tasks and the effect on occupant and firefighter safety.

Executive Summary

Both the increasing demands on the fire service - such as the growing number of Emergency Medical Services (EMS) responses, challenges from natural disasters, hazardous materials incidents, and acts of terrorism — and previous research point to the need for scientifically based studies of the effect of different crew sizes and firefighter arrival times on the effectiveness of the fire service to protect lives and property. To meet this need, a research partnership of the Commission on Fire Accreditation International (CFAI), International Association of Fire Chiefs (IAFC), International Association of Firefighters (IAFF), National Institute of Standards and Technology (NIST), and Worcester Polytechnic Institute (WPI) was formed to conduct a multiphase study of the deployment of resources as it affects firefighter and occupant safety. Starting in FY 2005, funding was provided through the Department of Homeland Security (DHS) / Federal Emergency Management Agency (FEMA) Grant Program Directorate for Assistance to Firefighters Grant Program — Fire Prevention and Safety Grants. In addition to the low-hazard residential fireground experiments described in this report, the multiple phases of the overall research effort include development of a conceptual model for community risk assessment and deployment of resources, implementation of a generalizable department incident survey, and delivery of a software tool to quantify the effects of deployment decisions on resultant firefighter and civilian injuries and on property losses.

The first phase of the project was an extensive survey of more than 400 career and combination (both career and volunteer) fire departments in the United States with the objective of optimizing a fire service leader's capability to deploy resources to prevent or mitigate adverse events that occur in risk- and hazard-filled environments. The results of this survey are not documented in this report, which is limited to the experimental phase of the project. The survey results will constitute significant input into the development of a future software tool to quantify the effects of community risks and associated deployment decisions on resultant firefighter and civilian injuries and property losses.

The following research questions guided the experimental design of the low-hazard residential fireground experiments documented in this report:

1. How do crew size and stagger affect overall start-to-completion response timing?

2. How do crew size and stagger affect the timings of task initiation, task duration, and task completion for each of the 22 critical fireground tasks?

3. How does crew size affect elapsed times to achieve three critical events that are known to change fire behavior or tenability within the structure:
   a. Entry into structure?
   b. Water on fire?
   c. Ventilation through windows (three upstairs and one back downstairs window and the burn room window).

4. How does the elapsed time to achieve the national standard of assembling 15 firefighters at the scene vary between crew sizes of four and five?

In order to address the primary research questions, the research was divided into four distinct, yet interconnected parts:

- Part 1 — Laboratory experiments to design appropriate fuel load
- Part 2 — Experiments to measure the time for various crew sizes and apparatus stagger (interval between arrival of various apparatus) to accomplish key tasks in rescuing occupants, extinguishing a fire, and protecting property
- Part 3 — Additional experiments with enhanced fuel load that prohibited firefighter entry into the burn prop – a building constructed for the fire experiments
- Part 4 — Fire modeling to correlate time-to-task completion by crew size and stagger to the increase in toxicity of the atmosphere in the burn prop for a range of fire growth rates.

The experiments were conducted in a burn prop designed to simulate a low-hazard[1] fire in a residential structure described as typical in NFPA 1710® *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. NFPA 1710 is the consensus standard for career firefighter deployment, including requirements for fire department arrival time, staffing levels, and fireground responsibilities.

Limitations of the study include firefighters' advance knowledge of the burn prop, invariable number of apparatus, and lack of experiments in elevated outdoor temperatures or at night. Further, the applicability of the conclusions from this report to commercial structure fires, high-rise fires, outside fires, terrorism/natural disaster response, HAZMAT or other technical responses has not been assessed and should not be extrapolated from this report.

Primary Findings

Of the 22 fireground tasks measured during the experiments, results indicated that the following factors had the most significant impact on the success of fire fighting operations. All differential outcomes described below are statistically significant at the 95 % confidence level or better.

Overall Scene Time:

The four-person crews operating on a low-hazard structure fire completed all the tasks on the fireground (on average) seven minutes faster — nearly 30 % — than the two-person crews. The four-person crews completed the same number of fireground tasks (on average) 5.1 minutes faster — nearly 25 % — than the three-person crews. On the low-hazard residential structure fire, adding a fifth person to the crews did not decrease overall fireground task times. However, it should be noted that the

1 A low-hazard occupancy is defined in the NFPA Handbook as a one-, two-, or three-family dwelling and some small businesses. Medium hazards occupancies include apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces. High-hazard occupancies include schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other highlife hazard or large fire potential occupancies.

benefit of five-person crews has been documented in other evaluations to be significant for medium- and high-hazard structures, particularly in urban settings, and is recognized in industry standards.[2]

Time to Water on Fire:

There was a 10% difference in the "water on fire" time between the two- and three-person crews. There was an additional 6% difference in the "water on fire" time between the three- and four-person crews. (i.e., four-person crews put water on the fire 16% faster than two person crews). There was an additional 6% difference in the "water on fire" time between the four- and five-person crews (i.e. five-person crews put water on the fire 22% faster than two-person crews).

Ground Ladders and Ventilation:

The four-person crews operating on a low-hazard structure fire completed laddering and ventilation (for life safety and rescue) 30 % faster than the two-person crews and 25 % faster than the three-person crews.

Primary Search:

The three-person crews started and completed a primary search and rescue 25 % faster than the two-person crews. The four- and five-person crews started and completed a primary search 6 % faster than the three-person crews and 30 % faster than the two-person crew. A 10 % difference was equivalent to just over one minute.

Hose Stretch Time:

In comparing four-and five-person crews to two-and three-person crews collectively, the time difference to stretch a line was 76 seconds. In conducting more specific analysis comparing all crew sizes to the two-person crews the differences are more distinct. Two-person crews took 57 seconds longer than three-person crews to stretch a line. Two-person crews took 87 seconds longer than four-person crews to complete the same tasks. Finally, the most notable comparison was between two-person crews and five-person crews — more than 2 minutes (122 seconds) difference in task completion time.

Industry Standard Achieved:

As defined by NFPA 1710, the "industry standard achieved" time started from the first engine arrival at the hydrant and ended when 15 firefighters were assembled on scene.[3] An effective response force was assembled by the five-person crews three minutes faster than the four-person crews. Based on the study protocols, modeled after a typical fire department apparatus deployment strategy, the total number of firefighters on scene in the two- and three-person crew scenarios never equaled 15 and therefore the two- and three-person crews were unable to assemble enough personnel to meet this standard.

Occupant Rescue:

Three different "standard" fires were simulated using the Fire Dynamics Simulator (FDS) model. Characterized in the *Handbook of the Society of Fire Protection Engineers* as slow-, medium-, and fast-growth rate[4], the fires grew exponentially with time. The rescue scenario was based on a non-ambulatory occupant in an upstairs bedroom with the bedroom door open.

Independent of fire size, there was a significant difference between the toxicity, expressed as fractional effective dose (FED), for occupants at the time of rescue depending on arrival times for all crew sizes. Occupants rescued by early-arriving crews had less exposure to combustion products than occupants rescued by late-arriving crews. The fire modeling showed clearly that two-person crews cannot complete essential fireground tasks in time to rescue occupants without subjecting them to an increasingly toxic atmosphere. For a slow-growth rate fire with two-person crews, the FED was approaching the level at which sensitive populations, such as children and the elderly are threatened. For a medium-growth rate fire with two-person crews, the FED was far above that threshold and approached the level affecting the general population. For a fast-growth rate fire with two-person crews, the FED was well above the median level at which 50 % of the general population would be incapacitated. Larger crews responding to slow-growth rate fires can rescue most occupants prior to incapacitation along with early-arriving larger crews responding to medium-growth rate fires. The result for late-arriving (two minutes later than early-arriving) larger crews may result in a threat to sensitive populations for medium-growth rate fires. Statistical averages should not, however, mask the fact that there is no FED level so low that every occupant in every situation is safe.

Conclusion:

More than 60 full-scale fire experiments were conducted to determine the impact of crew size, first-due engine arrival time, and subsequent apparatus arrival times on firefighter safety and effectiveness at a low-hazard residential structure fire. This report quantifies the effects of changes to staffing and arrival times for residential firefighting operations. While resource deployment is addressed in the context of a single structure type and risk level, it is recognized that public policy decisions regarding the cost-benefit of specific deployment decisions are a function of many other factors including geography, local risks and hazards, available resources, as well as community expectations. This report does not specifically address these other factors.

The results of these field experiments contribute significant knowledge to the fire service industry. First, the results provide a quantitative basis for the effectiveness of four-person crews for low-hazard response in *NFPA 1710*. The results also provide valid measures of total effective response force assembly on scene for fireground operations, as well as the expected performance time-to-critical-task measures for low-hazard structure fires. Additionally, the results provide tenability measures associated with a range of modeled fires.

Future research should extend the findings of this report in order to quantify the effects of crew size and apparatus arrival times for moderate- and high-hazard events, such as fires in high-rise buildings, commercial properties, certain factories, or warehouse facilities, responses to large-scale non-fire incidents, or technical rescue operations.

---

2 NFPA Standard 1710 - A.5.2.4.2.1 …Other occupancies and structures in the community that present greater hazards should be addressed by additional fire fighter functions and additional responding personnel on the initial full alarm assignment.

3 NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. Section 5.2.1 – Fire Suppression Capability and Section 5.2.2 Staffing.

4 As defined in the handbook, a fast fire grows exponentially to 1.0 MW in 150 seconds. A medium fire grows exponentially to 1 MW in 300 seconds. A slow fire grows exponentially to 1 MW in 600 seconds. A 1 MW fire can be thought-of as a typical upholstered chair burning at its peak. A large sofa might be 2 to 3 MWs.

Background

The fire service in the United States has a deservedly proud tradition of service to community and country dating back hundreds of years. As technology advances and the scope of service grows (e.g., more EMS obligations and growing response to natural disasters, hazardous materials incidents, and acts of terrorism), the fire service remains committed to a core mission of protecting lives and property from the effects of fire.

Firefighting is a dangerous business with substantial financial implications. In 2007, U.S. municipal fire departments responded to an estimated 1,557,500 fires. These fires killed 3,430 civilians (non-firefighters) and contributed to 17,675 reported civilian fire injuries. Direct property damage was estimated at $14.6 billion dollars (Karter, 2008). In spite of the vigorous nationwide efforts to promote firefighter safety, the number of firefighter deaths has consistently remained tragically high. In both 2007 and 2008, the U.S. Fire Administration reported 118 firefighter fatalities (USFA 2008).

Although not all firefighter deaths occur on the fireground — accidents in vehicles and training fatalities add to the numbers — every statistical analysis of the fire problem in the United States identifies residential structure fires as a key component in firefighter and civilian deaths, as well as direct property loss. Consequently, community planners and decision-makers need tools for optimally aligning resources with the service commitments needed for adequate protection of citizens.

Problem

Despite the magnitude of the fire problem in the United States, there are no scientifically based tools available to community and fire service leaders to assess the effects of prevention, fixed sprinkler systems, fire fighting equipment, or deployment and staffing decisions. Presently, community and fire service leaders have a qualitative understanding of the effect of certain resource allocation decisions. For example, a decision to double the number of firehouses, apparatus, and firefighters would likely result in a decrease in community fire losses, while cutting the number of firehouses, apparatus, and firefighters would likely yield an increase in the community fire losses, both human and property. However, decision-makers lack a sound basis for quantifying the total impact of enhanced fire resources on the number of firefighter and civilian lives saved and injuries prevented.

Studies on adequate deployment of resources are needed to enable fire departments, cities, counties, and fire districts to design an acceptable level of resource deployment based upon community risks and service provision commitment. These studies will assist with strategic planning and municipal and state budget processes. Additionally, as resource studies refine data collection methods and measures, both subsequent research and improvements to resource deployment models will have a sound scientific basis.

Review of Literature

Research to date has documented a consistent relationship between resources deployed and firefighter and civilian safety. Studies documenting engine and ladder crew performance in diverse simulated environments as well as actual responses show a basic relationship between apparatus staffing levels and a range of important performance variables and outcome measurements such as mean on-scene time, time-to-task completion, incidence of injury among fire service personnel, and costs incurred as a result of on-scene injuries (Cushman 1981, McManis 1984, Morrison 1990, Ontario 1991, Phoenix 1991, Roberts 1993).

Reports by fire service officials and consulting associates reviewing fire suppression and emergency response by fire crews in U.S. cities were the first publications to describe the relationship between adequate staffing levels and response time, time to completion of various fireground tasks, overall effectiveness of fire suppression, and estimated value of property loss for a wide range of real and simulated environments. In 1980, the Columbus Fire Division's report on firefighter effectiveness showed that for a predetermined number of personnel initially deployed to the scene of a fire, the proportion of incidents in which property loss exceeded $5,000 and horizontal fire spread of more than 25 sq ft (2.3 $m^{2)}$ was significantly greater for crews whose numbers fell below the set thresholds of 15 total fireground personnel at residential fires and 23 at large-risk fires (Backoff 1980). The following year, repeated live experiments at a one-family residential site using modern apparatus and equipment demonstrated that larger units performed tasks and accomplished knockdown more quickly, ultimately resulting in a lower percentage of loss attributable to factors controlled by the fire department. The authors of this article highlighted that the fire company is the fire department's basic working unit and further emphasized the importance of establishing accurate and up-to-date performance measurements to help collect data and develop conclusive strategies to improve staffing and equipment utilization (Gerard 1981).

Subsequent reports from the United States Fire Administration (USFA) and several consulting firms continued to provide evidence for the effects of staffing on fire crews' ability to complete tasks involved in fire suppression efficiently and effectively. Citing a series of tests conducted in 1977 by the Dallas Fire Department that measured the time it took three-, four-, and five-person teams to advance a line and put water on a simulated fire at the rear of the third floor of an old school, officials from the USFA underscored that time-to-task completion and final level of physical exhaustion for crews markedly improved not after any one threshold, but with the addition of each new team member. This report went on to outline the manner in which simulated tests exemplify a clear-cut means to record and analyze the resources initially deployed and finally utilized at fire scenes (NFA 1981). A later publication detailing more Dallas Fire Department simulations — ninety-one runs each for a private residential fire, high-rise office fire, and apartment house fire — showed again that increased staffing levels greatly enhanced the coordination and effectiveness of crews' fire suppression efforts during a finite time span (McManis Associates 1984). Numerous studies of local departments have supported this conclusion using a diverse collection of data, including a report by the National Fire Academy (NFA) on fire department staffing in smaller communities, which showed that a company crew staffed with four firefighters could perform rescue of potential victims approximately 80 % faster than a crew staffed with three firefighters (Morrison 1990).

During the same time period that the impact of staffing levels on fire operations was gaining attention, investigators began to question whether staffing levels could also be associated with the risk of firefighter injuries and the cost incurred as a result of such injuries at the fire scene. Initial results from the Columbus Fire Division showed that "firefighter injuries occurred more often when the total number of personnel on the fireground was less than 15 at residential fires and 23 at large-risk fires" (Backoff 1980), and mounting evidence has indicated that staffing levels are a fundamental health and safety issue for firefighters in addition to being a key determinant of immediate response capacity. One early analysis by the Seattle Fire Department for that city's Executive Board reviewed the average severity of injuries suffered by three-, four-, and five-person engine companies, with the finding that "the rate of firefighter injuries expressed as total hours of disability per hours of fireground exposure were 54 % greater for engine companies staffed with 3 personnel when compared to those staffed with 4 firefighters, while companies staffed with 5 personnel had an injury rate that was only one-third that associated with four-person companies" (Cushman 1981). A joint report from the International Association of Fire Fighters (IAFF) and Johns Hopkins University concluded, after a comprehensive analysis of the minimum staffing levels and firefighter injury rates in U.S. cities with populations of 150,000 or more, that jurisdictions operating with crews of less than four firefighters had injury rates nearly twice the percentage of jurisdictions operating with crews of four-person crews or more (IAFF, JHU 1991).

More recent studies have continued to support the finding that staffing per piece of apparatus integrally affects the efficacy and safety of fire department personnel during emergency response and fire suppression. Two studies in particular demonstrate the consistency of these conclusions and the increasing level of detail and accuracy present in the most recent literature, by looking closely at the discrete tasks that could be safely and effectively performed by three- and four-person fire companies. After testing drills comprised of a series of common fireground tasks at several fire simulation sites, investigators from the Austin Fire Department assessed the physiological impact and injury rates among the variably staffed fire crews. In these simulations, an increase from a three- to four-person crew resulted in marked improvements in time-to-task completion or efficiency for the two-story residential fire drill, aerial ladder evolution, and high-rise fire drill, leading the researchers to conclude that loss of life and property increases when a sufficient number of personnel are not available to conduct the required tasks efficiently, independent of firefighter experience, preparation, or training. Reviews of injury reports by the Austin Fire Department furthermore revealed that the injury rate for three-person companies in the four years preceding the study was nearly one-and-a-half that of crews staffed with four or more personnel (Roberts 1993). In a sequence of similar tests, the Office of the Fire Marshal of Ontario, Canada likewise found that three-person

fire companies were unable to safely perform deployment of backup protection lines, interior suppression or rescue operations, ventilation operations that required access to the roof of the involved structure, use of large hand-held hose lines, or establish a water supply from a static source without additional assistance and within the time limits of the study. Following these data, Fire Marshal officials noted that three-person crews were also at increased risk for exhaustion due to insufficient relief at fire scenes and made recommendations for the minimum staffing levels per apparatus necessary for suppression and rescue related tasks (Office of the Fire Marshal of Ontario 1993).

The most comprehensive contemporary studies on the implications of fire crew staffing now include much more accurate performance measures for tasks at the fireground, in addition to the basic metric of response time. They include environmental measures of performance, such as total water supply, which expand the potential for assessing the cost-effectiveness of staffing not only in terms of fireground personnel injury rates but also comparative resource expenditure required for fire suppression. Several examples from the early 1990s show investigators and independent fire departments beginning to gather the kind of specific, comprehensive data on staffing and fireground tasks such as those suggested and outlined in concurrent local government publications that dealt with management of fire services (Coleman 1988). A report by the Phoenix Fire Department laid out clear protocols for responding to structure fires and response evaluation in terms of staffing, objectives, task breakdowns, and times in addition to outlining the responsibilities of responding fire department members and the order in which they should be accomplished for a full-scale simulation activity (Phoenix 1991). One attempt to devise a prediction model for the effectiveness of manual fire suppression similarly reached beyond response time benchmarks to describe fire operations and the step-by-step actions of firefighters at incident scenes by delineating the time-to-task breakdowns for size-up, water supply, equipment selection, entry, locating the fire, and advancing hose lines, while also comparing the predicted time-to-task values with the actual times and total resources (Menker 1994). Two separate studies of local fire department performance, one from Taoyuan County in Taiwan and another from the London Fire Brigade, have drawn ties between fire crews' staffing levels and total water demand as the consequence of both response time and fire severity. Field data from Taoyuan County for cases of fire in commercial, business, hospital, and educational properties showed that the type of land use as well as response time had a significant impact on the water volume necessary for fire suppression, with the notable quantitative finding that the water supply required on-scene doubled when the fire department response increased by ten minutes (Chang 2005).

Response time as a predictor of residential fire outcomes has received less study than the effect of crew size. A Rand Institute study demonstrated a relationship between the distance the responding companies traveled and the physical property damage. This study showed that the fire severity increased with response distance, and therefore the magnitude of loss increased proportionally (Rand 1978). Using records from 307 fires in nonresidential buildings over a three-year period, investigators in the United Kingdom correspondingly found response time to have a significant impact on final fire area, which in turn was proportional to total water demand (Sardqvist 2000).

Recent government and professional literature continues to demonstrate the need for more data that would quantify in depth and illustrate the required tasks, event sequences, and necessary response times for effective fire suppression in order to determine with accuracy the full effects of either a reduction or increase in fire company staffing (Karter 2008). A report prepared for National Institute of Standards and Technology (NIST) stressed the ongoing need to elucidate the relationship between staffing and personnel injury rates, stating that "a scientific study on the relationship between the number of firefighters per engine and the incidence of injuries would resolve a long-standing question concerning staffing and safety" (TriData 2005). While not addressing staffing levels as a central focus, an annual review of fire department calls and false alarms by the National Fire Protection Association (NFPA) exemplified the need to capture not only the number of personnel per apparatus for effective fire suppression but also to clarify the demands on individual fire departments with resolution at the station level (NFPA 2008).

In light of the existing literature, there remain unanswered questions about the relationships between fire service resource deployment levels and associated risks. For the first time this study investigates the effect of varying crew size, first apparatus arrival time, and response time on firefighter safety, overall task completion and interior residential tenability using realistic residential fires. This study is also unique because of the array of stakeholders and the caliber of technical advisors involved. Additionally, the structure used in the field experiments included customized instrumentation for the experiments; all related industry standards were followed; robust research methods were used; and the results and conclusions will directly inform the *NFPA 1710* Technical Committee, as well as public officials and fire chiefs. [5]

5 NFPA is a registered trademark of the National Fire Protection Association, Quincy, Massachusetts. NFPA 1710 defines minimum requirements relating to the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by substantially all career fire departments. The requirements address functions and objectives of fire department emergency service delivery, response capabilities, and resources. The purpose of this standard is to specify the minimum criteria addressing the effectiveness and efficiency of the career public fire suppression operations, emergency medical service, and special operations delivery in protecting the citizens of the jurisdiction and the occupational safety and health of fire department employees. At the time of the experiments, the 2004 edition of NFPA 1710 was the current edition.

Purpose and Scope of the Study

This project systematically studies deployment of fire fighting resources and the subsequent effect on both firefighter safety and the ability to protect civilians and their property. It is intended to enable fire departments and city/county managers to make sound decisions regarding optimal resource allocation to meet service commitments using the results of scientifically based research. Specifically, the residential fireground experiments provide quantitative data on the effect of crew size, first-due engine arrival time, and subsequent apparatus stagger on time-to-task for critical steps in response and fire fighting.

The first phase of the multiphase project was an extensive survey of more than 400 career and combination fire departments in the United States with the objective of optimizing a fire service leader's capability to deploy resources to prevent or mitigate adverse events that occur in risk- and hazard-filled environments. The results of this survey are not documented in this report, which is limited to the experimental phase of the project, but they will constitute significant input into future applications of the data presented in this document.

This report describes the second phase of the project, divided into four parts:

- Part 1 — Laboratory experiments to design the appropriate fuel packages to be used in the burn facility specially constructed for the research project
- Part 2 — Field tests for critical time-to-task completion of key tasks in fire suppression
- Part 3 — Field tests with real furniture (room and contents experiments)
- Part 4 — Fire modeling to apply data gathered to slow-, medium-, and fast-growth rate fires

The scope of this study is limited to understanding the relative influence of deployment variables on low-hazard, residential structure fires, similar in magnitude to the hazards described in NFPA® 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.* The standard uses as a typical residential structure a 2,000 sq ft (186 m^2) two-story, single-family dwelling with no basement and no exposures (nearby buildings or hazards such as stacked flammable material).

The limitations of the study, such as firefighters' advance knowledge of the facility constructed for this experiment, invariable number of apparatus, and lack of experiments in extreme temperatures or at night, will be discussed in the Limitations section of this report. It should be noted that the applicability of the conclusions from this report to commercial structure fires, high-rise fires, outside fires, and response to hazardous material incidents, acts of terrorism, and natural disasters or other technical responses has not been assessed and should not be extrapolated from this report.

A Brief Overview of the Fireground Operations

Regardless of the size of a structure on fire, firefighting crews identify four priorities: life safety of occupants and firefighters, confinement of the fire, property conservation, and reduction of adverse environmental impact. Interdependent and coordinated activities of all fire fighting personnel are required to meet the priority objectives.

NFPA 1710 specifies that the number of on-duty fire suppression personnel must be sufficient to carry out the necessary fire fighting operations given the expected fire fighting conditions. During each fireground experiment, the following were dispatched to the test fire building:

- three engine companies
- one truck company
- a command vehicle with a battalion chief and a command aide

Staffing numbers for the engine and truck crews and response times were varied for the purposes of the tests. Additional personnel available to ensure safety will be described later in this report.

The following narrative account describes the general sequence of activities in part 2 of the experiments (time-to-task), when the fuel load permitted firefighter entry:

> The first arriving engine company conducts a size-up or initial life safety assessment of the building to include signs of occupants in the home, construction features, and location of the original fire and any extension to other parts of the structure. This crew lays a supply line from a hydrant close to the building for a continuous water supply.
>
> The truck company usually arrives in close proximity to the first engine company. The truck company is responsible for gaining access or forcing entry into the building so that the engine company can advance the first hose line into the building to locate and extinguish the fire. Usually, they assist the engine company in finding the fire. The NFPA and OSHA 2 In/2 Out[6] crew is also assembled prior to anyone entering an atmosphere that is immediately dangerous to life or health (IDLH). This important safety requirement will have a large impact on availability of firefighters to enter the building when small crews are deployed.
>
> Once a door is opened, the engine crew advances a hose line (attack line) toward the location of the fire. At the same time, members from the truck crew accompany the engine crew and assist in ventilating the building to provide a more tenable atmosphere for occupants and firefighters. Ventilation also helps by improving visibility in an otherwise "pitch black" environment, but it must be coordinated with the attack line crew to ensure it helps control the fire and does not contribute to fire growth. The truck crew performs a systematic rapid search of the entire structure starting in the area where occupants would be in the most danger. The most dangerous area is proximate to the fire and the areas directly above the fire.
>
> Depending upon the travel distance, the battalion chief and command aide will have arrived on the scene and have taken command of the incident and established a command post. The role of the incident commander is to develop the action plan to mitigate the incident and see that those actions are carried out in a safe, efficient, and effective manner. The command aide is responsible for situational assessment and communications, including communications with crew officers to ensure personnel accountability.
>
> Depending on response time or station location, the second (engine 2) and possibly the third engine company (engine 3) arrive. The second arriving engine (engine 2) connects to the fire hydrant where the first engine (engine 1) laid their supply line. Engine 2 pumps water from the hydrant through the supply line to the first engine for fire fighting operations. According to *NFPA 1710*, water should be flowing from the supply line to the attack engine prior to the attack crew's entry into the structure.
>
> The crew from the second engine advances a second hand line as a backup line to protect firefighters operating on the inside and to prevent fire from spreading to other parts of the structure.
>
> The third engine crew is responsible for establishing a Rapid Intervention Team (RIT), a rescue team staged at or near the command post or as designated by the Incident Commander (in the front of the building) with all necessary equipment needed to locate and/or rescue firefighters that become trapped or incapacitated. The RIT plans entry/exit portals and removes hazards, if found, to assist interior crews.
>
> As the fire fighting, search and rescue, and ventilation operations are continuing, two members of the truck company are tasked with placing ground ladders to windows and the roof to provide a means of egress for occupants or firefighters. The truck crew is responsible for controlling interior utilities such as gas and electric after their ventilation, search, and rescue duties are completed.
>
> Once the fire is located and extinguished and occupants are

6 The "2 In/2 Out" policy is part of paragraph (g)(4) of OSHAs revised respiratory protection standard, 29 CFR 1910.134. This paragraph applies to private sector workers engaged in interior structural fire fighting and to Federal employees covered under Section 19 of the Occupational Safety and Health Act. States that have chosen to operate OSHA-approved occupational safety and health state plans are required to extend their jurisdiction to include employees of their state and local governments. These states are required to adopt a standard at least as effective as the Federal standard within six months.

OSHAs interpretation on requirements for the number of workers required to be present when conducting operations in atmospheres that are immediately dangerous to life and health (IDLH) covers the number of persons who must be on the scene before fire fighting personnel may initiate an attack on a structural fire. An interior structural fire (an advanced fire that has spread inside of the building where high temperatures, "heat" and dense smoke are normally occurring) would present an IDLH atmosphere and therefore, require the use of respirators. In those cases, at least two standby persons, in addition to the minimum of two persons inside needed to fight the fire, must be present before fire fighters may enter the building.
Letter to Thomas N. Cooper, Purdue University, from Paula O. White, Director of Federal-State Operations, U.S. Department of Labor, Occupational Safety & Health Administration, November 1, 1995.

removed, the incident commander reassesses the situation and provides direction to conduct a very thorough secondary search of the building to verify that the fire has not extended into void spaces and that it is fully extinguished. (In a nonexperimental fire situation, salvageable property would be covered or removed to minimize damage.)

Throughout the entire incident, each crew officer is responsible for the safety and accountability of his or her personnel along with air management. The location and wellness of crews is tracked by the command aide through a system of personal accountability checks conducted at 20-minute intervals.

Following extinguishment of the fire, an onsite review is conducted to identify actions for improvement. Crews are monitored, hydrated and rested before returning to work in the fire building.

The Relation of Time-to-Task Completion and Risk

Delayed response, particularly in conjunction with the deployment of inadequate resources, reduces the likelihood of controlling the fire in time to prevent major damage and possible loss of life and increases the danger to firefighters.

Figure 1 illustrates a hypothetical sequence of events for response to a structure fire. During fire growth, the temperature of a typical compartment fire can rise to over 1,000° F (538° C). When a fire in part of a compartment reaches flashover, the rapid transition between the growth and the fully developed fire stage, flame breaks out almost at once over the surface of all objects in the compartment, with results for occupants, even firefighters in full gear, that are frequently deadly.

Successful containment and control of a fire require the coordination of many separate tasks. Fire suppression must be coordinated with rescue operations, forcible entry, and utilities control. Ventilation typically occurs only after an attack line is in place and crews are ready to move in and attack the fire. The incident commander needs up-to- the-minute knowledge of crew activities and the status of task assignments which could result in a decision to change from an offensive to a defensive strategy.

Standards of Response Cover

Developing a standard of response cover — the policies and procedures that determine the distribution, concentration, and reliability of fixed and mobile resources for response to fire (as well as other kinds of technical response) — related to service commitments to the community is a complex task. Fire and rescue departments must evaluate existing (or proposed) resources against identified risk levels in the community and against the tasks necessary to conduct safe, efficient and effective fire suppression at structures identified in these various risk levels. Leaders must also evaluate geographic distribution and depth or concentration of resources deployed based on time parameters.

Recognition and reporting of a fire sets off a chain of events before firefighters arrive at the scene: call receipt and processing, dispatch of resources, donning protective gear, and travel to the scene. *NFPA 1710* defines the overall time from dispatch to scene arrival as the *total response time*. The standard divides total

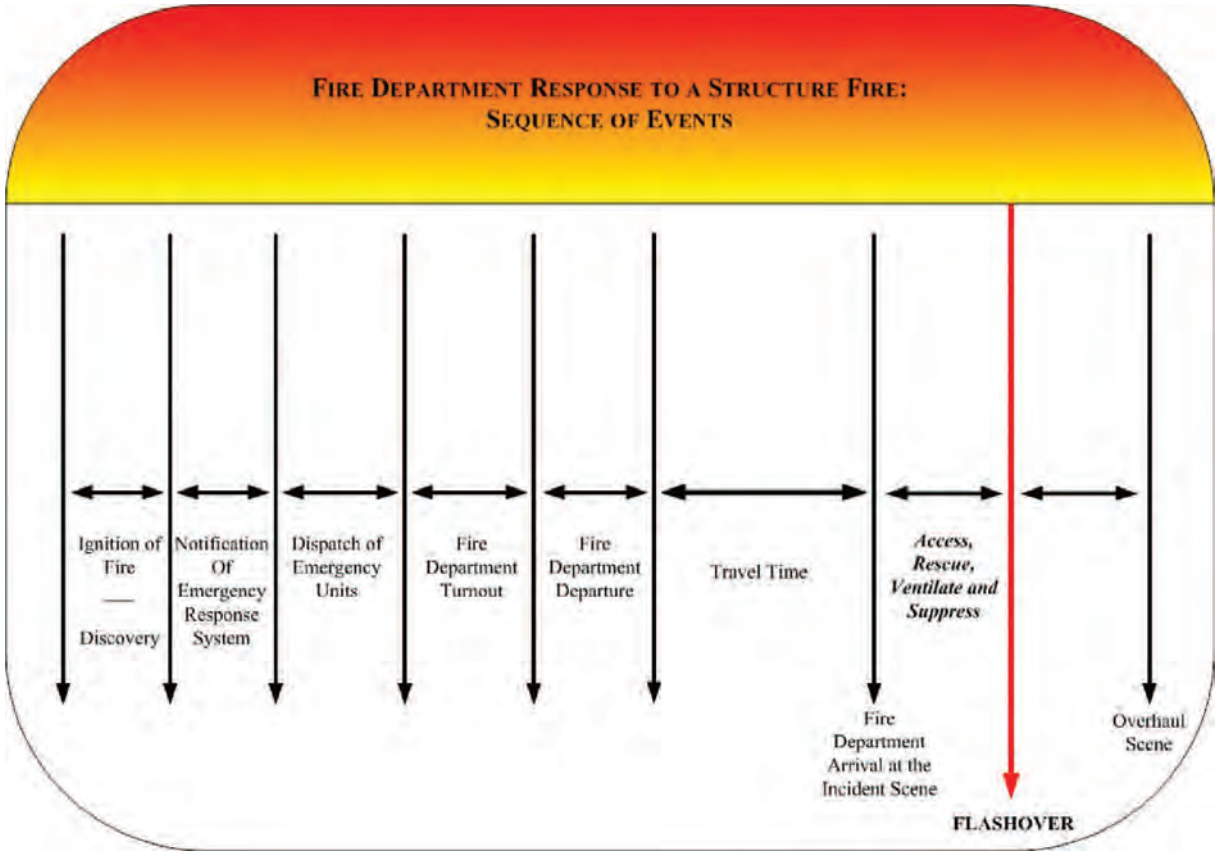


Figure 1: Hypothetical Timeline of Fire Department Response to Structure Fire

response time into a number of discrete segments, of which travel time — the time interval from the beginning of travel to the scene to the arrival at the scene — is particularly important for this study.

Arrival of a firefighting response force must be immediately followed by organization of the resources into a logical, properly phased sequence of tasks, some of which need to be performed simultaneously. Knowing the time it takes to accomplish each task with the allotted number of personnel and equipment is critical. Ideally crews should arrive and intervene in sufficient time to prevent flashover or spread beyond the room of origin.

Decision-making about staffing levels and geographic distribution of resources must consider those times when there will be simultaneous events requiring resource deployment. There should be sufficient redundancy or overlap in the system to allow for simultaneous calls and high volume of near simultaneous responses without compromising the safety of the public or firefighters.

Policy makers have long lacked studies that quantify changes in fireground performance based on apparatus staffing levels and on-scene arrival time intervals. These experiments were designed to observe the impact of apparatus staffing levels and apparatus arrival times on the time it takes to execute essential fireground tasks and on the tenability inside the burn prop for a full initial alarm assignment response. It is expected that the results of this study will be used to evaluate the related performance objectives in *NFPA 1710*.

Part 1: Planning for the Field Experiments

Laboratory Experiments

The purpose of the first segment, the laboratory experiments, was to characterize the burning behavior of the wood pallets as a function of:

- number of pallets and the subsequent peak heat release rate (HRR)
- compartment effects on burning of wood pallets
- effect of window ventilation on the fire
- effect on fire growth rate of the loading configuration of excelsior (slender wood shavings typically used as packing material)

Characterization of the fuel package was critical in order to ensure that the field experiments would not result in a flashover condition, one of the primary safety considerations in complying with the protocols in *NFPA 1403: Standard on Live fire Training Evolutions*.[7] Appendix A of this report contains the methods and full results for the laboratory experiments, which are summarized below. Figure 2 shows a test burn of pallets in the laboratory.



Figure 2: Test Burn of Pallets in Laboratory

Results of Laboratory Experiments

The objective of the laboratory experiments was to quantify the spread of heat and smoke throughout the planned burn prop in order to ensure that the fuel package would result in a fire large enough to generate heat and smoke consistent with a residential structure fire, yet not so large as to transition to flashover. The full results of the laboratory experiments and modeling are shown in Appendix A and Appendix B. To summarize briefly, a four-pallet configuration, which produced a peak of approximately 2 MW, was determined to be the largest fuel load the room could support without the threat of transitioning to flashover. The compartment produced a negligible effect on the heat release rate of the fire compared to open burning conditions. The presence of an open window in the burn room reduced the production of carbon monoxide and carbon dioxide gases, primarily through enhanced oxygen availability and dilution, respectively. The location and quantity of excelsior had a significant impact on the growth rate of fire. More excelsior located nearer the bottom of the pallets resulted in a more rapid achievement of peak burning.

The results of the fuel load experiments to inform the building and experimental design indicated development of untenable conditions in the field experiments between 5 min and 15 min, depending upon several factors: fire growth rate, ventilation conditions, the total leakage of heat into the building and through leakage paths, and manual fire suppression. This time frame allowed for differentiation of the effectiveness of various fire

7 NFPA 1403 contains the minimum requirements for training all fire suppression peronnel engaged in firefighting operations under live fire conditions.

Part 2: Field Experiment Methods

department response characteristics.

In part 2, fire experiments were conducted in a residential-scale burn prop at the Montgomery County Public Safety Training Academy in Rockville, MD.

Field Site

Montgomery County (MD) Fire and Rescue Department provided an open space to construct a temporary burn prop, with ready access to water and electrical utilities, at the Montgomery County Fire and Rescue Training Facility in Rockville, MD.

The burn prop was constructed as a two-story duplex with a common stairwell and movable walls between the sections to allow for multiple experiments daily. Symmetrically dividing the structure about the short axis allowed one side of the test structure to cool and dry out after a fire test with suppression. The burn prop contained two mirror-image, two-story units each totaling 2,000 ft^2 (186 m^2), without basement or nearby exposures — each therefore a typical model of a low-hazard single-family residence identified in *NFPA 1710*. An exterior view of the burn prop is shown in Figure 3. For each experiment there was a confirmed fire in the living room in the first floor rear of one unit of the structure.



Figure 3: Exterior View of Burn Prop

Details and dimension are shown in the floor plan in Figure 4.

The black lines in Figure 4 indicate load-bearing reinforced concrete walls and red lines indicate the gypsum over steel stud partition walls. The ceiling height was 94 in (2.4 m) throughout the entire structure except in the burn compartments, where additional hardening was installed to protect against repeated exposure to fire during the experiments. This additional fire proofing slightly reduced the ceiling height. Complete details about the building construction are included in Appendix C.

Noncombustible furniture (angle iron and gypsum board construction) was fashioned to represent obstacles of realistic size and location for firefighters navigating the interior of the structure. The dimensions were typical of residential furnishings. Figure 5 shows an example of the noncombustible furniture used in the time-to-task experiments.

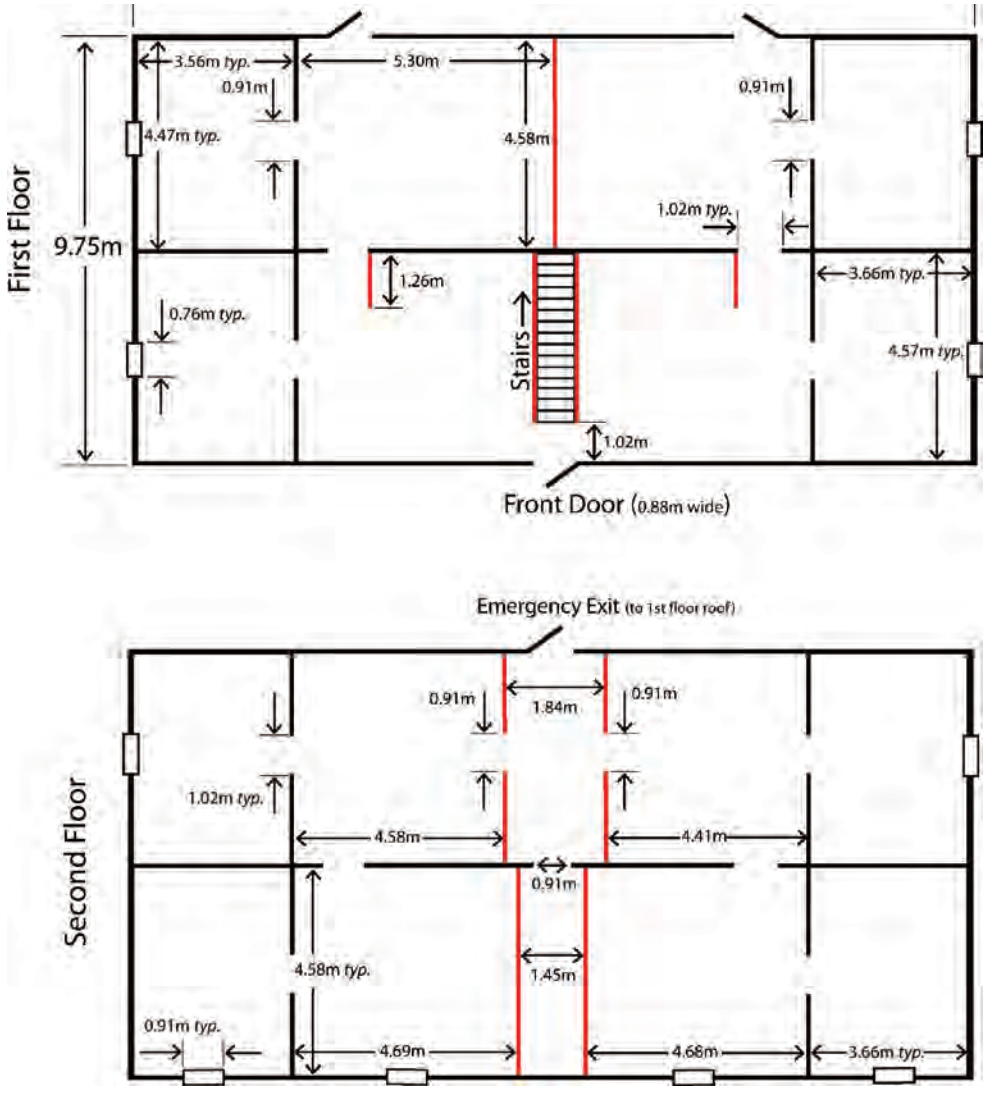


Figure 4: Dimensions of the Burn Prop Floor Plan

Overview of Field Experiments

In order to evaluate the performance representative of a *NFPA 1710*-compliant fire department, the field experiments consisted of two parts (the second and third parts of the four described in this report). In the first of the two parts of the field experiments, firefighter participants from Montgomery County (MD) and Fairfax County (VA) Fire Departments simulated an initial alarm assignment response to a structure described in *NFPA 1710* as a low-hazard residential structure to which firefighters respond on a regular basis. The staffing level of fire apparatus was varied incrementally from two to five personnel per piece. The interval between apparatus on-scene arrival times was varied at either 60 s or 120 s. Trained timing staff were used to record the start and completion times of 22 tasks deemed essential for mitigation of a residential fire incident by the study's technical experts. The pallet and excelsior configuration chosen from the laboratory experiments repeatably produced a consistent and realistic quantity of heat and smoke, similar to what firefighters encounter at a residential structure fire.

Although the fire source used in part 2 of the field experiments created a realistic amount of heat and smoke, the requirements of *NFPA 1403* prevented use of a fire source which could potentially reach flashover within the structure. Therefore, part 3 of the fire experiments was conducted in order to change the fuel package to be representative of realistic fuel loading that could be found in a living room in a residential structure (sleeper-sofa, upholstered chairs, end tables, etc). The intent of this part of the study was to determine how the times of firefighter interactions, averaged with respect to the staffing and arrival intervals, impacted the interior tenability conditions. Fire fighting tactics were performed in a manner which complied with *NFPA 1403*; ventilation was performed with proper personal protective equipment (PPE) and hand tools from the exterior of the burn prop. Suppression was performed with an interior remote suppression device operated from the exterior of the burn prop.

Instrumentation

Instrumentation to measure gas temperature, gas concentrations, heat flux, visual obscuration, video, and time during the experiments was installed throughout the burn prop. The data were recorded at 1-second intervals on a computer-based data acquisition system. Figure 6 presents a schematic plan view of the instrumentation. All instruments were wired to a centralized data collection room attached as a separate space on the west side of the building, which is described later in this report ensuring physical separation for the data collection personnel from the effects of the fire, while minimizing the wire and tube lengths to the data logging equipment. See Appendix C for additional details about the instrumentation.



Figure 5: Noncombustible Furniture Used in the Time-to-Task Experiments

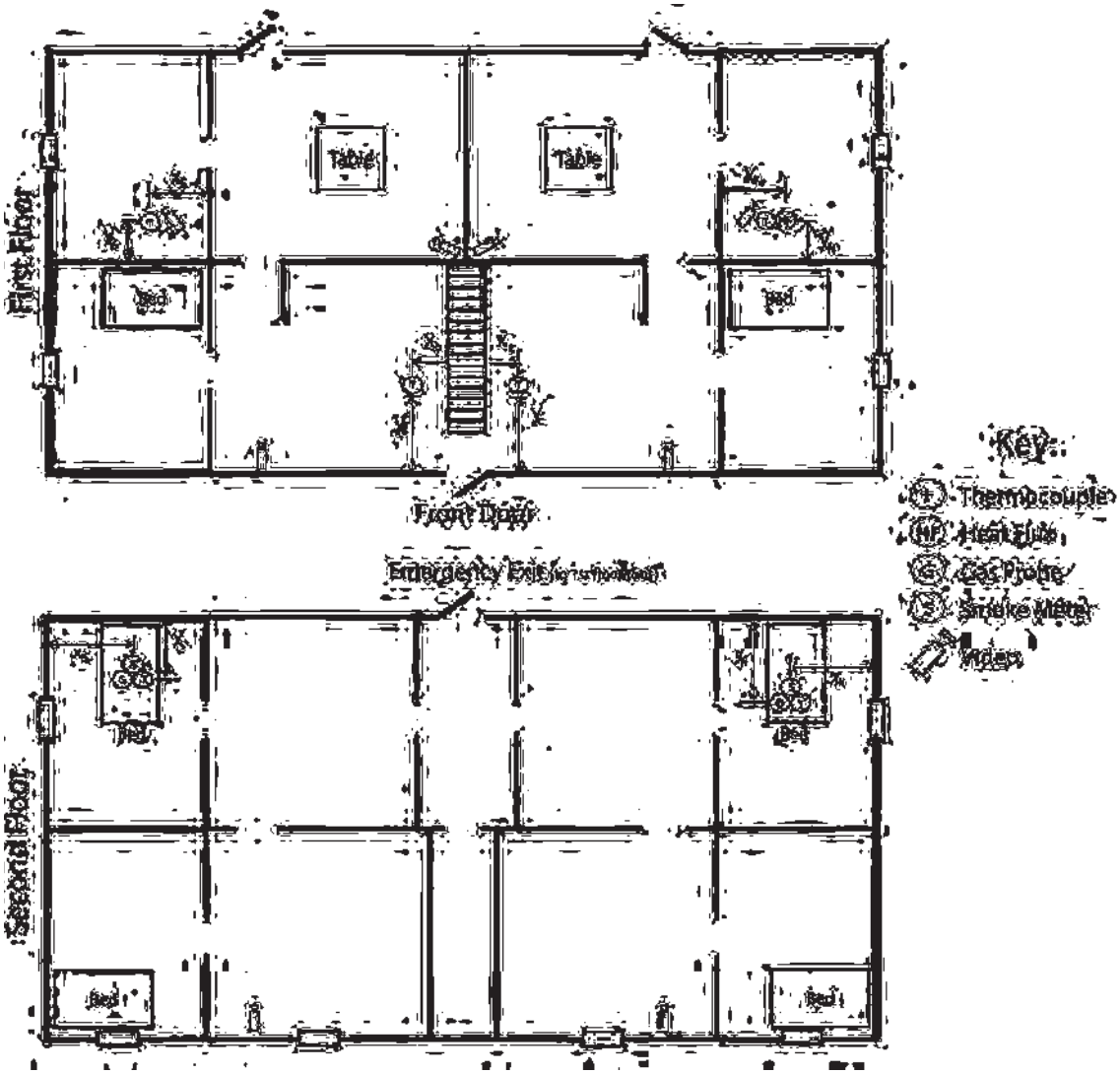


Figure 6: Instrumentation and Furniture Prop Layout



Figure 7: Fireground Safety Officer

Safety Protocols

Firefighter safety was always a primary concern in conducting the research. Participants were drawn from two departments — Fairfax County, VA and Montgomery County, MD — that regularly conduct NFPA 1403 compliant live fire training for their staff and recruits.

A safety officer was assigned to the experiments by the Montgomery County Fire and Rescue Department to assure compliance with *NFPA 1403*. The safety officer (Figure 7) participated in all orientation activities, daily briefings, and firefighter gear checks and was always actively involved in overseeing all experiments. The safety officer had full authority to terminate any operation if any safety violation was observed. In addition to the safety officer, a rapid intervention team (RIT), assigned from dedicated crews not in the actual experiment, was in place for each experiment, and a staffed ambulance was on standby at the site. Radio communication was always available during the experiments should a "mayday" emergency arise.

Experiments were stopped for any action considered to be a protocol breach or safety concern. For example, all ladders — 24 ft (7.3 m) or 28 ft (8.5 m) — were to be raised by two firefighters. As crew sizes were reduced, some firefighters attempted to place ladders single-handedly in an effort to complete the task more quickly. This procedure, while vividly illustrating how firefighters try to do more with less in the field, is unsafe and could potentially result in strain or impact injuries.

Additional safety features were built in to the field structure. A deluge sprinkler system oriented to the known location of the fuel package could be remotely activated for rapid fire suppression. All first floor rooms had direct access to the exterior of the building through either doors or windows. The second story had an emergency exit to the roof of the attached instrumentation room.

A closely related concern to ensure firefighter safety and readiness to repeat experiments with equivalent performance was adequate rehabilitation (see Figure 8). At the beginning and end of each day, crews completed a health and safety check. The importance of staying well-hydrated before and during experiments was especially emphasized.



Figure 8: Crew Rehabilitation

Time-to-Task Experiments

On-Scene Fire Department Tasks

The on-scene fire department task part of the study focused on the tasks firefighters perform after they arrive on the scene of a low-hazard residential structure fire. A number of nationally recognized fire service experts were consulted during the development of the on-scene fire department tasks in order to ensure a broad applicability and appropriateness of the task distribution.[8] The experiments compared crew performance and workload for a typical fire fighting scenario using two-, three-, four-, and five-person crews. 24 total experiments were conducted to assess the time it took various crew sizes to complete the same tasks on technically similar fires in the same structure. In addition to crew sizes, the experiments assessed the effects of stagger between the arriving companies. Close stagger was defined as a 1-minute time difference in the arrival of each responding company. Far stagger was defined as a 2-minute time difference in the arrival of each responding company. One-minute and two-minute arrival stagger times were determined from analysis of deployment data from more than 300 U.S. fire departments responding to a survey of fire department operations conducted by the International Association of Fire Chiefs (IAFC) and the International Association of Fire Fighters (IAFF). Considering both crew size and company stagger there were eight experiments conducted in triplicate totaling twenty-four tests, as shown in the full replicate block in Table 1. A full replicate was completed in a randomized order (determined by randomization software) before a test configuration was repeated.

Crew Size

For each experiment, three engines, a ladder-truck and a battalion chief and an aide were dispatched to the scene of the residential structure fire. The crew sizes studied included two-, three-, four-, and five-person crews assigned to each engine and truck dispatched. Resultant on-scene staffing totals for each experiment follow: (FF = firefighter)

- Two Person crews = 8 FFs + Chief and Aide = 10 total on-scene
- Three Person crews = 12 FFs + Chief and Aide= 14 total on-scene
- Four Person crews = 16 FFs + Chief and Aide = 18 total on-scene
- Five Person crews = 20 FFs + Chief and Aide = 22 total on-scene[9]

Department Participation

The experiments were conducted in Montgomery County, MD at the Montgomery County Fire Rescue Training Academy during the months of January and February 2009. All experiments took place in daylight between 0800 hours and 1500 hours. Experiments were postponed for heavy rain, ice, or snow and rescheduled for a later date following other scheduled experiments.

Montgomery County (MD) and Fairfax County (VA) firefighters participated in the field experiments. Each day both departments committed three engines, a ladder truck and associated crews, as well as a battalion chief to the experiments. The two battalion chiefs, alternated between the roles of battalion chief and aide. Firefighters and officers were identified by participating departments and oriented to the experiments. Each experiment included engine crews, truck crews and command officers from each participating department. Participants varied with regard to age and experience. Crews that normally operated together as a company were kept intact for the experiments to assure typical operation for the crew during the scenarios. However, in all experiments crews were used from both departments, including engine crews, truck crews, and officers.

This allocation of resources made it possible to conduct back-to-back experiments by rotating firefighters between field work and rehabilitation areas.

Crew Size	Apparatus Stagger
2 Person	Close Stagger (One minute)
3 Person	Close Stagger (One minute)
4 Person	Close Stagger (One minute)
5 Person	Close Stagger (One minute)
2 Person	Far Stagger (Two minutes)
3 Person	Far Stagger (Two minutes)
4 Person	Far Stagger (Two minutes)
5 Person	Far Stagger (Two minutes)

Table 1: Primary Variables for Time-to-Task Experiments

Crew Orientation

All study participants were required to attend an orientation prior to the beginning of the experiments (see Figure 9, page 25). The orientations were used to explain experiment procedures, task flows, division of labor between crews, and milestone events in the scenario.

Daily orientations were conducted for all shifts to assure every participant attended. Orientations included a description of the overall study objectives as well as the actual experiments in which they would be involved. Per the requirements of *NFPA 1403*, full disclosure regarding the structure, the fire, and the tasks to be completed were provided. Crews were also oriented to the fireground props, instrumentation used for data collection, and the specific scenarios to be conducted. Every crew member was provided a walkthrough of the structure during the orientation and each day prior to the start of the experiments.

8 Technical experts included Dennis Compton, Russell Sanders, William "Shorty" Bryson, Vincent Dunn, David Rohr, Richard Bowers, Michael Clemens, James Walsh, Larry Jenkins and Doug Hinkle. More information about the experts is presented in the Acknowledgments later in this report.

9 Note that the on-scene totals account for only the personnel assigned to "work" the fire. Additional personnel were provided for an RIT team, a staffed ambulance on site, and a safety officer specific to the experiments. The additional personnel are not included in thee staffing described above.

Tasks

Twenty-two fireground tasks were completed in each experiment. Meticulous procedures gathered data to measure key areas of focus, such as individual task start times, task completion times, and overall scenario performance times. Each task was assigned a standardized start and end marker, such as crossing the threshold to enter the building with a hose line or touching a ladder to raise it to a second story window. The 22 tasks, with the events for measuring start and stop times, are shown in Table 2 (page26). Figures 10 — 19 illustrate firefighter activity in a number of the tasks to complete experiments or prepare for the next experiment.

For reasons of both safety and cost efficiency, two tasks — forcible entry of the front door and ventilation of the windows on the first and second stories — required special procedures.

The study could not accommodate replacing the doors and windows daily for the fire suppression experiments. Before the start of experiments with the full sequence of tasks, these two tasks were measured in a realistic manner using training props constructed at the site of the fireground experiments. As with the overall experiments, these two tasks were repeated in triplicate and the times averaged. The average time to complete the tasks was then used in the larger scale experiment. As firefighters came to the point of breaching the door or windows, the timers would hold them for the time designated by the earlier experiments and then give them the approval to open the door or windows. The start and end times were then recorded just as other tasks were.





Figure 9: Crew Orientation and Walkthrough



Figure 10: Ground Ladders



Figure 11: Ventilation



Figure 12: Ground Level Window Breakage Prop



Figure 13: Second Story Window Breakage Prop



Figure 14: Door Forcible Entry Prop



Figure 15: Crew Preparation and Cue Cards

Table 2: Tasks and Measurement Parameters

Tasks	Measurement Parameters
1. Stop at Hydrant, Wrap Hose	START - Engine stopped at hydrant STOP - Firefighter back on engine and wheels rolling
2. Position Engine 1	START - Wheels rolling from hydrant STOP - Wheels stopped at structure
3. Conduct Size-up (360-degree lap), transmit report, establish command	START - Officer off engine STOP - Completes radio transmission of report
4. Engage Pump	START - Driver off engine STOP - Driver throttles up pump
5. Position Attack Line (Forward Lay)	START - Firefighter touches hose to pull it from engine STOP - Flake, charge and bleed complete (hose at front door prepared to advance)
6. Establish 2 In/2 Out	Company officer announces – "2 In/2 Out established" (4 persons assembled on scene OR at the call of the Battalion Chief/Company Officer)
7. Supply Attack Engine	START - Firefighter touches hydrant to attach line STOP - Water supply to attack engine
8. Establish RIT **9. Gain/Force Entry**	Time that Company Officer announces RIT is established START - Action started (HOLD time= 10 seconds)
10. Advance Attack Line	STOP - Door opened for entry START – Firefighter touches hose STOP – Water on fire
11. Advance Backup Line (stop time at front door)	START - Firefighter touches hose to pull from engine bed STOP - Backup line charged to nozzle
12. Advance Backup Line/Protect Stairwell	START - Firefighter crosses threshold STOP - Position line for attack at stairwell

Tasks	Measurement Parameters
13. Conduct Primary Search	START - Firefighters enter front door STOP - Firefighters transmit "search complete"
14. Ground Ladders in Place	START - Firefighter touches ladder to pull it from truck STOP - 4 Ladders thrown: 3 ladders on the 2nd-story windows and 1 to the roof
15. Horizontal Ventilation (Ground)	START- Firefighter at 1st window to begin ventilation (HOLD for 8 seconds) STOP - Hold time complete - window open
16. Horizontal Ventilation (2nd Story)	START - Firefighter grabs ladder for climb. (Firefighter must leg lock for ventilation. HOLD time at each window is 10 seconds) STOP - All 2nd-story windows open - descend ladder - feet on ground.
17. Control Utilities (Interior)	START - Radio transmission to control utilities STOP - When firefighter completes the task at the prop
18. Control Utilities (Exterior)	START - Radio transmission to control utilities STOP - When firefighter completes the task at the prop
19. Conduct Secondary Search	START - Firefighters enter front door STOP - Firefighters transmit "secondary search complete"
20. Check for Fire Extension (walls)	START- Firefighters pick up check-for-extension prop STOP- Completion of 4 sets total (1 set = 4 in and 4 out) This task may be done by more than one person.
21. Check for Fire Extension (ceilings)	START - Firefighters pick up check-for-extension prop STOP - Completion of 4 sets total (1 set = 3 up and 5 down) This task may be done by more than one person.
22. Mechanical Ventilation	START - Firefighters touch fans to remove from truck STOP - Fans in place at front door and started

Data Collection: Standardized Control Measures

Several control measures were used to collect data, including crew cue cards, radio communications, task timers, and video recording. Performance was timed for each task in each scenario including selected milestone tasks such as door breach, water-on-fire, and individual window ventilation. Data were collected for crew performance on each task, and individual firefighter performance was not considered.

Task Flow Charts and Crew Cue Cards

Task procedures were standardized for each experiment/scenario. Technical experts worked with study investigators to break down crew tasks into individual tasks based on crew size. Task flow charts were created and then customized for the various crew sizes. The carefully designed task flow ensured that the same overall workload was maintained in each experiment, but was redistributed based on the number of personnel available for the work. See Appendix D for additional details.

All tasks were included in each scenario and cue cards were developed for each individual participant in each scenario. For example, a four-person crew would have a cue card for each person on the crew including the officer, the driver, and the two firefighters. Cards were color coded by crew size to assure proper use in each scenario.



Figure 16: Connecting to the Hydrant



Figure 17: Crews Responding



Figure 18: Ceiling Breach/Molitor Machine



Figure 19: Incident Command



Figure 20: Task Timers



Figure 21: Video Recording for Quality Control

Radio communications

Interoperability of radio equipment used by both participating departments made it possible to use regular duty radios for communication during the experiments. Company officers were instructed to use radios as they would in an actual incident. Montgomery County Fire and Rescue Communications recorded all radio interaction as a means of data backup. Once all data quality control measure were complete, the records were then overwritten as a routine procedure.

Task Timers

Ten observers/timers, trained in the use of a standard stop watch with split-time feature, recorded time-to-task data for each field experiment. To assure understanding of the observed tasks, firefighters were used as timers, each assigned specific tasks to observe and to record the start and end times.

To enhance accuracy and consistency in recording times, the data recording sheets used several different colors for the tasks (see Appendix D). Each timer was assigned tasks that were coded in the same color as on the recording sheet. All timers wore high-visibility safety gear on the fireground (see Figure 20).

Video records

In addition to the timers, video documentation provided a backup for timed tasks and for quality control (see Figure 21). No less than six cameras were used to record fireground activity from varied vantage points. Observer/timer data were compared to video records as part of the quality control process.

Crew Assignment

Crews from each department that regularly operated together were assigned to work as either engine or truck companies in each scenario. Both Fairfax County and Montgomery County crews participated in each experiment.

Crews assigned to each responding company position in one scenario were assigned to another responding company position in subsequent scenarios, with the objective of minimizing learning from one experiment to another. For example, crews in the role of engine 1 in a morning scenario might be assigned to the engine 3 position in the afternoon, thus eliminating learning from exact repetition of a task as a factor in time to completion. Additionally, participating crews from both Montgomery County and Fairfax County were from three different shifts, further reducing opportunities for participant repetition in any one position.

Response Time Assumptions

Response time assumptions were made based on time objectives set forth in the *NFPA 1710*. Time stagger allocations were set by the project technical advisors in order to assess the impact of arriving unit time separation on task start and completion times, as well as the overall scene time.

Below are the values assigned to the various time segments in the overall response time. The total of the response time segments may also be referred to as the total reflex time.

1. Fire ignition = time zero
2. 60 s for recognition (detection of fire) and call to 9-1-1
3. 60 s for call processing/dispatch
4. 60 s for turnout[10]
5. Close Stagger = 240 s travel time FIRST engine with 60 s ladder-truck lag and 90 s lag for each subsequent engine
   a. Truck arrives at 300 s from notification
   b. Second engine at 330 s from notification
   c. Third engine at 420 seconds from notification
6. Far Stagger = 240 s travel time FIRST engine with 120 s ladder-truck lag and 150 s lag for each subsequent engine
   a. Truck arrives at 360 s from notification
   b. Second engine arrives at 390 s from notification
   c. Third engine arrives at 540 s from notification.

The design of this part of the experiments allowed firefighter entry into the burn building. The next part of the experiments required a modified methodology.

10 After the experiments were complete, the NFPA 1710 technical committee released a new edition of the standard that prescribes 80 seconds for turnout time.

Part 3: Room and Contents Fires

As previously discussed, *NFPA 1403* prohibits firefighters in a training exercise from entering a structure with sufficient fuel load to result in room flashover. But the value of the data from the time-to-task experiments lies not just in the duration and time-of-completion statistics for tasks, but also in measuring the tenability of the atmosphere for occupants urgently needing firefighter assistance. Therefore Part 3 of the experiments (room and contents fires) used a larger fuel load to focus on the seven of the 22 tasks that cause a change in the fire behavior through ventilation or active suppression:



The Tornado Remote Controlled Monitor is Produced by Task Force Tips, Valparaiso, Indiana, USA. Permission to publish courtesy of Task Force Tips



Figure 22: Remotely Controlled Fire Suppression Nozzle for Room and Contents Fires

1. Forced entry of the front door
2. Water on fire
3. Second floor window #1 ventilated (burn room window)
4. Second floor window #2 ventilated (front window, near corner)
5. Second floor window #3 ventilated (front window, near front door)
6. First floor window #1 ventilated (window beside the fire room)
7. First floor window #2 ventilated (self-ventilated at flashover)

Because the fuel load was sufficient for flashover, all firefighter activity was conducted outside the building. Tasks that in Part 3 required entry into the building, such as search or interior utility control, were factored into this part by delaying the next task for the average duration of the task from Part 2. Firefighters in full gear opened the door with a gloved hand or opened windows from the ground with a tool such as a pike pole or angle iron, again at the time specified by the averages from Part 2. Averages were derived from the three iterations of each scenario. The different number of iterations in Part 3 will be explained later in this report.

Because firefighters could not enter the building, a nozzle controlled from the instrumentation room was installed. The nozzle was placed in the room directly outside the burn room and oriented toward the burn room near the doorway in order to best emulate the nozzle location of live firefighter suppression (see Figure 22). The nozzle was encased with mineral wool and heavy-duty aluminum foil (bottom picture in Figure 22) to protect the electronics and wiring from the intense radiation energy emitted by the fire. Blocks were used to anchor the nozzle against the lateral forces exerted by the momentum of the water supply. The activation time for suppression was determined by the data from the time-to-task test results.

A 15° spray pattern was directed toward the seat of the fire and swept horizontally from side to side. While the remotely controlled hose line knocked down the majority of the fire, it was not as effective as a live firefighter with a better view into the room of origin. Therefore, after the fire was diminished, a supplemental stream was applied through the burn room window in order to control the fire (see Figure 23). All personnel on the hose line were in full turnout gear and self-contained breathing apparatus during the exterior application of water.

Fuel Packages for the Room and Contents Fires

In order to maximize the repeatability of the fire development, nominally identical rooms of furniture of identical manufacturer, style, and age were used for each test. A plan-view schematic of the furniture is shown in Figure 24 and pictures of the burn room prior to testing are shown in Figure 25. Key dimensions, mass, and materials for combustible furnishings are detailed in Appendix C.



Figure 23: Supplemental Suppression Applied for Room and Contents Tests

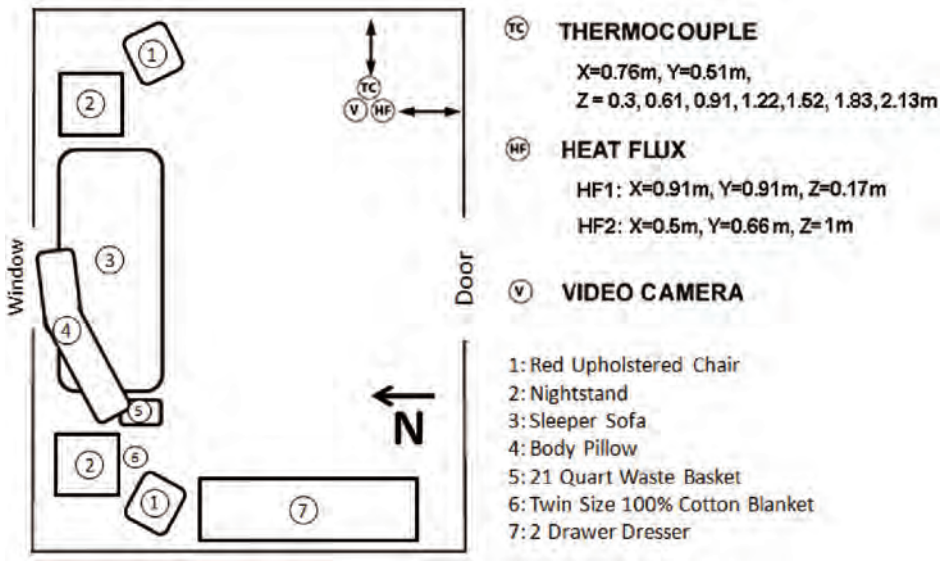


Figure 24: Configuration of Furnishings in Burn Room (Room and Contents Fires)



Figure 25: Pictures of the Room and Contents Furnishings

The ignition source consisted of a cardboard book of 20 matches that was ignited by an electrically heated wire, often referred to as an electric match. The electric match was placed near the bottom of a 21 qt (19.9 L) polypropylene waste container. The height of the waste container was 15.5 in (394 mm) with interior dimensions at the top opening of 14.5 in (368 mm) by 11.3 in (287 mm). Approximately 0.7 lbs (0.3 kg) of dry newspaper was added to the waste container. The majority of the newspaper was folded flat, and placed on edge along the sides of the waste container. Four sheets of newspaper, 22 in (559 mm) by 25 in (635 mm) were crumpled into "balls" approximately 3.9 in (100 mm) diameter and placed on top of the electric match in the center of the waste container.

Experimental Matrix for Room and Contents Fires

Sufficient amounts of furniture for 16 rooms were available for the room and contents fires, so eight experiment scenerios were conducted — each with a replicate. Because the time to untenable conditions was a primary variable of interest in the room and contents fires, the arrival time of the first due engine was a paramount consideration. Because the effects of the subsequent apparatus stagger were explored in the time-to-task tests, the stagger was fixed at the "close arrival" time. Additionally, a baseline measurement was required to compare the effectiveness of response to the absence of a fire department response. Therefore, a five-person, later arrival combination was eliminated in favor of a no-response scenario (with replicate). Table 3 summarizes the 16 tests conducted.

The first due engine arrival times were determined using the following assumptions: ignition of the fire occurs at

Crew Size	First Due Arrival Time
2-Person	Early Arrival of First Engine (6.5 min) – close stagger
3-Person	Early Arrival of First Engine (6.5 min) – close stagger
4-Person	Early Arrival of First Engine (6.5 min) – close stagger
5-Person	Early Arrival of First Engine (6.5 min) – close stagger
2-Person	Later Arrival of First Engine (8.5 min) – close stagger
3-Person	Later Arrival of First Engine (8.5 min) – close stagger
4-Person	Later Arrival of First Engine (8.5 min) – close stagger
No Response (Baseline)	N/A

Table 3: Experimental Matrix for Room and Contents Tests (Each Conducted in Replicate)

time zero. Smoke detector activation and a call to 9-1-1 occurs at 60 seconds after the fire starts. Call intake and processing requires an additional 90 seconds. The firefighters take 60 seconds to complete their turnout at the station and begin travel to the scene. Thus travel time begins 3.5 minutes into experiment. The two levels of arrival time are then determined by two different travel times: early arrival assumes a three-minute travel time, while later arrival assumes a five-minute travel time. For all scenarios in the room and contents experiments, the close stagger (60 seconds) between subsequent apparatus times was used.

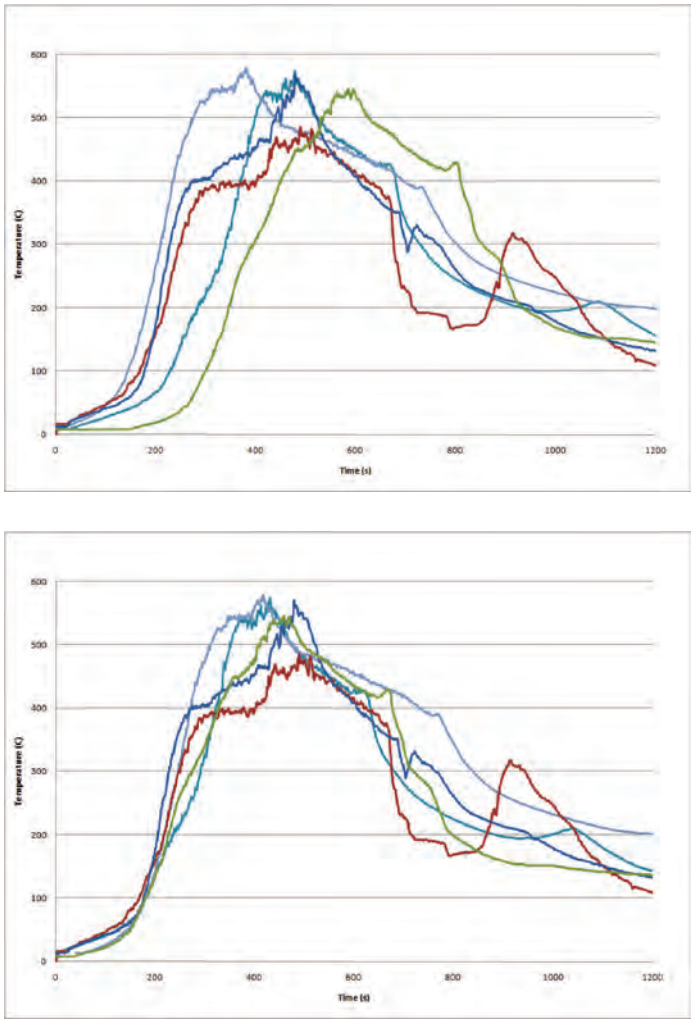


Figure 26: Direct Comparison of Temperatures, Before (Top) and After Adjustment (Bottom)

Procedure for Minimizing the Effect of Variance in Fire Growth Rate

Fires involving furnishings have inherent variance in burning behaviors. Factors such as humidity and minor variations in materials (particularly worn furnishings that may have different foam compression or fabric wear patterns), can result in uncertainty of 20 % or more, despite significant efforts to enhance repeatability. The early growth period of fire development is often associated with the greatest variance, since minor factors (as discussed above) can influence the thermal environment more easily when the fire is small. Therefore, the room and contents fires were normalized to the 212 °F (100 °C) temperature near the ceiling in the burn room in order to minimize the variance of the room and contents fires. The time at which the burn room reached this temperature (usually in approximately 180 seconds) rather than the actual ignition time, was designated as the "zero time."

Figure 26 shows the time-temperature curves before and after normalizing at 100°C. This approach was implemented during the experiments by watching the time temperature data in real-time from the instrumentation room and announcing the "zero-time" over the fireground radio system. The normalization procedure did not negatively affect tenability measurements in the target room because when the fire is small, products of combustion do not reach the room because of lack of momentum. Therefore, adjusting all room and contents tests to the same upper layer temperature was an appropriate way to minimize variance.

Milestone Times for Critical Tasks

As stated earlier, firefighters could not enter the burn building during the room and contents experiments because of the danger for potential flashover in an experimental scenario. Therefore, prescribed tasks were performed at specified times based on data from part 2. In this section we report on significant data gathered from instrumentation and describe an additional part of the experiments designed to extend our understanding of the effect of crew size and stagger on the tenability of the atmosphere in a burning structure.

Table 4 (page 32) identifies significant tasks selected as key milestones because of the way they affect fire behavior and atmospheric tenability inside the structure.

Milestone Tasks	2-Person Close Stagger
	Time from ignition (min : s)
Breached Door	8:44
Water On Fire	9:56
Upper Fire Window	13:01
Ground Non-fire Window	14:51
Upper Corner Window	17:55
Upper Front Door Window	19:55
Ground Fire Window	4:30
Milestone Tasks	**3-Person Close Stagger**
	Time from ignition (min : s)
Breached Door	7:48
Water On Fire	8:54
Upper Fire Window	11:26
Ground Non-fire Window	13:31
Upper Corner Window	15:54
Upper Front Door Window	17:58
Ground Fire Window	4:30
Milestone Tasks	**4-Person Close Stagger**
	Time from ignition (min : s)
Breached Door	7:46
Water On Fire	8:41
Upper Fire Window	9:23
Ground Non-fire Window	10:32
Upper Corner Window	11:46
Upper Front Door Window	13:45
Ground Fire Window	4:30
Milestone Tasks	**5-Person Close Stagger**
	Time from ignition (min : s)
Breached Door	7:35
Water On Fire	8:03
Upper Fire Window	10:11
Ground Non-fire Window	10:54
Upper Corner Window	12:31
Upper Front Door Window	12:47
Ground Fire Window	04:30

Table 4: Tasks That Affect Fire Behavior and Atmospheric Tenability

Analysis of Experimental Results

This section describes the analytic approaches used to address the research objectives of the study. First the statistical methods used to analyze the fireground time-to-task observations are presented. Then the time-to-task data and the room and contents data were combined to assess crew performance in relation to tenability within the structure.

Time-to-Task Analysis

Time-to-task data were compiled into a database and assessed for outliers and missing entries. Because all time-to-task experiments were conducted in triplicate, missing data were apparent and were reviewed via video and radio tapes. Missing data attributable to timer error were replaced by a time observed in the video. Where video and/or radio documentation was not adequate, missing data were recoded to the mean of the task times from the other two experiments.

Data Queries

The statistical methods used to analyze the time-to-task data were driven by a principal goal of this research project — to assess the effect of crew size, first-due engine arrival time, and subsequent apparatus stagger on time-to-task for critical steps in response and fire fighting. This research goal motivated the development of four specific research questions (see Figure 27) that in turn pointed to specific statistical analyses for generating inference and insight.

Statistical Methods – Time-to-Task

The analysis of the time-to-task data involved a sequence of multiple linear regressions using Ordinary Least Squares to generate and test the effects of staffing and stagger on timings. The regressions were of the form:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik} + \varepsilon_i$$

where the x_{ik} reflect factors such as stagger and crew size, and the y represents our dependent/outcome variable.

Time-related outcomes (i.e., the dependent variables in the regression equations) could include task duration, elapsed time to start the task, and elapsed time until task completion, all measured in seconds. Table 5 (page 34) lists the time-related outcomes used to test the effect of crew size and stagger for the tasks in the field experiments.

The effects of crew size and stagger were explored using indicator variables in the regression analyses. The coefficient for a given indicator (for example, crew size of four relative to a crew size of two) indicated the number of seconds the larger crew size added or reduce the timing outcome of a task. Crew sizes were collapsed in some regressions to test whether the timings of "larger" crew sizes of four and five were significantly different than "smaller" crew sizes of two and three. Interaction terms were not assessed in these regression analyses because of the small number of experiments available for analysis.

Standard t-tests examined statistical significance (i.e., to see if the hypothesis of "no impact" could be rejected) to estimate the impact of several specific configurations:

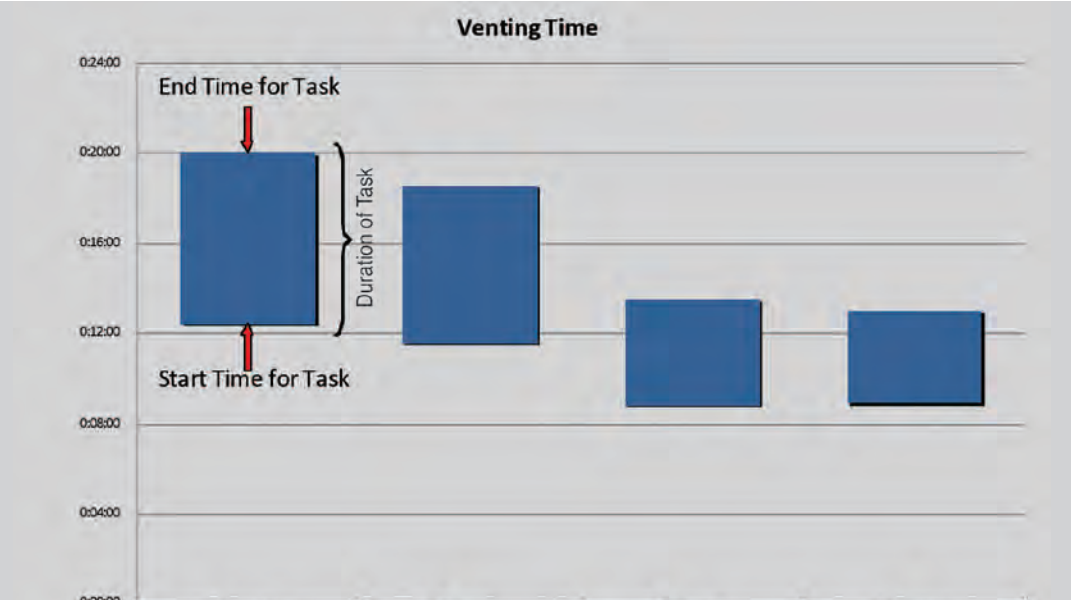
- crew sizes of three versus two
- crew sizes of four versus three
- crew sizes of five versus four
- (occasionally) five versus two, and four versus two
- larger (four & five combined) versus smaller (two & three combined) and
- stagger

The specific tests for each task (regression analysis) are shown in the Appendix E. The actual coefficients of each regression and their corresponding standard errors are presented in Appendix F. To infer impact, significant tests were conducted at the 0.05 significance level. Only statistically significant contrasts of crew size and/or stagger are included in this section of the report. Graphic expositions of relevant time/task related findings are then presented as well. Where stagger was statistically significant, the effects are graphed separately. Where stagger was not statistically significant, the data for crew size were combined.

Time-to-Task Research Questions

1) How do crew size and stagger (i.e., timing of between first engine and subsequent apparatuses) affect overall (i.e., start to completion) response timing?
   a. To what extent do variations in crew size affect overall response timing?
   b. To what extent do variations in both crew size and stagger affect overall response timing?
2) How do crew size and stagger affect the timings of task initiation, task duration, and task completion for each of the tasks comprising the suite of 22 tasks?
   a. To what extent do variations in crew size affect timings across the suite of tasks?
   b. To what extent do variations in both crew size and stagger affect response timings across the suite of tasks?
3) How does crew size affect elapsed times to achieve three critical events known to change fire behavior or atmospheric tenability for occupants?
   a. Entry into structure
   b. Water on fire
   c. Ventilation of each window (three upstairs and one downstairs window and the burn room window)
4) How does the elapsed time to achieve the national standard of assembling 15 firefighters at the scene (measured using "at hydrant" as the start time) vary by crew sizes of 4 and 5?

Figure 27: Research Questions for Time-to-Task Experiments



	2-Person	3-Person	4-Person	5-Person
End Time	0:20:02	0:18:33	0:13:30	0:12:59
Duration	0:07:36	0:07:01	0:04:42	0:04:04
Start Time	0:12:26	0:11:32	0:08:48	0:08:55

Figure 28: Example Time-to-Task Graph

	Time-to-Task Outcome Measures		
Task:	*Elapsed Time Until Start**	*Elapsed Time for Task Completion**	*Duration**
Conduct size-up	X	X	X
Position attack line	X		X
Establish 2 in - 2 out		X	
Establish RIT		X	
Gain forced entry	X		
Advance line	X		
Advance line		X	
Advance backup line to door	X	X	
Advance backup line to stairwell	X		
Advance backup line 2		X	
Conduct primary search 1	X		
Ground ladders in place		X	X
Horizontal ventilation, second story, window 3	X	X	
Horizontal ventilation, second story, window 2	X	X	
Horizontal ventilation, second story, window 1	X	X	
Horizontal ventilation, first story, window 2	X	X	
Control utilities interior	X		
Control utilities exterior	X		
Conduct secondary search	X		
Check for fire extension walls	X		
Check for fire extension ceiling	X		

* The columns of this table show the dependent variables, and the rows indicate the Tasks; an 'X' in a cell indicates that a separate regression analysis was conducted for a given dependent variable.

Table 5: Dependent Variables Used in a Regression Analysis of the Effect of Crew Size and Stagger on Time-to-Task Outcomes

Regression analyses

Appendix F presents the regression results for each task and relevant outcome, along with their corresponding standard errors. The results of conducting significance tests at the 0.05 level of significance are shown in Appendix E. Rather than detailing each of the lengthy lists of coefficients found to be significant, only the answers to the primary research questions are presented for each task.

Measurement Uncertainty

The measurements of length, temperature, mass, moisture content, smoke obscuration, and stopwatch timing taken in these experiments have unique components of uncertainty that must be evaluated in order to determine the fidelity of the data. Appendix G summarizes the uncertainty of key measurements taken during the experiments. Importantly, the magnitudes of uncertainties associated with these measurements have no impact on the statistical inferences presented in this report.

How to Interpret Time-to-Task Graphs

Figure 28 presents a sample time-to-task analysis, in this case results for venting time. Each crew size has a column graphic showing the start time and completion time for the task. Visually, columns starting lower on the graph depict deployment configurations that resulted in earlier start times. The height of the column graphic is a visualization of the duration of the task, taller columns indicating longer times to task completion. Time data are also shown in a table below the graph. Where stagger was statistically significant, the effects are graphed separately. Where stagger was *not* statistically significant, as in the illustration, the data for crew size were combined.

Time-to-Task Graphs

Overall Scene Time (Time to Complete All 22 Tasks)

The four-person crews operating on a low-hazard structure fire completed the same number of tasks on the fireground (on average) 7 minutes faster than the two-person crews (see Figure 29). The four-person crews completed the same number of fireground tasks (on average) 5.1 minutes faster than the three-person crew. The four-person crews were able to complete necessary fireground tasks on a low-hazard residential structure fire nearly 30 % faster than the two-person crews and nearly 25 % faster than the three-person crews. Although on the low-hazard residential structure fire, adding a fifth person to the crews did not show any additional decrease in fireground task times, the benefits of a five-person vs. a four-person crew are significant in other measurements, particularly the "water-on-fire" time. Additionally, the greater need for five-person crews for medium- and high-hazard structures, particularly in urban settings, has been documented in other studies (Backoff et al., 1980; Cushman, 1982; McManis Associates et al., 1984) and five-person crews are required for areas that contain medium and high-hazard structures in fire protection consensus standards.[11]

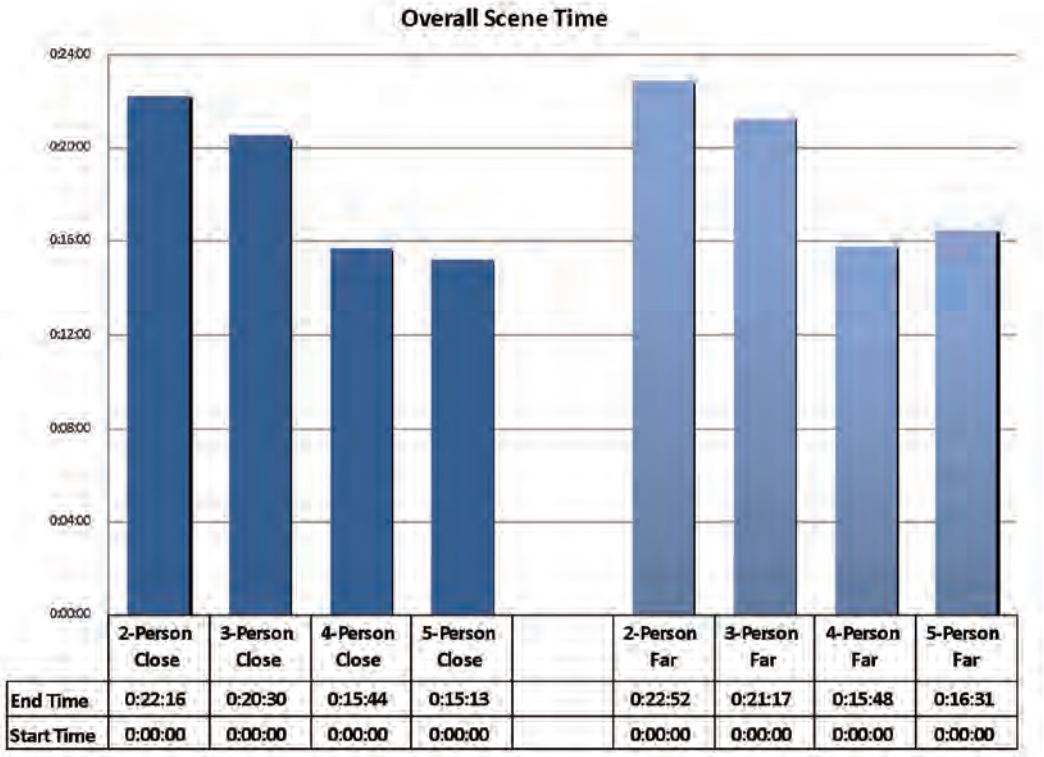


Figure 29: Overall Scene Time

11 NFPA 1710, Section 5.2.3.1.2 and Section 5.2.3.2.2: In jurisdictions with tactical hazards, high-hazard occupancies, high incident frequencies, geographical restrictions, or other pertinent factors as identified by the AHJ, these companies shall be staffed with a minimum of five or six on duty members.

Overall Scene Time and Crew Sizes

The graphs in Figure 30 show average times for each task by crew size.

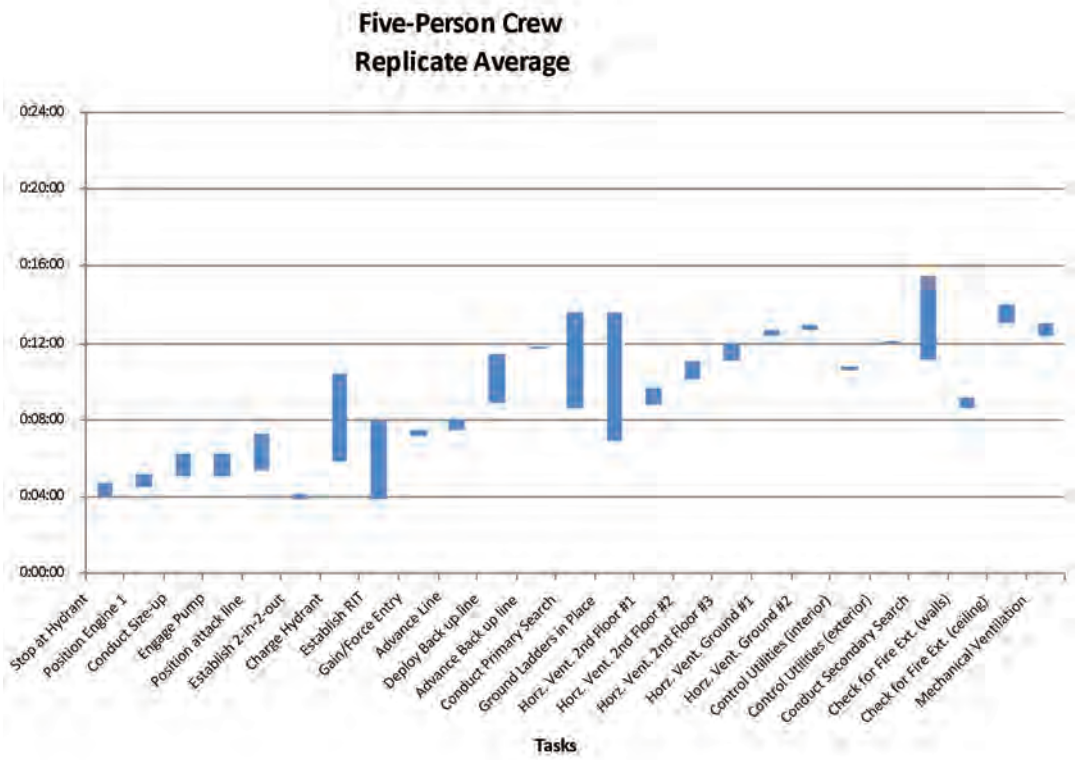


Figure 30 a: Overall Scene Time-FIve Person Crew

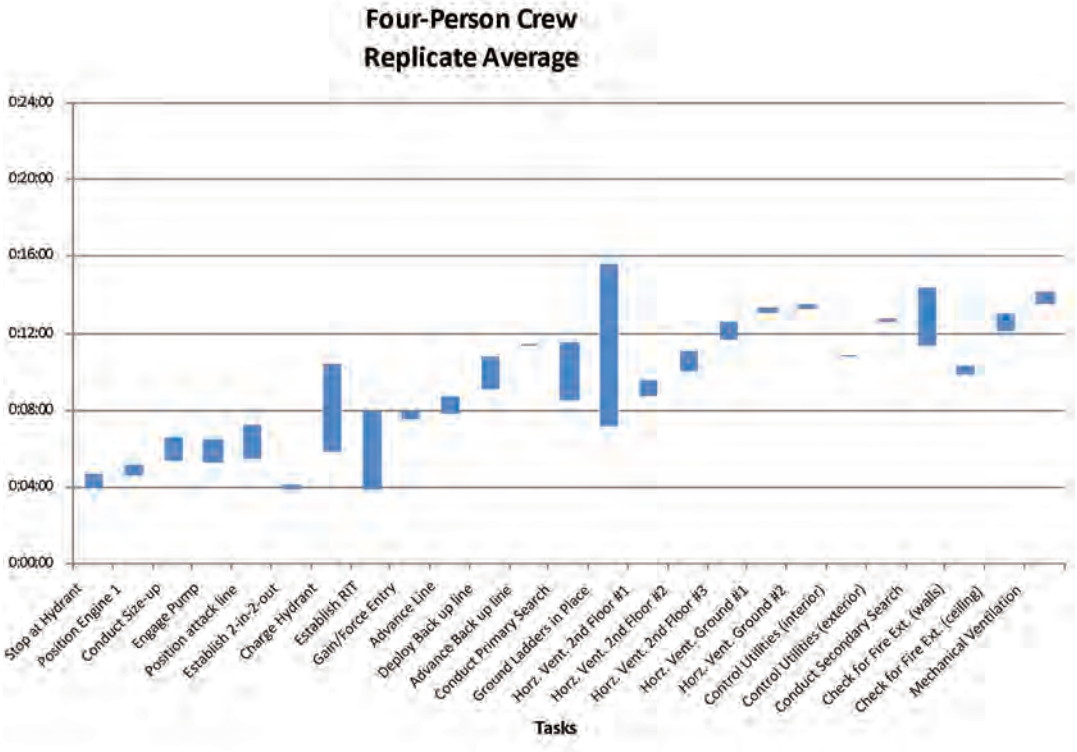


Figure 30 b: Overall Scene Time-Four Person Crew

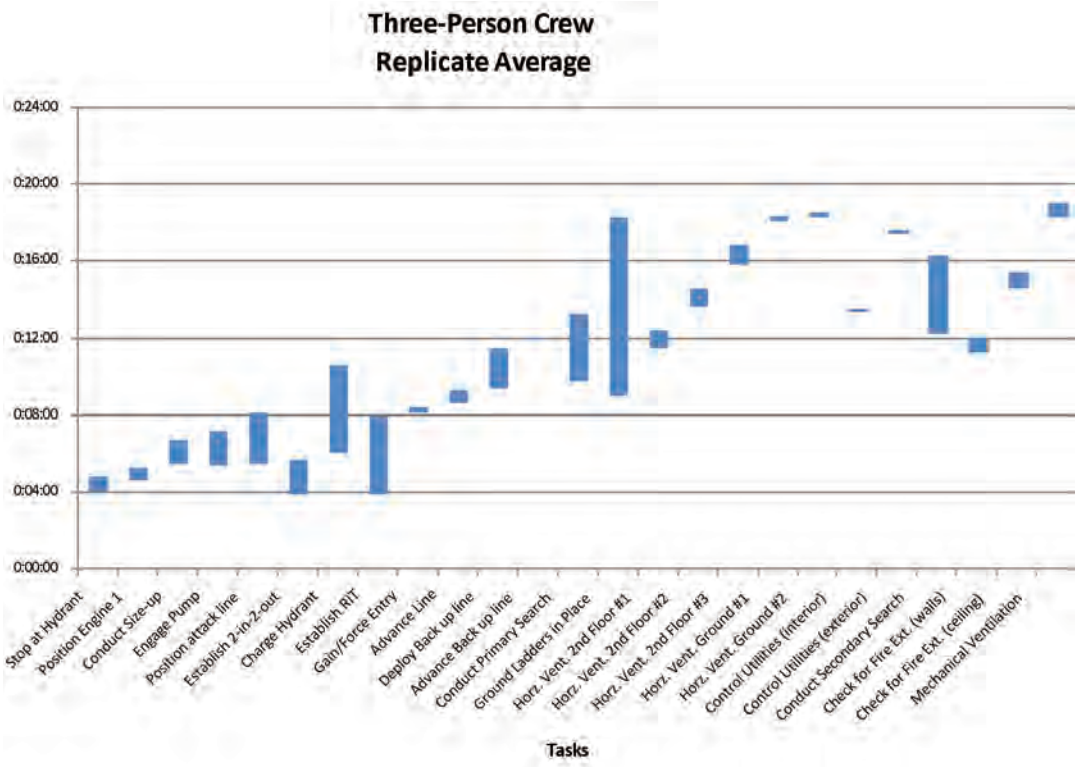


Figure 30 c: Overall Scene Time-Three Person Crew

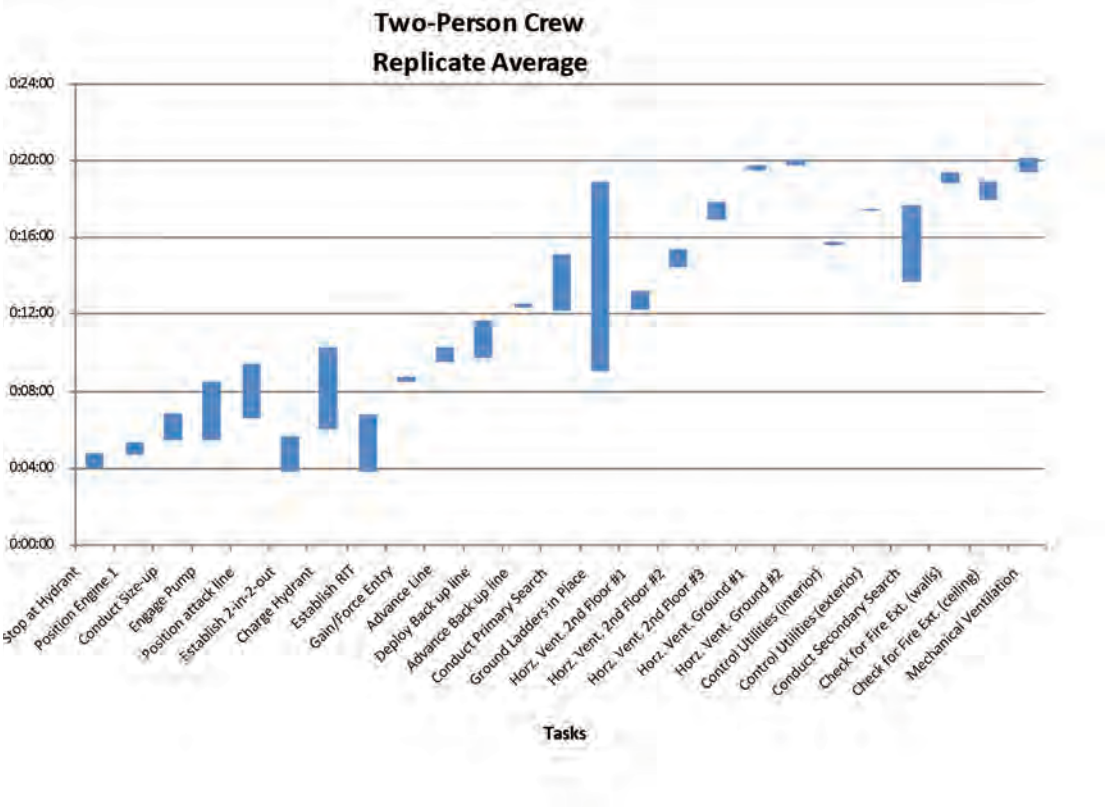
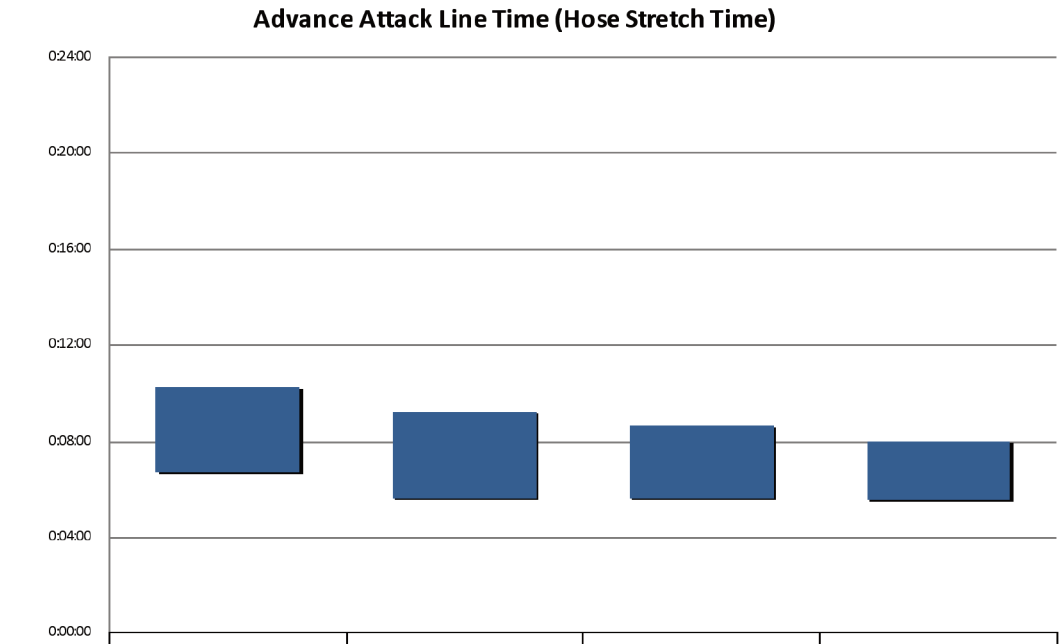


Figure 30 d: Overall Scene Time-Two Person Crew

Advance Attack Line Time (Hose Stretch Time)

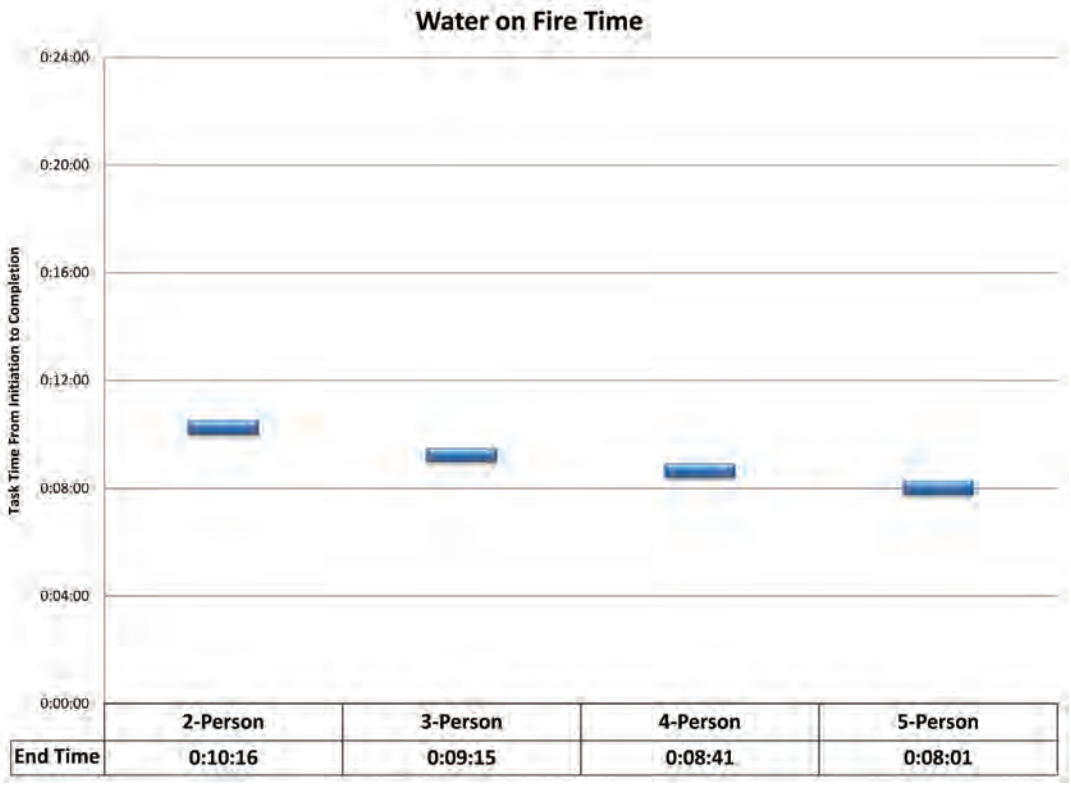
Figure 31 measures the interval from the start of the task "Position Attack Line" to the end of the task "Advance Attack Line." In comparing four- and five-person crews to two and three-person crews collectively, the time difference for this measure was statistically significant at 76 seconds (1 minute 16 seconds). In conducting more specific analysis comparing all crew sizes to a two-person crew the differences are more distinct. A two-person crew took 57 seconds longer than a three-person crew to stretch a line. A two-person crew took 87 seconds longer than a four-person crew to complete the same task. Finally, the most notable comparison was between a two-person crew and a five-person crew, with a 122-second difference in task completion time.[12, 13]



	2-Person	3-Person	4-Person	5-Person
End Time	0:10:16	0:09:15	0:08:41	0:08:01
Duration	0:03:34	0:03:36	0:03:02	0:02:29
Start Time	0:06:43	0:05:39	0:05:39	0:05:33

Figure 31: Advance Line Time (Hose Stretch Time) by Crew Size

12 Apparatus stagger was not statistically significant, so the data for crew size were combined.
13 Where subtracting the start time from the end time yields a result that differs from the duration noted in the chart by one second, it is the result of rounding fractional seconds to the nearest whole second.

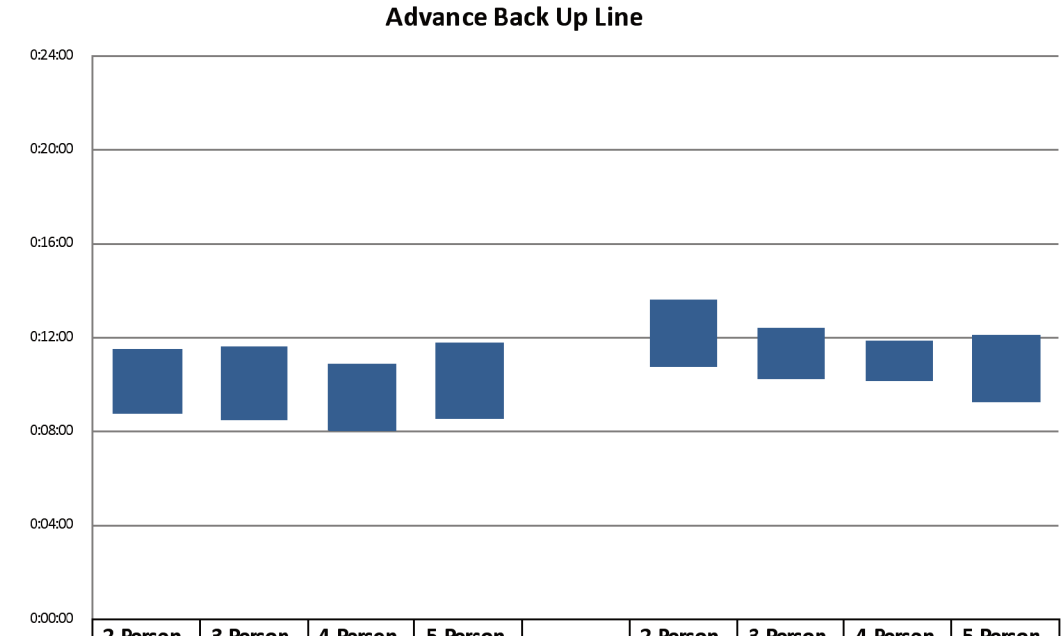


	2-Person	3-Person	4-Person	5-Person
End Time	0:10:16	0:09:15	0:08:41	0:08:01

Figure 32: Water on Fire Time by Crew Size and Stagger

Time to Water on Fire

There was a 10% difference in the "water on fire" time between the two- and three-person crews. There was an additional 6% difference in the "water on fire" time between the three- and four-person crews. (i.e., four-person crews put water on the fire 16% faster than two person crews). There was an additional 6% difference in the "water on fire" time between the four- and five-person crews (i.e. five-person crews put water on the fire 22% faster than two-person crews).



	2-Person Close	3-Person Close	4-Person Close	5-Person Close		2-Person Far	3-Person Far	4-Person Far	5-Person Far
End Time	0:11:28	0:11:33	0:10:55	0:11:48		0:13:37	0:12:23	0:11:54	0:12:04
Duration	0:02:34	0:02:58	0:02:46	0:03:09		0:02:45	0:02:04	0:01:41	0:02:44
Start Time	0:08:54	0:08:35	0:08:08	0:08:39		0:10:52	0:10:19	0:10:13	0:09:20

Figure 33: Times to Advance Backup Line by Crew Size and Stagger

Advancing a Backup Line

Advancing a backup line to the door and stairwell was started 16 % faster and completed 9 % for replicates with shorter staggers between company arrivals. Advancing a backup line is typically a task completed by the third arriving engine on a full alarm assignment and is critical to the safety of firefighters already in the building on the initial attack line. For this task, stagger of arrival was statistically significant and is an important consideration for overall station location and full alarm response capability. The differences can be seen in Figure 33, which shows the time from the start for the task "Deploy Backup Line" to the end of the task "Advance Backup Line."

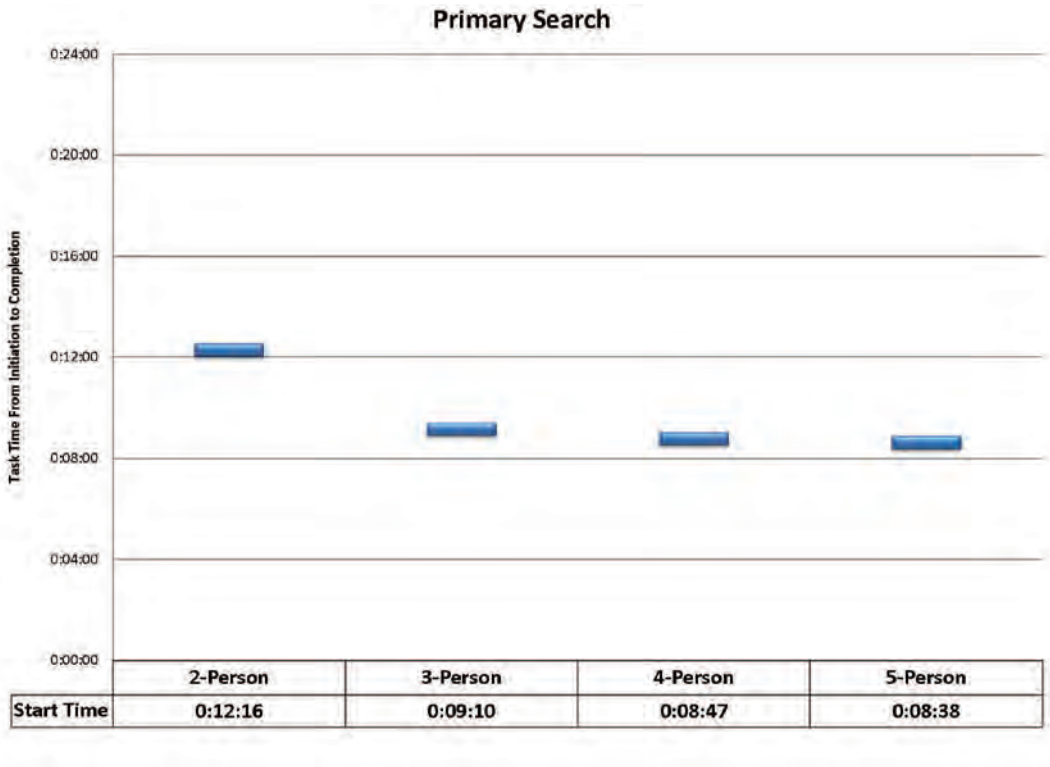
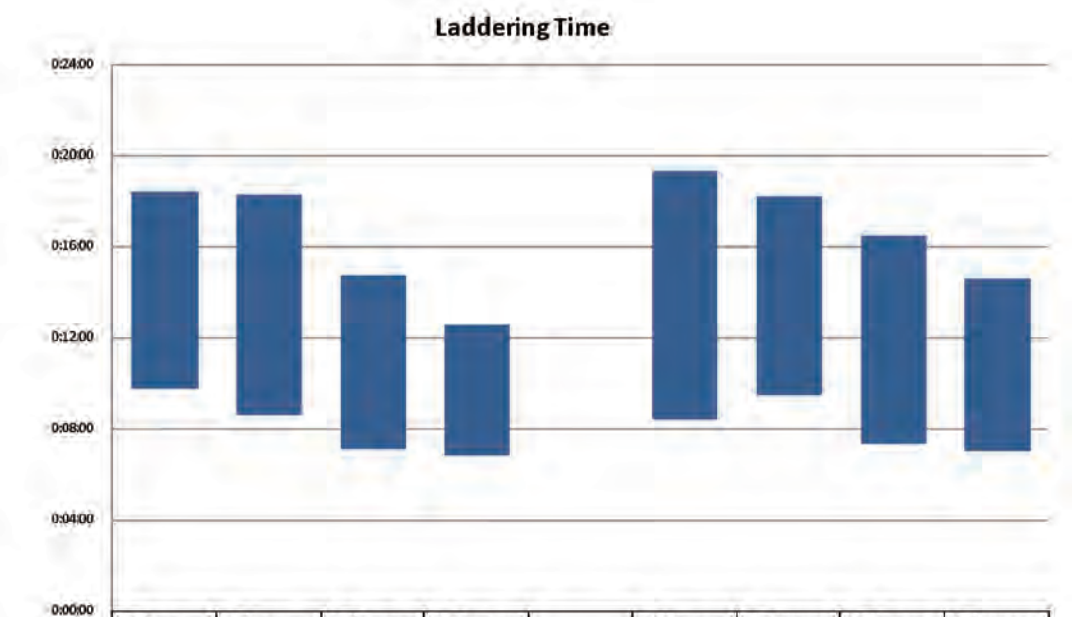


Figure 34: Times to Conduct Primary Search by Crew Size

14 Stagger was not significant, so data from close and far were combined to increase statistical power.

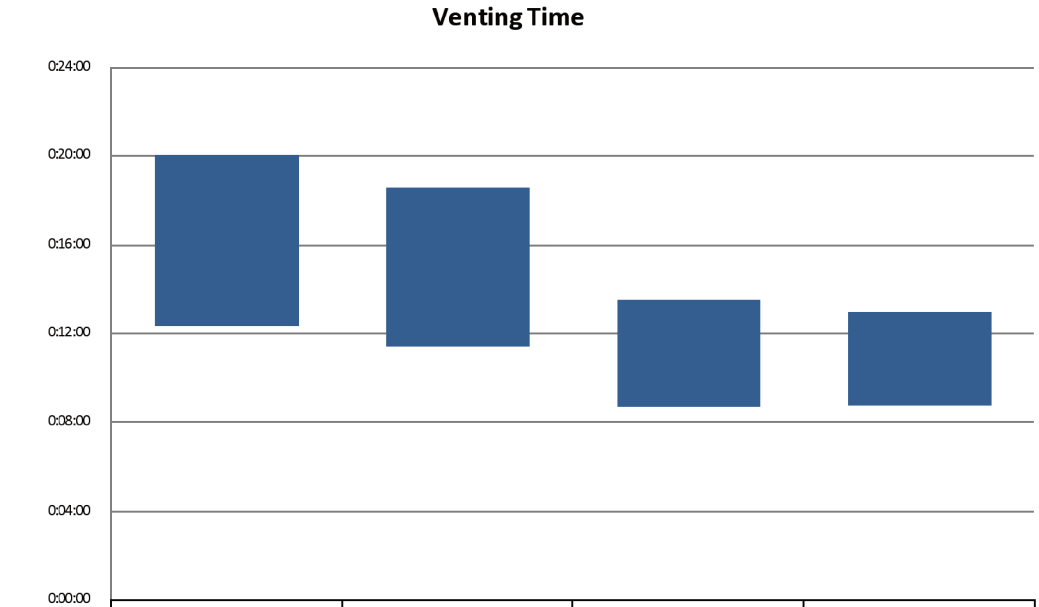


	2-Person Close	3-Person Close	4-Person Close	5-Person Close		2-Person Far	3-Person Far	4-Person Far	5-Person Far
End Time	0:18:24	0:18:19	0:14:45	0:12:34		0:19:23	0:18:12	0:16:29	0:14:38
Duration	0:08:31	0:09:35	0:07:31	0:05:40		0:10:51	0:08:40	0:09:03	0:07:31
Start Time	0:09:54	0:08:44	0:07:14	0:06:54		0:08:31	0:09:32	0:07:26	0:07:07

Figure 35: Laddering Time by Crew Size

Primary Search

Figure 34 summarizes the times that crews took to start the primary search. On the low-hazard, two-story single-family dwelling 2,000 sq ft (186 m^2) , the three-person crew started a primary search/rescue more than 25 % faster than the two-person crew. In the same structure, the four- and five-person crews started a primary search 6 % faster than the three-person crews and 30 % faster than the two-person crew. Note that there is no end time included in this figure. Primary search end times were reliant upon radio communication by firefighters inside the structure. On occasion this communication did not occur or was delayed. Therefore data reliability was insufficient for analysis of task duration and end time.[14]



	2-Person	3-Person	4-Person	5-Person
End Time	0:20:02	0:18:33	0:13:30	0:12:59
Duration	0:07:36	0:07:01	0:04:42	0:04:04
Start Time	0:12:26	0:11:32	0:08:48	0:08:55

Figure 36: Ventilation Times by Crew Size[15]

Laddering and Venting Time

A four-person crew operating on a low-hazard structure fire completed laddering and ventilation (for life safety and rescue) 30 % faster than a two-person crew and 25 % faster than a three-person crew.

Ground laddering time started with the removal of the first ladder from the truck and stopped at end time of the last ladder put in place. A total of four ladders were raised on each experiment.

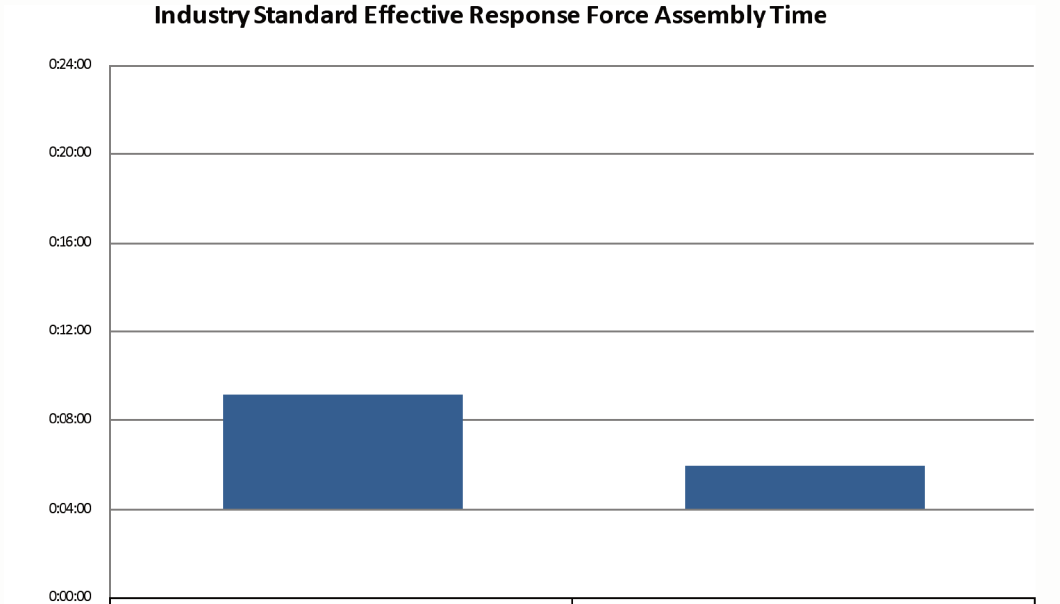
Truck operations ventilation time is the time from the start time of ventilation of the first window until the last window ventilation was complete.

The differences in start times and duration of the tasks can be seen in Figure 35 and Figure 36.

15 Stagger was not statistically significant, so the data for crew size were combined.

Industry Standard Effective Response Force Assembly Time

NFPA 1710 requires that a fire department have the capability to deploy an initial full-alarm assignment to a scene within eight-minutes (480 seconds). The number of people required falls between 15 and 17, depending on whether an aerial apparatus is used, and/or if two engines are being used to provide a continuous water supply. In these experiments, the measurement for an effective response force assembly time started from the first engine arrival at the hydrant and ended when 15 firefighters were assembled on scene. Figure 37 reveals the differences in assembly times between the four and five-person crews. An effective response force was assembled by the five-person crews a full three minutes faster than the four-person crews. It is important to note that (by definition), the two-and three-person crews were unable to meet this standard at any time during the experiments.[16]



	4-Person	5-Person
End Time	0:09:10	0:05:57
Duration	0:05:02	0:01:48
Start Time	0:04:09	0:04:09

Figure 37: Industry Standard Effective Response Force Assembly Time

16 Stagger was not statistically significant, so the data for far and near stagger were combined.

Part 4: Fire Modeling

In the room and contents experiments conducted in Part 3 of the study, instrumentation measured oxygen, carbon dioxide, and carbon monoxide concentrations. Data were grouped by the type of experiment conducted with respect to crew size and first due engine arrival time. As previously shown in the experimental matrix, each group contained two replicate tests. In each group of data the results of the replicates were averaged to simplify the data for further comparison. Figure 38 and Figure 39 show the typical concentration curves for the experiments.

These two graphs show the ranges representative of those found in the experiments. Charts of gas curves for the remainder of the experiments — for both the burn room and the target room — can be found in Appendix H.

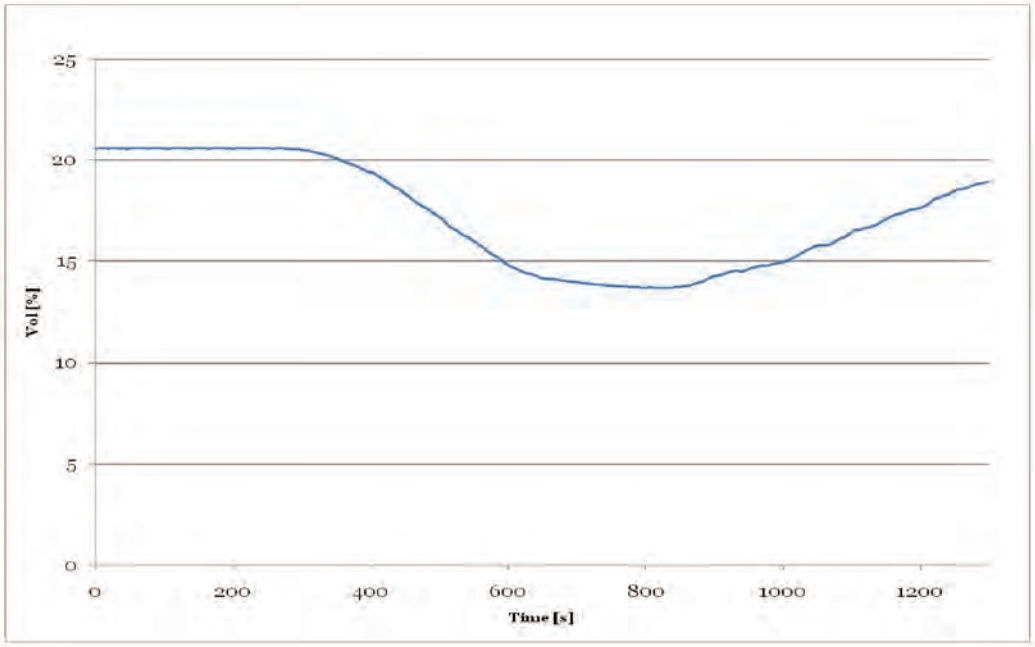


Figure 38: Representative Oxygen Concentration

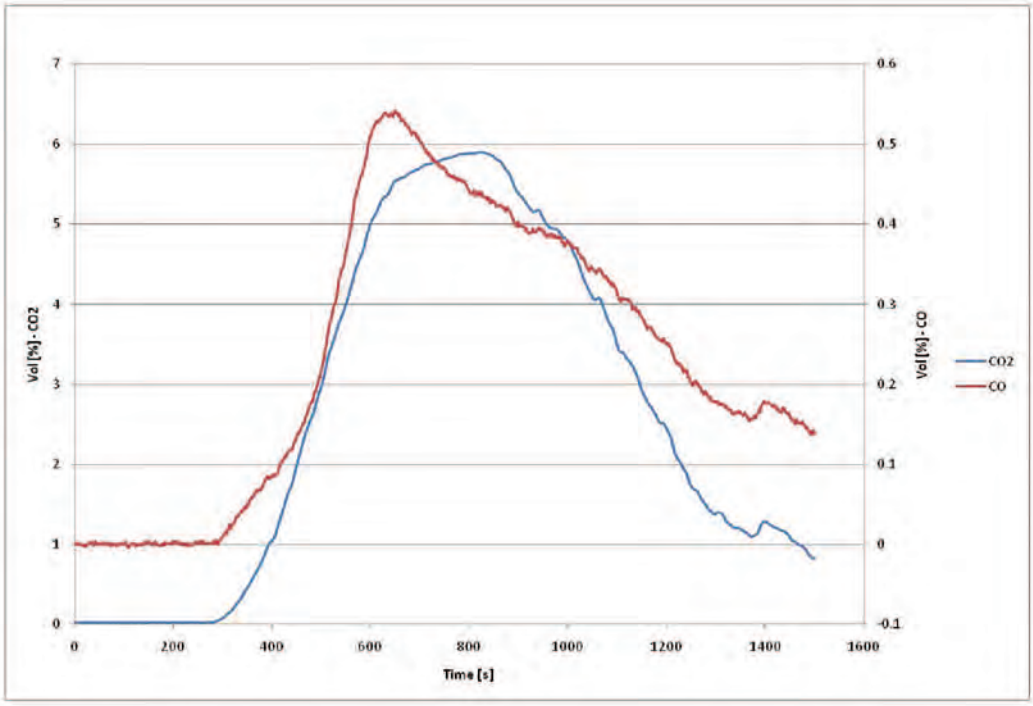


Figure 39: Representative Carbon Monoxide and Carbon Dioxide Concentrations

Fire Modeling Methods

A primary goal of fire department response is to prevent civilian injuries and deaths. Because the significant majority of fire deaths in the United States occur in residences, a rapid fire service response provides the last line-of-defense against civilian fire deaths. Further, because the fire service is less likely to rescue occupants intimate with the fire (i.e., inside the room of origin where conditions deteriorate rapidly), tenability measurements were taken in a remote bedroom on the second floor of the residential burn structure. The gas and temperature measurements were taken at the 5 ft (1.5 m) height above the floor, 3 ft (0.9 m) from the west wall in order to simulate a nonambulatory occupant (e.g, someone asleep, under the influence of alcohol or drugs, or otherwise mobility impaired).

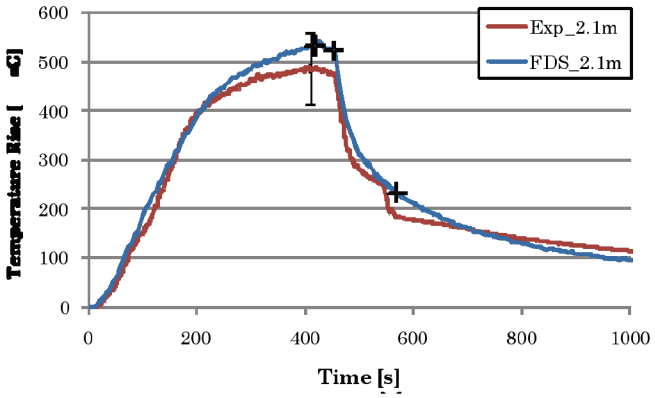


Figure 40: Measured vs. Predicted Temperature at the 2.1 m (6.9 ft) Thermocouple Location in the Burn Compartment

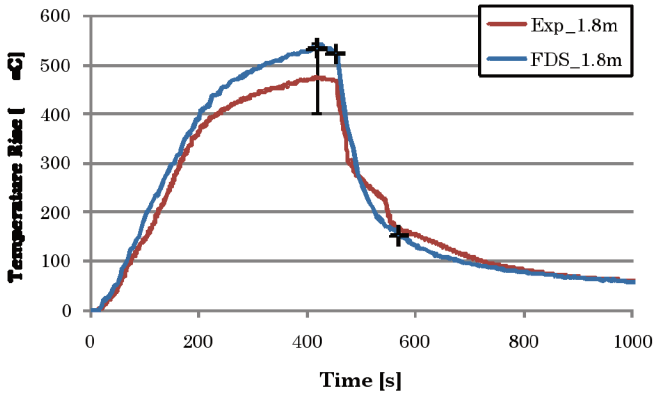


Figure 41: Measured vs. Predicted Temperature at the 1.8 m (5.9 ft) Thermocouple Location in the Burn Compartment

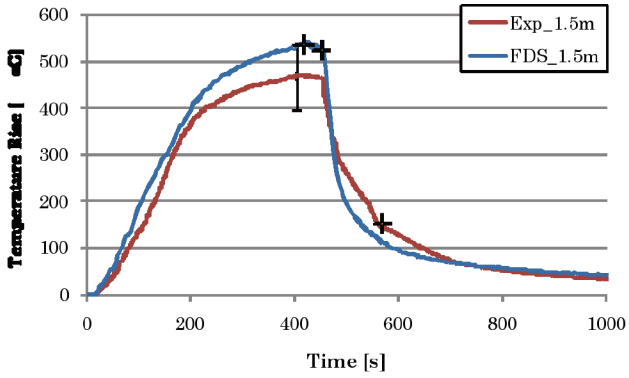


Figure 42: Measured vs. Predicted Temperature at the 1.5 m (4.9 ft) Thermocouple Location in the Burn Compartment

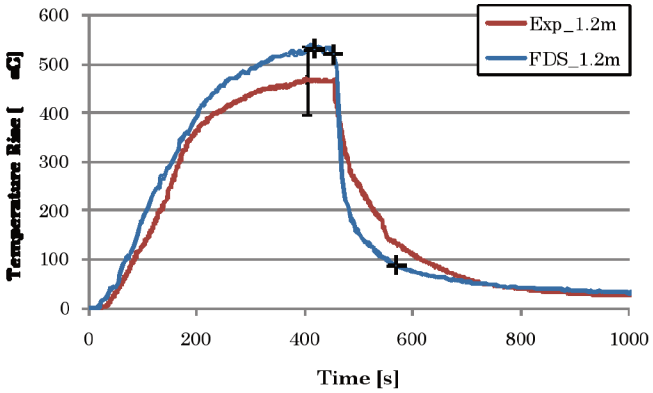


Figure 43: Measured vs. Predicted Temperature at the 1.2 m (3.9 ft) Thermocouple Location in the Burn Compartment

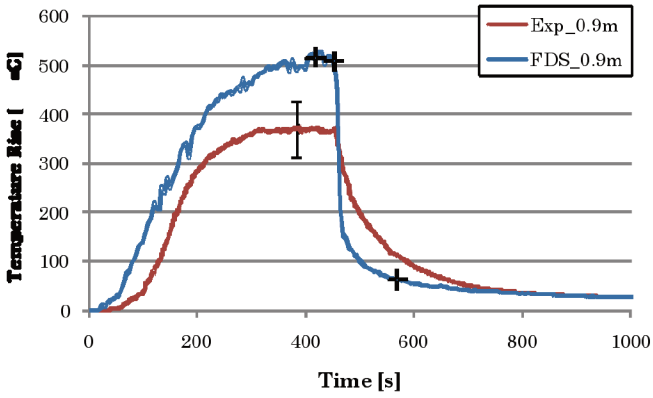


Figure 44: Measured vs. Predicted Temperature at the 0.9 m (2.9 ft) Thermocouple Location in the Burn Compartment

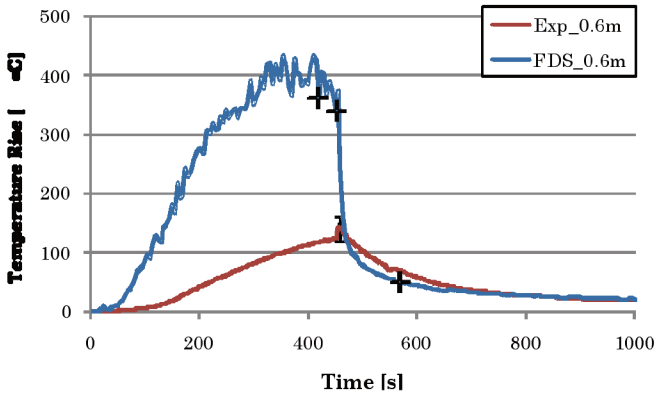


Figure 45: Measured vs. Predicted Temperature at the 0.6 m (1.9 ft) Thermocouple Location in the Burn Compartment

Computational fire models used the average suppression timings obtained from the time-to-task experiments under specific deployment configurations as inputs to the model. This quantitative approach eliminated the experimental variance of the fire. The resulting "computational" fire is repeatable, and therefore, any differences in occupant exposure to toxic gases will be due to the intervention times associated with a specific deployment configuration rather than the random variation that naturally occurs from fire to fire.

Fire simulations were completed using the NIST Fire Dynamics Simulator (FDS). FDS is a computational fluid dynamics model of fire-driven fluid flow. The first version of the FDS was released in 2000. FDS has been extensively verified and validated (USNRC 2007). Since the initial release, numerous improvements have been made and new features added. This study used FDS version 5.4.2 (Sub-version #4957), which was released on October 19, 2009. In order to calibrate the model, simulations were performed to replicate the experimental results observed in the

room-and-contents fires. Once the ability of the model to replicate experimental results was established, the different fire growth rates and deployment configurations were simulated to characterize the effectiveness of different responses relative to different fire growth rates.

The occupant exposure to toxic gases was assumed to occur until the occupant is rescued by the truck crew (start time of primary search plus one minute). Table 6 shows the "rescue time" for the various crew sizes that correspond to the test matrix for the room and contents experiments.

Part 4 of the experiments used fire modeling to correlate response times to atmospheric tenability in a burning structure. In order to calibrate the computer fire model, simulations were performed to replicate the experimental results observed in the room-and-contents fires. Model inputs include building geometry and material properties, ventilation paths (doors, windows, leakage paths), and heat release rate of the fuel package. While the building geometry is easily measured and material properties (such as the thermal properties of drywall and concrete) are readily estimated, the heat release rate was not directly measured during the experiments. The heat release rate of the fuel package is the primary determinant of the production rate of heat, smoke, and gas species (e.g., carbon dioxide, carbon monoxide).

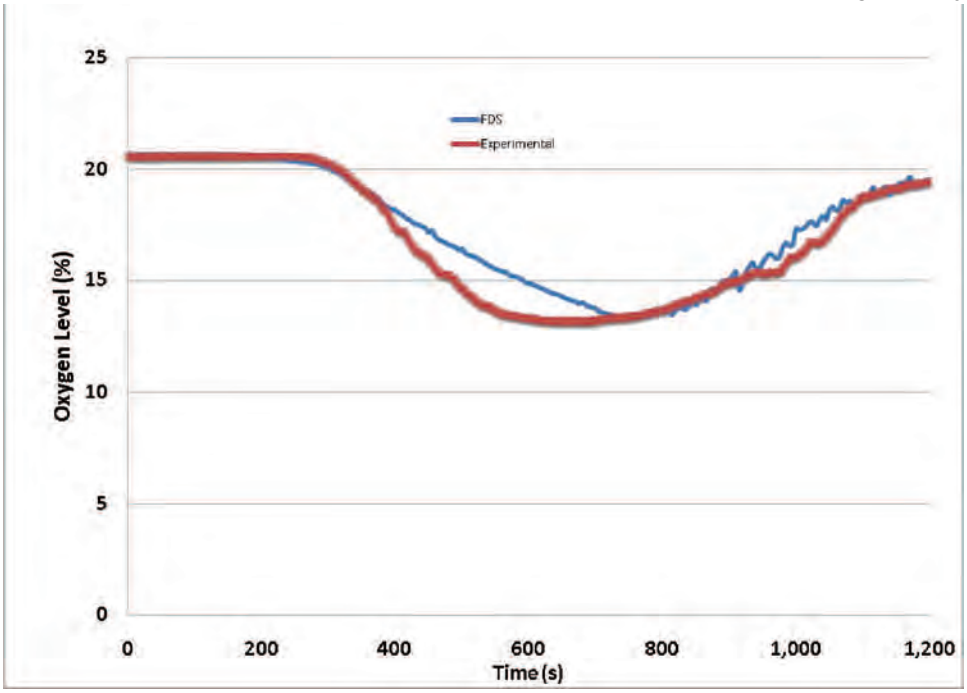


Figure 46: Measured Versus Predicted Oxygen Levels in the Upstairs Bedroom at 5 ft (1.5 m)

Figures 40 through 45 compare the experimental and simulated burn room temperatures using the burn room thermocouple tree. The tree contained thermocouples located at 0.6 m (1.9 ft), 0.9 m (2.9 ft), 1.2 m (3.9 ft), 1.5 m (4.9 ft), 1.8 m (5.9 ft), and 2.1 m (6.9 ft) above the floor. For additional information about the instrumentation type location, see Appendix C. The results for thermocouples located in the hot gas layer show excellent agreement. The temperature at the lower two thermocouples show an overprediction of the hot gas layer depth in the computer simulation. A small difference in the location of the interface height (the steep temperature gradient between the relatively cool lower gas layer and the hot upper gas layer), can result in significant predicted temperature differences with relatively little effect on the bulk heat and mass transport accuracy. This explanation is supported by the agreement of the temperatures in the remote bedroom.

Figure 46 compares the experimental and predicted oxygen concentration levels in the upstairs bedroom (measured at 5 ft (1.5 m) above the floor, centered above the bed). Figures 47 through 52 compare the experimental and simulated temperatures in the upstairs (target room) bedroom. As expected, the temperatures are moderated by mixing (cool ambient air mixes with hot combustion gases during transport between the burn room and the target room) and by thermal losses to the (cooler) surfaces between the two rooms.

Once the model inputs were determined to agree with the experimental results, the input heat release rate was changed to represent three fire growth rates representative of a range of fire hazard development – slow, medium, and fast, which are described in greater detail in the following sections.

Time to Untenable Conditions: Research Questions

In the real world, fires grow at many different rates – from very slow, smoldering fires all the way to ultra-fast, liquid fuel or spray fires. In order to extend the applicability of the findings of this report beyond the one fire growth rate observed in part 3 of this report (residential room and contents fires), computer fire modeling was used to quantify the effectiveness of fire department operations in response to an idealized range of fire growth rates (characterized as slow, medium, and fast). Based on the research questions shown in Figure 53, fire modeling methods were then selected to maximize the applicability of the times to task results.

1) How do performance times relate to fire growth as projected by standard fire time/temperature curves?

2) How do these performance times vary by crew size, first due arrival time, and stagger?

3) How do crew size, stagger, and arrival time affect occupant tenability within the structure?

Figure 53: Research Questions for Time to Untenable Conditions

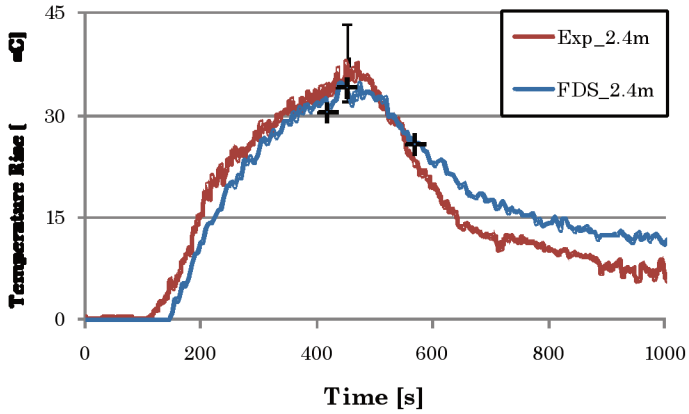


Figure 47: Measured vs. Predicted Temperature at the 2.4 m (7.8 ft) Thermocouple Location in the Bedroom

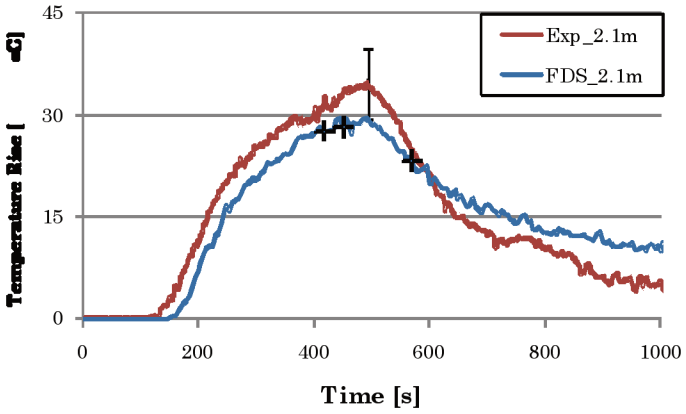


Figure 48: Measured vs. Predicted Temperature at the 2.1 m (6.8 ft) Thermocouple Location in the Bedroom

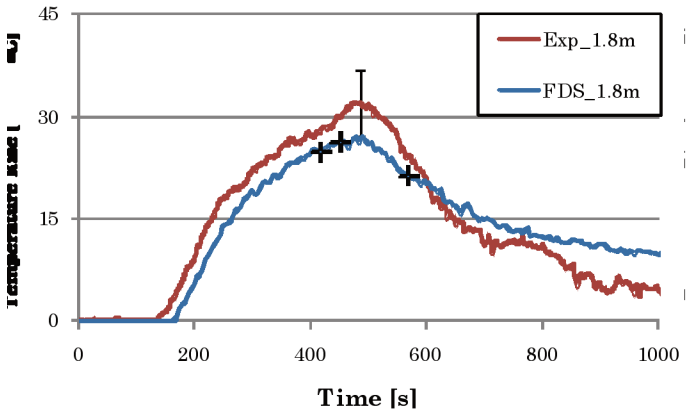


Figure 49: Measured vs. Predicted Temperature at the 1.8 m (5.9 ft) Thermocouple Location in the Bedroom

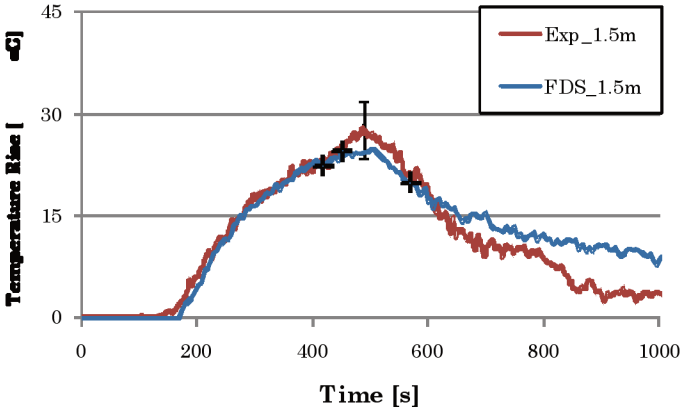


Figure 50: Measured vs. Predicted Temperature at the 1.5 m (4.9 ft) Thermocouple Location in the Bedroom

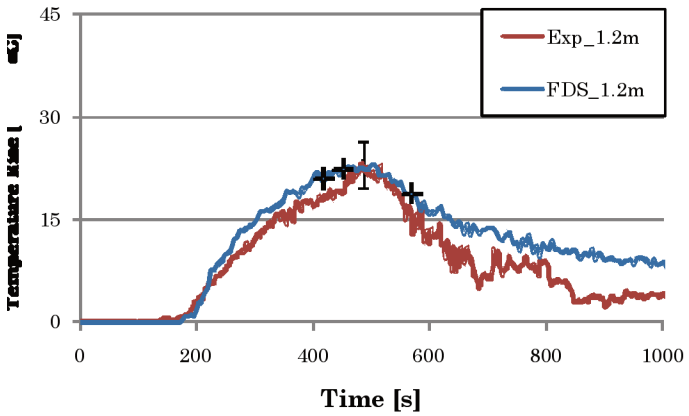


Figure 51: Measured vs. Predicted Temperature at the 1.2 m (3.9 ft) Thermocouple Location in the Bedroom

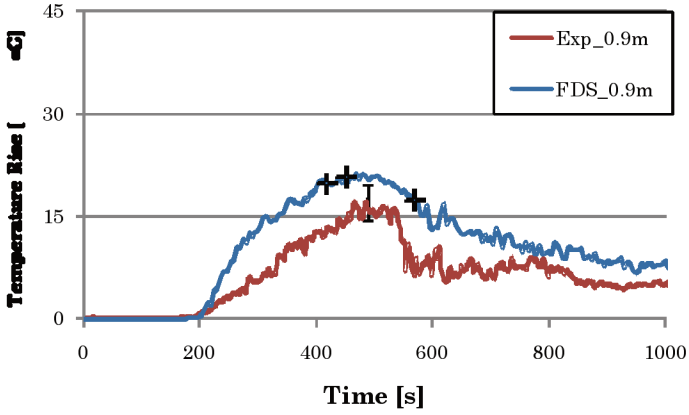


Figure 52: Measured vs. Predicted Temperature at the 0.9 m (2.9 ft) Thermocouple Location in the Bedroom

Fire Growth Rates

Three fire growth rates were used in the computer fire modeling to assess the effectiveness of different fire department deployment configurations in response to fires that were similar to, faster growing, and slower growing than the fires observed in the room-and-contents fires. The slow, medium, and fast fire growth rates are defined by the Society of Fire Protection Engineers according to the time at which they reach 1 megawatt (MW). A typical upholstered chair burning at its peak would produce a 1-MW fire, while a large sofa at its burning peak would produce roughly a 2-MW fire.

The growth rate of fires is often approximated by simple correlation of heat release rate to the square of time. If a fire is not suppressed before full-room involvement, the probability of spread beyond the room of origin increases dramatically if there is nearby fuel load to support fire spread. If a nearby fuel load is available, the 12 ft (3.7 m) by 16 ft (4.9 m) compartment used in the fire experiments would become fully involved at approximately 2 MW. Table 7 shows the time in seconds at which 1-MW and 2-MW (fully involved) fires in this compartment would be reached in the absence of suppression.

A fire department rescue operation is a race between the deteriorating interior conditions inside the structure and the rescue and suppression activities of the fire department. Each fire growth rate was used as a baseline heat release rate for the simulation. Intervention times (window and door opening times and suppression time) from the time-to-task tests were systematically input into the model to evaluate the effects on interior tenability conditions. The interior tenability conditions were calculated in a remote upstairs bedroom (above the room of fire origin on the first floor) in order to maximize the opportunity for differentiation among different crew configurations.

Fire Growth Rate	Time in Seconds Reach 1 MW	Time in Seconds to Reach to 2 MW
Slow	600	848
Medium	300	424
Fast	150	212

Table 7: Time to Reach 1 MW and 2 MW by Fire Growth Rate In the Absence of Suppression

Fractional Effective Dose (FED)

In order to convert instantaneous measurements of local gas conditions, the fractional effective dose (FED) formulation published by the International Standards Organization (ISO) in document 13571 *Life-threatening Components of Fire – Guidelines for the Estimation of Time Available for Escape Using Fire Data* (ISO 2007) were used. FED is a probabilistic estimate of the effects of toxic gases on humans exposed to fire effluent. The formulation used in the simulations accounts for carbon monoxide (CO), carbon dioxide (CO_2), and oxygen (O_2) depletion. Other gases, including hydrogen cyanide (HCN) and hydrogen chloride (HCl), were not accounted for in this analysis and may alter FED for an actual occupant.

$$FED = \sum_{i=1}^{n} \frac{C_i}{(C_t)_i} \Delta t \qquad \text{Eq.1}$$

Where C_i is the concentration of the ith gas and $(C_t)_i$ is the toxic concentration of ith gas and Δt is the time increment.

There are three FED thresholds generally representative of different exposure sensitivities of the general population. An FED value of 0.3 indicates the potential for certain sensitive populations to become incapacitated as a result of exposure to toxic combustion products. Sensitive populations may include elderly, young, or individuals with compromised immune systems. Incapacitation is the point at which occupants can no longer effect their own escape. An FED value of 1.0 represents the median incapacitating exposure. In other words, 50 % of the general population will be incapacitated at that exposure level. Finally, an FED value of 3.0 represents the value where occupants who are particularly tolerant of combustion gas exposure (extremely fit persons, for example) are likely to become incapacitated.

These thresholds are statistical probabilities, not exact measurements. There is variability in the way individuals respond to toxic atmospheric conditions. FED values above 2.0 are often fatal doses for so-called typical occupants. There is no threshold so low that it can be said to be safe for every exposed occupant.[17]

Deployment Configuration (All times with close stagger adjusted for early and late arrival of first due engine)	Rescue Time for Deployment Configuration (Min : Sec)
2-Person Early	12:47
3-Person Early	9:03
4-Person Early	9:10
5-Person Early	8:57
2-Person Late	14:47
3-Person Late	11:03
4-Person Late	11:10

Table 6: Rescue Time for Different Deployment Configurations

17 See the following sections of ISO Document 13571:
5.2 Given the scope of this Technical Specification, FED and/or FEC values of 1,0 are associated, by definition, with sublethal effects that would render occupants of average susceptibility incapable of effecting their own escape. The variability of human responses to toxicological insults is best represented by a distribution that takes into account varying susceptibility to the insult. Some people are more sensitive than the average, while others may be more resistant (see Annex A.1.5). The traditional approach in toxicology is to employ a safety factor to take into consideration the variability among humans, serving to protect the more susceptible subpopulations.
5.2.1 As an example, within the context of reasonable fire scenarios FED and/or FEC threshold criteria of 0,3 could be used for most general occupancies in order to provide for escape by the more sensitive subpopulations. However, the user of this Technical Specification has the flexibility to choose other FED and/or FEC threshold criteria as may be appropriate for chosen fire safety objectives. More conservative FED and/or FEC threshold criteria may be employed for those occupancies that are intended for use by especially susceptible subpopulations. By whatever rationale FED and FEC threshold criteria are chosen, a single value for both FED and FEC must be used in a given calculation of the time available for escape.

Results from Modeling Methods

Table 8 shows the FED for slow-, medium-, and fast-growth rate fires correlated to rescue times based on crew size and arrival time in the study. As with the room-and-contents fire in part 3, results in Table 8 included only the close-stagger rescue time data. The effect of far-stagger rescue times on occupant tenability should be investigated in future studies. Values above 0.3 are shown in yellow, and those above the median incapacitating exposure of 1.0 are shown in red.

Figure 54 shows that with slow-growth fires in the experimental residential structure, all crew configurations could achieve rescue time before FED reached incapacitating levels. Figure 55 illustrates the greater danger of medium-growth fires, where the FED at rescue time for two-person crews is well above the 0.3 level, and almost to that level for the other crews.

Figure 56 (page 49) vividly illustrates the extreme danger of fast-growth fires. By the time a two-person crew is able to facilitate a rescue, the FED has far exceeded the median 1.0 level. For other crew sizes, the FED has exceeded 0.3, which is a threshold level for vulnerable populations.

Crew Configuration	Rescue Time	Fire Growth Rates		
		Slow	Medium	Fast
2 Early	12:47	.12	.72	1.49
2 Late	14:47	.35	1.37	2.56
3 Early	9:03	.01	.11	.40
3 Late	11:03	.04	.36	.84
4 Early	9:10	.01	.11	.42
4 Late	11:10	.05	.38	.91
5 Early	8:57	.01	.10	.38

KEY	
White	89% or more of population may be capable of effecting their own escape if they are able.
Yellow	Potential for certain sensitive populations (such as children and the elderly) to become incapacitated.
Red	More than 50% of the population would be incapable of effecting their own escape.

Table 8: FED as a Function of Deployment Configuration and Fire Growth Rate

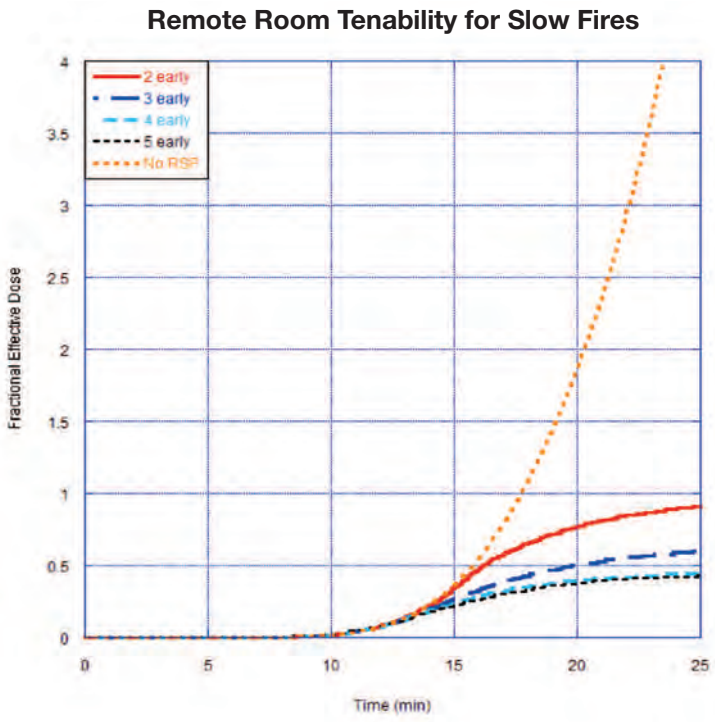


Figure 54: FED Curves for Early Arrival for All Crew Sizes at Slow-Growth Fires

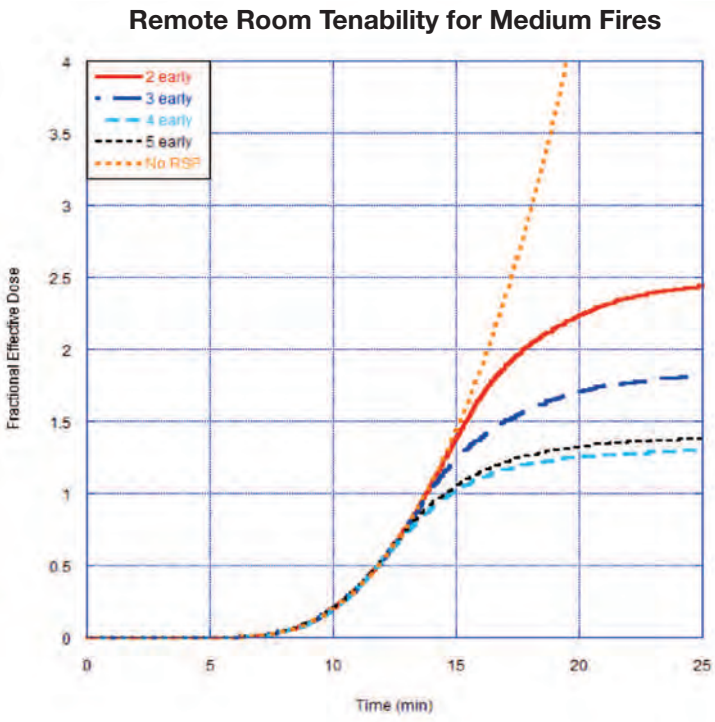


Figure 55: Average FED Curves for Early Arrival for All Crew Sizes at Medium-Growth Fires

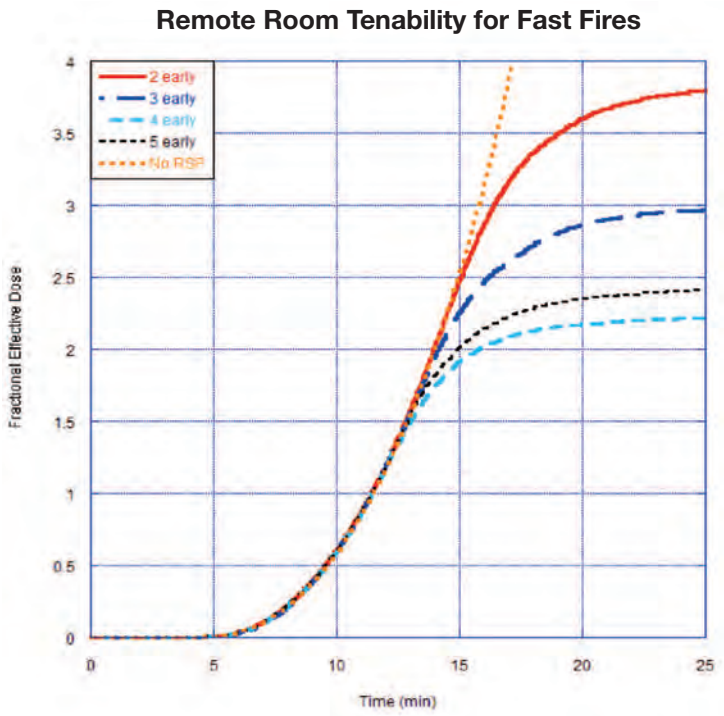


Figure 56: Average FED Curves for Early Arrival for All Crew Sizes at Fast-Growth Fires

Interior Firefighting Conditions and Deployment Configuration

The available time to control a fire can be quite small. Risks to firefighters are lower for smaller fires than larger fires because smaller fires are easier to suppress and produce less heat and fewer toxic gases. Therefore, firefighter deployment configurations that can attack fires earlier in the fire development process present lower risk to firefighters. The longer the duration of the fire development process without intervention, the greater the increase in risk for occupants and responding firefighters. Therefore, time is critical.

Stopping the escalation of the event involves firefighter intervention via critical tasks performed on the fireground. Critical tasks, as described previously, include those tasks that directly affect the spread of fire as well as the associated structural tenability.

There are windows of opportunity to complete critical tasks. A fire in a structure with a typical residential fuel load at six minutes post-ignition is very different from the same fire at eight minutes or at ten minutes post-ignition. Some tasks that are deemed "important" (e.g., scene size-up) for a fire in early stages of growth become critical if intervention tasks are delayed. Time can take away opportunities. If too much time passes, then the window of opportunity to affect successful outcomes (e.g., rescue victim or stop fire spread) closes.

For a typical structure fire event involving a fire department response, there is an incident commander on the scene who determines both the strategy and tactics that will be employed to stop the spread of the fire, rescue occupants, ventilate the structure, and ultimately extinguish the fire. Incident commanders must deal with the fire in the present and make intelligent command decisions based on the circumstances at hand upon arrival. Additionally, arrival time and crew size are factors that contribute to the incident commander's decisions and affect the capability of the firefighters to accomplish necessary tasks on scene in a safe, efficient, and effective manner.

Table 9 illustrates vividly the more dangerous conditions small crews face because of the extra time it takes to begin and complete critical tasks (particularly fire suppression). In the two minutes more it took for the two-person crew (early arrival) than the five-person crew (early arrival) to get water on the fire, a slow growth rate fire would have increased from 1.1 MW to 1.5 MW. This growth would have been even more extreme for a medium-or fast-growth rate fire. The difference is even more substantial for the two-person crew with late arrival as the fire almost doubled in size in the time difference between this crew and the five-person crew.

Based on fire modeling for the low hazard structure studied with a typical residential fuel load, it is likely that medium- and fast-growth rate fires will move beyond the room of origin prior to the arrival of firefighters for all crew sizes. Note that results in Table 8 included only the close-stagger rescue time data. The effect of far-stagger rescue times on occupant tenability should be investigated in future studies. Therefore, the risk level of the event upon arrival will be higher for all crews which must be considered by the incident commander when assigning firefighters to on-scene tasks.

Deployment Configuration	Time to Water on Fire (Min : Sec)	Fire Size at Time of Suppression for Slow-Growth Fires
2-Person, Late Arrival	14:26	2.1 MW
2-Person, Early Arrival	12:26	1.5 MW
3-Person, Late Arrival	13:24	1.8 MW
3-Person, Early Arrival	11:24	1.3 MW
4-Person, Late Arrival	13:11	1.7 MW
4-Person, Early Arrival	11:11	1.3 MW
5-Person, Late Arrival	12:33	1.6 MW
5-Person, Early Arrival	10:33	1.1 MW

Table 9: Fire Size at Time of Fire Suppression

Physiological Effects of Crew Size on Firefighters

Reports on firefighter fatalities consistently document overexertion/overstrain as the leading cause of line-of-duty fatalities. There is strong epidemiological evidence that heavy physical exertion can trigger sudden cardiac events (Mittleman et al. 1993; Albert et al. 2000). Therefore, information about the effect of crew size on physiological strain is very valuable.

During the planning of the fireground experiments, investigators at Skidmore College recognized the opportunity to conduct an independent study on the relationship between firefighter deployment configurations and firefighter heart rates. With the approval of the Institutional Review Board of Skidmore College, they were able to leverage the resources of the field experiments to conduct a separate analysis of the cardiac strain on fire fighters on the fireground.

For details, consult the complete report (Smith 2009). Two important conclusions from the report reinforce the importance of crew size:

- Average heart rates were higher for members of small crews, particularly two-person crews.
- Danger is increased for small crews because the stress of fire fighting keeps heart rates elevated beyond the maximum heart rate for the duration of a fire response, and so the higher heart rates were maintained for sustained time intervals.

Study Limitations

The scope of this study is limited to understanding the relative influence of deployment variables to low-hazard, residential structure fires, similar in magnitude to the hazards described in *NFPA 1710*. The applicability of the conclusions from this report to commercial structure fires, high-rise fires, outside fires, terrorism/natural disaster response, HAZMAT or other technical responses has not been assessed and should not be extrapolated from this report.

Every attempt was made to ensure the highest possible degree of realism in the experiments while complying with the requirements of *NFPA 1403*, but the dynamic environment on the fireground cannot be fully reproduced in a controlled experiment. For example, *NFPA 1403* required a daily walkthrough of the burn prop (including identifying the location of the fire) before ignition of a fire that would produce an Immediately Dangerous to Life and Health (IDLH) atmosphere, a precaution not available to responders dispatched to a live fire.

The number of responding apparatus for each fireground response was held constant (three engines and one truck, plus the battalion chief and aide) for all crew size configurations. The effect of deploying either more or fewer apparatus to the scene was not evaluated.

The fire crews who participated in the experiments typically operate using three-person and four-person staffing. Therefore, the effectiveness of the two-person and five-person operations may have been influenced by a lack of experience in operating at those staffing levels. Standardizing assigned tasks on the fireground was intended to minimize the impact of this factor, which has an unknown influence on the results.

The design of the experiments controlled for variance in performance of the incident commander. In other words, a more-or less-effective incident commander may have a significant influence on the outcome of a residential structure fire.

Although efforts were made to minimize the effect of learning across experiments, some participants took part in more than one experiment, and others did not.

The weather conditions for the experiments were moderate to cold. Frozen equipment such as hydrants and pumps was not a factor. However, the effect of very hot weather conditions on firefighter performance was not measured.

All experiments were conducted during the daylight hours. Nighttime operations could pose additional challenges.

Fire spread beyond the room of origin was not considered in the room and contents tests or in the fire modeling. Therefore, the size of the fire and the risk to the firefighter may be somewhat underestimated for fast-growing fires or slower-response configurations.

There is more than one effective way to perform many of the required tasks on the fireground. Attempts to generalize the results from these experiments to individual departments must take into account tactics and equipment that vary from those used in the experiments.

Conclusions

More than 60 laboratory and full-scale fire experiments were conducted to determine the impact of crew size, first-due engine arrival time, and subsequent apparatus arrival times on firefighter safety and effectiveness at a low-hazard residential structure fire. This report quantifies the effects of changes to staffing and arrival times for low-hazard residential firefighting operations. While resource deployment is addressed in the context of a single structure type and risk level, it is recognized that public policy decisions regarding the cost-benefit of specific deployment decisions are a function of many factors including geography, available resources, community expectations, as well as all local hazards and risks. Though this report contributes significant knowledge to community and fire service leaders in regard to effective resource deployment for fire suppression, other factors contributing to policy decisions are not addressed.

The objective of the experiments was to determine the relative effects of crew size, first-due engine arrival time, and stagger time for subsequent apparatus on the effectiveness of the firefighting crews relative to intervention times and the likelihood of occupant rescue using a parametric design. Therefore, the experimental results for each of these factors are discussed below.

Of the 22 fireground tasks measured during the experiments, the following were determined to have especially significant impact on the success of fire fighting operations. Their differential outcomes based on variation of crew size and/or apparatus arrival times are statistically significant at the 95 % confidence level or better.

Overall Scene Time:

The four-person crews operating on a low-hazard structure fire completed all the tasks on the fireground (on average) seven minutes faster — nearly 30 % — than the two-person crews. The four-person crews completed the same number of fireground tasks (on average) 5.1 minutes faster — nearly 25 % — than the three-person crew. For the low-hazard residential structure fire, adding a fifth person to the crews did not decrease overall fireground task times. However, it should be noted that the benefit of five-person crews has been documented in other evaluations to be significant for medium- and high-hazard structures, particularly in urban settings, and should be addressed according to industry standards.[18]

Time to Water on Fire:

There was a nearly 10 % difference in the "water on fire time" between the two and three-person crews and an additional 6 % difference in the "water on fire time" between the three- and four-person crews (i.e., 16 % difference between the four and two-person crews). There was an additional 6 % difference in the "water on fire'" time between the four- and five-person crews (i.e., 22 % difference between the five and two-person crews).

Ground Ladders and Ventilation:

The four-person crew operating on a low-hazard structure fire can complete laddering and ventilation (for life safety and rescue) 30 % faster than the two-person crew and 25 % faster than the three-person crew.

Primary Search:

The three-person crew started and completed a primary search and rescue 25 % faster than the two-person crew. In the same structure, the four- and five-person crews started and completed a primary search 6 % faster than the three-person crews and 30 % faster than the two-person crew. A 10 % difference was equivalent to just over one minute.

Hose Stretch Time:

In comparing four-and five-person crews to two-and three-person crews collectively, the time difference to stretch a line was 76 seconds. In conducting more specific analysis comparing all crew sizes to a two-person crew the differences are more distinct. A two-person crew took 57 seconds longer than a three-person crew to stretch a line. A two-person crew took 87 seconds longer than a four-person crew to complete the same tasks. Finally, the most notable comparison was between a two-person crew and a five-person crew — more than 2 minutes (122 seconds) difference in task completion time.

Industry Standard Achieved:

The "industry standard achieved" time started from the first engine arrival at the hydrant and ended when 15 firefighters were assembled on scene.[19] An effective response force was assembled by the five-person crews three minutes faster than the four-person crews. According to study deployment protocal, the two- and three-person crews were unable to assemble enough personnel to meet this standard.

Occupant Rescue:

Three different "standard" fires (slow-, medium-, and fast-growth rate) were simulated using the Fire Dynamics Simulator (FDS) model. The fires grew exponentially with time. The fire modeling simulations demonstrated that two-person, late arriving crews can face a fire that is twice the intensity of the fire faced by five-person, early arriving crews. The rescue scenario was based on a nonambulatory occupant in an upstairs bedroom with the bedroom door open.

Independent of fire size, there was a significant difference between the toxicity, expressed as fractional effective dose (FED), for occupants at the time of rescue depending on arrival times for all crew sizes. Occupants rescued by crews starting tasks two minutes earlier had lesser exposure to combustion products.

The fire modeling showed clearly that two-person crews cannot complete essential fireground tasks in time to rescue occupants without subjecting either firefighters or occupants to an increasingly hazardous atmosphere. Even for a slow-growth rate fire, the FED was approaching the level at which sensitive populations, such as children and the elderly are threatened. For a medium-growth rate fire with two-person crews, the FED was far above that threshold and approached the level affecting the median sensitivity in general population. For a fast-growth rate fire, the FED was well above the median level at which 50 % of the general population would be incapacitated. Larger crews responding to slow-growth rate fires can rescue most occupants prior to incapacitation along with early-arriving larger crews responding to medium-growth rate fires. The result for late-arriving (two minutes later than early-arriving) larger crews may result in a threat to sensitive populations for medium-growth rate fires." The new sentence is consistent with our previous description for two-person crews where we identify a threat to sensitive populations.. Statistical averages should not, however, mask the fact that there is no FED level so low that every occupant in every situation is safe.

18 NFPA Standard 1710 - A.5.2.4.2.1 …Other occupancies and structures in the community that present greater hazards should be addressed by additional fire fighter functions and additional responding personnel on the initial full alarm assignment.

19 NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. Section 5.2.1 – Fire Suppression Capability and Section 5.2.2 Staffing.

Summary:

The results of these field experiments contribute significant knowledge to the fire service industry. First, the results establish a technical basis for the effectiveness of company crew size and arrival time in *NFPA 1710*. The results also provide valid measures of total effective response force assembly on scene for fireground operations, as well as the expected performance of time-to-critical-task measures for a low-hazard structure fires. Additionally, the results provide tenability measures associated with the occupant exposure rates to the range of fires considered by the fire model.

Future Research

In order to realize a significant reduction in firefighter line-of-duty death (LODD) and injury, fire service leaders must focus directly on resource allocation and the deployment of resources, both contributing factors to LODD and injury. Future research should use similar methods to evaluate firefighter resource deployment to fires in medium- and high-hazard structures, including multiple-family residences and commercial properties. Additionally, resource deployment to multiple-casualty disasters or terrorism events should be studied to provide insight into levels of risks specific to individual communities and to recommend resource deployment proportionate to such risk. Future studies should continue to investigate the effects of resource deployment on the safety of both firefighters and the civilian population to better inform public policy.

Acknowledgements

A project of this magnitude extends significantly beyond the capabilities and expertise of the report authors. The following individuals were instrumental in the success of the experiments:

- Technical Experts — Dennis Compton, Retired Chief from Mesa, AZ and consultant, IFSTA; Russell Sanders, Retired Chief from Louisville, KY and staff, NFPA; William "Shorty" Bryson, Retired Chief of Miami, FL and Past President of Metropolitan Fire Chiefs; David Rohr, Operations Chief from Fairfax County Fire and Rescue; Richard Bowers, Chief from Montgomery County Fire and Rescue Department; Vincent Dunn, Retired from Fire Department of New York; Michael Clemens, Chief of Training from Montgomery County Fire and Rescue Department; James Walsh, Battalion Chief from Fairfax County Fire and Rescue; Larry Jenkins, Captain I from Fairfax County Fire and Rescue; Doug Hinkle, Training Captain from Montgomery County Fire and Rescue Department; and Paul Neal, Safety Officer for Montgomery County Fire and Rescue Department.

- Montgomery County Fire Department – Former Chief Tom Carr and Chief Richard Bowers — AND Fairfax County Fire and Rescue Services — Chief Ronald Mastin for supporting this study over a period of years to an unprecedented degree.

- NIST experimental and modeling personnel - Michael Selepak, Roy McLane, Anthony Chakalis, Andrew Lock, Marco Fernandez, Ed Hnetkovsky, Jay McElroy, Lauren DeLauter, Glenn Forney, Dan Murphy, and Craig van Norman.

- IAFF Staff/ Data Entry/ Timer Supervision/Heart Rate Monitors– Nicole Taylor, Randy Goldstein, and Ron Benedict

- Skidmore College – Denise Smith and Polar Heart Rate Monitors for supplemental study to bolster the significance of the main study results.

- Timers — DeWayne Dutrow — Lead, Cliff Berner, Michael Fleming, Colby Poore, Chris Maple, Michael Thornton, Robert Daley, Ryan Loher

- Montgomery County Support Services — Joey Fuller III — Lead, Chris Hinkle, Doug Dyer, Joey Fuller IV

- The dedicated Fire Officers and Firefighters from Montgomery County Fire & Rescue and Fairfax County Fire & Rescue, who performed the difficult work of structural fire fighting safely and courageously.

References

- Albert CM, Mittleman MA, Chae CU, Lee IM, Hennekens CH, Manson JE (2000). Triggering of sudden death from cardiac causes by vigorous exertion. N Engl J Med 343(19):1355-1361.
- Backoff, R. W.; et al. (1980). Firefighter Effectiveness - A Preliminary Report. Columbus Fire Division, The Ohio State University.
- Barnard RJ, Duncan HW [1975]. Heart rate and ECG responses of firefighters. J Occup Med 17: 247-250.
- Blevins, L. G. and Pitts, W. M. (1999). Modeling of Bare and Aspirated Thermocouples in Compartment Fires. Fire Safety Journal, Vol. 33, 239-259.
- Bryant, R. A., et al. (2004). The NIST 3 Megawatt Quantitative Heat Release Rate Facility - Description and Procedure. Natl. Inst. Stand. Technol. NIST IR 7052
- Centaur Associates. (1982). Report on the Survey of Fire Suppression Crew Size Practices.
- Center for Public Safety Excellence. (2008.) CFAI: STANDARDS OF COVER, FIFTH EDITION. Chantilly, Va.
- Center for Public Safety Excellence. (2009.) FIRE & EMERGENCY SERVICE SELF-ASSESSMENT MANUAL. Chantilly, VA.
- Chang, C. Huang, H. (2005). A Water Requirements Estimation Model for Fire Suppression: A Study Based on Integrated Uncertainty Analysis, Fire Technology, Vol. 41, NO. 1, Pg. 5.
- Coleman, Ronny J. (1988). MANAGING FIRE SERVICES, 2nd Edition, International City/County Management Association, Washington, DC.
- Cushman, J. (1982). Report to Executive Board, Minimum Manning as Health & Safety Issue. Seattle, WA Fire Department, Seattle, WA.
- Gerard, J.C. and Jacobsen, A.T. (1981). Reduced Staffing: At What Cost?, Fire Service Today, Pg. 15.
- Fahy R (2005). U.S. Firefighter Fatalities Due to Sudden Cardiac Death 1995-2004. NFPA Journal. 99(4): 44-47.
- Hall, John R. Jr. (2006). U.S Unintentional Fire Death Rates by State. National Fire Protection Association, Quincy, MA.
- Huggett, C. (1980). Estimation of the Rate of Heat Release by Means of Oxygen Consumption. J. of Fire and Flammability, Vol. 12, pp. 61-65.
- International Association of Fire Fighters/John's Hopkins University. (1991). "Analysis of Fire Fighter Injuries and Minimum Staffing Per Piece of Apparatus in Cities With Populations of 150,000 or More," December 1991.
- ISO (2007). ISO 13571: Life-threatening Components of Fire — Guidelines for the Estimation of Time Available for Escape Using Fire Data, International Standards Organization, Geneva.
- Janssens, M. L. (1991). Measuring Rate of Heat Release by Oxygen Consumption., Fire Technology, Vol. 27, pp. 234-249.
- Jones, W. W. (2000). Forney, G. P.; Peacock, R. D.; Reneke, P. A. Technical Reference for CFAST: An Engineering Tool for Estimating Fire and Smoke Transport. National Institute of Standards and Technology, Gaithersburg, MD. NIST TN 1431; 190 p. March 2000.
- Karter, M.J. Jr. (2008). U.S. Fire Loss for 2007. NFPA Journal, September/October 2008.
- McGrattan, K. B. (2006). Fire Dynamics Simulator (Version 4): Technical Reference Guide. NIST Gaithersburg, MD. NIST SP 1018; NIST Special Publication 1018; 109 p. March 2006.
- McManis Associates and John T. O'Hagan and Associates (1984). "Dallas Fire Department Staffing Level Study," June 1984; pp. I-2 & II-1 through II-7.
- Menker, W.K. (1994). Predicting Effectiveness of Manual Suppression, MS Thesis, Worcester Polytechnic Institute.
- Metro Chiefs/International Association of Fire Chiefs (1992) "Metro Fire Chiefs - Minimum Staffing Position," May 1992.
- Mittleman MA, Maclure M, Tofler GH, Sherwood JB, Goldberg RJ, Muller JE (1993). Triggering of acute myocardial infarction by heavy physical exertion. N Engl J Med 329(23):1677–1683.
- Morrison, R. C. (1990). Manning Levels for Engine and Ladder Companies in Small Fire Departments National Fire Academy, Emmitsburg, MD.
- NFA (1981). Fire Engines are Becoming Expensive Taxi Cabs: Inadequate Manning. National Fire Academy, United States Fire Administration, Emmitsburg, MD.
- NFPA (2007). NFPA 1403: Standard on Live Fire Training Evolutions. National Fire Protection Association, Quincy, MA.
- NFPA (2004). NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. National Fire Protection Association, Quincy, MA.
- NFPA (2008). Fire Protection Handbook, 20th Edition. National Fire Protection Association, Quincy, MA.

- Office of the Fire Marshal of Ontario. (1993). Fire Ground Staffing and Delivery Systems Within a Comprehensive Fire Safety Effectiveness Model. Ministry of the Solicitor General, Toronto, Ontario, Canada.
- Omega Engineering, Inc. (2004). The Temperature Handbook. 5th Edition.
- Parker, W. J. (1984). Calculations of the Heat Release Rate by Oxygen-Consumption for Various Applications., Journal of Fire Sciences, Vol. 4, pp. 380-395.
- Phoenix, AZ Fire Department," Fire Department Evaluation System (FIREDAP)," December 1991; p. 1.
- Purser, D. (2002). "Toxicity Assessment of Combustion Products." In The SFPE Handbook of Fire Protection Engineering, 3rd Edition. DiNenno (Editor). National Fire Protection Association, Quincy, MA.
- Rand Institute. (1978). Fire Severity and Response Distance: Initial Findings. Santa Monica, CA.Roberts, B.
- Romet TT, Frim J (1987). Physiological responses to firefighting activities. Eur J Appl Physiol 56: 633-638.
- Sardqvist, S; Holmsted, G., Correlation Between Firefighting Operation and Fire Area: Analysis of Statistics, Fire Technology, Vol. 36, No. 2, Pg. 109, 2000
- Smith DL, Petruzzello SJ, Kramer JM, Warner SE, Bone BG, Misner JE (1995). Selected physiological and psychobiological responses of physical activity in different configurations of firefighting gear. Ergonomics 38(10): 2065-2077
- Smith, D. Effect of Deployment of Resources on Cardiovascular Strain of Firefighters." DHS, 2009.
- Thornton, W. (1917). The Relation of Oxygen to the Heat of Combustion of Organic Compounds., Philosophical Magazine and J. of Science, Vol. 33.
- TriData Corporation. The Economic Consequences of Firefighter Injuries and Their Prevention, Final Report. National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD. 2005.
- USFA (2002). Firefighter Fatality Retrospective Study. United States Fire Administration
- USFA (2008). Fatal Fires, Vol. 5-Issue 1, March 2005. USFA, Firefighter Fatalities in the United States in 2007. June 2008. Prepared by C2 Technologies, Inc., for U.S. Fire Administration, Contract Number EME-2003-CO-0282.
- USNRC (2007). Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications. Volume 2: Experimental Uncertainty. Washington, DC : United States Nuclear Regulatory Commission. 1824.

APPENDIX A: Laboratory Experiments

The fire suppression and resource deployment experiments consisted of four distinct parts: laboratory experiments, time-to-task experiments, room and contents experiments and fire modeling. The purpose of the laboratory experiments was to assure a fire in the field experiments that would consistently meet *NFPA 1403* requirements for live fire training exercises. The laboratory experiments enabled investigators to characterize the burning behavior of the wood pallets as a function of:

- number of pallets and the subsequent peak heat release rate
- compartment effects on burning of wood pallets
- effect of window ventilation on the fire
- effect on fire growth rate of the loading configuration of excelsior (slender wood shavings typically used as packing material)

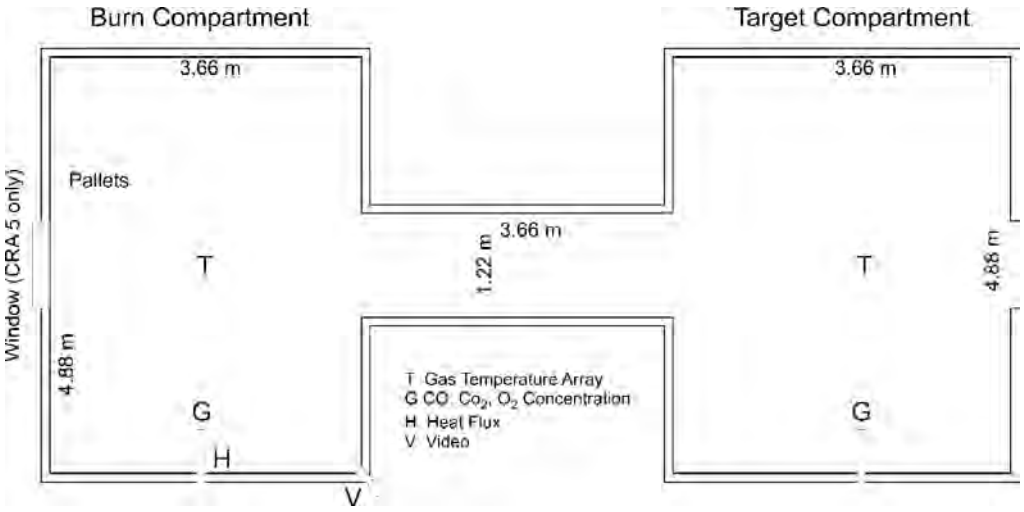


Figure A-1. Compartment Configuration and Instrumentation for Pallet Tests

Design and Construction

Figure A-1 shows the experimental configuration for the compartment pallet burns. Two identically sized compartments (3.66 m x 4.88 m x 2.44 m) were connected by a hallway (4 m x 1 m x 2.4 m). At each end of the hallway, a single door connected the hallway to each of the compartments. In the burn compartment, a single window (3 m x 2 m) was covered with noncombustible board that was opened for some experiments and closed for others. At the end of test, it was opened to extinguish the remaining burning material and to remove any debris prior to the next test. In the second compartment, a single doorway connected the compartment to the rest of the test laboratory. It was kept open throughout the tests allowing the exhaust to flow into the main collection hood for measurement of heat release rate.

The structure was constructed of two layer of gypsum wallboard over steel studs. The floor of the structure was lined with two layers of gypsum wallboard directly over the concrete floor of the test facility. In the burn compartment, an additional lining of cement board was placed over the gypsum walls and ceiling surfaces near the fire source to minimize fire damage to the structure after multiple fire experiments. A doorway 0.91 m wide by 1.92 m tall connected the burn compartment to the hallway and an opening 1 m by 2 m connected the hallway to the target compartment. Ceiling height was 2.41 m throughout the structure, except for the slight variation in the burn room.

Fuel Source

The fuel source for all of the tests was recycled hardwood pallets constructed of several lengths of hardwood boards nominally 83 mm wide by 12.7 mm thick. Lengths of the individual boards ranged from nominally 1 m to 1.3 m. The finished size of a single pallet was approximately 1 m by 1.3 m by 0.11 m. **Figure A-2** shows the fuel source for one of the tests including six stacked pallets and excelsior ignition source. For an ignition source, excelsior was placed within the pallets, with the amount and location depending on the ignition scenario. Figure A-3 shows the pallets prior to a slow and a fast ignition scenario fire. Table A-1 details the total mass of pallets and excelsior for each of the free burn and compartment tests.

Experimental Conditions

The experiments were conducted in two series. In the first series, heat release measurements were made under free burn conditions beneath a 6 m by 6 m hood used to collect combustion gases and provide the heat release rate (HRR) measurement. A second series of tests was conducted with the fire in a compartmented structure to assess environmental conditions within the structure during the fires and determine the effect of the compartment enclosure on the fire growth. Table A-1 presents a summary of the tests conducted.



Figure A-2. Pallets and Excelsior Ignition Source Used as a Fuel Source

Table A-1. Tests Conducted and Ambient Conditions at Beginning of Each Test

Test	Test Type	Number of Pallets	Ignition Scenario	Total Pallet Mass (kg)	Excelsior Mass (kg)
PAL 1	Free burn	4	Fast	79.3	8.1
PAL 2	Free burn	6	Fast	118.8	15.1
PAL 3	Free burn	8	Fast	146.7	16.2
PAL 4	Free burn	4	Slow	51.0	1.65
PAL 5	Free burn	6	Slow	160.3	0.85
CRA 1	Compartment	6	Slow	114.0	0.83
CRA 2	Compartment	4	Slow	69.7	
CRA 3	Compartment	4	Fast	71.1	0.8
CRA 4	Compartment	4	Slow	73.9	0.83
CRA 5	Compartment	4	Slow	73.8	0.85

Notes: PAL stands for "pallet" and CRA ("Community Risk Assessment") is the designator for the configuration of pallets burned in the compartment. Efforts were made to use the same amount of excelsior mass for CRA 2 (~0.8 kg), but the value was not measured.



Figure A-3. Fuel and Excelsior Source for Slow (top) and Fast (bottom) Ignition Scenarios

Measurements Conducted

Heat release rate (HRR) was measured in all tests. HRR measurements were conducted under the 3 m by 3 m calorimeter at the NIST Large Fire Research Laboratory. The HRR measurement was based on the oxygen consumption calorimetry principle first proposed by Thornton (Thornton 1917) and developed further by Huggett (Huggett 1980) and Parker (Parker 1984). This method assumes that a known amount of heat is released for each gram of oxygen consumed by a fire. The measurement of exhaust flow velocity and gas volume fractions (O_2, CO_2 and CO) were used to determine the HRR based on the formulation derived by Parker (Parker 1984) and Janssens (Janssens 1981). The combined expanded relative uncertainty of the HRR measurements was estimated at ± 14 %, based on a propagation of uncertainty analysis (Bryant 2004).

For the compartment fire tests, gas temperature measurements were made in the burn compartment and in the target compartment connected by a hallway to the burn compartment using 24 gauge bare-bead chromel-alumel (type K) thermocouples positioned in vertical array. Thermocouples were located at the center of each compartment at locations 0.03 m, 0.30 m, 0.61 m, 0.91 m, 1.22 m, 1.52 m, 1.83 m, and 2.13 m from the ceiling. The expanded uncertainty associated with a type K thermocouple is approximately ± 4.4° C. (Omega 2004)

Gas species were continuously monitored in the burn compartment at a level 0.91 m from the ceiling at a location centered on the side wall of the compartment, 0.91 m from the wall. Oxygen was measured using paramagnetic analyzers. Carbon monoxide and carbon dioxide were measured using non-dispersive infrared (NDIR) analyzers. All analyzers were calibrated with nitrogen and a known concentration of gas prior to each test for a zero and span concentration calibration. The expanded relative uncertainty of each of the span gas molar fractions is estimated to be ± 1 %.

Total heat flux was measured on the side wall of the enclosure at a location centered on the side wall, 0.61 m from the ceiling level. The heat flux gauges were 6.4 mm diameter Schmidt-Boelter type, water cooled gauges with embedded type-K thermocouples (see Figure A-4). The manufacturer reports a ± 3 % expanded uncertainty in the response calibration (the slope in kW/m²/mV). Calibrations at the NIST facility have varied within an additional ± 3 % of manufacturer's calibration. For this study, an uncertainty of ± 6 % is estimated.



Figure A-4: Heat Flux Gauge with Radiation Shielding

Test	Test Type	Number of Pallets	Ignition Scenario	Peak HRR (kW)	Time to Peak HRR (s)
PAL 1	Free burn	4	Fast	2144	205
PAL 2	Free burn	6	Fast	2961	320
PAL 3	Free burn	8	Fast	3551	301
PAL 4	Free burn	4	Slow	1889	385
PAL 5	Free burn	6	Slow	2410	986
CRA 1	Compartment	6	Slow	1705	1102
CRA 2	Compartment	4	Slow	1583	649
CRA 3	Compartment	4	Fast	1959	159
CRA 4	Compartment	4	Slow	1620	775
CRA 5	Compartment	4	Slow	1390	927

Table A-2. Peak Heat Release Rate During Several Pallet Tests in Free-burn and in a Compartment

Results

Table A-2 shows the peak HRR and time to peak HRR for the free burn tests and for the compartment tests. Figure A-5 includes images from the free burn experiments near the time of peak HRR for each of the experiments. Figure A-6 illustrates the progression of the fire from the exit doorway looking down the hallway to the burn compartment for one of the tests. Figure A-7 to Figure A-10 present graphs of the heat release rate for all of the tests. Figure A-11 through Figure A-15 shows the gas temperature, major gas species concentrations, and heat flux in the burn compartment and target compartment in the five compartment tests.

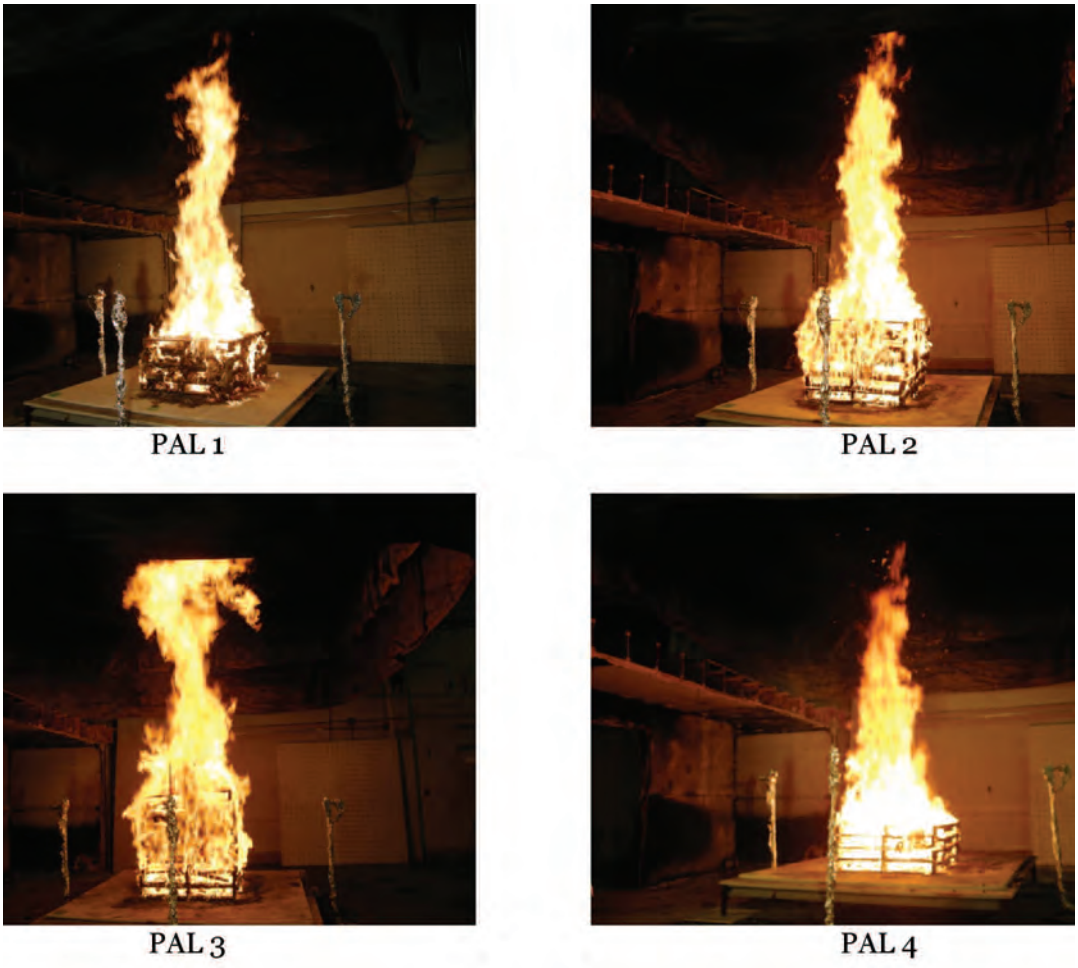


Figure A-5. Free-Burn Experiments Near Time of Peak Burning



Figure A-6. Example Fire Progression from Test CRA 1

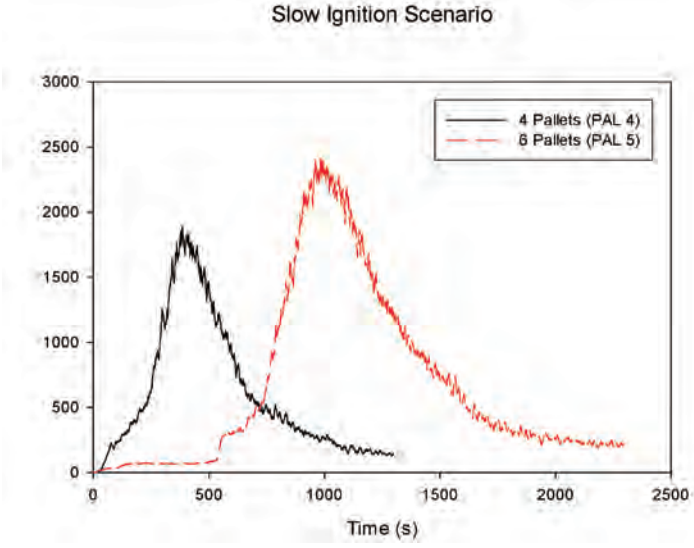


Figure A-7. HRR, Slow Ignition, Free Burn Scenario

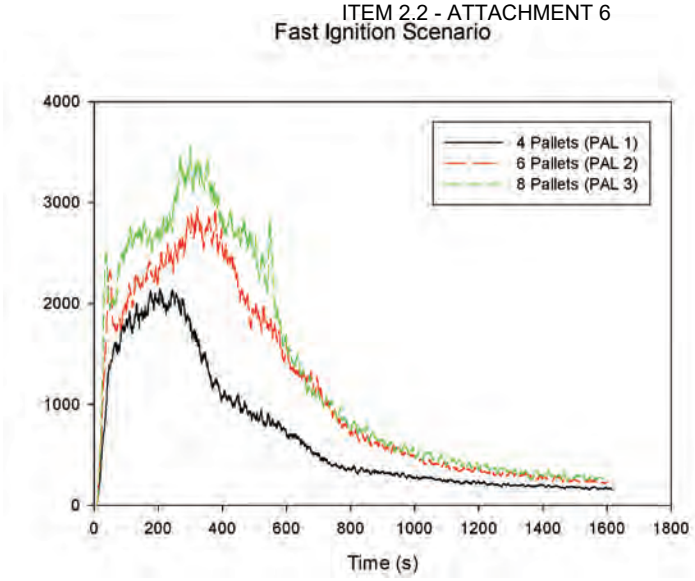


Figure A-8. HRR, Fast Igntion, Free Burn Scenario

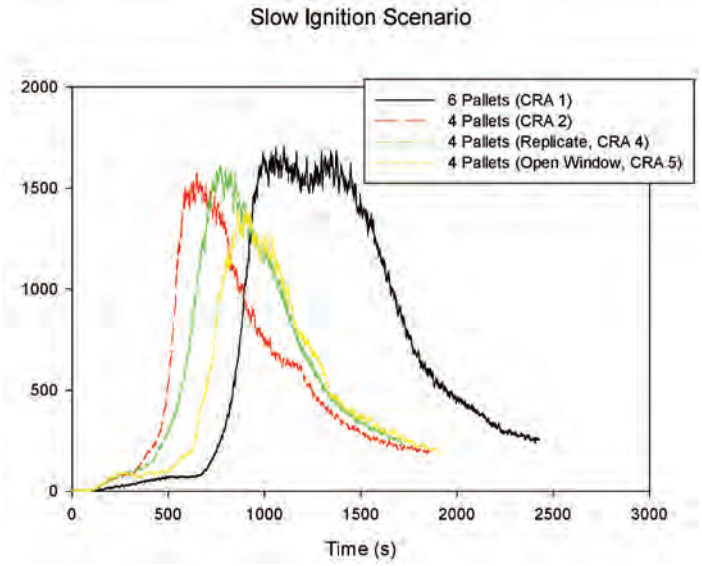


Figure A-9. HRR, Slow Ignition, Compartment Test

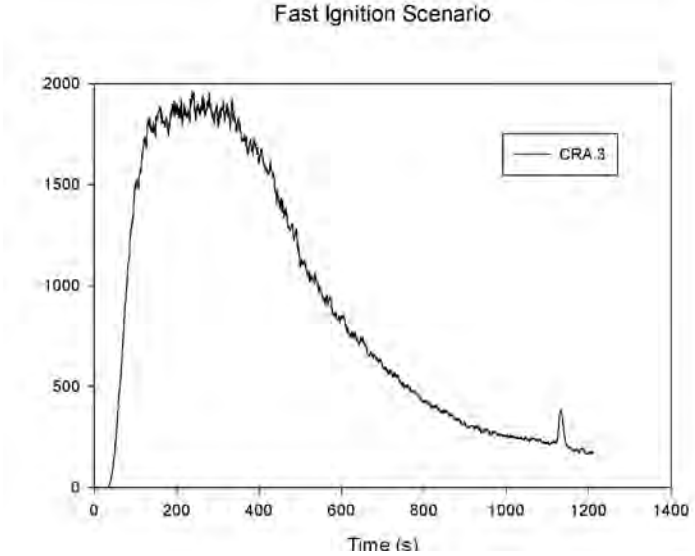


Figure A-10. HRR, Fast Ignition, Compartment Test

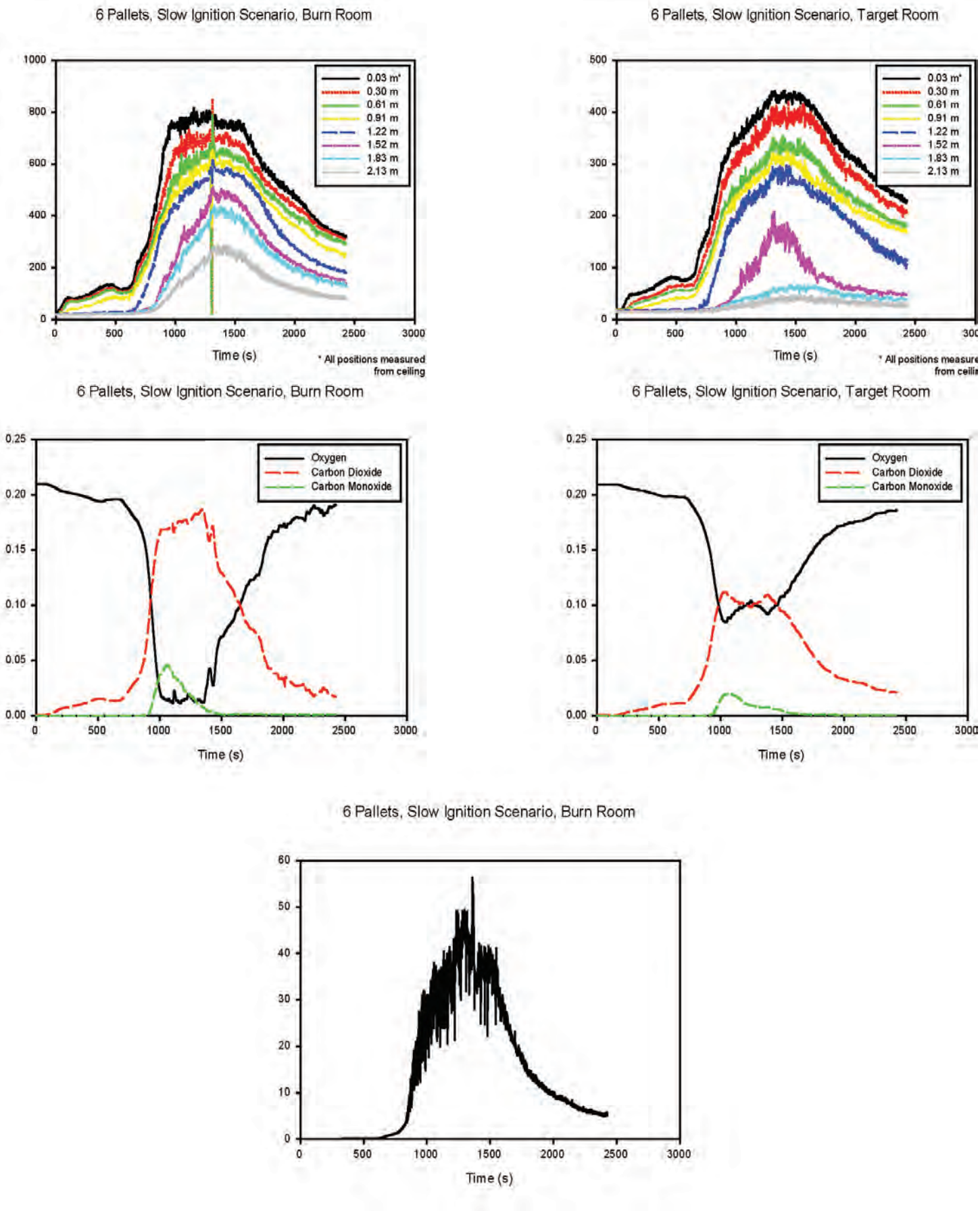
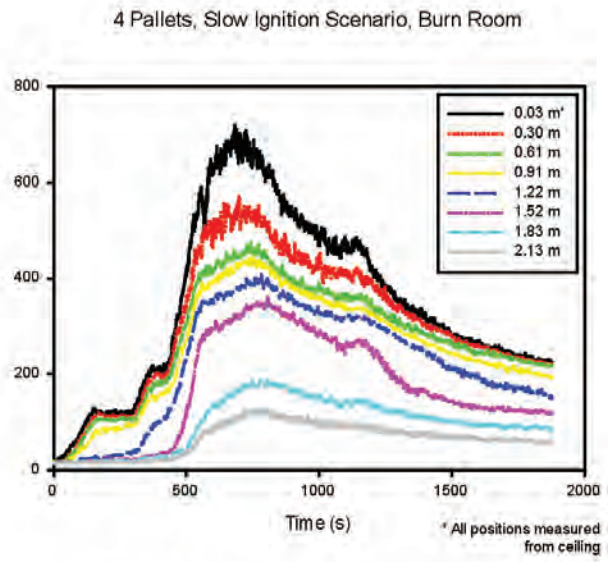
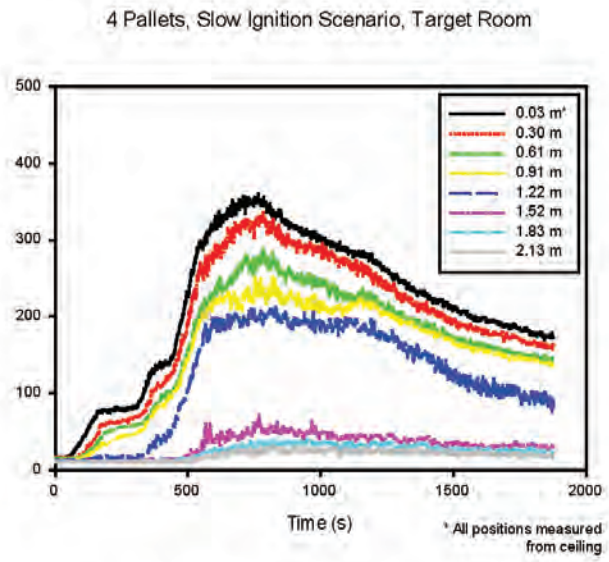
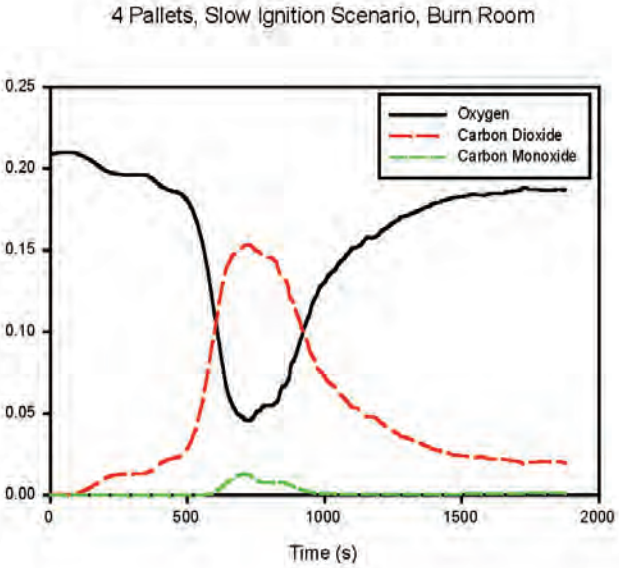
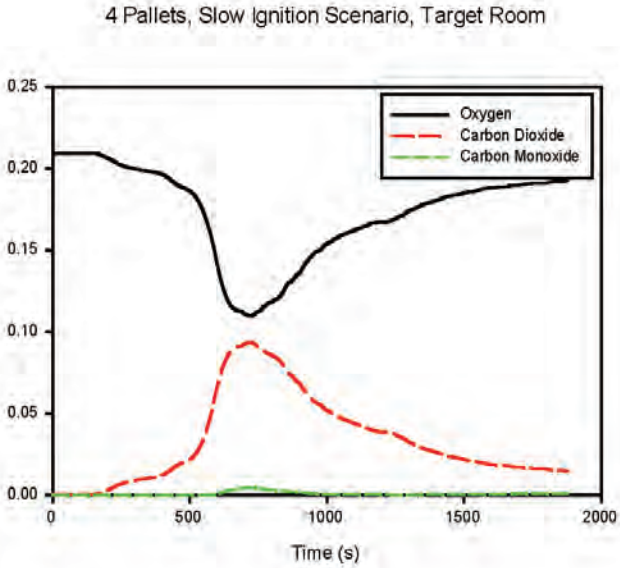


Figure A-11. Temperature, Gas Concentration, and Heat Flux During Test CRA 1, 6 Pallets, Slow Ignition Scenario









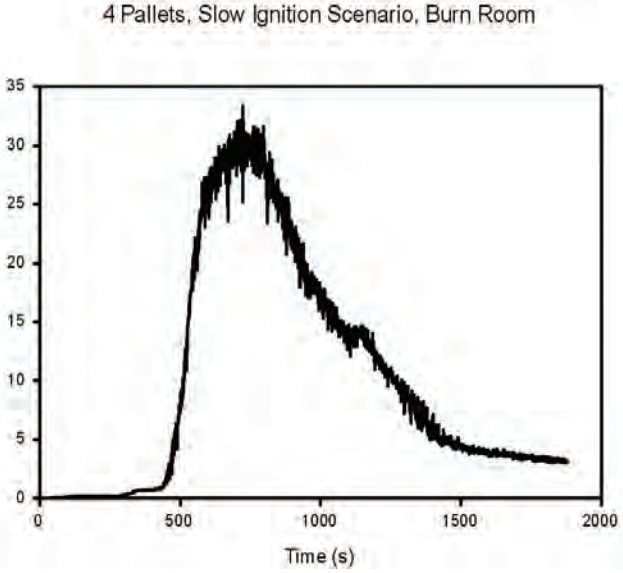
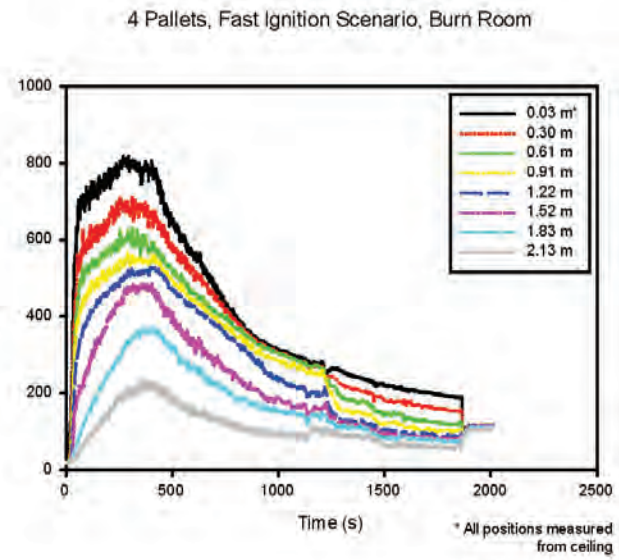
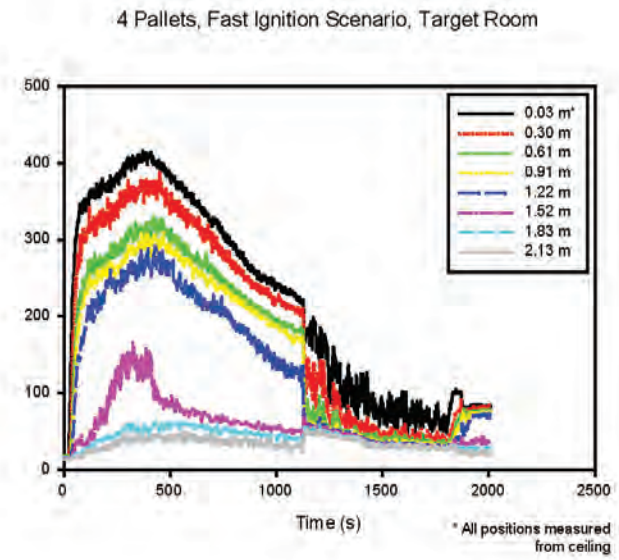
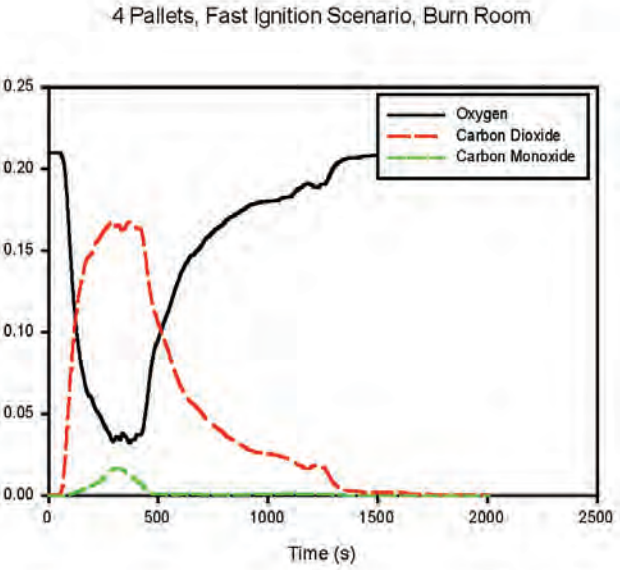
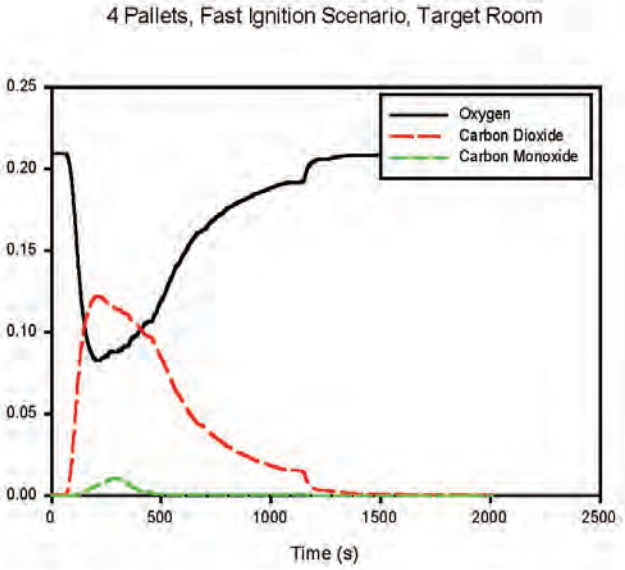


Figure A-12. Temperature, Gas Concentration, and Heat Flux During Test CRA 2, 4 Pallets, Slow Ignition Scenario









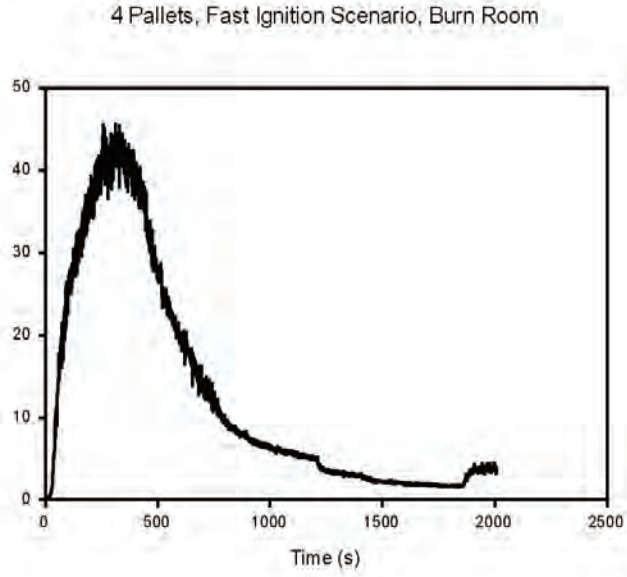
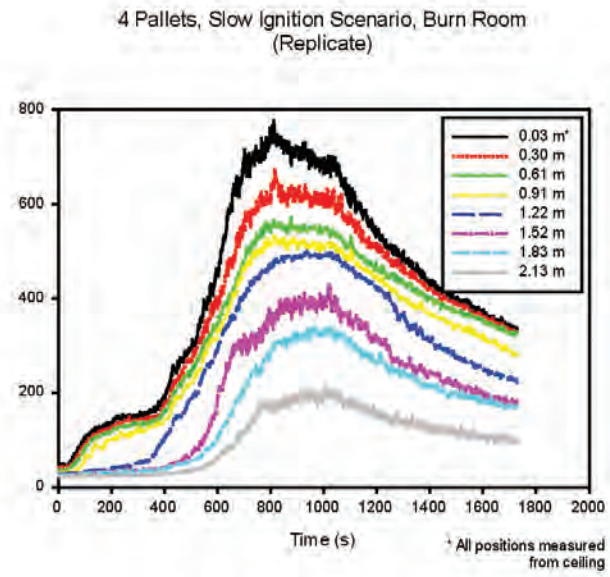
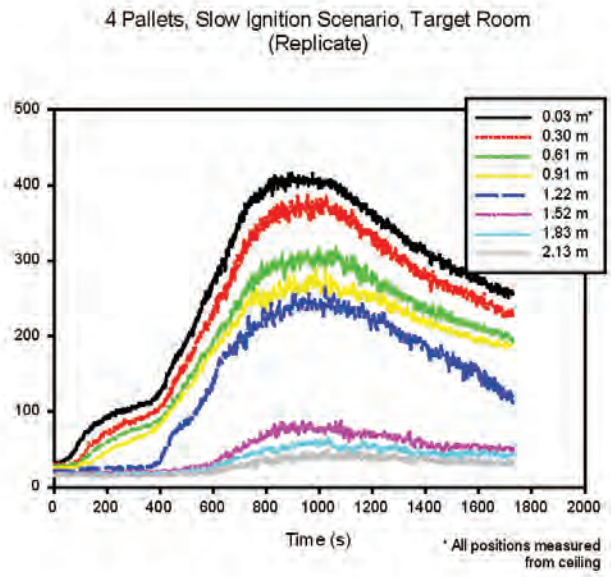
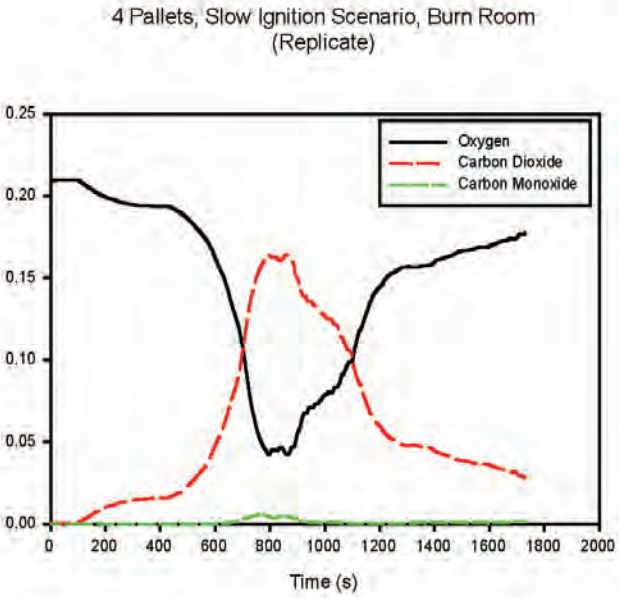
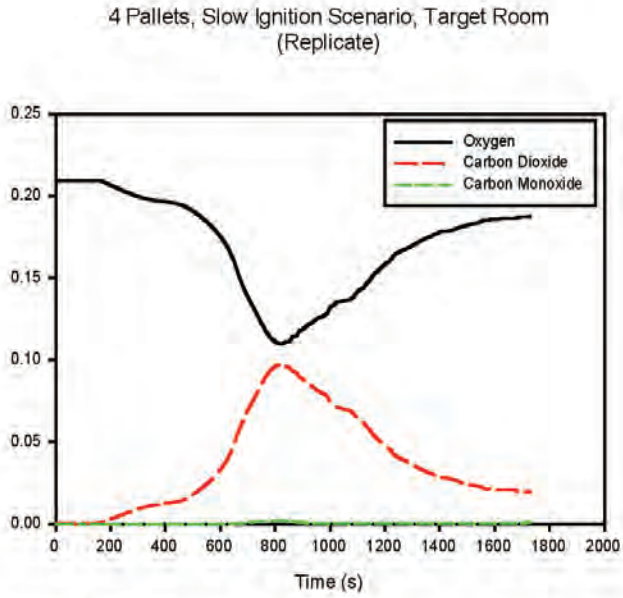


Figure A-13. Temperature, Gas Concentration, and Heat Flux During Test CRA 3, 4 Pallets, Fast Ignition Scenario









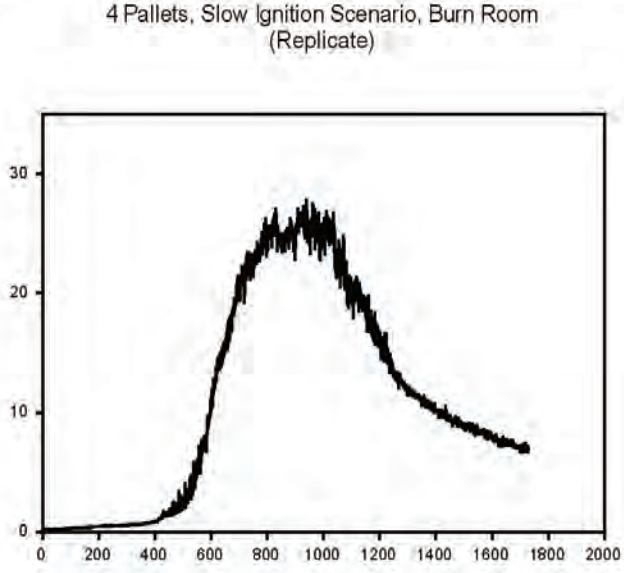
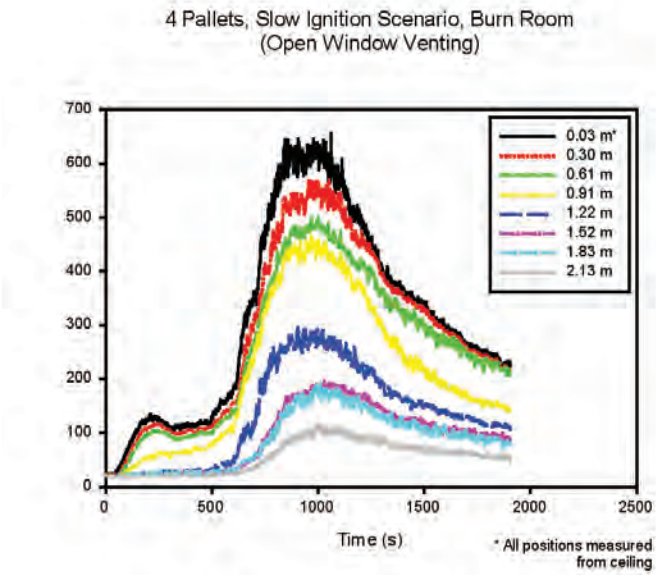
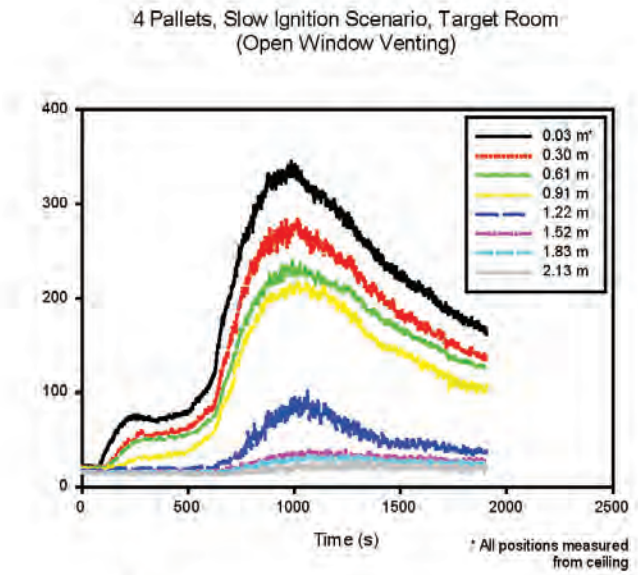
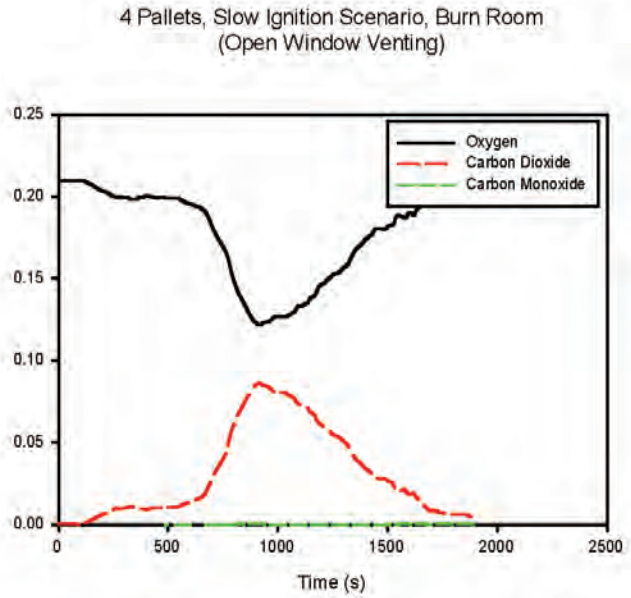
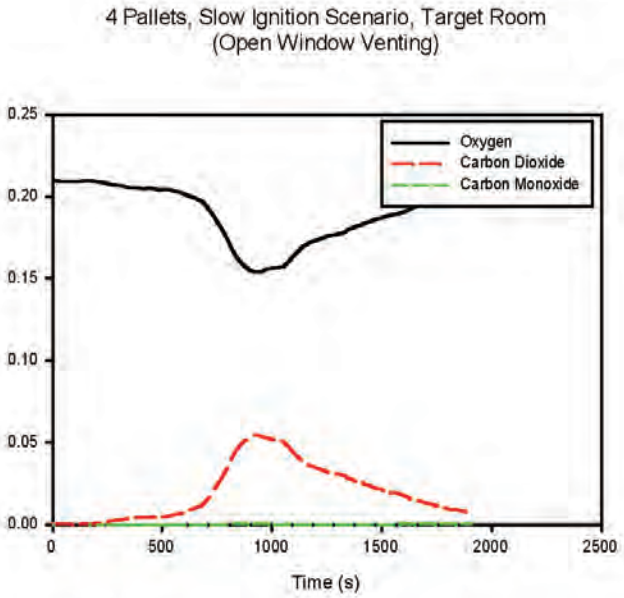


Figure A-14. Temperature, Gas Concentration, and Heat Flux During Test CRA 4, 4 Pallets, Slow Ignition Scenario (Replicate)









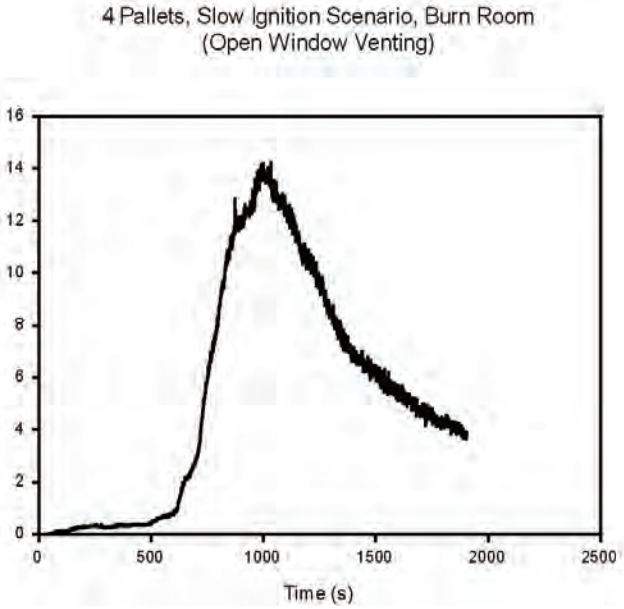


Figure A-15. Temperature, Gas Concentration, and Heat Flux During Test CRA 5, 4 Pallets, Slow Ignition Scenario (Open Window Venting)

APPENDIX B: Designing Fuel Packages for Field Experiments

Based upon the results of the laboratory experiments, the project team determined that four pallets would provide both a realistic fire scenario, as well as a repeatable and well-characterized fuel source. Varying the placement and quantity of excelsior provided significant variance in the rate of fire growth. Prior to finalization of the fuel package and construction specifications, modeling was used to ensure that the combination of fuel and residential geometry would result in untenable conditions throughout the structure without subjecting the firefighters to unsafe testing conditions. Therefore, CFAST (the consolidated fire and smoke transport model (Jones 2000)) and FDS (fire dynamics simulator model (McGrattan 2006)) were used to predict the temperatures and toxic species within the structure as a function of the experimentally determined heat release rates. The results summarized below confirmed that the building geometry and fuel package produced adequate variation in tenability conditions in the residential structure and ensured that the room of origin would not reach flashover conditions (a key provision of *NFPA 1403*). Meeting these conditions provided the foundation for experiments to meet the two primary objectives of fire department response: preservation of life and property.

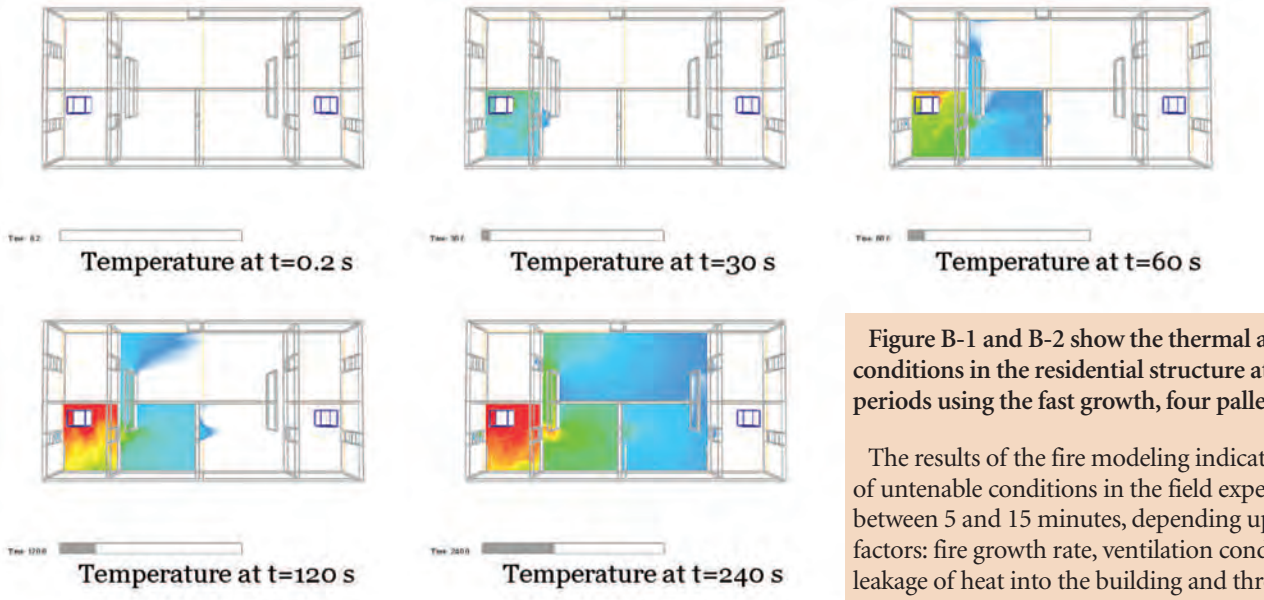


Figure B-1 and B-2 show the thermal and smoke conditions in the residential structure at different time periods using the fast growth, four pallet fuel package.

The results of the fire modeling indicated development of untenable conditions in the field experiments between 5 and 15 minutes, depending upon several factors: fire growth rate, ventilation conditions, the total leakage of heat into the building and through leakage paths, and firefighter intervention. This time frame allowed for differentiation of the effectiveness of various fire department deployment models.

Figure B-1: Time-dependent temperature contours in field structure with fast growth fire

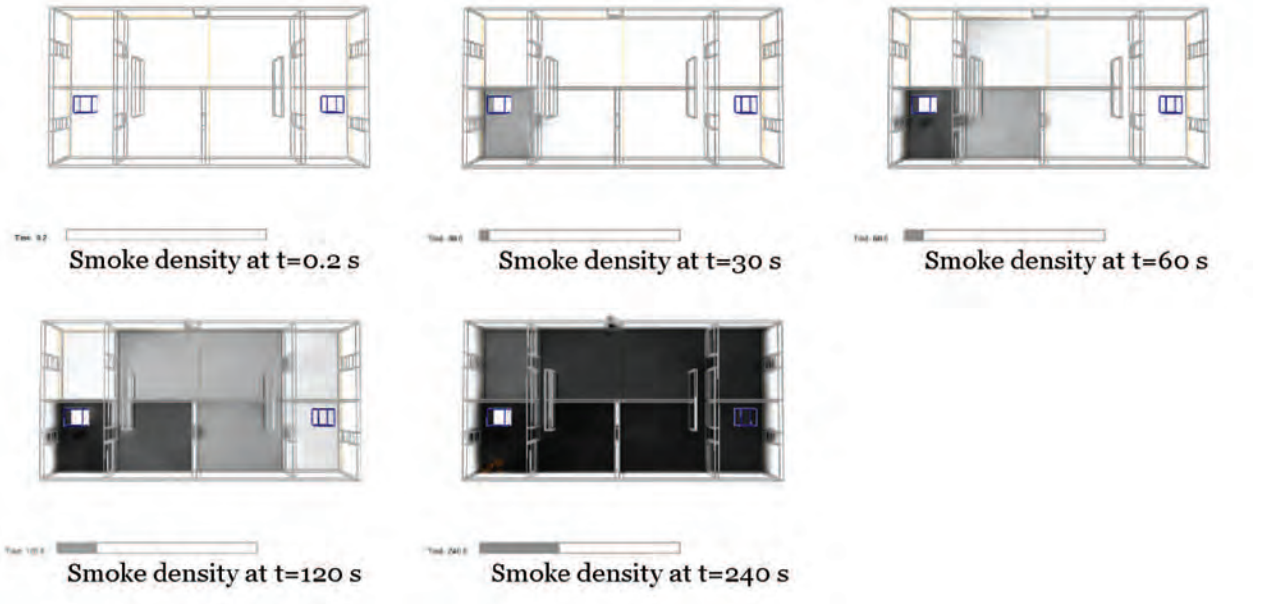


Figure B-2: Time-dependent smoke density contours in field structure with fast growth fire

APPENDIX C: Temporary Burn Prop Construction and Instrumentation

Through the generosity of the Montgomery County (MD), an open space was provided to construct a temporary burn prop at the Montgomery County Fire and Rescue Training Facility in Rockville, MD. The area had ready access to water and electrical utilities. A licensed general contractor was retained, including a structural engineer for the design of critical ceiling members, and the burn prop was constructed over a several month period in late 2008.

The burn prop consisted of two 2,000 ft.^{2} (186 m^2) floors totaling 4,000 ft.^{2} (372 m^2). An exterior view of two sides of the burn prop is shown in Figure C-1.

Additional partitions were installed by NIST staff to create a floor plan representative of a two-story, 186 m^2 (2,000 ft.^{2}) single family residence. Note that the structure does not have a basement and includes no exposures. The overall dimensions are consistent with the general specifications of a typical low hazard residential structure that many fire departments respond to on a regular basis, as described in *NFPA 1710*.

Further details about typical single family home designs are not provided in the standard. Therefore, a floor plan representative of a typical single family home was created by the project team. Details and floor plan dimensions are shown in Figure C-2.



Figure C-1: View of two sides of the burn prop

The black lines indicate load-bearing reinforced concrete walls and red lines indicate the gypsum over steel stud partition walls. The ceiling height, not shown in Figure C-2, is 94 in. (2.4 m) throughout the entire structure except in the burn compartments, where the ceiling height is 93 in. (2.4 m). The purpose of the partition walls was to symmetrically divide the structure about the short axis in order to allow one side of the test structure to cool down and dry-out after a fire test with suppression while conducting experiments on the other side.

The concrete walls original to the burn prop were 8 in. (204 mm) thick steel reinforced poured concrete and the floors on the first level and second levels were 4 in. (102 mm) thick poured concrete. The support structure for the second floor and the roof consisted of corrugated metal pan welded to open web steel joists. The dimensions of the joists are shown in Figure C-3. The ceiling was constructed from ½ in. (13 mm) thick cement board fastened to the bottom chord of the steel joists. Partition walls were constructed from 5/8 in. (17 mm) thick gypsum panels attached to 20 gauge steel studs fastened to steel track, spaced 16 in. (407 mm) on center.

Additional construction was implemented in the burn compartments to address thermal loading and hose stream impingement concerns. Spray-on fireproofing was applied to the steel joists prior to fastening the ceiling, as shown in Figure C-4. The ceilings were constructed with three layers of ½ in. (13 mm) cement board, as opposed to one layer construction in the rest of the building. Each layer was fastened in a different direction so that seams of adjacent layers ran orthogonally. The difference in ceiling heights previously

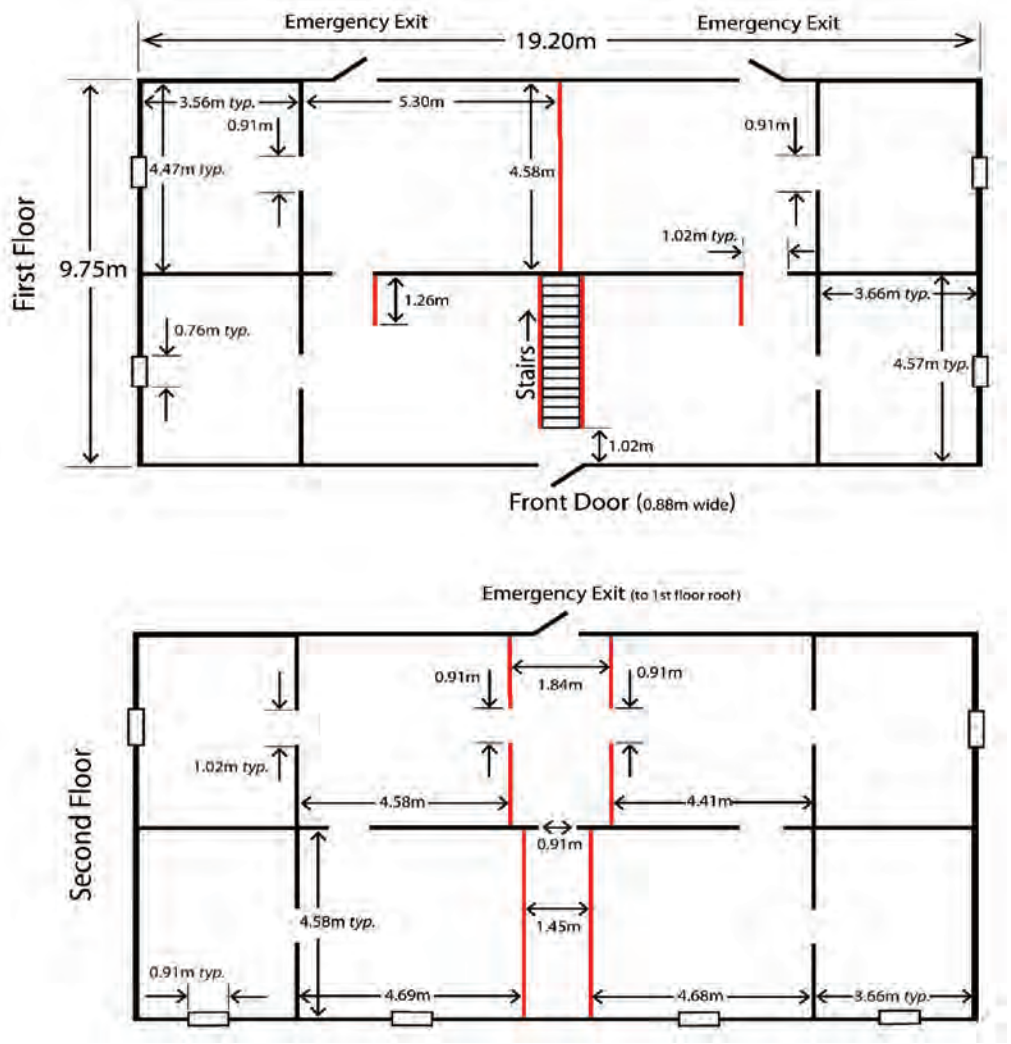


Figure C-2: Dimensions of the Burn Prop Floor Plan

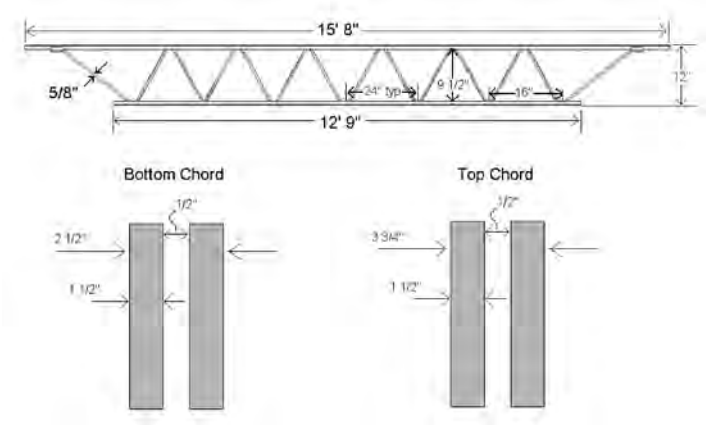


Figure C-3: Structural Steel Dimensions

mentioned is the result of the two additional sheets of cement board. The burn compartment walls were constructed from a single layer of ½ in. (13 mm) cement board over a single layer of 5/8 in. (16 mm) gypsum board, attached to 7/8 in. (22 mm) offset metal furring strips. Particular care was taken so that all ceiling and partition wall seams were filled with chemically-setting type joint compound to prevent leakage into the interstitial space between the ceiling and the floor above. After construction of the ceiling was complete, a dry-standpipe deluge system was installed with one head in each burn room to provide emergency suppression. During an experiment, a 2.5 in. (104 mm) ball valve fitting was attached and charged from a nearby hydrant. Figure C-5 was taken during the process of replacing "worn out" ceiling panels and shows the additional construction implemented in the burn room as well as the deluge sprinkler head.

Windows and exterior doors were constructed to be non-combustible. Windows were fabricated from 0.25 in. (10 mm) thick steel plate and the exterior doors were of prefabricated hollow-core steel design. The windows on the first floor were 30 in. (0.76 m) width x 36 in. (0.91 m) height and 36 in. (0.91 m) width x 40 in. (1.02 m) height on the second floor. Exterior doors were 35.8 in. (0.88 m) width x 80.5 in. (2.03 m) height. There were no doors attached to the doorways inside the structure. Figure C-6 shows the construction of the burn prop windows as well as the NFPA 1403-compliant latch mechanism. Figure C-7 is a picture of the interior of the burn prop taken just outside the burn compartment, showing the construction of the ceiling, interior doorway construction, gypsum wing wall and the joint compound used to seal seams in the ceiling and walls.

Instrumentation

After construction, the instrumentation to measure the propagation of products of combustion was installed throughout the burn prop. The instrumentation plan was designed to measure gas temperature, gas concentrations, heat flux, visual obscuration, video, and time during the experiments. The data were recorded at intervals of 1 s on a computer based data acquisition system. A schematic plan view of the instrumentation arrangement is shown in Figure C-8.

Table C-1 gives the locations of all of the instruments. Measurements taken prior to the compartment fire experiments were length, wood moisture content, fuel mass and weather conditions (relative humidity, temperature, wind speed and direction). Gas temperatures were measured with two different constructs of type K (Chromel-Alumel) thermocouples. All thermocouples outside the burn compartments were fabricated from 30 gauge glass-wrapped thermocouple wire. Vertical arrays of three thermocouples were placed near the front door on the north side and south sides of the stairwell on the first floor. On the second floor, vertical arrays of eight thermocouples were placed near the center of each target room. Inside the burn compartments, seven 3.2 mm (0.125 in.) exposed junction thermocouples and 0.76 m (30 in.) SUPER OMEGACLAD XL® sheathed thermocouple probes were arranged in a floor-to-ceiling array. Figure C-9 shows the vertical array in the burn



Figure C-4: Fireproofing added to structural steel



Figure C-5: Additional construction of burn room walls and ceiling and deluge sprinkler head.



Figure C-6: Window & Latch Construction



Figure C-7: Interior View of Burn Prop

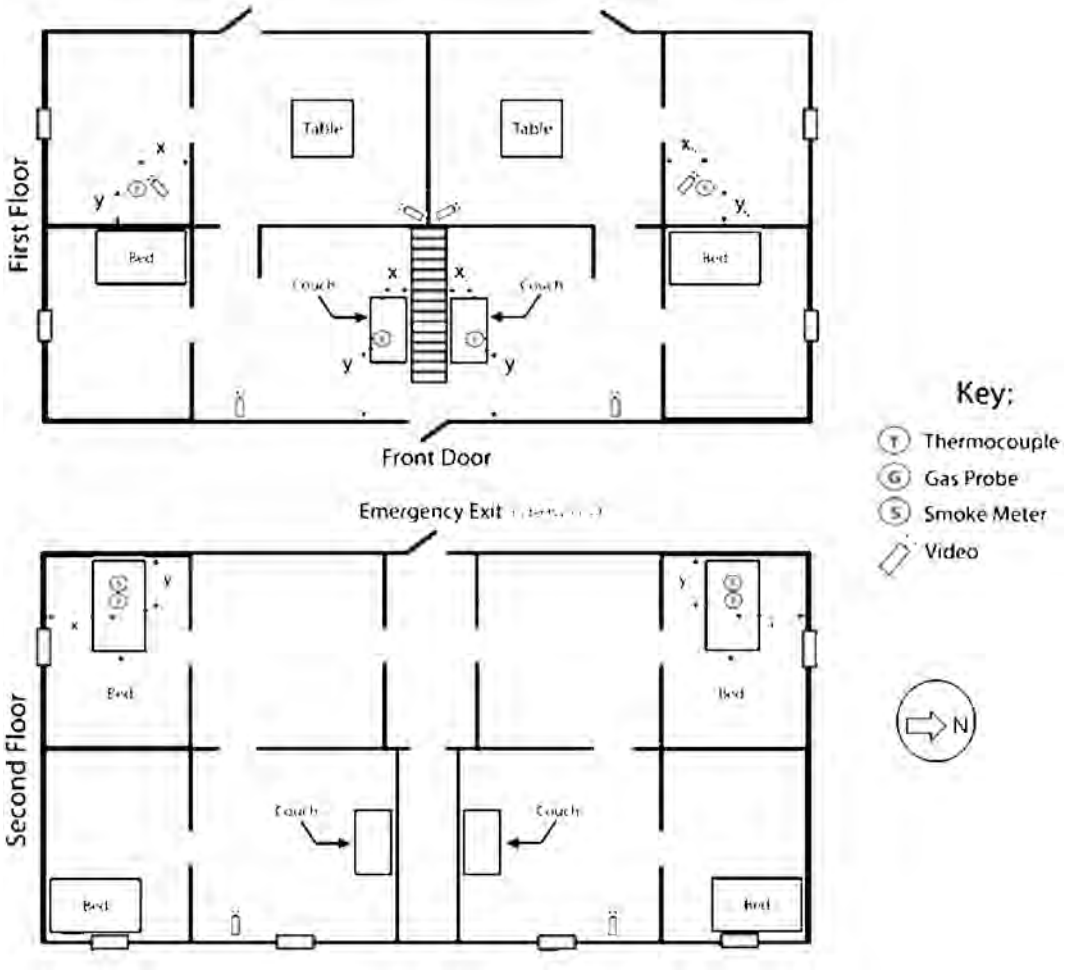


Figure C-8: Instrumentation & Furniture Prop Layout

compartment. Type K thermocouple probes were chosen because of their ability to withstand high temperature, moisture and physical abuse resulting from physical contact with hose streams and firefighters. To protect the extension wire and connectors from the effects of heat and water, through-holes were drilled in the burn compartment walls and the sheaths were passed through from the adjacent compartment. To prevent leakage through the holes, all void spaces were tightly packed with mineral wool. Inside the burn compartment the end of each probe was passed through an angle iron stand, and fastened to the floor and ceiling to provide additional protection from physical contact with firefighters and to ensure that the measurement location remained fixed throughout the experiments. In consideration of the risk associated with heating the open web steel joists, additional thermocouples were placed above each burn compartment to monitor the temperature of the interstitial space.

Table C-1: Detailed locations of instruments within respective rooms

Floor	Instrument	X_S [m]	Y_S [m]	Z_S [m]	X_N [m]	Y_N [m]	Z_N [m]	X_C [m]	Y_C [m]	Z_C [m]
1	**Thermocouple**	0.76	0.51	0.3, 0.61, 0.91, 1.22, 1.52, 1.83, 2.13	0.76	0.51	0.3, 0.61, 0.91, 1.22, 1.52, 1.83, 2.13	Find	Find	0.91, 1.52, 2.41
	HF Gauge 1		N/A		0.91	0.91	0.17			
	HF Gauge 2				0.5	0.66	1			
2	**Thermocouple**	1.83	0.91	0.3, 0.61, 0.91, 1.22, 1.52, 1.83, 2.13, 2.41	1.83	0.91	0.3, 0.61, 0.91, 1.22, 1.52, 1.83, 2.13, 2.41		N/A	
	Smoke Meter	1.7	0.49	1.52	1.64	0.43	1.5			
	Gas Probe	1.83	0.91	1.7	1.83	0.91	1.52			



Figure C-9: Burn Room Thermocouple Array

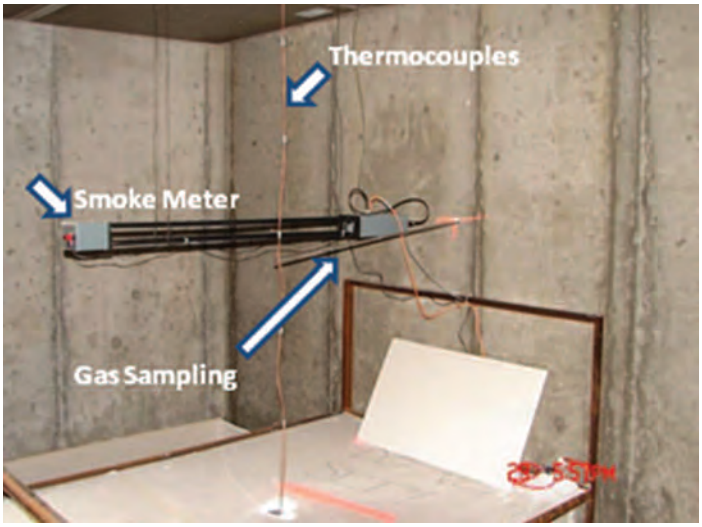


Figure C-10: Target Room Instrument Cluster

Gas concentrations were sampled at the same location in each target room. Both gas probes were plumbed to the same analyzer and isolated using a switch valve; gas was only sampled at one location during any given test. The gas sampling points were located in the center of the West wall (C Side) of both rooms, 1.5 m (5 ft.) above the floor. The sampling tubes were connected to a diaphragm pump which pulled the gas samples through stainless steel probes into a sample conditioning system designed to eliminate moisture in the gas sample. The dry gas sample was then piped to the gas analyzer setup. In all of the experiments, oxygen was measured using a paramagnetic analyzer and carbon monoxide and carbon dioxide were measured using a non-dispersive infrared (NDIR) analyzer. One floor-to-ceiling thermocouple array was also co-located with each sample port inlet.

Schmidt-Boelter heat flux gauges were placed in the North burn room. One gauge was located 1.0 m (3.3 ft.) above the floor and was oriented towards the fire origin (waste basket). This heat flux gauge was placed to characterize the radiative heat flux at the face piece level that would be experienced by a firefighter inside the room. A second flux gauge was placed on the floor in order to characterize the radiative heat flux from the upper layer and to make an estimate of how close the room was to flashing over with respect to time from ignition (using the common criteria of flashover occurring at ~20kW/m^2 at the floor level). The heat flux gauges were co-located with the thermocouple probe array.

All length measurements were made using a steel measuring tape. Wood moisture content measurements were taken using a non-insulated-pin type wood moisture meter. Fuel mass was measured prior to each experiment using a platform-style heavy duty industrial scale. Mass was not measured after each experiment because of the absorption of fire suppression water. Publicly accessible Davis Vantage Pro2 weather instrumentation (available via http://www.wunderground.com) located approximately two miles from the experimentation site was used to collect weather data in five minute intervals for the each day that the experiments were conducted. Figure C-10 is a photograph of the West wall of the North target room, showing the thermocouple array, the smoke obscuration meter, and a gas sampling probe used during the phase two experiments. The layout is identical to that in the South target room.

Non-combustible "prop" furniture was fabricated from angle iron stock and gypsum wallboard. The purpose of the furniture was twofold. The furniture was placed inside the burn prop to simulate realistic obstacles which obscure the search paths and hose stream advancement. The second use for the furniture was so that measurement instrumentation could be strategically placed within the frame of the furniture. This served to protect instrumentation from physical damage as a result of contact with firefighters and their tools. Figure C-11 shows an example of a table placed outside the burn room.

All instruments were wired to a centralized data collection room, shown in Figure C-12, which was attached as a separate space on one side of the building. This ensured physical separation for the data collection personnel from the effects of the fire, while minimizing the wire and tube lengths to the data logging equipment. Note that the roof of the instrument room was designed to serve as an additional means of escape for personnel from the second floor of the burn prop through a metal door. A railing was installed in order to minimize the fall risk in the event that the emergency exit was required.



Figure C-11: Non-combustible "Prop" Table



Outside



Inside

Figure C-12: Instrumentation Room

Table C-2: Dimensions and Mass of Furniture for Room and Contents Tests

Furniture	Width [m]	Depth [m]	Height [m]	Mass [kg]	Material
Couch	1.8	0.8	0.9	58.1	See D-3
Dresser	1.8	0.5	0.6	72.3	Laminated Particle Board
Nightstand	0.5	0.6	0.61	22.7	Laminated Particle Board
Chair	0.5	0.7	0.6	9.2	Wood, Fabric, and Polyurethane Foam
	Back cushion = 0.1m, Bottom cushion = 0.07m				
Blanket	1.8	-	2.4	1.3	100 % Cotton
Body Pillow	0.5	-	1.4	1.3	100 % cotton cover, polyester fill
Trash Can	0.4	0.3	0.4	1.3	Polypropylene
Towel	0.8	-	1.4	0.4	100 % Cotton
Wallboard	1.2	0.003	2.4	9.0	MDF

Table C-3: Materials in Couch

Body:	Resinated dyed fiber (unknown material) 3 %
	PU foam pad 46%
	Waste fiber batting (unknown material) 26 %
	Polyester fiber batting 25 %
Cushions:	PU foam pad 86 %
	Polyester fiber batting 14 %

APPENDIX D: Data Collection and Company Protocols for Time-to-Task Tests

Time-to-Task Data Collection Chart

Date _____Start Time _____ End Time (all task complete) _____

Timer Name _____

Task	Start Time	Completion Time	Duration
Stop at Hydrant-- Wrap Hose			
Position Engine 1			
Conduct Size-up - 360° lap - Transmit report - establish command			
Engage Pump			
Position attack line (stop time – at front door)			
Establish 2-in-2-out			
Charge Hydrant – supply attack Engine			
Establish RIT			
Gain/Force Entry			
Advance Line (stop time –water on fire)			
Deploy Back up line (stop time at front door)			
Advance Back up line/protect stairwell (start time at front door – Stop at stairwell)			
Conduct Primary Search			
Ground Ladders in Place			
Horizontal Ventilation (ground)			
Horizontal Ventilation (2nd story)			
Control Utilities (interior)			
Control Utilities (exterior)			
Conduct Secondary Search			
Check for Fire Extension (walls)			
Check for Fire Extension (ceiling)			
Mechanical Ventilation			

Company Protocols: Crew Size of 2

(10 total personnel on scene)

PLUS 4 RIC – 1403 = total 14 needed

Tasks/Company	Engine 1/2	Truck 1/2	Engine 2/2	Battalion Chief/ Aide	Engine 3/2
Arrive on Scene - Arrive/ stop at hydrant - Position engine ——————— - Layout report - On-scene report - Conduct size-up – 360º lap – incident action plan – offensive – detail incident (situation report) - Transmit size-up to responding units - Transfer command to chief	Driver Officer -	-Arrive - 360º lap		- Arrives - Assumes Command - Evaluates Resources - Establishes Command post - Evaluates exposure problems - Directs hose positioning - Coordinates Units - Transmits Progress reports - Changes strategy - Orders, records, and transmits results of primary and secondary searches - Declares fire under control	
Establish Supply line - Hydrant-Drop line (wrap) - Position engine - Pump engaged - 4" straight lay - ---------- - Supply attack engine	Driver/O Driver/O Driver/O	Position Truck	-Dry Lay – 2nd engine takes hydrant - Charged hydrant – Supply attack engine Driver		
Position attack line - Flake - Charge - Bleed - ---------- - Advance	Officer – (Not interior—just front door) Officer	Officer			
Establish - 2 in – 2 out (Initial RIT)		O/D			
Establish RIT (Dedicated)		O/D (performs all RIT duties)			

Tasks/Company	Engine 1/2	Truck 1/2	Engine 2/2	Battalion Chief/ Aide	Engine 3/2
Gain/ Force Entry		O/D			
Advance Line - scan search fire room - suppression	Officer (if officer commits then he must pass command)		Officer		
Deploy Back-up Line and protect stairwell					O/D
Complete Primary Search (in combo with Fire Attack) Search Fire Floor Search other Floors					O/D
Ventilation (vent for fire or vent for life) - Horizontal - Ventilation		Driver/Officer			
Ground Laddering – 2nd story windows, front and side, for firefighter means of egress and for vertical ventilation – 24'/28' and roof ladder in case of vertical vent.		Driver /Officer			
Control Utilities (Interior and exterior)					Driver/Officer
Conduct Secondary Search - Search Fire Floors - Search other Floors Check for Fire Extension Open ceiling walls near fire on fire floor Check floor above for fire extension - wall breech - ceiling breech	Officer Officer		Officer Officer		O/D
Mechanical Ventilation		Driver/Officer			

Company Protocols: Crew Size of 3

(14 total personnel on scene)

PLUS 4 RIC – 1403 = total 18 needed

Tasks/Company	Engine 1/3	Truck 1/3	Engine 2/3	Battalion Chief/ Aide	Engine 3/2
Arrive on Scene - Arrive/ stop at hydrant - Position engine _____ - Layout report - On-scene report - Conduct size-up – 360º lap – incident action plan – offensive – detail incident (situation report) - Transmit size-up to responding units - Transfer command to chief	 Driver Officer -	-Arrive - 360 degree lap		- Arrives - Assumes Command - Evaluates Resources - Establishes Command post - Evaluates exposure problems - Directs hose positioning - Coordinates Units - Transmits Progress reports - Changes strategy - Orders, records, and transmits results of primary and secondary searches - Declares fire under control	
Establish Supply line - Hydrant-Drop line (wrap) - Position engine - Pump engaged - 4” straight lay - ---------- - Supply attack engine	Driver Driver Driver	Position Truck	Dry Lay – 2nd engine takes hydrant Charged hydrant – Supply attack engine Driver		
Position attack line - Flake - Charge - Bleed - Advance	D/RB				
Establish - 2 in – 2 out (Initial RIT)		O/RB			
Establish RIT (Dedicated)			O/RB— advance by foot to get to point of entry – performs all RIT duties		

Tasks/Company	Engine 1/3	Truck 1/3	Engine 2/3	Battalion Chief/ Aide	Engine 3/3
Gain/ Force Entry		O/RB			
Advance Line - scan search fire room - suppression	O/RB (if officer commits then he must pass command)				
Deploy Back-up Line and protect stairwell					O/RB
Complete Primary Search (in combo with Fire Attack) Search Fire Floor Search other Floors		O/ RB -			
Ventilation (vent for fire or vent for life) - Horizontal - Ventilation		Driver			Driver
Ground Laddering – 2nd story windows, front and side, for firefighter means of egress and for vertical ventilation – 24'/28' and roof ladder in case of vertical vent.		Driver			Driver
Control Utilities (Interior and exterior)		Driver (exterior) O/RB (Interior)			Driver (exterior)
Conduct Secondary Search - Search Fire Floors - Search other Floors					O/RB
Check for Fire Extension Open ceiling walls near fire on fire floor Check floor above for fire extension - wall breech - ceiling breech	O/RB	O/RB			
Mechanical Ventilation		Driver			Driver

Company Protocols: Crew Size of 4

Total on scene = 18

PLUS 4 RIC – 1403 = total 22 needed

Tasks/Company	Engine 1/4	Truck 1/4	Engine 2/4	Battalion Chief/ Aide	Engine 3/4
Arrive on Scene - Arrive/ stop at hydrant - Position engine _____ - Layout report - On-scene report - Conduct size-up – 360º lap – incident action plan – offensive – detail incident (situation report) - Transmit size-up to responding units - Transfer command to chief	Driver Officer -	-Arrive - 360 degree lap		- Arrives - Assumes Command - Evaluates Resources - Establishes Command post - Evaluates exposure problems - Directs hose positioning - Coordinates Units - Transmits Progress reports - Changes strategy - Orders, records, and transmits results of primary and secondary searches - Declares fire under control	
Establish Supply line - Hydrant-Drop line (wrap) - Position engine - Pump engaged - 4" straight lay - ---------- - Supply attack engine (1 3/4")	Driver Driver Driver	Position Truck	-Dry Lay – 2nd engine takes hydrant Charged hydrant – Supply attack engine Driver		
Position attack line - Flake - Charge - Bleed - Advance	RB/Nozzle LB/Flake Both advance line for fire attack				
Establish - 2 in – 2 out (Initial RIT)		D/LB			
Establish RIT (Dedicated)			O/LB/RB— advance by foot to get to point of entry – performs all RIT duties		

Tasks/Company	Engine 1/4	Truck 1/4		Battalion Chief/ Aide	Engine 3/4
Gain/ Force Entry		O/RB			
Advance Line - scan search fire room - suppression	RB/LB Officer – not on line (if officer commits then he must pass command)				
Deploy Back-up Line and protect stairwell					O/RB
Complete Primary Search (in combo with Fire Attack) Search Fire Floor Search other Floors		Officer and RB -			
Ventilation - Horizontal - Ventilation		Driver and LB			
Ground Laddering – 2nd story windows, front and side, for firefighter means of egress and for vertical ventilation – 24'/28' and roof ladder in case of vertical vent.		Driver /LB			
Control Utilities (Interior and exterior) Conduct Secondary Search - Search Fire Floors - Search other Floors		Driver/LB (control exterior) O/RB (control interior)			D/LB
Check for Fire Extension Open ceiling walls near fire on fire floor Check floor above for fire extension - wall breech - ceiling breech	O/RB	O/RB			
Mechanical Ventilation		D/LB			

Company Protocols: Crew Size of 5

D/O/LB/RB/CB Total on scene = 22

PLUS 4 RIC – 1403 = total 26 needed

Tasks/Company	Engine 1/5	Truck 1/5	Engine 2/5	Battalion Chief/ Aide	Engine 3/4
Arrive on Scene - Arrive/ stop at hydrant - Position engine _____ - Layout report - On-scene report - Locate Fire - Conduct size-up – 360º lap – incident action plan – offensive – detail incident (situation report) - Transmit size-up to responding units - Transfer command to chief	Driver Officer -	-Arrive - 360 degree Size up.		- Arrives - Assumes Command - Evaluates Resources - Establishes Command post - Evaluates exposure problems - Directs hose positioning - Coordinates Units - Transmits Progress reports - Changes strategy - Orders, records, and transmits results of primary and secondary searches - Declares fire under control	
Establish Supply line - Hydrant-Drop line (wrap) - Position engine - Pump engaged - 4" straight lay - ---------- - Supply attack engine (1 3/4")	Driver Driver Driver	Position Truck	-Dry Lay – 2nd engine takes hydrant Charged hydrant – Supply attack engine Driver		
Position attack line - Flake - Charge - Bleed - Advance	RB/Nozzle LB/Flake CB/ Control ---------- Advance line for fire attack ---------- The Officer responsibility is to supervise hose stretch /monitor safety and continually survey the scene				
Establish - 2 in – 2 out (Initial RIT)		D/LB			

Tasks/Company	Engine 1/5	Truck 1/5	Engine 2/5	Battalion Chief/ Aide	Engine 3/5
Establish RIT (Dedicated)			O/LB/RB— advance by foot to get to point of entry – performs all RIT duties		
Gain/ Force Entry		O/RB/CB			
Advance Line - scan search fire room - suppression	RB/LB/CB Officer – not on line (if officer commits then he must pass command)				
Insures first line flowing water— Deploy Back-up Line and protect stairwell (1 ¾")					O/RB/CB
Complete Primary Search (in combo with Fire Attack) Search Fire Floor – Search other floors-		Officer and RB/CB			
Ventilation (vent for fire or vent for life) - Horizontal - Vertical		Driver and LB			
Ground Laddering – 2nd story windows, front and side, for firefighter means of egress and for vertical ventilation – 24'/28' and roof ladder in case of vertical vent.		Driver /LB			
Control Utilities after search, force entry, venting and fire extinguished (Interior and exterior)		Driver/LB (control exterior) O/RB/CB (control interior)			
Conduct Secondary Search -Fire Floor -Primary and secondary search of entire floor above		 D/LB			 D/LB O/RB/CB
Check for Fire Extension Open ceiling walls near fire on fire floor Check floor above for fire extension wall breech ceiling breech-	O/RB				O/RB/CB
Mechanical Ventilation					

Appendix E: Statistical Analysis of Time to Task Test Data

Identifying Statistically Significant Differences in Crew Size and Stagger on a Number of Task Timings Using Regression Analyses of Times (Start, End and Duration) on Crew Size and Stagger

	Crew Size			Stagger	Crew Size	Stagger
Task-Based Measure of Time	**3 vs. 2**	**4 vs. 3**	**5 vs. 4**		**5/4 vs. 3/2**	
Total time	X *	X			X	
Conduct size up (start)			X		X	
Conduct size up (end)					X	
Conduct size up (duration)						
Position attack line (start)	X				X	
Position attack line (duration)		X			X	
Establish 2 in 2 out (end)		X		X	X	X
Establish RIT (end)	na	na	na	na	na	na
Gain forced entry (start)		X			X	
Advance line (start)	X	X			X	
Advance line (end)	X		X		X	
Deploy backup line (start)					X	X
Deploy backup line (end)				X		X
Advance backup line (start)				X		X
Advance backup line (end)				X		X
Conduct primary search (start)	X	X			X	
Ground ladders in place (end)		X	x	X	X	o
Ground ladders in place (duration)			X	X	X	X
Horizontal ventilation Story 2 window 3 (Start)		X			X	
Horizontal ventilation Story 2 window 3 (End)		X			X	
Horizontal ventilation Story 2 window 2 (Start)		X			X	
Horizontal ventilation Story 2 window 2 (End)		X			X	
Horizontal ventilation Story 2 window 1 (Start)		X			X	
Horizontal ventilation Story 2 window 1 (End)		X			X	
Horizontal ventilation Story 1 window 2 (Start)	o	X			X	
Horizontal ventilation Story 1 window 2 (End)		X			X	
Control utilities (interior) (Start)	X	X			X	
Conduct Secondary Search (Start)	X				X	
Check for Fire Ext (walls) (Start)	X	X			X	
Check for Fire Ext (ceiling) (Start)		X				
Stretch time**	X		o		X	

* An 'X' denotes statistical significance at the 0.05 level; a 'o' denotes significance at the 0.10 level.

Appendix F: All Regression Coefficients

Regression Models of Time to Task (in Seconds) as a Function of Crew Size and Stagger (Standard Errors are in Parentheses underneath coefficients)

		Coefficients				
Measure of Task Time	**Time measured**	**Crew size of 3**	**Crew size of 4**	**Crew size of 5**	**Close Stagger**	**Constant**
Total time		-100.5	**-408.33**	**-402.17**	**-40.83**	**1374.42**
		(50.29)	(50.29)	(50.29)	(35.56)	(39.77)
Conduct size up	Start	**2.5**	**-5.167**	**-18.17**	**-1.25**	**335**
		(5.97)	(5.97)	(5.97)	(4.22)	(4.72)
Conduct size up	Complete	**-5.167**	**-13.17**	**-38.33**	**-12**	**416**
		(13.60)	(13.60)	(13.60)	(9.62)	(10.75)
Conduct size up	Duration	**-7.667**	**-8**	**-20.17**	**-10.75**	**81.04**
		(12.10)	(12.10)	(12.10)	(8.56)	(9.57)
Position attack line	Start	**-63.5**	**-63.5**	**-69.67**	**-11.17**	**408.1**
		(14.09)	(14.09)	(14.09)	(9.96)	(11.14)
Position attack line	Duration	**-16**	**-63.67**	**-61.67**	**5.167**	**160.6**
		(13.79)	(13.79)	(13.79)	(9.75)	(10.90)
Establish 2in - 2 out	Complete	**-6.7E-15**	**-90**	**-90**	**-30**	**355**
		(9.73)	(9.73)	(9.73)	(6.88)	(7.69)
Establish RIT	Complete	**70**	**70**	**70**	**-60**	**435**
		0.00	0.00	0.00	0.00	0.00
Gain forced entry	Start	**-23.5**	**-54**	**-80.83**	**-20.83**	**528.6**
		(19.66)	(19.66)	(19.66)	(13.90)	(15.54)
Advance line	Start	**-54**	**-97.83**	**-123.5**	**-17.5**	**586.3**
		(18.83)	(18.83)	(18.83)	(13.31)	(14.88)
Advance line	Complete	**-61**	**-95.5**	**-134.7**	**-19.08**	**625.5**
		(20.35)	(20.35)	(20.35)	(14.39)	(16.08)
Deploy backup line	Start	**-26**	**-42.67**	**-53.5**	**-96.75**	**641.5**
		(17.11)	(17.11)	(17.11)	(12.10)	(13.53)
Deploy backup line	Complete	**-15.83**	**-56.17**	**-17.5**	**-53.75**	**728.9**
		(33.49)	(33.49)	(33.49)	(23.68)	(26.48)
Advance backup line	Start	**-33**	**-66.83**	**-34.83**	**-63**	**779.7**
		(29.65)	(29.65)	(29.65)	(20.97)	(23.44)
advancebackupline2	Complete	**-34.5**	**-68.17**	**-36.17**	**-63.75**	**784.4**
		(29.73)	(29.73)	(29.73)	(21.02)	(23.50)
conductprimarysearch1	Start	**-147**	**-215.8**	**-211.5**	**0.1667**	**736.1**
		(25.08)	(25.08)	(25.08)	(17.74)	(19.83)
Ground ladders in place	Complete	**-38**	**-196.5**	**-317.8**	**-69.83**	**1168**
		(48.38)	(48.38)	(48.38)	(34.21)	(38.24)
Ground ladders in place	Duration	**-33.83**	**-83.67**	**-185.7**	**-72.08**	**617**
		(48.12)	(48.12)	(48.12)	(34.03)	(38.04)
Horizontal ventilation, second story, window 3	Start	**-53.67**	**-217.8**	**-211**	**-26.59**	**759.1**
		(30.75)	(30.75)	(30.75)	(21.75)	(24.31)
Horizontal ventilation, second story, window 3	Complete	**-64.83**	**-316**	**-353**	**-33.58**	**1088**
		(49.74)	(49.74)	(49.74)	(35.17)	(39.32)
Horizontal ventilation, second story, window 2	Start	**-51.67**	**-265.8**	**-261.2**	**-18.83**	**885.1**
		(37.20)	(37.20)	(37.20)	(26.30)	(29.41)

All Regression Coefficients (CONTINUED)

Regression Models of Time to Task (in Seconds) as a Function of Crew Size and Stagger (Standard Errors are in Parentheses underneath coefficients)

Horizontal ventilation, second story, window 2	Complete	**-53.5**	**-259.8**	**-262.3**	**-13.33**	**931.3**
		(39.97)	(39.97)	(39.97)	(28.26)	(31.60)
Horizontal ventilation, second story, window 1	Start	**-70**	**-316.3**	**-348.8**	**-31.08**	**1038**
		(48.37)	(48.37)	(48.37)	(34.20)	(38.24)
Horizontal ventilation, second story, window 1	Complete	**-51.83**	**-219**	**-214.8**	**-24**	**805.7**
		(33.71)	(33.71)	(33.71)	(23.83)	(26.65)
Horizontal ventilation, first story, window 2	Start	**-87.17**	**-386.3**	**-428.5**	**-44.67**	**1200**
		(45.13)	(45.13)	(45.13)	(31.91)	(35.68)
Horizontal ventilation, first story, window 2	Complete	**-88.5**	**-391.5**	**-423.3**	**-44.17**	**1224**
		(47.02)	(47.02)	(47.02)	(33.25)	(37.17)
Control utilities interior	Start	**-136.5**	**-287.8**	**-300**	**-6.333**	**946.3**
		(45.57)	(45.57)	(45.57)	(32.22)	(36.02)
Control utilities exterior	Start	**6.667**	**-281.8**	**-312.8**	**-38.17**	**1063**
		(70.21)	(70.21)	(70.21)	(49.65)	(55.51)
Conduct secondary search	Start	**-92.5**	**-143**	**-152.7**	**-28.25**	**846**
		(38.97)	(38.97)	(38.97)	(27.56)	(30.81)
Check for fire extension walls	Start	**-453.8**	**-535.3**	**-608.7**	**-38.25**	**1155**
		(38.28)	(38.28)	(38.28)	(27.07)	(30.26)
Check for fire extension ceiling	Start	**-206.3**	**-349.7**	**-292.7**	**-2.833**	**1086**
		(48.29)	(48.29)	(48.29)	(34.14)	(38.17)

Regression Models of Time to Task (in Seconds) as a Function of Combined Crew Size and Stagger (Standard Errors appear in Parentheses)

		Coefficients		
Measure of Task Time*	Time measured	Crew size of 4/5 vs. 3/2	Close Stagger	Constant
Total time		**-355** (37.23)	**-40.83** (37.23)	**1324.00** (32.24)
Conduct size up	Start	**-12.92** (4.50)	**-1.25** (4.50)	**336.2** (3.90)
Conduct size up	Complete	**-23.17** (9.97)	**-12** (9.97)	**413.4** (8.64)
Conduct size up	Duration	**-10.25** (8.44)	**-10.75** (8.44)	**77.21** (7.31)
Position attack line	Start	**-34.83** (13.66)	**-11.17** (13.66)	**376.3** (11.83)
Position attack line	Duration	**-54.67** (9.60)	**5.167** (9.60)	**152.6** (8.31)
Establish 2in - 2 out	Complete	**-90** (6.55)	**-30** (6.55)	**355** (5.67)
Establish RIT	Complete	**35** (10.80)	**-60** (10.80)	**470** (9.35)
Gain forced entry	Start	**-55.67** (14.32)	**-20.83** (14.32)	**516.8** (12.40)
Advance line	Start	**-83.67** (15.67)	**-17.5** (15.67)	**559.3** (13.57)
Advance line	Complete	**-84.58** (17.67)	**-19.08** (17.67)	**595** (15.31)
Deploy backup line	Start	**-35.08** (12.30)	**-96.75** (12.30)	**628.5** (10.65)
Deploy backup line	Complete	**-28.92** (23.43)	**-53.75** (23.43)	**721** (20.29)
Advance backup line	Start	**-34.33** (21.17)	**-63** (21.17)	**763.2** (18.33)
advancebackupline2	Complete	**-34.92** (21.27)	**-63.75** (21.27)	**767.1** (18.42)
conductprimarysearch1	Start	**-140.2** (28.28)	**0.1667** (28.28)	**662.6** (24.49)
Ground ladders in place	Complete	**-238.2** (37.99)	**-69.83** (37.99)	**1149** (32.90)
Ground ladders in place	Duration	**-117.7** (36.37)	**-72.08** (36.37)	**600.1** (31.49)
Horizontal ventilation, second story, window 3	Start	**-187.6** (22.31)	**-26.59** (22.31)	**732.3** (19.32)
Horizontal ventilation, second story, window 3	Complete	**-302.1** (35.38)	**-33.58** (35.38)	**1056** (30.64)

Regression Models of Time to Task (in Seconds) as a Function of Combined Crew Size and Stagger (CONTINUED) (Standard Errors appear in Parentheses)

Horizontal ventilation, second story, window 2	Start	**-237.7** (26.27)	**-18.83** (26.27)	**859.3** (22.75)
Horizontal ventilation, second story, window 2	Complete	**-234.3** (28.12)	**-13.33** (28.12)	**904.6** (24.36)
Horizontal ventilation, second story, window 1	Start	**-297.6** (34.64)	**-31.08** (34.64)	**1003** (30.00)
Horizontal ventilation, second story, window 1	Complete	**-191** (24.05)	**-24** (24.05)	**779.8** (20.83)
Horizontal ventilation, first story, window 2	Start	**-363.8** (33.83)	**-44.67** (33.83)	**1156** (29.30)
Horizontal ventilation, first story, window 2	Complete	**-363.2** (34.80)	**-44.17** (34.80)	**1180** (30.14)
Control utilities interior	Start	**-225.7** (37.23)	**-6.333** (37.23)	**878.1** (32.25)
Control utilities exterior	Start	**-300.7** (47.48)	**-38.17** (47.48)	**1066** (41.12)
Conduct secondary search	Start	**-101.6** (29.88)	**-28.25** (29.88)	**799.7** (25.88)
Check for fire extension walls	Start	**-345.1** (75.46)	**-38.25** (75.46)	**927.9** (65.35)
Check for fire extension ceiling	Start	**-218** (46.32)	**-2.833** (46.32)	**983.1** (40.12)
Stretch time = advance line minus position engine	Duration	**-75.7** (16.68)	**-17.2** (16.68)	**273.3** (14.44)

*** Standard errors are in parentheses below coefficient value**

		Crew size of 3	Crew size of 4	Crew size of 5	Close Stagger	Constant
Stretch time = advance line minus position engine	Duration	**-57.3** (19.39)	**-86.7** (19.39)	**-122.0** (19.39)	**-17.2** (13.71)	**301.9** (15.33)

APPENDIX G: Measurement Uncertainty

The measurements of length, temperature, mass, moisture content, smoke obscuration, and time taken in these experiments have unique components of uncertainty that must be evaluated in order to determine the fidelity of the data. These components of uncertainty can be grouped into two categories: Type A and Type B. Type A uncertainties are those evaluated by statistical methods, such as calculating the standard deviation of the mean of a set of measurements. Type B uncertainties are based on scientific judgment using all available and relevant information. Using relevant information, the upper and lower limits of the expected value are estimated so that the probability that the measurement falls within these limits is essentially 100 %. After all the component uncertainties of a measurement have been identified and evaluated it is necessary to use them to compute the combined standard uncertainty using the law of propagation of uncertainty (the "root sum of squares"). Although this expresses the uncertainty of a given measurement, it is more useful in a fire model validation exercise to define an interval for which the measurement will fall within a certain level of statistical confidence. This is known as the expanded uncertainty. The current international practice is to multiply the combined standard uncertainty by a factor of two (k=2), giving a confidence of 95 %.

Length measurements of room dimensions, openings and instrument locations were taken using a steel measuring tape with a resolution of 0.02 in (0.5 mm). However, measurement error due to uneven and unlevel surfaces results in an estimated uncertainty of ± 0.5 % for length measurements taken on the scale of room dimensions. The estimated total expanded uncertainty for length measurements is ± 1.0 %.

The standard uncertainty of the thermocouple wire itself is 1.1°C or 0.4 % of the measured value, whichever is greater (Omega 2004). The estimated total expanded uncertainty associated with type K thermocouples is approximately ± 15 %. Previous work done at NIST has shown that the uncertainty of the environment surrounding thermocouples in a full-scale fire experiment has a significantly greater uncertainty (Blevins 1999) than the uncertainty inherent with thermocouple design. Furthermore, while a vertical thermocouple array gives a good approximation of the temperature gradient with respect to height, temperatures cannot be expected to be uniform across a plane at any height because of the dynamic environment in a compartment fire. Inaccuracies of thermocouple measurements in a fire environment can be caused by:

- Radiative heating or cooling of the thermocouple bead
- Soot deposition on the thermocouple bead which change its mass, emissivity, and thermal conductivity
- Heat conduction along thermocouple wires
- Flow velocity over the thermocouple bead

To reduce these effects, particularly radiative heating and cooling, thermocouples with smaller diameter beads were chosen. This is particularly important for thermocouples below the interface because the radiative transfer between the surrounding room surfaces will be significantly less uniform than if the thermocouple were in the hot gas layer. It is suggested in [Pitts] that it may be possible to correct for radiative transfer given enough sufficient knowledge about thermocouple properties and the environment. However, measurements of local velocity and the radiative environment were not taken. Additionally, the probes were located away from the burn compartment walls in order to avoid the effects of walls and corners.

The gas measurement instruments and sampling system used in this series of experiments have been demonstrated to have an expanded (k = 2) relative uncertainty of ± 1 % when compared with span gas volume fractions (Matheson). Given the limited set of sampling points in these experiments, an estimated uncertainty of ± 10 % is being applied to the results.

The potential for soot deposition on the face of the water-cooled total heat flux gauges contributes significant uncertainty to the heat flux measurements. Calibration of heat flux gauges was completed at lower fluxes and then extrapolated to higher values and this resulted in a higher uncertainty in the flux measurement. Combining all of component uncertainties for total heat flux resulted in a total expanded uncertainty of -24 % to +13 % for the flux measurements.

Prior to experimentation, ten of the wooden pallets used in the fuel packages were randomly selected for measurement. Two measurements were taken, moisture content and mass. Moisture content was measured using a pin-type moisture meter with a moisture measurement range of 6 % to 40% and an accuracy of <0.5 % of the measured value between 6 % and 12 % moisture content. Mass measurements were made with an industrial bench scale having a range of 0kg to 100 kg, a resolution of 0.1 kg and an uncertainty of ± 0.1 kg.

All timing staff were equipped with the same model of digital stopwatch with a resolution of 0.01 seconds and an uncertainty of ± 3 seconds per 24 hours; the uncertainty of the timing mechanism in the stopwatches is small enough over the duration of an experiment that it can be neglected. There are three components of uncertainty when using people to time fire fighting tasks. First, timers may have a bias depending on whether they record the time in anticipation of, or reaction to an event. A second component exists because multiple timers were used to record all tasks. The third component is the mode of the stimulus to which the staff is reacting: audible (firefighters announcing task updates over the radio) or visual (timing staff sees a task start or stop).

Milestone events in these experiments were recorded both audibly and visually. A test series described in the *NIST Recommended Practice Guide for Stopwatch and Timer Calibrations* found the reaction times for the two modes of stimulus to be approximately the same, so this component can be neglected. Because of the lack of knowledge regarding the mean bias of the timers, a rectangular distribution was assumed and the worst case reaction time bias of 120 ms was used, giving a standard deviation of 69 ms. The standard deviation of the reaction time was assumed to be the worst case of 230 ms. The estimated total expanded uncertainty of task times measured in these experiments is 240 ms.

An additional component of uncertainty exists for the time measurement of the application of water on the fire. In order to measure this time, timing staff were required to listen for radio confirmation that suppressing water had been applied by the interior attack crew. This process required a member of the interior crew to find and manipulate their microphone, wait for the radio to access a repeater, and transmit the message. Because of the lack of

knowledge about the distributions of time it takes for each part of this process, all parts are lumped into a single estimate of uncertainty and a rectangular distribution is assumed. This is most reasonably estimated to be 2.5 seconds with a standard deviation of ±2.89 seconds and an expanded uncertainty of ± 5.78 seconds.

Weather measurement uncertainty was referenced to the published user's manual for the instrumentation used. The weather instrumentation has calibration certificates that are traceable to NIST standards. A summary of experimental measurement uncertainty is given in Table G-1.

Table G-1: Summary of Measurement Uncertainty

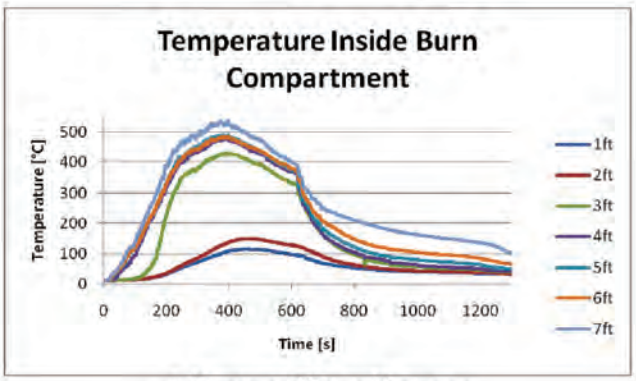
Measurement	Component Standard Uncertainty	Combined Standard Uncertainty	Total Expanded Uncertainty
Length Measurements			
Instrumentation Locations	± 1 %	± 3 %	± 6 %
Building Dimensions	± 1 %		
Repeatability[1]	± 2 %		
Random[1]	± 2 %		
Gas Temperature – Lower Layer			
Calibration	± 1 %	± 8 %	± 15 %
Radiative Cooling	- 5 % to + 0 %		
Radiative Heating	0 % to + 5 %		
Repeatability[1]	± 5 %		
Random[1]	± 3 %		
Wood Moisture Content			
	± 0.5 %	± 0.5 %	± 1%
Wood Pallet Mass			
	± 0.2%	± 0.1%	± 0.1%
Weather			
Relative Humidity	± 3%		
Barometric Pressure	± 0.03" Hg		
Wind Speed	± 5%		
Wind Direction	± 5%		
Outside Temperature	±0.5°C		
Time			
Timer Bias	± 0.069s	± 2.90s	
Reaction Time	± 0.230s		± 5.80 s
Radio Operation	± 2.890s		

Notes: 1. Random and repeatability evaluated as Type A, other components as Type B.

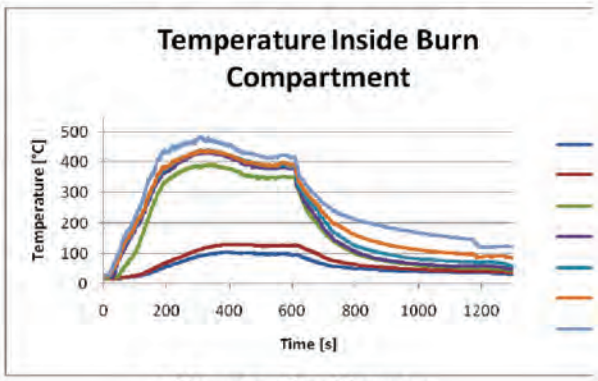
APPENDIX H: Charts of Gas and Temperature Data

Examples of Gas and Temperature Data for Time-to-Task Tests

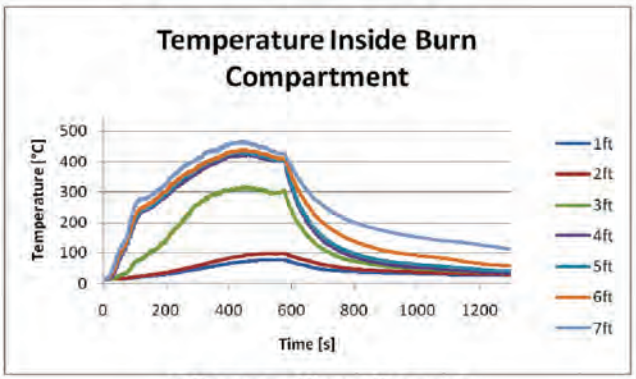
Burn Room Data



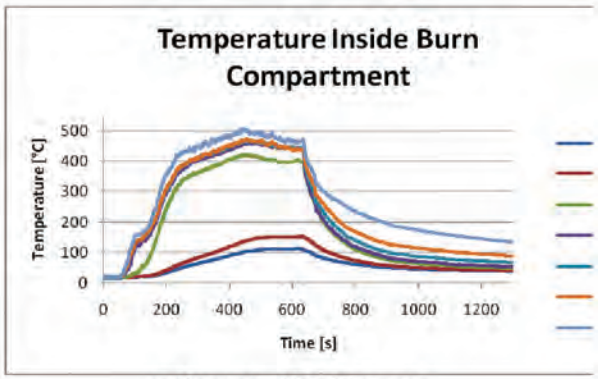
2 Person, Close Stagger



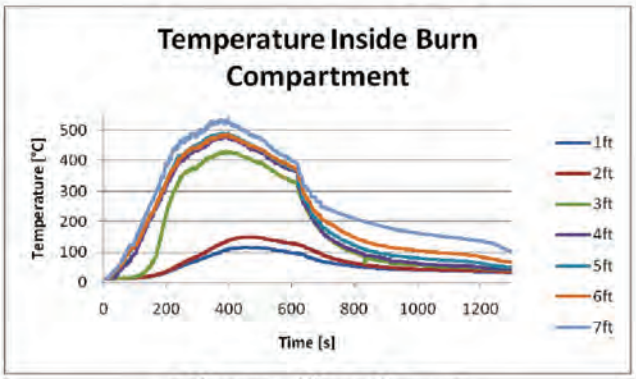
2 Person, Far Stagger



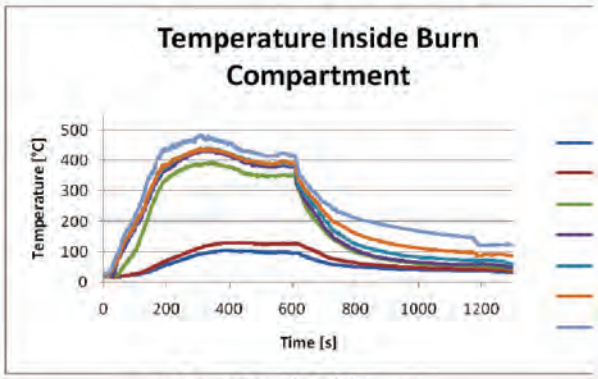
3 Person, Close Stagger



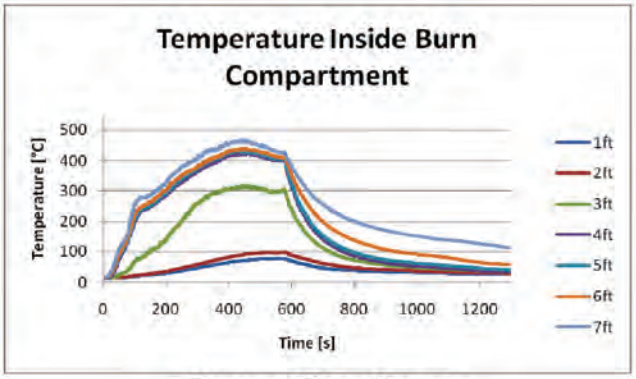
3 Person, Far Stagger



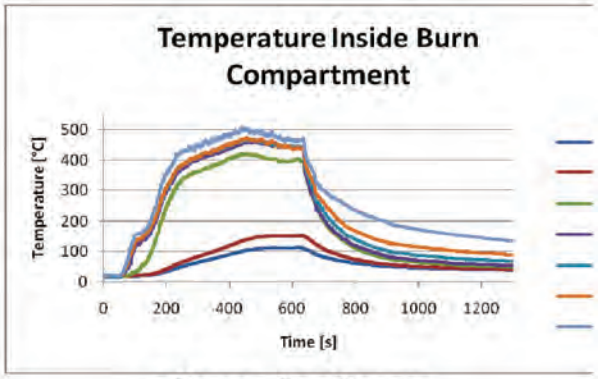
2 Person, Close Stagger



2 Person, Far Stagger

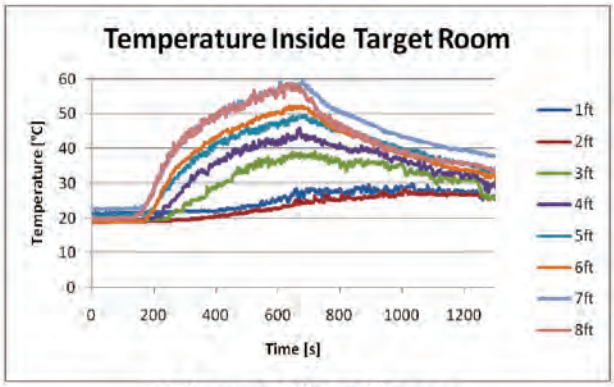


3 Person, Close Stagger

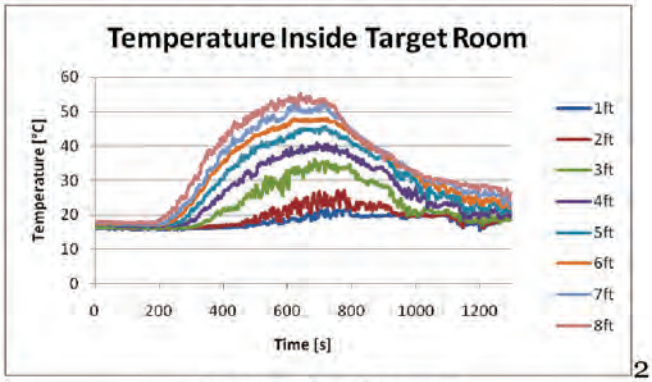


3 Person, Far Stagger

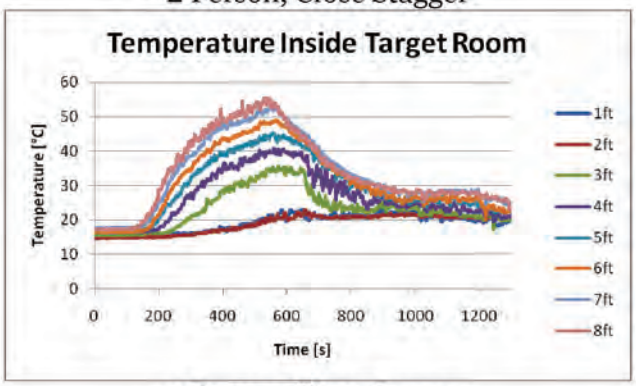
Target Room Data



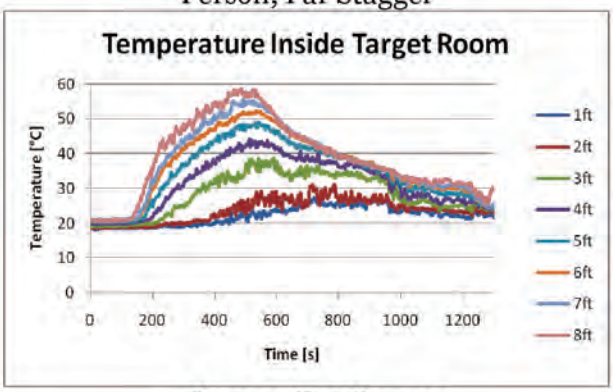
2 Person, Close Stagger



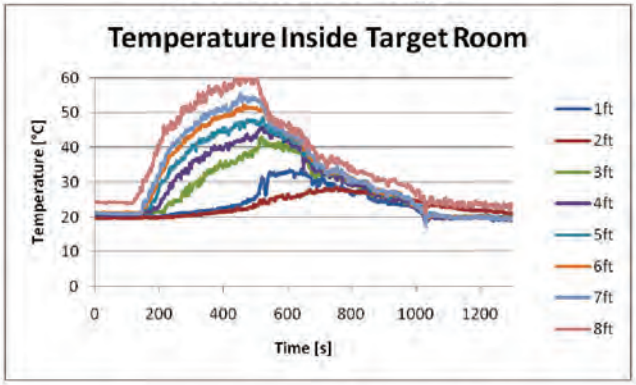
2 Person, Far Stagger

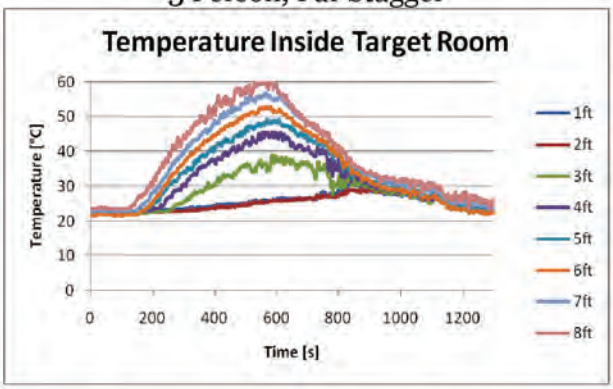


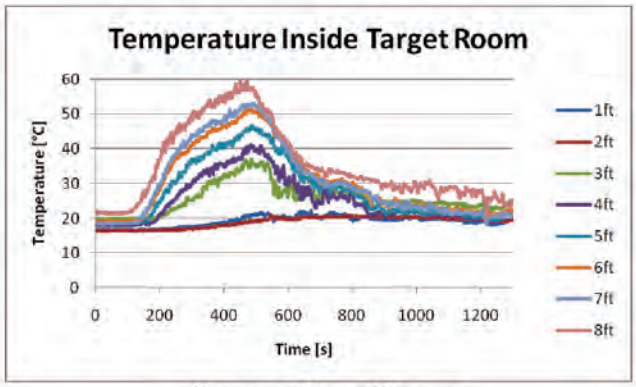
3 Person, Close Stagger



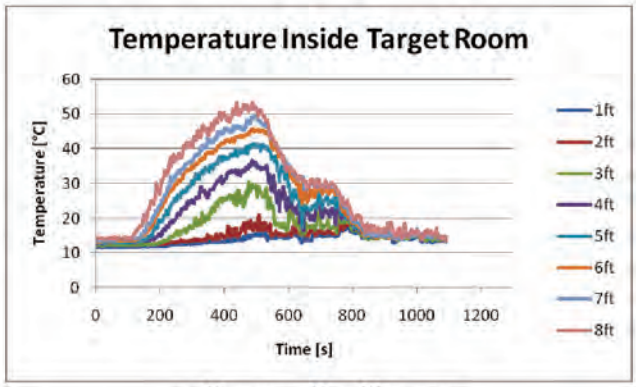
3 Person, Far Stagger





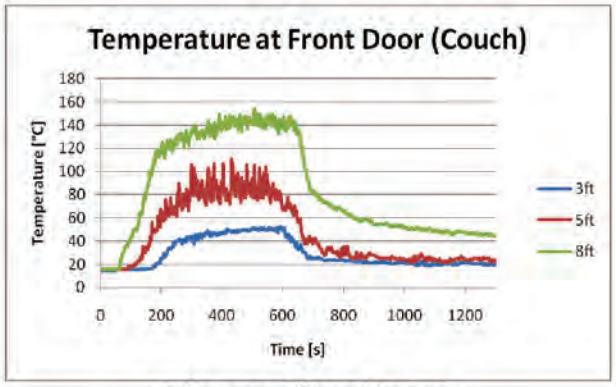


5 Person, Close Stagger

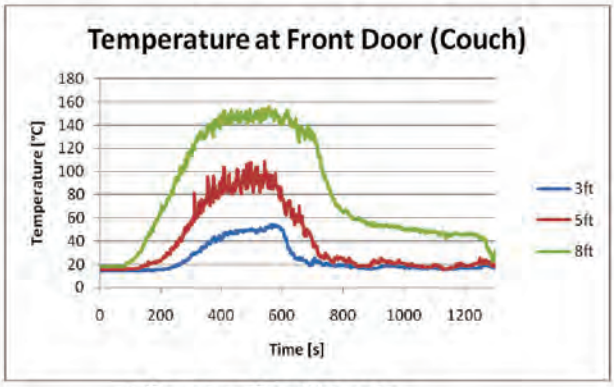


5 Person, Far Stagger

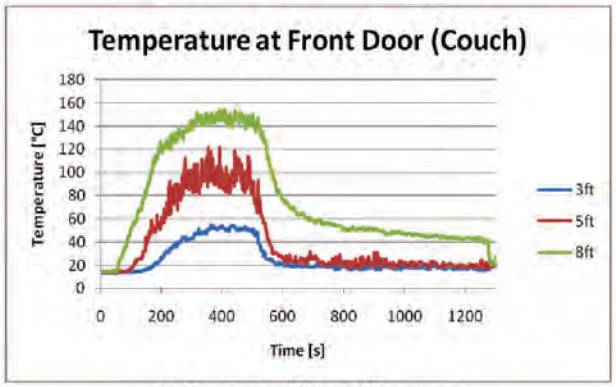
Temperature Near Front Door (Couch)



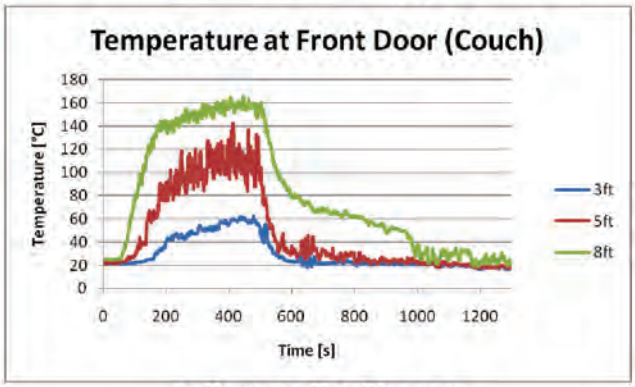
2 Person, Close Stagger



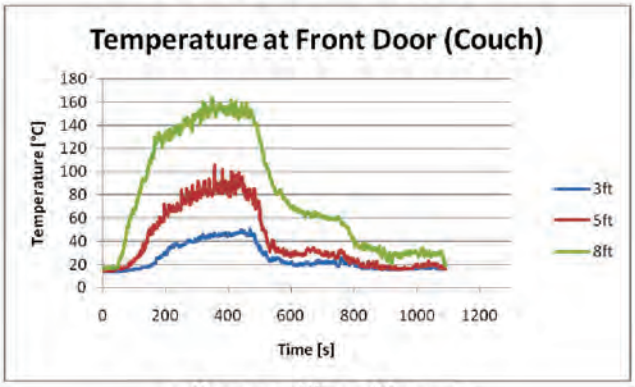
2 Person, Far Stagger



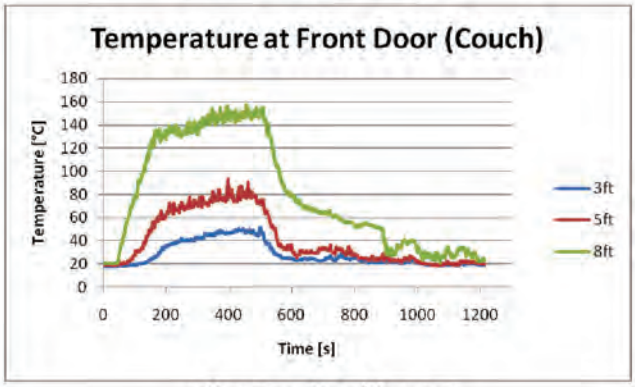
3 Person, Close Stagger



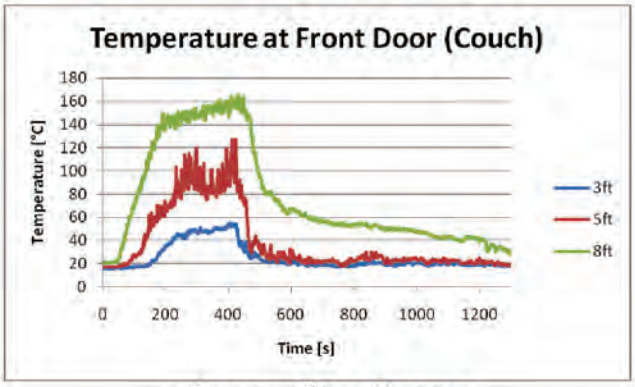
3 Person, Far Stagger



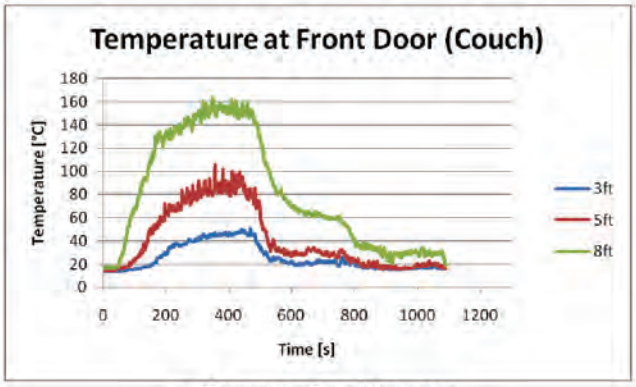
4 Person, Close Stagger



4 Person, Far Stagger



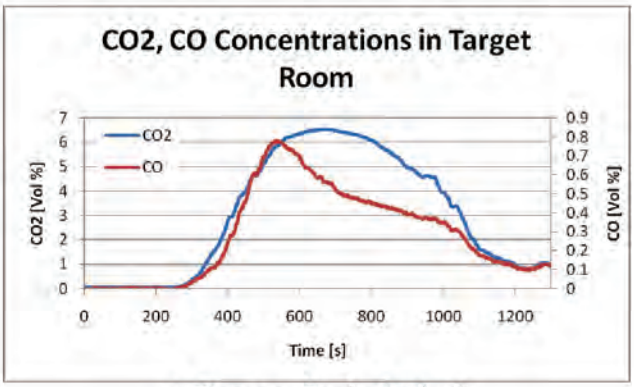
5 Person, Close Stagger



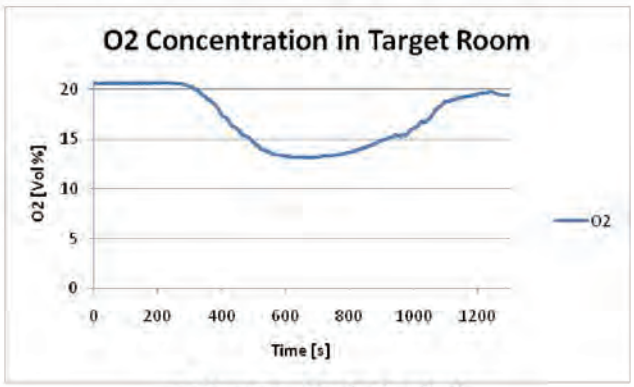
5 Person, Far Stagger

Gas and Temperature Data for Room and Contents Tests

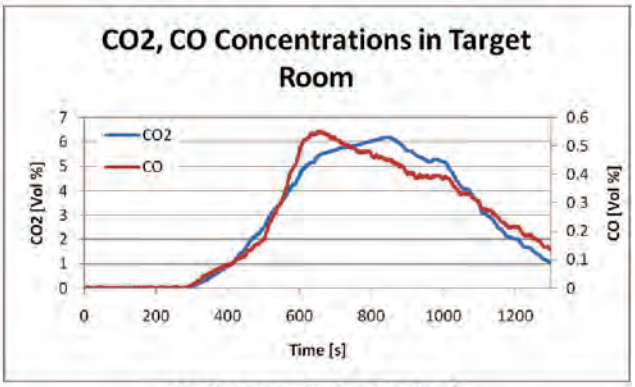
Examples of Gas Data in Target Room



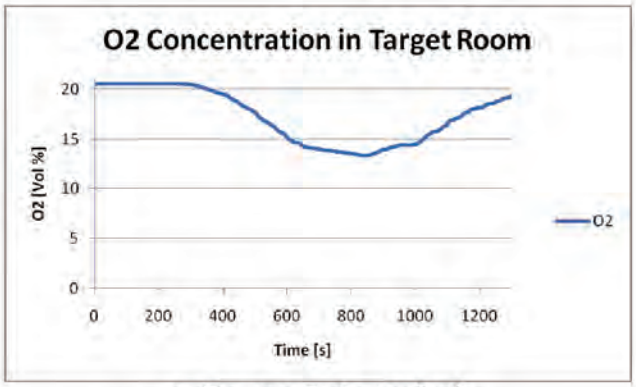
2-Person, Early Arrival



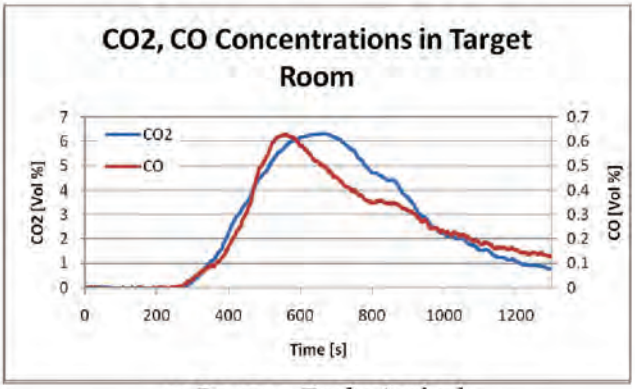
2-Person, Early Arrival



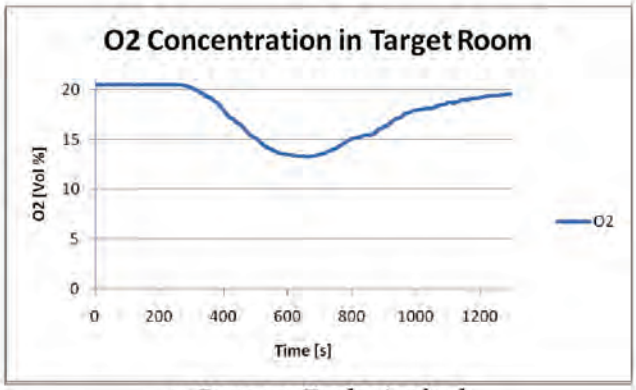
2-Person, Late Arrival



2-Person, Late Arrival



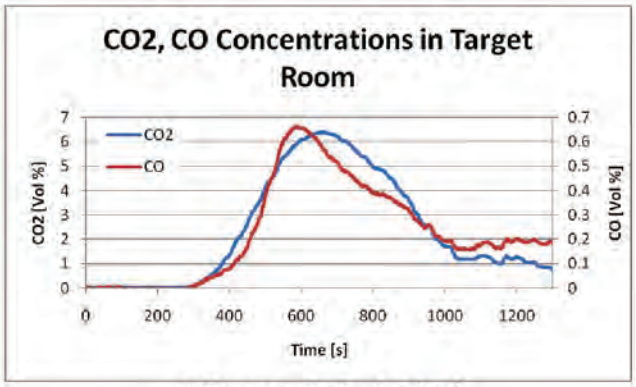
3-Person, Early Arrival



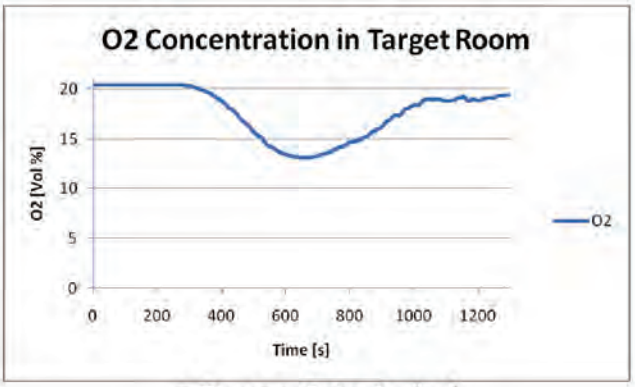
3-Person, Early Arrival

Gas and Temperature Data for Room and Contents Tests

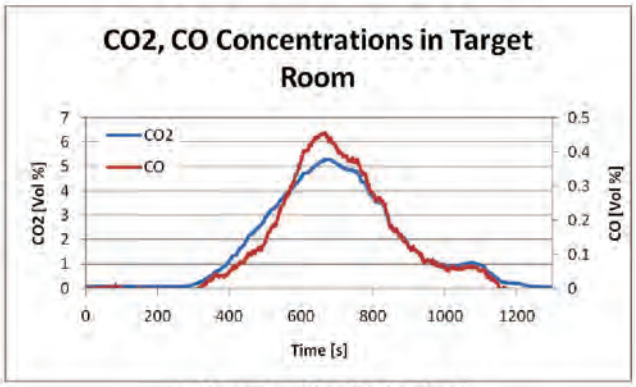
Examples of Gas Data in Target Room



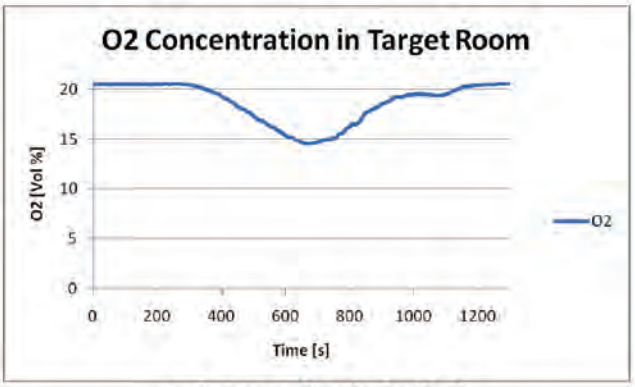
3-Person, Late Arrival



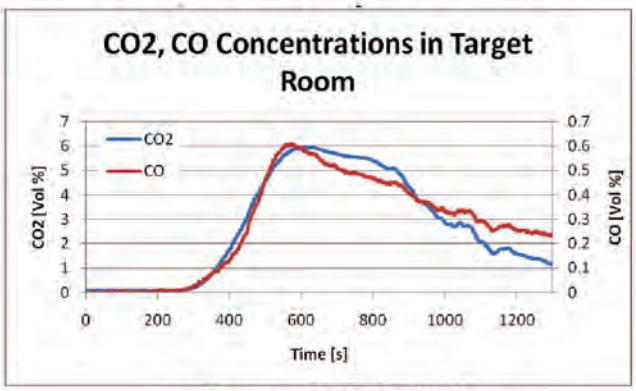
3-Person, Late Arrival



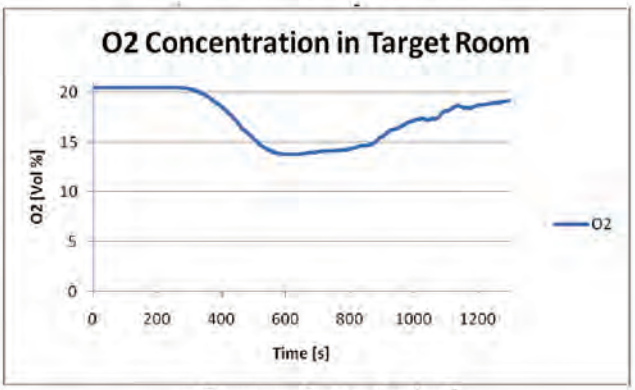
4-Person, Early Arrival



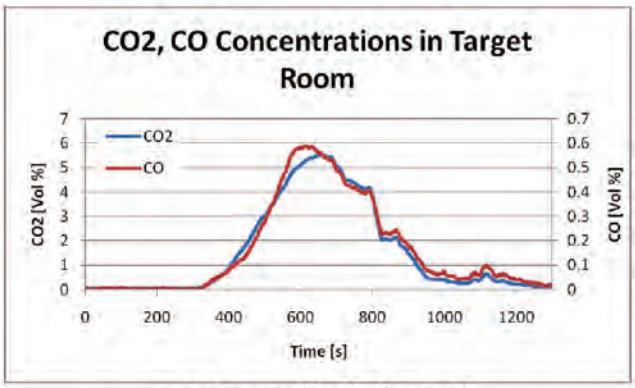
4-Person, Early Arrival



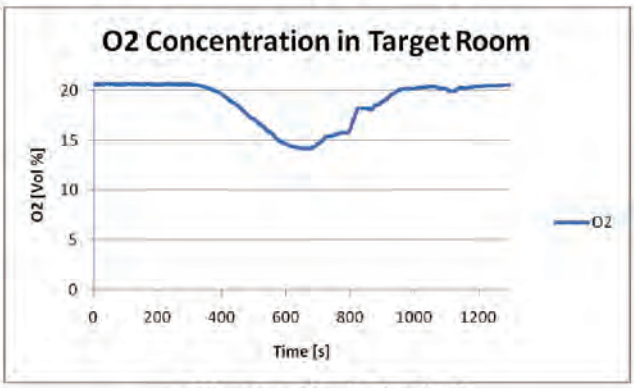
4-Person, Late Arrival



4-Person, Late Arrival

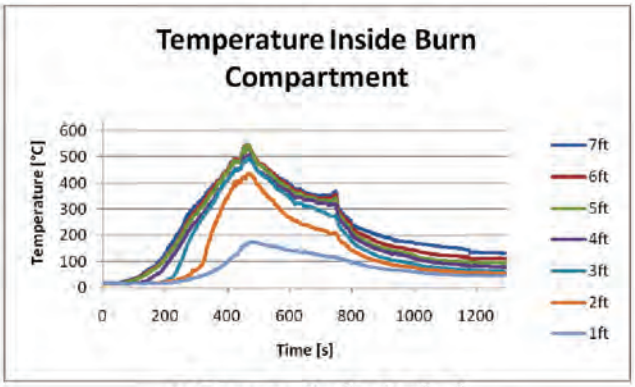


5-Person, Early Arrival

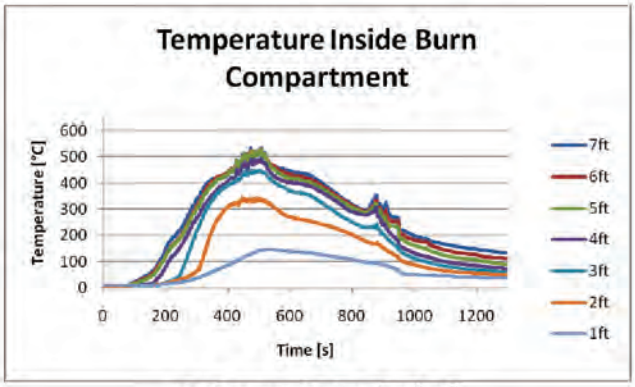


5-Person, Early Arrival

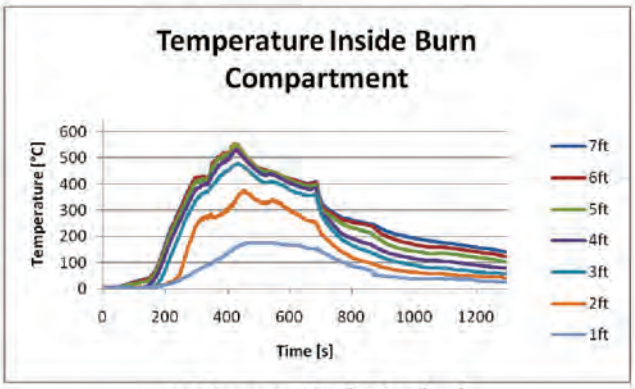
Temperatures in Burn Room



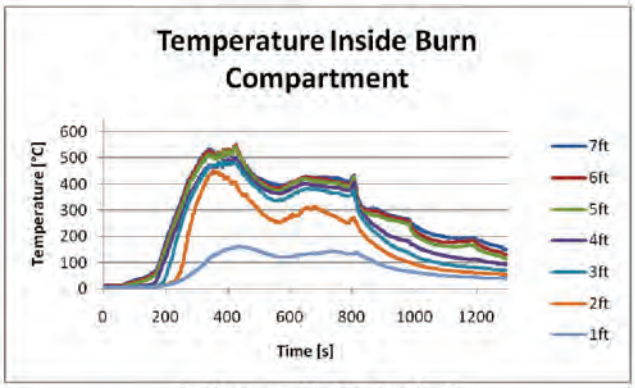
2-Person, Early Arrival



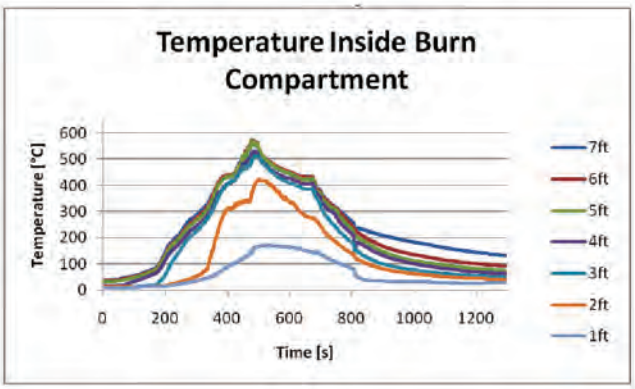
2-Person, Late Arrival



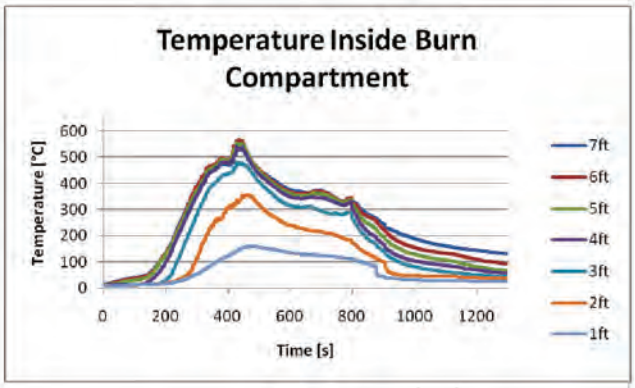
3-Person, Early Arrival



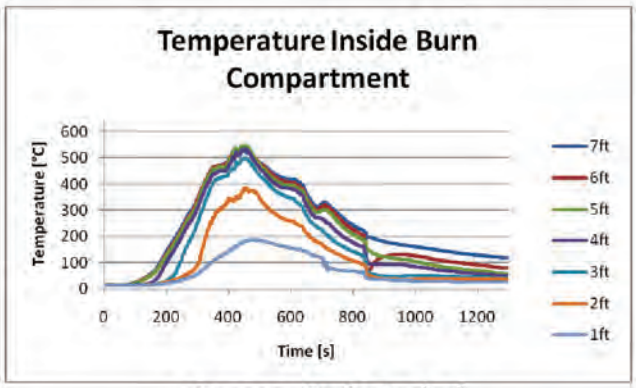
3-Person, Late Arrival



4-Person, Early Arrival

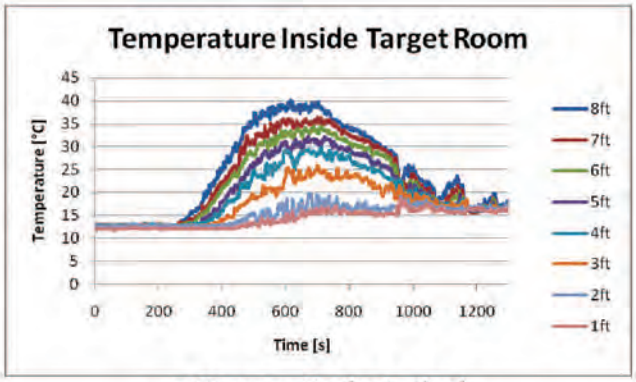


4-Person, Late Arrival

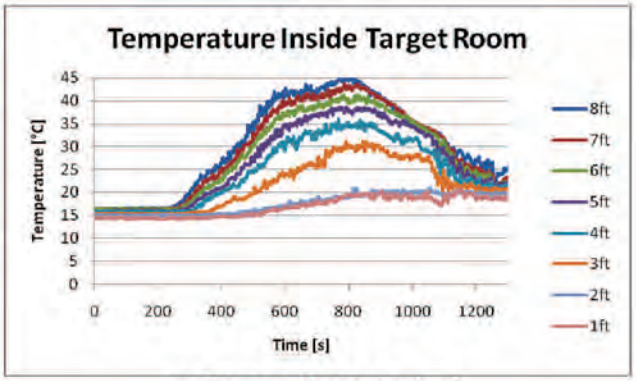


5-Person, Early Arrival

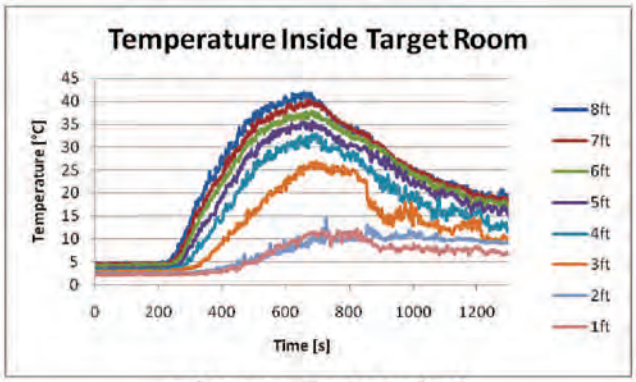
Temperatures in Target Room



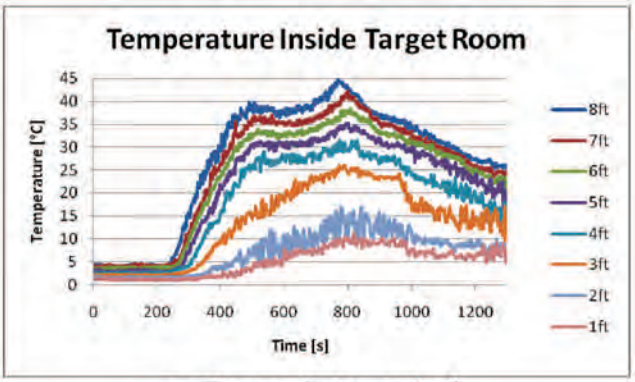
2-Person, Early Arrival



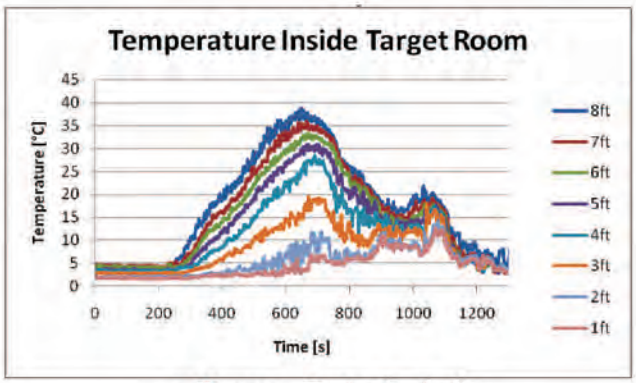
2-Person, Late Arrival



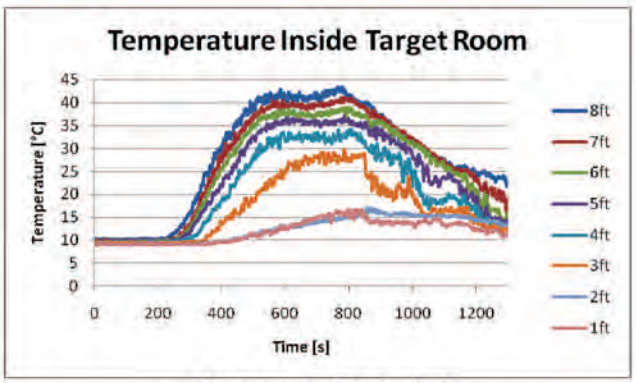
3-Person, Early Arrival



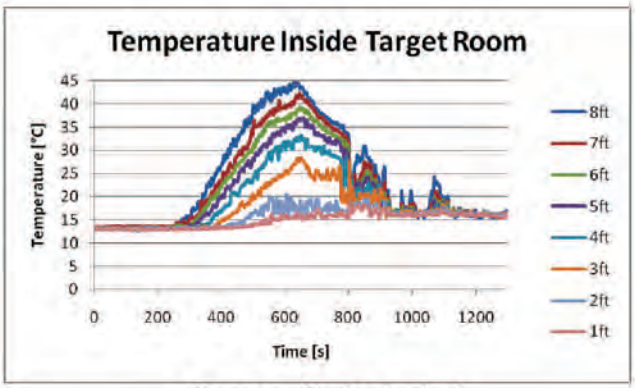
3-Person, Late Arrival



4-Person, Early Arrival

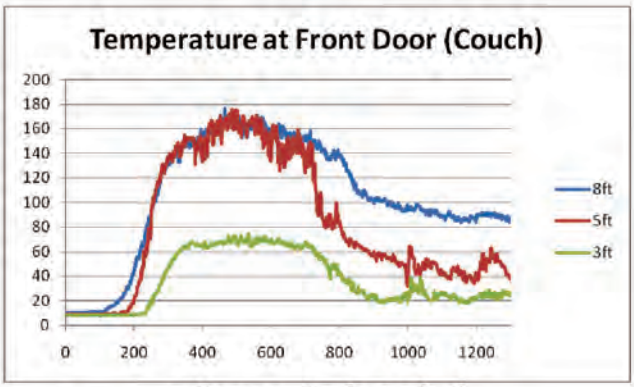


4-Person, Late Arrival

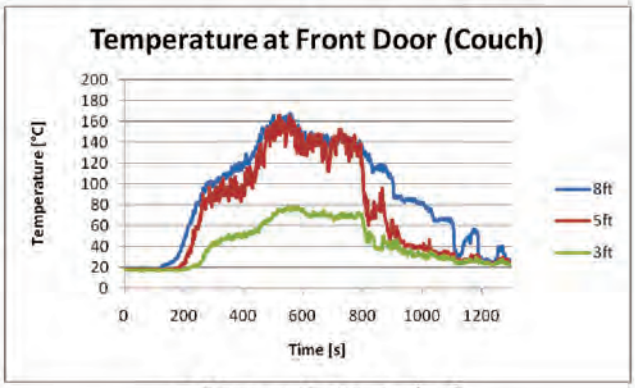


5-Person, Early Arrival

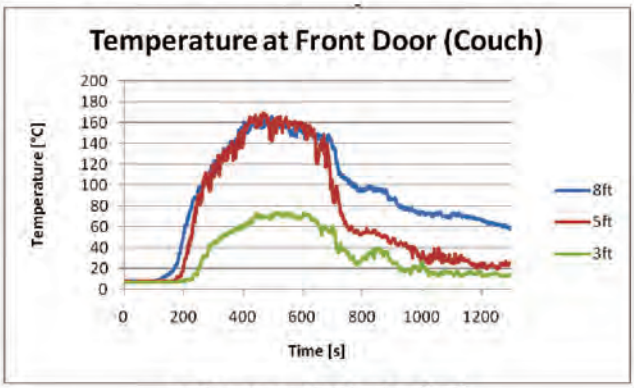
Temperatures Near Front Door (Couch)



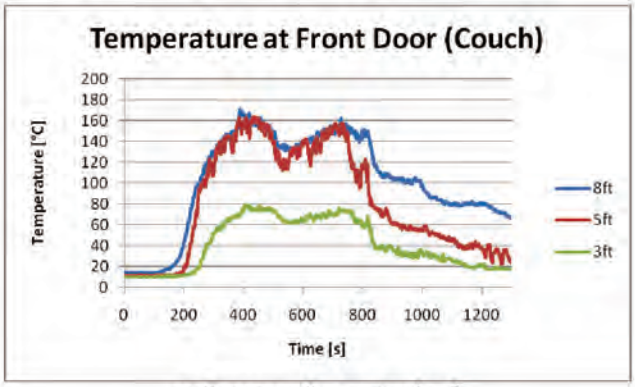
2-Person, Early Arrival



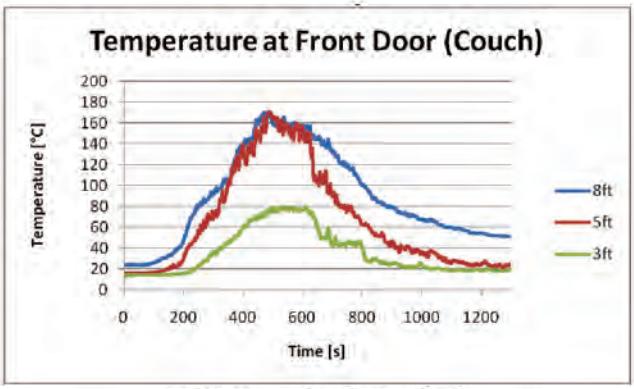
2-Person, Late Arrival



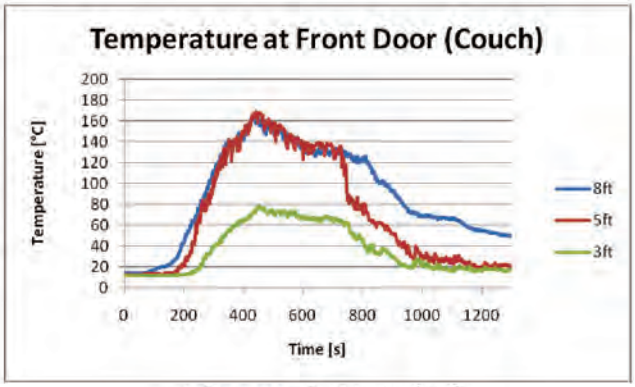
3-Person, Early Arrival



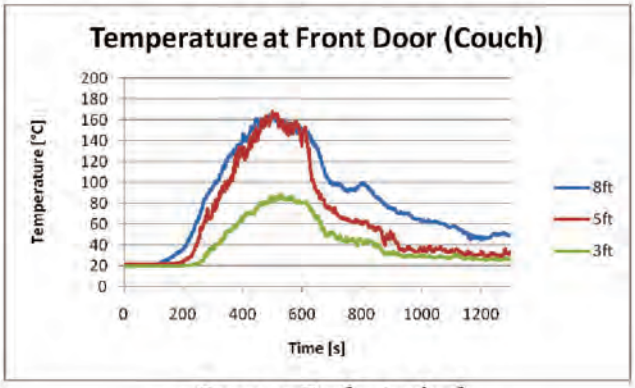
3-Person, Late Arrival



4-Person, Early Arrival



4-Person, Late Arrival



5-Person, Early Arrival

NOTES:

FIRE FIGHTER SAFETY AND DEPLOYMENT STUDY

Report on

EMS Field Experiments



Lori Moore-Merrell
Rob Santos
Doug Wissoker
Ron Benedict
Nicole Taylor
Randy Goldstein
Greg Mears
Jane Brice
Jason D. Averill
Kathy Notarianni

NIST National Institute of Standards and Technology U.S. Department of Commerce

URBAN INSTITUTE

UNC SCHOOL OF MEDICINE

EMSpic PERFORMANCE IMPROVEMENT CENTER

September 2010

Report on
EMS Field Experiments

Lori Moore-Merrell
Rob Santos
Doug Wissoker
Ron Benedict
Nicole Taylor
Randy Goldstein
Jane Brice
Greg Mears
Jason D. Averill
Kathy Notarianni

FIRE FIGHTER SAFETY AND DEPLOYMENT STUDY

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately. Such identification is not intended to imply recommendation or endorsement by the partner organizations, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

Produced with the Cooperation of
Montgomery County, Maryland
Fire and Rescue, Department
Chief Richard Bowers

Produced with the Cooperation of
Fairfax County, Virginia
Fire and Rescue Department
Chief Ronald Mastin

Funding provided through DHS/FEMA Grant Program Directorate for FY 2008
Assistance to Firefighters Grant Program – Fire Prevention and Safety Grants
(EMW-2008-FP-01603)


NIST
National Institute of
Standards and Technology
U.S. Department of Commerce


INTERNATIONAL
FIRE CHIEFS
ASSOCIATION


A
I
F
F
AFL-CIO
CLC


WPI


CFAI RISK


URBAN
INSTITUTE


UNC
SCHOOL OF MEDICINE


EMSpic
PERFORMANCE
IMPROVEMENT
CENTER

Table of Contents

Abstract 9
Executive Summary 10
Primary Findings 11
Background 13
Problem 14
Literature Review 15
Purpose and Scope of the Study 17
A Brief Overview of an EMS Response 18
The Star of Life 18
EMS Response to Time Critical Events 19
The Relation of Time-to-Task Completion and Risk 19
Standards of Response Cover 20
Experiment Planning and Methodology 20
Department Participation 20
Crew Orientation 20
Cue Cards 20
Tasks 20
On Scene EMS Tasks 20
Radio Communication 21
Task Timers 21
Video records 21
Crew Assignment 21
Props 21
Safety Protocols 22
Response Time Assumptions 22
Part 1: Patient Access and Removal from Incident Scene ..24
Incident Scene 24
Tasks 24
Part 2: Trauma Patient 25
Incident Scene 25
Tasks 25
Part 3: Cardiac Patient 27
Incident Scene 27
Tasks 27
Analysis of Experimental Results 29
Time-to-Task Analysis 29
Data Queries 29
Statistical Methods 29
For Access and Removal 29
For Trauma and Cardiac scenarios 29
Measurement Uncertainty 32
How to Interpret the Time-to-Task Graphs 32
Time-to-Task Graphs 33
Part 1- Patient Access and Removal 34
Access 34
Patient Removal 33
Part 2- Multi-System Trauma 34
Individual Task Times 35
Patterns in the Trauma Scenario 39
Part 3- Chest Pain and Witnessed Cardiac Arrest 40
Individual Task Times 41
Patterns in the Cardiac Scenario 43
Conclusions 44
Patient Access and Removal 44
Trauma 44
Cardiac 44
Summary 46
Study Limitations 47
Future Research 48
Acknowledgements 49
References 50
Glossary 52
Acronynms 54
Appendix A: Time to Task Measures 55
Appendix B: Trauma Patient Assessment and Interview Form 58
Appendix C: Medical Patient Interview Form 59
Appendix D: Medical Patient Assessment/Interview Form 60
Appendix E: Statistical Analysis of Time to Task Data Patient Access and Removal 61
Appendix F: Statistical Analysis of Time to Task Data Systemic Trauma Patient 62
Appendix G: Statistical Analysis of Time to Task Data Cardiac Arrest Patient 63
Appendix H: All Regression Coefficients 65
Notes 70

Abstract

The fire service has become the first line medical responder for all types of medical emergencies in the majority of the United States. Fire departments typically deliver first-on-scene, out-of-hospital care services, regardless of whether or not they provide transport. The design of fire department-based Emergency Medical Services (EMS) systems varies across communities. Some departments deploy only Basic Life Support (BLS) units and personnel, some deploy a mix of BLS and Advanced Life Support (ALS) units and personnel, and a few departments operate solely at an ALS level. Additionally, the number of total personnel dispatched on an EMS call also differs. This number is dependent on factors such as the type of system resources, the nature of the EMS incident, and the number of simultaneous and concurrent incidents.

For the first time, this study investigates the effects of varying crew configurations for first responders, the apparatus assignment of ALS personnel, and the number of ALS personnel on scene on the task completion times for ALS level incidents. This study is also unique because of the array of stakeholders and the caliber of technical experts involved. Throughout the experiments, all industry standards and safety protocols were followed and robust research methods were used. The results and conclusions will directly inform the NFPA 1710[1] and NFPA 1720 Technical Committees, who are responsible for developing industry operational and deployment standards.

This report presents the results of more than 102 field experiments designed to quantify the effects of various fire department-based EMS deployment configurations for three different scenarios—-1) patient access and removal from the incident scene, 2) a victim of systemic trauma due to a long distance fall and 3) a patient with chest pain leading to a cardiac arrest. In addition to systematically controlling for arrival times of units, first responder crew size was varied to consider two-, three-, and four-person staffing. ALS personnel configuration for both the first responder unit and ambulance transport unit were also varied for purposes of the experiments. In each deployment, personnel performed a series of defined tasks consistent with the scenario being evaluated. Report results quantify the effectiveness of crew size, ALS configuration, and the number of ALS personnel on the start, duration, and completion time of all tasks delineated in the three scenarios. Conclusions are drawn from statistically significant results.

NFPA is a registered trademark of the National Fire Protection Association, Quincy, Massachusetts.

Executive Summary

Increasing demands on the fire service, including the rising number of EMS responses, point to the need for scientifically-based studies on the effect of first responder crew size, Advanced Life Support configuration, and the number of Advanced Life Support (ALS) personnel on scene on the safety of responders, as well as the operational efficiency and effectiveness of fire departments responding to emergency medical incidents. To address this need, a research partnership of the Commission on Fire Accreditation International (CFAI), International Association of Fire Chiefs (IAFC), International Association of Fire Fighters (IAFF), National Institute of Standards and Technology (NIST), and Worcester Polytechnic Institute (WPI) was formed to conduct a multiphase study of firefighter safety and the deployment of resources. A portion of that study, as reported here, includes an assessment of time-to-tasks for EMS incidents.

Beginning in FY 2005, funding was provided through the Department of Homeland Security (DHS)/ Federal Emergency Management Agency (FEMA) Grant Program Directorate for Assistance to Firefighters Grant Program-Fire Prevention and Safety Grants. In addition to the EMS field experiments described in this report, the multiple phases of the overall research effort include development of a conceptual model for community risk assessment and deployment of resources, implementation of a generalizable department incident survey, and delivery of a software tool to quantify the effects of deployment decisions on resultant firefighter and civilian injuries and on property losses.

The first phase of the project was an extensive survey of more than 400 career and combination (both career and volunteer) fire departments in the United States with the objective of optimizing a fire service leader's capability to deploy resources to prevent or mitigate adverse events that occur in risk- and hazard-filled environments. The results of this survey are not documented in this report, which is limited to the EMS experimental phase. The survey results will constitute significant input into the development of a future software tool to quantify the effects of community risks and associated deployment decisions on resultant firefighter and civilian illnesses and injuries.

The National Fire Protection Association estimates that 10,380 EMS workers were exposed to infectious diseases in 2008 (Karter, 2009). Another study noted that almost 10 % of Emergency Medical Technicians (EMTs) and Paramedics miss work at any given time due to job-related illness or injury (Studnek et al, 2007). Another study noted that injury rates for EMS workers are higher than rates reported by the Department of Labor (DOL) for any other industry in 2000 (Maguire et al, 2005) and another study noted that EMS providers have a high risk for occupational injury, with approximately 25 % of workers reporting at least one work-related injury in the previous six months. Many of these injuries were the result of falls or lifting patients (Heick, 2009). Funding and additional research are critical to further defining the high risks to firefighters during EMS responses and developing interventions to mitigate this serious problem.

In order to address the primary research questions using realistic scenarios, the research was divided into three distinct, yet interconnected parts.

- Part 1 — Time-to-task experiments related to gaining access to a patient and removing the patient from the incident scene.
- Part 2 — Time-to-task experiments related to the care of a victim with multi-system trauma.
- Part 3 — Time-to-task experiments related to the care of a victim with chest pain and witnessed cardiac arrest.

These parts included the most basic elements of an overall EMS response, which are — access the patient, conduct patient assessment, deliver on scene patient care, package the patient, and remove the patient from the scene to a transport-capable vehicle.

Scope

The EMS portion of the Firefighter Safety and Deployment of Resources Study was designed solely to assess the personnel number and configuration aspect of an EMS incident for responder safety, effectiveness, and efficiency. This study does not address the efficacy of any patient care intervention. This study does however quantify first responder crew size, i.e., the number and placement of ALS trained personnel resources on the time-to-task measures for EMS interventions. Upon recommendation of technical experts, the investigators selected trauma and cardiac scenarios to be used in the experiments as these events are resource intensive and will likely reveal relevant differences in regard to the research questions. The applicability of the conclusions from this report to a large-scale hazardous or multiple-casualty event has not been assessed and should not be extrapolated from this report.

EMS protocols pertaining to the treatment and transport of patients vary by departments. For the purpose of this study, apparatus arrival times and on scene tasks were standardized by technical experts. Individual performance times were recorded for each task. Response data from more than 300 United States Fire Departments show that when dispatched simultaneously, a first responder arrives prior to an ambulance in approximately 80 % of EMS responses, (IAFC/IAFF, 2005). Therefore, arrival times of the first responder engine and the ambulance were staggered. Additionally, in real-world situations, as in this study, many of the tasks can be performed simultaneously based on the number and training level of responding personnel. Attempts to generalize the results from these experiments to individual departments must take into account response and patient care protocols and equipment that may vary from those used in the experiments.

Primary Findings

The objective of the experiments was to determine how first responder crew size, ALS provider placement, and the number of ALS providers is associated with the effectiveness of EMS providers. EMS crew effectiveness was measured by task intervention times in three scenarios including patient access and removal, trauma, and cardiac arrest. The results were evaluated from the perspective of firefighter and paramedic safety and scene efficiency rather than as a series of distinct tasks. More than 100 full-scale EMS experiments were conducted for this study.

Hundreds of firefighters and paramedics are injured annually on EMS responses. Most injuries occur during tasks that require *lifting or abnormal movement* by rescuers. Such tasks include lifting heavy objects (including human bodies both conscious and unconscious), manipulating injured body parts and carrying heavy equipment. Several tasks included in the experiments fall into this category, including splinting extremities, spinal immobilization (back boarding) and patient packaging. Similar to the lifting or heavy workload tasks, larger crews were able to complete the labor intensive tasks using multiple crew members on a single task to assure safe procedures were used reducing the likelihood of injury or exposure.

A number of tasks are also *labor intensive*. These tasks can be completed more efficiently when handled by multiple responders. Several tasks in the experiments are in this category. These include checking vital signs, splinting extremities, intubation with spinal restriction, establishing I.V. access, spinal immobilization, and patient packaging. During the experiments larger crews completed these tasks more efficiently by distributing the work load among more people thereby reducing the likelihood of injury.

Finally, there are opportunities on an EMS scene to reduce scene time by completing tasks simultaneously rather than sequentially thus increasing operational efficiency. For the experiments, crews were required to complete all tasks in each scenario regardless of their crew size or configuration. Therefore, patterns in task start times and overall scene times reveal operational efficiencies. When enough hands are available at the scene to complete tasks simultaneously, this leads to overall time reductions relative to smaller crews that are forced to complete tasks sequentially.

Patient Access and Removal

With regard to accessing the patient, crews with three or four first responders reached the patient around half a minute faster than smaller crews with two first responders. With regard to completing patient removal, larger first responder crews in conjunction with a two-person ambulance were more time efficient. The removal tasks require heavy lifting and are labor intensive. The tasks also involve descending stairs while carrying a patient, carrying all equipment down stairs, and getting patient and equipment out multiple doors, onto a stretcher and into an ambulance.

The patient removal results show substantial differences associated with crew size. Crews with three- or four-person first responders complete removal between 1.2 – 1.5 minutes faster than smaller crews with two first responders. All crews with first responders complete removal substantially faster (by 2.6 - 4.1 minutes) than the ambulance-only crew.

These results suggest that time efficiency in access and removal can be achieved by deploying three- or four-person crews on the first responding engine (relative to a first responder crew of two). To the extent that each second counts in an EMS response, these staffing features deserve consideration. Though these results establish a technical basis for the effectiveness of first responder crews and specific ALS crew configurations, other factors contributing to policy decisions are not addressed.

Trauma

Overall, field experiments reveal that four-person first responder crews completed a trauma response faster than smaller crews. Towards the latter part of the task response sequence, four-person crews start tasks significantly sooner than smaller crews of two or three persons.

Additionally, crews with one ALS provider on the engine and one on the ambulance completed all tasks faster and started later tasks sooner than crews with two ALS providers on the ambulance. This suggests that getting ALS personnel to the site sooner matters.

A review of the patterns of significant results for task start times reinforced these findings and suggests that (in general) small non-significant reductions in task timings accrue through the task sequence to produce significantly shorter start times for the last third of the trauma tasks.

Finally, when assessing crews for their ability to increase on-scene operational efficiency by completing tasks simultaneously, crews with an ALS provider on the engine and one ALS provider on the ambulance completed all required tasks 2.3 minutes (2 minutes 15 seconds) faster than crews with a BLS engine and two ALS providers on the ambulance. Additionally, first responders with four-person first responder crews completed all required tasks 1.7 minutes (1 minute 45 seconds) faster than three-person crews and 3.4 minutes (3 minutes and 25 seconds) faster than two-person crews.

Cardiac

The overall results for cardiac echo those of trauma. Regardless of ALS configuration, crews responding with four first responders completed all cardiac tasks (from at-patient to packaging) more quickly than smaller first responder crew sizes. Moreover, in the critical period following cardiac arrest, crews responding with four first responders also completed all tasks more quickly than smaller crew sizes. As noted in the trauma scenario, crew size matters in the cardiac response.

Considering ALS placement, crews responding with one ALS provider on both the engine and ambulance completed all scene tasks (from at-patient to packaging) more quickly than a crew with a BLS engine and two ALS providers on the ambulance. This suggests that ALS placement can make a difference in response efficiency. One curious finding was that crews responding with a BLS engine and an ambulance with two ALS providers completed the tasks that follow cardiac arrest 50 seconds *sooner* than crews with an ALS provider on both the engine and ambulance. As noted, this counter-intuitive difference in the results may be attributable to the delay of the patient arrest time based on the arrival of the 12-Lead ECG monitor with the two-person ALS Ambulance crew. The 12-Lead ECG task *end time* was the arrest *start time*. In this scenario, there were instantaneously two ALS providers present at the arrest rather than the one ALS provider placing the 12-Lead ECG device in the ALS engine /ALS Ambulance crew.

A review of the patterns of significant findings across task start times showed mixed results. An ALS on an engine showed an advantage (sooner task starting times) over an ALS on an ambulance for a few tasks located earlier in the cardiac response sequence (specifically, ALS Vitals 12-Lead through IV access). A first responder with four-person crew also showed shorter start times for a few early tasks in the cardiac response sequence (initial airway, breathing and circulation (ABCs), and the ALS Vitals 12-Lead and expose chest sequence). More importantly, a sequential time advantage appears for the last three tasks of the sequence (analyze shock #2 through package patient).

Finally, when assessing crews for their ability to increase on-scene operational efficiency by completing tasks simultaneously, crews with an ALS provider on the engine and one ALS provider on the ambulance completed all required tasks 45 seconds faster than crews with a BLS engine and two ALS providers on the ambulance. Regardless of ALS configuration, crews responding with four first responders completed all cardiac tasks from the 'at patient time' to completion of packaging 70 seconds faster than first responder crews with three persons, and 2 minutes and 40 seconds faster than first responder crews with two persons. Additionally, *after the patient arrested*, an assessment of time to complete remaining tasks revealed that first responders with four-person crews completed all required tasks 50 seconds faster than three-person crews and 1.4 minutes (1 minute 25 seconds) faster than two-person crews.

Summary

While resource deployment is addressed in the context of three basic scenarios, it is recognized that public policy decisions regarding the cost-benefit of specific deployment decisions are a function of many factors including geography, resource availability, community expectations as well as population demographics that drive EMS call volume. While this report contributes significant knowledge to community and fire service leaders in regard to effective resource deployment for local EMS systems, other factors contributing to policy decisions are not addressed. The results, however, do establish a technical basis for the effectiveness of first responder crews and ALS configuration with at least one ALS level provider on first responder crews. The results also provide valid measures of total crew size efficiency in completing on-scene tasks some of which involve heavy lifting and tasks that require multiple responders to complete.

These experimental findings suggest that ALS provider placement and crew size can have an impact on some task start times in trauma and cardiac scenarios, especially in the latter tasks leading to patient packaging. To the extent that creating time efficiency is important for patient outcomes, including an ALS trained provider on an engine and using engine crew sizes of four are worth considering. The same holds for responder safety – for access and removal and other tasks in the response sequence, the availability of additional hands can serve to reduce the risks of lifting injuries or injuries that result from fatigue (e.g., avoid having small crews repeatedly having to ascend and descend stairs).

Background

In recent years, the provision of emergency medical services has progressed from an amenity to a citizen-required service. Today more than 90 % of career and combination fire departments deliver emergency medical care services, making fire departments the largest group of providers of prehospital EMS in North America. Fire department operations are geared to rapid response, whether it is for EMS, resuce, or fire suppression. In many jurisdictions, EMS responses equate to over 75 % of a fire departments call volume. EMS deployment decisions are therefore a critical driving factor for any department considering both short and long term resource deployment decisions.

The National Fire Protection Association estimates that 10,380 EMS workers were exposed to infectious diseases in 2008 (Karter, 2009). Another study noted that almost 10 % of EMTs and Paramedics miss work at any given time due to job-related illness or injury (Studnek et al, 2007). Another study noted that injury rates for EMS workers are higher than rates reported by the Department of Labor (DOL) for any other industry in 2000 (Maguire et al, 2005) and another study noted that EMS providers have a high risk for occupational injury, with approximately 25 % of workers reporting at least one work-related injury in the previous 6 months. Many of these injuries were the result of falls or lifting patients (Heick, 2009). Funding and additional research are critical to further quantifying the high risks to firefighters during EMS responses and developing interventions to mitigate this serious problem.

Much discussion and past research has focused on ambulance transport services, largely ignoring the impact of critical interventions that can be provided prior to ambulance transport unit arrival. Ambulances are important for the transport of patients needing more definitive medical care (Pratt, 2007). However, based on the number and the geographic distribution of apparatus stationed for "all hazards" response, a more rapid response is typically provided by fire department baseline units carrying medical supplies and EMS trained personnel (IAFC/IAFF, 2005). As fire departments continue to enhance their roles in EMS, it becomes important to examine how different deployment configurations and initiation of specific medical interventions may change the long-term outcome for the patient. Consequently, community planners and decision-makers need tools to optimally align resources with their service commitment for adequate emergency medical care for citizens.

Problem

Despite the role played by the fire service in the provision of emergency medical services, there are no scientifically based tools available to community and fire service leaders to assess the effects of EMS crew size and deployment on firefighter safety. More and more individuals, including the indigent, the working uninsured, and the underinsured, rely on prehospital medical care, which continuously increases the need for EMS resources in fire departments. The continued lack of comprehensive community health services and comprehensive health care reform means addressing this issue is a critical step in the evolution of the fire service and public safety.

Presently, community and fire service leaders have a qualitative understanding of the effect of certain resource allocations. For example, an increase in the number of fire houses, medically equipped apparatus, and EMS trained personnel would lead to a decrease in the time citizens spend waiting for EMS resources to arrive. Consequently a decrease in the number of fire houses, medically equipped apparatus, and EMS trained personnel would likely lead to an increase in the time before critical medical interventions can be provided. However, decision-makers lack a sound basis for quantifying the overall impact of enhanced emergency medical resources and the number of EMS-trained personnel on the timely provision of life-saving procedures.

Studies on adequate deployment of resources are needed to enable fire departments, cities, counties, and fire districts to design an acceptable level of resource deployment based upon community risks and service provision commitment. These studies will assist with strategic planning and municipal and state budget processes. Additionally, as resource studies refine data collection methods and measures, both subsequent research and improvements to resource deployment models will have a sound scientific basis.

Literature Review

Within the past four decades, the range and structure of services provided by firefighters have broadened and changed dynamically as an ever-increasing amount of department resources are used to respond to emergency medical calls. Expanded activities and increased expectations bring advantages, as well as challenges for both communities and fire departments in terms of providing optimal protection during emergency situations, while quantitatively assessing objective systems performance.

Studies documenting engine and ladder response times and crew performance in diverse live and simulated fire hazard environments, show a relationship between apparatus staffing levels and a range of important performance variables and outcome measurements such as response time, time-to-task completion, fire growth status at the time of attack, and occupant toxicity levels (Averill et al, 2010). Recent analyses of EMS crew staffing configuration have suggested that both the number of personnel dispatched per unit and the level of emergency medical certification of that crew may influence similar standards of measurement in the realm of medical response by multi-role firefighters. (Brown et al, 1996)

The rapid evolution of emergency service delivery and the growth of fire-based EMS systems correspond with an increase in literature that has detailed both the need for careful outcomes evaluation and continued innovation in terms of establishing performance variables that accurately assess the effectiveness of prehospital care provided by emergency medical technicians (EMTs). Investigators from government, professional organizations, and academia have described the progress made in the field of prehospital care and the challenges that EMT's and multi-role firefighters face in an expanding body of literature (Moore, 2002).

Publications to date have continually reached towards ascertaining the performance measures, operational protocols, and dispatch configurations that optimize outcomes across diverse communities. Many of the currently established EMS benchmarks and obstacles identified in recent literature hold particular importance for multi-role firefighters. Far-reaching studies of EMS response have demonstrated how response time, scene time, transport time, crew size, equipment, and the level of crew staffing and certification levels have influenced patient survival (Cummins et al, 1991). While studies have continued to demonstrate the impact of these factors with increasingly sophisticated methods, the need to improve understanding of EMS delivery persists. Existing standards of care need to be reevaluated so current systems can adjust and progress in response to ongoing research findings.

Historically, total response time has been measured from the time a responding unit leaves a fire station until the time the unit arrives at the incident. However, anecdotal evidence suggests that total response time should include the time to locate and access the patient (time to patient side). Previous studies have shown a substantial time difference between the time the first responder arrives on-scene and the time of patient access. One study noted that the patient access time interval represented 24 % of the total EMS response time interval among calls originating less than three floors above or three floors below ground and 32 % of those located three or more stories above ground. (Morrison et al, 2005)

Early literature on out-of-hospital cardiac arrest (OHCA) sought to uncover the effects of patient characteristics and location of initial collapse on survival to hospital discharge, with researchers then beginning to quantify the importance of response time. A paper by researchers from the EMS Division of King County, Washington and University of Washington Departments of Medicine and Biostatistics found significantly higher survival rates for patients who arrested outside the home, noting that of those 781 patients, most were more frequently younger, male, and more likely to be witnessed at the time of collapse and had received bystander cardiopulmonary resuscitation (CPR). (Litwin et al, 1987)

A growing number of defibrillation effectiveness studies began to demonstrate that response time, EMT training and practice, and population density influenced the effectiveness of this type of EMS delivery. (Olson, 1989; Kellerman, 1992; Hallstrom, 2004; DeMaio, 2005) For an urban environment exceeding three million, at least one study noted that over a period of one year, survival rates were lower in urban environments than those reported for smaller cities, but reaffirmed that the single factor most likely contributing to poor overall survival was a relatively long interval between collapse and defibrillation. In their conclusions, the authors recommended the use of standardized terms and methodology and stressed that "detailed analysis of each component of the emergency medical services systems will aid in making improvements to maximize survival of out-of-hospital cardiac arrest." (Becker, 1991)

Researchers studying patient outcomes following traumatic brain injury (TBI) were employing the specific anatomic, physiologic, and age characteristics of patients to formulate methods that would evaluate the effectiveness of trauma care. The "Trauma and Injury Severity Scores" (TRISS) method was one such system that generated scores for patients based upon systolic blood pressure, capillary refill, respiratory rate, and respiratory expansion. These scores provided a means of accurate analysis for EMS performance for cases of TBI, just as situational characteristics for OHCA, such as location of collapse, collapsing rhythm, and time to initial call were being used to gauge the effectiveness of emergency medical interventions for patients in distinct crisis scenarios. For instance, the correlation between age and predicted mortality for patients with comparable Trauma and Injury Severity Scores in an early study of the TRISS method suggested that a significantly narrower margin of effectiveness exists for seriously injured patients age 55 years or older. (Boyd, 1987)

Fire departments have long grappled with the most appropriate dispatch and notification configurations for EMS systems in different communities. Analyses have focused on comparisons of "one-tier" versus "two-tier" notification systems. "One-tier" systems require ALS units to respond to and transport all calls. In

[2] "Multi-role" is a term given to firefighters cross-trained in a number of related emergency services fields, such as EMS, hazardous materials response, and technical rescue.

a "two-tier" system, ALS units are allowed to delegate varying degrees of responsibility for response and transport to BLS units. Two studies appearing in the *Annals of Emergency Medicine* in the same year examined the response capacity and performance measures for a broad sample of urban EMS systems with regard to dispatching protocols and notification systems. (Sweeney, 1998; Chu, 1998) Reviewing previously published studies on 39 emergency medical services programs from 29 different locations from 1967 to 1988, researchers focusing specifically on cardiac arrest and resuscitation outcomes noted survival rates to be higher for two-tiered systems where both a paramedic and either an EMT or EMT-D were dispatched to calls, as compared to survival rates for one-tier systems where dispatches were exclusive for an EMT, EMT-D, or paramedic. This analysis also showed rates of survival to hospital discharge to be slightly higher for patients with a collapse rhythm of ventricular fibrillation, which suggested that the earlier CPR initiation possible in two-tier configurations was a primary means to the higher survival rates in these systems (Eisenberg et al., 1990).

In an article that plotted responses to an EMS system configuration survey against Code 3 ("lights and sirens") response times to emergency calls, investigators identified three different types of "two-tier" configurations. In the first two-tier system, ALS units responded to all calls but once on-scene could turn a patient over to a BLS unit for transport. In the second two-tier model, ALS units did not respond to all calls and BLS units could be sent for noncritical calls. In the final two-tier configuration, a non-transport ALS unit was dispatched with a transporting BLS unit with ALS personnel joining BLS personnel for transport on all ALS calls. After reviewing survey responses from EMS systems in 25 mid-sized cities with populations of 400,000 to 900,000, researchers suggested that a two-tier response system that permitted dispatch of BLS units for noncritical calls would allow a given number of ALS units to serve a much larger population while still maintaining rapid Code 3 response times (Braun et al, 1990).

The emergence of the "chain of survival" concept in the prehospital treatment of cardiac arrest merged the effectiveness of specific EMS interventions for individual patient characteristics and the level of qualification of staffing on emergency apparatus as standards of measurement within a system-wide scheme of performance evaluation. In a statement explaining the chain of survival and detailing its components, researchers argued that time to recognition of OHCA, EMS system activation, initiation of CPR, defibrillation, intubation, and intravenous administration of medications were successive, distinct factors that directly influenced outcomes of sudden cardiac arrest and should therefore be used inclusively as measurements of overall performance for EMS systems. The authors presented a thorough review of past literature and noted that while a small number of urban EMS systems approached the then-current practical limit for survivability from sudden cardiac arrest, most EMS systems in the U.S. and other countries had defects in their chain, as demonstrated by a near universal preponderance of poor resuscitation rates. This paper was notable for describing the research supporting each "link" in the chain or performance measurement of EMS system effectiveness and recommending specific actions to improve each area, thereby strengthening the chain of survival. Moreover, researchers suggested that communities implementing two-tier, double response systems might show optimal improvements in survival rates, as reports on EMT-D systems showed small response times but restricted intervention methods while ALS-only systems recorded longer response times with more advanced treatment options (Cummins et al, 1991).

Time-to-task measurements that have more recently been formulated into the "chain of survival" model for sudden cardiac arrest have been widely accepted as measurements of fire crews' performance. The continuous patient care and vigilant monitoring of vitals advocated in most EMS models are duties that multi-role firefighters are distinctly well-equipped to perform, especially in emergency situations requiring both fire suppression and emergency medical response. Critical thinking, strategic teamwork, and ongoing, immediate priority assessments during emergency situations are all skills taught and regularly instilled by training and routine evaluation for multi-role firefighters.

In light of the existing literature, there remain unanswered questions about the relationship between resource deployment levels, in terms of first responder crew size and EMS training levels, and the associated task performance during EMS incidents. For the first time, this study investigates the effects of varying crew configurations for first responders, the apparatus assignment of ALS personnel, and the number of ALS personnel on scene on the task completion for ALS level incidents. This study is also unique because of the array of stakeholders and technical advisors involved. All industry standards and safety protocols were followed, and robust research methods were used. The results and conclusions will directly inform the NFPA 1710 Technical Committee, who is responsible for developing industry standards associated with the deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments.

Purpose and Scope of the Study

This project systematically studies deployment of fire department-based EMS resources and the subsequent effect on the ability to provide an efficient and effective response. It will enable fire departments and city/county managers to make sound decisions regarding optimal resource allocation to meet service commitments using the results of scientifically based research. Specifically, the EMS field experiments provide quantitative data on the effects on varying crew size configurations, ALS personnel placement, and the number of ALS personnel available on ALS level incidents.

The first phase of the multiphase project was an extensive survey of more than 400 career and combination fire departments in the United States with the objective of optimizing a fire service leader's capability to deploy resources to prevent or mitigate adverse events that occur in risk- and hazard-filled environments. The results of this survey are not documented in this report, which is limited to the experimental phase of the project, but they will constitute significant input into future applications of the data presented in this document.

In order to address the primary research questions using realistic scenarios, the research was divided into three distinct, yet interconnected parts.

- Part 1- Time-to-task experiments related to gaining access to a patient and removing the patient from the incident scene.
- Part 2- Time-to-task experiments related to the care of a victim with multi-system trauma.
- Part 3- Time-to-task experiments related to the care of a victim with chest pain and witnessed cardiac arrest.

These parts included the most basic elements of an overall EMS response and included time for personnel to access the patient, conduct patient assessment, deliver on-scene patient care, package the patient, and remove the patient from the scene to a transport-capable vehicle.

The EMS portion of the Firefighter Safety and Deployment of Resources Study was designed to assess the labor aspect of an EMS incident necessary to ensure safe, effective, and efficient operations. While studies have shown a relationship between response time and efficiency of patient care intervention, this project has no direct measures. This study does however quantify the effects of first responder crew size and ALS trained personnel resources on time-to-task for EMS interventions. The applicability of the conclusions from this report to a large-scale hazardous or multiple-casualty event has not been assessed and should not be extrapolated from this report.

EMS protocols pertaining to the treatment and transport of patients vary by departments. For the purpose of this study, tasks were standardized by technical experts and individual times were recorded for each task. In real-world situations, as in this study, many of these can be performed simultaneously based on the number and training level of responding personnel. Attempts to generalize the results from these experiments to individual departments must take into account protocols and equipment that vary from those used in the experiments.

A Brief Overview of the EMS Response

Considering the setting and the circumstances of emergency medical care delivery, the prehospital 9-1-1 emergency care patient should be considered a distinct type of patient in the continuum of health care. These patients not only have medical needs, but they may also need simultaneous physical rescue, protection from the elements and the creation of a safe physical environment, as well as management of non-medical surrounding sociologic concerns (Pratt et al., 2007). Interdependent and coordinated activities of all personnel are required to meet the priority objectives.

NFPA 1710: *Standard on Fire Department Operations, Emergency Medical Operations, and Special Operations to the public by Career Fire Departments* specifies that the number of on-duty EMS providers must be sufficient relative to the level of EMS provided by the fire department, and be based on the minimum levels needed to provide patient care and member safety.[3] NFPA Standard 1710 also recommends that personnel deployed to ALS emergency responses include a minimum of two members trained at the emergency medical technician-basic level and two members trained at the emergency medical technician-paramedic level, arriving at the scene within the established time frame of two hundred and forty seconds (four minutes) or less for BLS units and four hundred and eighty seconds (eight minutes) or less for ALS units provided that a first-responder with Automated External Defibrillator (AED) or BLS unit arrived in two hundred forty seconds (four minutes) or less travel time, or at the minimum levels established by the authority having jurisdiction.[4]

During each EMS experiment, a first responder unit and an ambulance transport unit was dispatched to the scene. Crew size for the first responder unit and ALS configuration for both the first responder unit and ambulance transport unit were varied for purposes of the experiments. There were three specific scenarios to which personnel responded.

- Patient access and removal from incident site
- Systemic trauma/fall victim
- Chest pain/cardiac arrest

Important time intervals typically not measured by EMS systems are "time to patient access" and the "time to patient removal" intervals. These intervals include the time it takes personnel with equipment to locate and access the patient and the time it takes personnel to remove the patient and equipment from the incident scene to the ambulance for transport. These intervals are critically important to calculating overall scene time, particularly in scenarios where the patient is not immediately accessible (high-rise buildings, commercial complexes, schools, etc.).

The Star of Life

The elements comprising an EMS incident are symbolized by the Star of Life.[5] The six branches of the star are symbols of the six main tasks executed by rescuers throughout an emergency medical event.



Figure 1: The Star of Life

The six branches of the star include the elements listed below.

- Detection: Citizens must first recognize that an emergency exists and know how to contact the emergency response system in their community. This can be done using several different methods such as dialing 9-1-1, dialing a seven digit local emergency number, using amateur radios, or call boxes.
- Reporting: Upon accessing a call center, callers are asked for specific information so that the proper resources can be sent. In an ideal system, certified Emergency Medical Dispatchers (EMDs) ask a pre-defined set of questions. In this phase, dispatchers also become a link between the scene and the responding units and can provide additional information as it becomes available.
- Response: This branch identifies the response of emergency crews to the scene. The response may include an engine with firefighters trained as EMT's followed by an ambulance carrying additional firefighter/EMT's or it may be a fire engine first responder crew followed by an ambulance carrying single role EMS personnel.
- On scene care: Definitive care is provided on the scene by the emergency response personnel. Standing orders and radio or cellular contact with an emergency physician has broadened the range of on scene care that can be provided by EMS responders. A long algorithm of procedures and drugs may be used before the patient is removed from the scene.
- Care in Transit: Emergency personnel transport the patient to the closest appropriate medical care facility for definitive care. During transport, patient care/treatment is continued.
- Transfer to Definitive care: Emergency crews transfer the patient to the appropriate specialized care facility. Transfer includes providing a detailed written report of the patient assessment and care provided on-scene and in-transit.

[3] NFPA 1710, Section 5.3.3.2.1: On duty EMS units shall be staffed with the minimum personnel necessary for emergency medical care relative to the level of EMS provided by the fire department.
[4] NFPA 1710, Section 5.3.3.3.4: Personnel deployed to ALS emergency responses shall include a minimum of two members trained at the emergency medical technician-paramedic level and two members trained at the emergency medical technician-basic level arriving on scene within the established travel time.
[5] Designed by Leo R. Schwartz, Chief of the EMS Branch, National Highway Traffic Safety Administration (NHTSA) in 1977.

EMS Response to Time Critical Events

In a statement explaining the chain of survival and detailing its components, researchers argued that time to recognition of OHCA, EMS system activation, initiation of CPR, defibrillation, intubation, and intravenous administration of medications were successive, distinct factors that directly influenced outcomes of sudden cardiac arrest and should therefore be used inclusively as measurements of overall performance for EMS systems. This paper was notable for describing the research supporting each "link" in the chain or performance measurement of EMS system effectiveness and recommending specific actions to improve each area, thereby strengthening the chain of survival (Cummins et al., 1991).

A typical EMS event, regardless of the nature of the incident, follows a basic script. The first arriving unit performs a scene size-up and initial life safety assessment. The crew then gathers the appropriate equipment from the unit based upon patient injury, illness and location, and accesses and treats the patient.

In an analysis of data from more than 300 U.S. Fire Departments, first responder units arrived prior to ambulances in approximately 80 % of responses (IAFC/IAFF 2005). This response capability is likely attributed to the strategic locations of fire stations housing the engines and the fact that engines are often more densely located than ambulance transport units. In some cases, as is the case with motor vehicles accidents with entrapment and some structural collapse incidents, initial responding personnel may need to perform patient treatment and stabilization while performing patient rescue. For these types of incidents, it is necessary to have additional personnel on scene to assist with patient care and removal from the incident scene.

However, even without these major impediments, additional crew members assist with patient care and movement. In the experiments, crew members were used to assist with patient treatment, packaging, removing the patient from the incident location to the ambulance transport unit, repositioning the ambulance transport unit, and other tasks that streamlined the on-scene activity.

The Relation of Time-to-Task Completion and Risk

Delayed response, combined with inadequate personnel resources exacerbates the likelihood of negative patient outcomes. While rapid response is critical to patient survival, the personnel who respond must also be highly competent in patient assessment and stabilizing treatment delivery.

Figure 2 illustrates a hypothetical sequence of events for response to a cardiac arrest (heart attack). A rapid response to an EMS incident is effective only if the personnel arriving on the scene can initiate appropriate emergency medical interventions. This requires adequate numbers of personnel, as well as appropriate equipment and prior training. Early advanced cardiac life support (ACLS) provided by paramedics at the scene is another critical link in the management of cardiac arrest. According to industry standards EMS systems should have sufficient staffing to provide a minimum of two rescuers trained in ACLS to respond to the emergency. However, because of the difficulties in treating cardiac arrest in the field, additional responders should be present (AHA, 2005).

The delivery of prehospital care is complex requiring both interpersonal and clinical skills. Firefighter/Paramedics must be able to communicate with patients, bystanders, on scene safety personnel, and hospital personnel. A lack of cooperation in any of these interactions could have a detrimental effect on the patient.

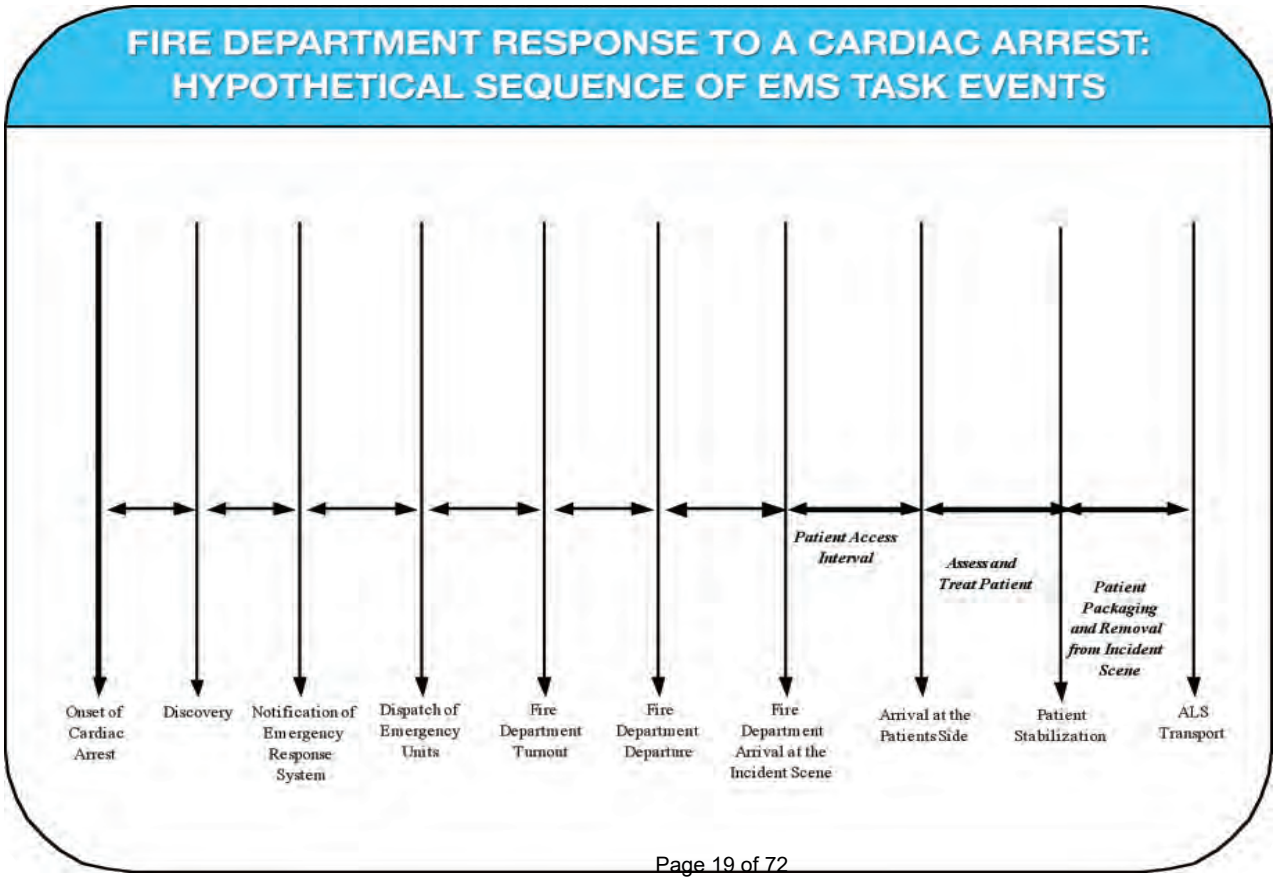


Figure 2: Hypothetical Timeline of a Fire Department Response to an EMS Incident

Standards of Response Cover

Developing a standard of response cover (SORC) related to service commitments to the community is a complex task. A SORC includes the policies and procedures that determine the distribution, concentration, and reliability of fixed and mobile resources for response to emergency medical incidents (CFAI, 2009). Fire departments that provide EMS must evaluate existing (or proposed) resources against identified risk levels in the community and against the tasks necessary to provide safe, efficient and effective emergency medical services. EMS risks that must be considered include population demographics such as socioeconomic status, age, ethnicity and health insurance status, as well as population density, community type (urban, suburban, or rural), access to healthcare, and traffic patterns and congestion. In addition to community risks, leaders must also evaluate geographic distribution and depth or concentration of resources deployed based on time parameters established by community expectation, state or local statute or industry standards.

Recognition and reporting of an emergency medical incident begins a chain of events that occur before firefighters arrive at the scene. These events include call receipt and processing, dispatch of resources, donning protective gear, and travel to the scene. NFPA 1710 defines the overall time from dispatch to the scene arrival as total response time. The standard divides total response time into a number of discrete segments, shown in Figure 2.

Arrival of emergency crews on scene is then followed by a sequence of tasks. Depending on the availability of resources available, tasks may be completed simultaneously or sequentially. Knowing the time it takes to accomplish each task with an allotted number of personnel and equipment can be useful in planning resource deployment. Ideally crews should arrive and intervene in sufficient time to prevent patient brain death, excessive blood loss, and minimize pain and suffering with the goal and expectation of transporting and delivering a viable patient to an appropriate medical facility.

Decision-making regarding staffing levels and geographic distribution of resources must also consider times when there are simultaneous events requiring multiple resource deployment into multiple areas of the jurisdiction. There should be sufficient redundancy or overlap in the system to allow for simultaneous incidents and high volume of near-simultaneous responses without compromising the safety of the patient, the public, or firefighters.

Policy makers have long lacked studies that quantify changes in EMS scene performance based on crew sizes and configuration. These experiments were designed to observe the impact of first responder crew size and ALS configuration on the time it takes to execute essential EMS tasks. It is expected that the results of this study will be used to inform the threshold performance objectives to the NFPA 1710 and 1720 Technical Committees.

Experiment Planning and Methodology

The EMS field experiments consisted of three distinct parts:

- Part 1- Time-to-task experiments related to gaining access to a patient and removing the patient from the incident scene.
- Part 2- Time-to-task experiments related to the care of a victim with multi-system trauma.
- Part 3- Time-to-task experiments related to the care of a victim with chest pain and witnessed cardiac arrest.

Following is a detailed description of the overall methods used throughout the experiments. Specific information pertaining to each part is presented separately.

The following research questions guided the experimental design of the EMS field experiments documented in this report:

- 1. What is the effect of first responder crew size on EMS task times?
- 2. What is the effect of ALS personnel placement on EMS task times?
- 3. What is the effect of the number of ALS trained personnel on EMS task times?

Department Participation

The experiments were conducted in Montgomery County, MD at the Montgomery County Public Safety Training Academy and in Fairfax County, VA at the EMS Simulation Center. Experiments took place during the months of April and May 2009. All experiments took place in daylight between 0800 hours and 1500 hours.

Montgomery County (MD) and Fairfax County (VA) firefighters and paramedics participated in the field experiments. Each day, both departments committed one ALS engine, one ALS ambulance and the associated crews. Firefighters and paramedics were identified and oriented to the experiments. Participants varied with regard to age and experience. The allocation of resources made it possible to conduct back-to-back experiments by rotating firefighters between field work and rehabilitation areas.

Crew Orientation

Daily orientations were conducted. Orientations included a description of the overall study objectives, as well as the actual experiments in which they would be involved. Crews were also oriented to the site layouts and specific scenarios to be conducted.

Cue Cards

Task procedures were standardized for each experiment/scenario. Technical experts worked with the study investigators to break down crew tasks based on crew size. Task flow charts were then created and customized for the various crew sizes. The carefully designed task flow ensured that the same overall workload was maintained in each experiment, but was redistributed based on the number of personnel available for work.

All tasks were included in each scenario and cue cards were developed for each individual participant in each scenario. For example, a four-person first responder crew would have a cue card for each person on the crew including the driver, officer, and two firefighter/EMTs or paramedics. Cards were color coded by crew size to ensure proper use in each scenario.

Tasks

Tasks were completed specific to each scenario (patient access and removal from incident scene, trauma, and cardiac). Meticulous procedures gathered data to measure key areas of focus such as individual start times, task completion times, and overall scenario performance times. Each task in each scenario was assigned a standardized start and end marker, such as retrieving the key from the Knox Box[6] or patient secured with straps to stretcher/cot. All tasks, with the events for measuring start and stop times, are shown in Table 3 through Table 5.

[6] A Knox Box, known officially as the KNOX-BOX Rapid Entry System is a small, wall-mounted safe that holds building keys for firefighters and EMTs to retrieve in emergencies. Local fire companies can hold master keys to all such boxes in their response area, so that they can quickly enter a building without having to force ent or find individual keys held in deposit at the station.

On-Scene EMS Tasks

The on-scene tasks focused on the activities firefighters perform after they arrive on the scene of an emergency medical incident. A number of nationally recognized EMS experts were consulted during the development of the on scene EMS tasks in order to ensure a broad applicability and appropriateness of task distribution.[7] The experiments compared crew performance and workload for typical medical response scenarios using two-, three-, and four-person first responder crews, along with a two-person ambulance crew. In total, 102 experiments were conducted to assess the time it took various crew configurations to complete the overall tasks in Parts 1, 2, and 3. In addition to first responder crew sizes, the experiments assessed the time necessary to access the patient, conduct a patient assessment, deliver on scene patient care, package the patient, and remove the patient from the incident scene to the ambulance. Two scenarios were selected as the basis of Parts 2 and 3. The scenarios included a patient with systemic trauma and a patient with chest pains leading to cardiac arrest.

The experiments also assessed the placement and number of responding ALS-trained personnel. There were 15 crew configurations considered during the experiments. These included the first responder crew being varied from two-, three-, and four-person crews. Additionally, the first responder crew configuration was varied to include either an all BLS crew or a combination crew containing one firefighter trained at the ALS level. The ambulance crew was held constant at two-persons. However, the ambulance crew configuration was varied to include two BLS crew members, one BLS and one ALS crew member, or two ALS crew members. Table 1 shows the crew configurations used throughout the experiments.

During the experiment crews dispatched to various scenarios included a first responder crew and ambulance transport unit or a single ambulance transport unit. For those experiments where both an engine company and an ambulance were dispatched, a three-minute stagger time was imposed for each of those trials. The three minute stagger time was determined from an analysis of deployment data from more than 300 fire departments responding to a survey of fire department operations conducted by the IAFC and the IAFF (2005). Each experiment containing a specific crew configuration was conducted in triplicate and completed in a randomized order (determined by randomization software) before a test configuration was repeated.

First Responder Engine Company	Ambulance Transport Unit	ALS Personnel On-Scene	Total Personnel On-Scene
N/A	2 BLS	0	2
N/A	2 ALS	2	2
N/A	1 BLS/1 ALS	1	2
2 BLS	2 ALS	2	4
3 BLS	2 ALS	2	5
4 BLS	2 ALS	2	6
1 BLS/1 ALS	1 BLS/1 ALS	2	4
2 BLS/1 ALS	1 BLS/1 ALS	2	5
3 BLS/1 ALS	1 BLS/1 ALS	2	6
2 BLS	1 BLS/1 ALS	1	4
3 BLS	1 BLS/1 ALS	1	5
4 BLS	1 BLS/1 ALS	1	6
1 BLS/1 ALS	2 BLS	1	4
2 BLS/1 ALS	2 BLS	1	5
3 BLS/1 ALS	2 BLS	1	6

Table 1: Crew Configurations for Time-to-Task Experiments

Radio Communication

Interoperability of radio equipment used by both participating departments made it possible to use regular duty radios for communication during the experiments. Company officers were instructed to use radios as they would in an actual incident. Montgomery County Fire and Rescue Communications recorded all radio interaction as a means of data backup. Once all data quality control measures were complete, the records were then overwritten as a routine procedure.

Task Timers

Ten observers/timers, trained in the use of identical standard stop watches with split-time feature, recorded time-to-task data for each field experiment. To assure understanding on the observed tasks, firefighters were used as timers, each assigned to specific tasks to observe and record the start and end times.

To enhance accuracy and consistency during recording times, the data recording sheets used several different colors for the tasks (see Appendix A). Each timer was assigned tasks that were coded in the same color as the recording sheet. All timers wore high-visibility safety gear on the incident scene.

Video records

In addition to the timers, video documentation provided a backup for timed tasks and for quality control. Cameras were used to record EMS scene activity from varied vantage points. Observer/timer data were compared to video records as part of the quality control process.

Crew Assignment

Crews from each department that regularly operated together were assigned to work as either a first responder crew or ambulance transport crew in each scenario. Both Fairfax County and Montgomery County crews participated in the experiment.

Crews assigned to each responding company position in one scenario were assigned to another responding company position in subsequent scenarios, with the objective of minimizing learning from one experiment to another. For example, crews in the role of first responder in the morning scenario might be assigned to the ambulance transport crew in the afternoon, thus eliminating learning the exact repetition of a task as a factor in time to completion. Additionally, participating crews from both Montgomery County and Fairfax County were from three different shifts, further reducing opportunities for participant repetition in any one position.

Props

Crews were assigned specific equipment lists to bring for this scenario. All equipment used was actual working equipment from the units assigned to the scenario. Specific items included in all scenarios were an airway bag, medical bag, oxygen cylinder, ECG monitor defibrillator, cot, and clipboard. Items specific to a particular scenario will be listed in that section of the report, including manikins and a live individual acting as a patient.

[7] Technical experts included Greg Mears, Michael McAdams, and Philip Pommerening. More information about the experts is presented in the Acknowledgements later in this report.

Safety Protocols

Participant safety was a primary concern in conducting the experiments. All participants and experiments complied with guidelines and recommendations as outlined in NFPA 450: *Guide for Emergency Medical Services and Systems*, NFPA 1500: *Standard on Fire Department Occupational Safety and Health Program*, and NFPA 1999: *Standard on Protective Clothing for Emergency Medical Operations*.



Figure 3: Safety Officer

A safety officer from the Montgomery County Fire and Rescue Department was assigned to oversee all experiments.

The safety officer ensured all protocols concerning participant safety, under both real and experimental conditions were followed. This included wearing the correct personal protective equipment, vehicle maneuvering, and overall scene safety. The safety officer participated in all orientation activities and daily briefings. The safety officer had full authority to terminate any operation if any safety violation was observed. Radio communication was always available.

A closely related concern to firefighter safety and readiness to repeat experiments with equivalent performance was adequate rehabilitation. Each "team" of participants had ample time between experiments to rest and rehydrate.

Response Time Assumptions

Response time assumptions were made based on time objectives set forth in NFPA 1710. Time stagger allocations were set by project technical advisors in order to assess the impact of arriving unit time separation on task start and completion times, as well as overall scene time. Table 2 shows the values assigned to the various segments in overall response time.

Event Occurrence = time zero
60 seconds for recognition and call to 9-1-1
90 seconds for call processing and dispatch
60 seconds for responder turnout
Travel time = first responder engine = 420 seconds post event
Ambulance = 600 seconds post event

Table 2: Response Time Assumptions



Figure 4: Ascending Stairs to Access Patient



Figure 5: Carrying Patient Using Stair Chair



Figure 6: Trauma Patient Assessment



Figure 7: Trauma Patient Spinal Immobilization



Figure 8: Trauma Patient Packaging



Figure 9: Loading Patient on to Stretcher for Transport



Figure 10: Cardiac Patient Assessment



Figure 11: Cardiac Patient Intubation



Figure 12: Cardiac Patient I.V. & Medication Admin.



Figure 13: Moving Patient for Transport

Part 1: Patient Access and Removal from Incident Scene

Historically, total response time has been measured from the time a responding unit leaves a fire station until the time the unit arrives at the incident location. However, some studies suggest that total response time should include the additional time to locate and access the patient. Previous studies have shown a substantial time difference between the time the first responder arrives on scene and the time of patient access. One study noted that the patient access time interval represented 24 % of the total EMS response time interval among calls originating less than three floors above or three floors below ground and 32 % of those located three or more stories above ground (Morrison et al., 2005).

This study quantifies the time interval from arrival at the incident address until the crew begins the patient assessment, known as "at patient arrival time." The experiment assumed the patient was on the 3rd floor of a garden style apartment complex with stair access. This is representative of a typical structure to which firefighters respond in many residential neighborhoods. Patient assessment and treatment were not performed during the patient access and removal experiment. The primary purpose of this part of the experiment was to ascertain patient access and removal times. This part of the experiment was conducted separately from the patient care scenarios in an effort to establish distinctive timelines for patient access and removal separate from the patient care scenarios where on scene time can vary widely based on patient illness or injury.

Incident Scene

Garden Apartment Complex Scenario:

Firefighters from Fairfax County (VA) and Montgomery County (MD) simulated an initial EMS response for a patient with difficulty breathing in a garden style apartment building, represented by Simulation Lab #1 on the grounds of the Montgomery County Safety Training Academy in Rockville, MD. Simulation Lab #1 is a seven-story building, consisting of concrete scissor stairwells leading to the top floor of the building. The front of the building was equipped with a Knox Box, which firefighters accessed before entering the building. This task was typical of security access at any apartment complex.

Apparatus and crews were staged approximately 500 ft (150 m) from the Montgomery County Simulation Lab #1. Apparatus responded to the incident location, personnel dismounted and assembled equipment. Equipment included a defibrillator, airway bag, oxygen, and drug bag. Additionally, ambulance crews were required to bring the stair chair for patient packaging and removal. A crew member obtained an access key from the Knox Box and gained entry. Once crews entered the building they proceeded with the equipment to locate the patient on the third floor stairwell landing.

Patient assessment and treatment were not performed in this part of the experiments. In each experiment, the patient was packaged onto a stair chair, and then the patient and equipment were carried down three flights of stairs and out of the building. The patient was then transferred to a stretcher and loaded into the ambulance for transport.

Tasks

Tasks for the garden apartment scenario for patient access and removal are delineated in Table 3.

Tasks	Measurement Parameters
1. Arrive on Scene	START- Engine stopped at building - Ambulance stopped at building - Wheels stopped/brake engaged
2. Assemble Equipment	START- Personnel off engine - Personnel off ambulance STOP- Equipment in hand moving toward patient
3. Conduct size-up/Scene safety	START- Officer off engine - Officer off ambulance STOP- Officer begins scene report
4. Enter door/building Knox Box or access code	START- Touch door STOP- Door open
5. Ascend stairs (three stories)	START- Personnel with foot on first stair STOP- Crew assembled at top of stairs
6. Package patient	START- Load onto stair chair with monitor, straps in place STOP- Moving patient out towards exit
7. Descend stairs	START- Personnel with foot on first stair STOP- Crew and patient at bottom of stairs
8. Exit door/building	START- Personnel exits building with patient on stair chair
9 Transfer patient to cot/stretcher	START- Begin transfer of patient onto cot/stretcher with monitor, straps in place STOP- Patient secure on cot/stretcher
10. Turn ambulance for loading	START- Firefighter in ambulance driver seat STOP- Ambulance positioned for patient loading
11. Load Ambulance	START- Patient secure on cot/stretcher STOP- Patient loaded and ambulance doors

Table 3: Time-to-Task Measures for Garden Apartment Scenario/Patient Access and Removal

Part 2: Trauma Patient

The trauma scenario involved time-to-task experiments focusing on a labor intensive traumatic scenario. In the experiment, a patient had fallen from a 25 ft (7.5 m) ladder at a construction site. This part of the experiment quantified the time intervals for different crew sizes and configurations responding to this event.

Incident Scene

The gymnasium at the Montgomery County (MD) Public Safety Training Academy was used for the trauma experiments. A classroom at the facility was also used for crew orientation and staging. Prior to the start of the experiments, participants were provided with the scenario background. Specifically, the call originated from a construction site that was only accessible by foot.

When cued, crews entered the gym and walked approximately 40 ft (12 m), carrying an airway bag (including suction), oxygen, spinal mobilization equipment, a trauma bag, and a radio and clip board. The "patient" was a 150 lb (68 kg) training manikin "voiced" when prompted by one of the timers. The patient could answer basic questions until the point in the sequence where the patient lost consciousness. During the scenario, when it became clear that the patient needed to be transported, a backboard was brought into the scene by the ambulance crew. After packaging the patient onto a backboard, the patient and equipment were carried out of the construction site to a waiting stretcher approximately 40 ft (12 m) away.

Tasks

The on-scene tasks focused on the activities firefighters regularly perform after they arrive on the scene of a patient with a traumatic injury. The experiments compared time-to-task performance based on varying crew sizes and ALS configurations.

Forty-five trauma experiments were conducted to assess the time it took various crew sizes and ALS configurations to complete the assigned tasks. Time between arrival of the first responding unit and ambulance transport unit was held constant at three minutes.

The following narrative describes the general sequence of activities in Part 2 of the experiments.

> The first responding unit arrived, conducted a size-up and initial life safety assessment of the area, and gathered the appropriate equipment. The crew, with equipment, then proceeded into the construction site and located the patient. The patient was lying supine on the ground. The responders introduced themselves, obtained patient consent to examine and treat, and immediately initiated cervical spinal immobilization precautions and the patient interview. Other crew members then followed Airway, Breathing, and Circulation (A, B, C's) protocols. During the patient assessment, it was revealed the patient had a head laceration and an angulated fracture of the tibia/fibula (closed) on the right leg. Patient information was recorded on a standardized form created for the experiments and can be seen in Appendix B.
>
> During the scenario, when the backboard straps were secure, the patient went into respiratory arrest. Crews then rechecked vital signs which revealed the patient had stopped breathing. The crew immediately began respiratory arrest protocol including administering a patent patient airway using an endotracheal tube. Intubation was performed using strict spinal immobilization restriction. With the airway established, the patient was then ventilated using a bag-valve-mask and patient packaging was completed. Crews then carried the patient and all equipment out of the construction site to the waiting stretcher.

Tasks	Measurement Parameters
1. At patient	START- Personnel at patient side One point in time
2. Spinal motion restriction	START- Personnel touches patient to position for immobilization STOP- Patient supine and personnel holding neck tension, patient immobilized
3. A, B, C's	START- At patient STOP- Personnel notes A, B, C's intact
4. Patient interview	START- Ask three questions 1) What happened? 2) Where are you hurting? 3) What is your name STOP- Questions answered 1) Don't know 2) Head and right leg 3) Joe
5. Body sweep- find laceration on head and angulated fracture of tibia/fibula (closed) on Right leg	START- Personnel starts patient survey/sweep- touches patient and explains "Sir, I am going to check you for injuries" STOP- Personnel locates/identifies head laceration and leg fracture. Head-to-toe sweep complete. Starts on right, goes down, the back up left side to shoulder
6. Oxygen (O^2) administration- face mask	START- Accessing O^2 administration equipment STOP- Mask on patient and O^2 on high flow
7. Check vitals	START- Accessing equipment for any vitals check Blood pressure (BP) cuff, stethoscope, cardiac monitor, or pulse oximiter STOP- All vitals checked and reported
8. Expose patient as indicated	START- Touch patient clothing for removal STOP- Patient chest and legs exposed
9. Control bleeding	START- Personnel accesses equipment (bandages) STOP- Head wound bandaged (gauze and tape)
10. Splint leg	START- Personnel accesses equipment (splint) or touch foot to check pulse STOP- Leg splinted- pulse check when splint in place
11. Back board	START- Personnel accesses equipment (board, collar, straps) STOP- Patient secured on back board- all straps in place
Movement causes labored breathing = Agonal Respiration >> Patient Vomits >> Patient Unconscious	
12. Airway- Endotracheal (ET) intubation with spinal motion restriction (completed on ground due to distance from transport unit)	START- Paramedic (and assisting personnel) touches airway bag (including laryngeal scope, ET tube, syringe, and stethoscope) STOP- ET tube in place, cuff inflated, lung sounds checked, and tube secured
13. Bag Valve Mask (BVM)	START- Paramedic touches BVM STOP- BVM- first squeeze
14. Package patient/move for transport	START- Pick up back board to move to cot/stretcher STOP- Ambulance door closed

Table 4: Time-to-Task Measures for Trauma Scenerio

Fourteen tasks were completed in the trauma experiments. Meticulous procedures gathered data to measure key areas of focus, such as individual task start times, task completion times, and overall scenario performance times. Each task was assigned a standardized start and end marker, such as accessing oxygen equipment (start) until the mask was on the patient and oxygen was flowing (stop). The 14 tasks can be seen in Table 4.

Part 3: Cardiac Patient

The cardiac scenario involved time-to-task experiments focusing on a labor-intensive medical event, i.e., a patient that experiences a myocardial infarction leading to cardiac arrest. This part of the experiment quantified the time intervals for different crew sizes and ALS configurations responding to the event.

Incident Scene

The cardiac experiments were conducted in a laboratory at the Fairfax County Fire and Rescue Department EMS Simulation Center. The Simulation Center houses classrooms, laboratories, and offices for training of EMT's and paramedics. Assorted furniture was staged in the laboratory to duplicate a "home" setting. When cued, crews entered the room and proceeded approximately 10 ft (3 m) to the patient. The patient was represented by SimMan® by Laerdal. SimMan® is an adult-sized manikin that can produce vital signs including, a pulse, heartbeat, lung sounds, blood pressure and other signs noted in real humans. SimMan® also had vocal capabilities such as speaking or crying (Laerdal, 2010). SimMan® was operated remotely from a control booth adjacent to the laboratory.

Prior to the start of the experiments, participants were provided with the scenario background. Specifically, the call originated from a private residence and the caller complained of chest pain. Responders entered the room carrying an airway bag, oxygen, drug bag, and defibrillator. The defibrillator was either an AED and/or a 12-Lead ECG model defibrillator dependent upon the arrival of ALS trained personnel. During the scenario, the patient went into cardiac arrest on cue and crews reacted by changing their path of patient care for chest pain to a more time-critical path of treatment for a pulseless, apneic patient. When crews had completed on-scene patient care tasks, the patient was packaged onto a backboard and stretcher. The patient and all equipment were removed from the room to conclude the experiment.

Tasks

As noted previously, the on-scene tasks focused on the activities firefighters perform after they arrive on the scene of a patient with a cardiac emergency. The experiments compared crew performance for a typical cardiac scenario using a combination of varying crew sizes and configurations.

Forty-five cardiac experiments were conducted to assess the time it took various crew sizes and configurations to complete the assigned tasks. Time between arrival of the first responding unit and ambulance transport unit was held constant at three minutes.

The following narrative describes the general sequence of activities in Part 3 of the experiments.

The first responding unit arrived, conducted a size-up and initial life safety assessment of the building and gathered the appropriate equipment. The crew, with equipment, then proceeded to the front door of the patient residence, knocked, and entered. After confirming the scene was safe, patient assessment was begun.

The responders introduced themselves, obtained the patient's consent to examine and treat and then proceeded to conduct the patient interview. The patient interview was standardized to include SAMPLE and OPQRST protocols. Patient information was recorded on a standardized form created for the experiments and can be seen in Appendix C.

During the scenario, on cue, the patient went into cardiac arrest. Upon patient arrest, the crew rechecked the patient's vital signs which revealed the patient had stopped breathing and had no pulse.

The crew then followed protocol and moved the patient to the floor where they could immediately begin CPR and prepare to administer defibrillation. Study protocol then followed Advanced Cardiac Life Support guidelines for patient care (AHA, 2005).

Twenty-two tasks were completed in the cardiac experiments. Meticulous procedures gathered data to measure key areas of focus, such as individual task start times, task completion times, and overall scenario performance times. Each task was assigned a standardized start and end marker, such as accessing oxygen tank equipment (start) until the mask was on patient and oxygen was flowing (stop). The 22 tasks can be seen in Table 5.

Tasks	Measurement Parameters
1. Identify and enter door/ patient quarters	START- Enter door STOP- One point in time
2. At patient	START- Personnel at patient side STOP - One point in time
3. A, B, C's	START- At patient's side STOP- Personnel notes A, B, C's intact
4. Patient interview	START- Ask patient history questions, "SAMPLE", and "OPQRST" pain survey STOP- Questions asked and answered
5. O^2 administration	START- Accessing O^2 administration equipment "Let's put patient on four liters O^2" STOP- Cannula on patient and O^2 flowing
6. Check vitals (pulse, respiratory rate, BP, pulse oximetry)	START- Accessing equipment for vitals check (BP cuff, stethoscope, cardiac monitor, or pulse oximeter) STOP- All vitals checked and reported BLS = Pulse, respiratory rate, BP, and pulse oximetry ALS = cardiac monitor, 12-lead in place
7. ALS vitals- Electrocardiogram (ECG) 12-lead	START- Touch patient shirt for removal STOP- 12-lead monitor in place
8. Expose patient	START- Touch patient shirt for removal STOP- Chest exposed
PATIENT ARREST	START - Timer cued when task complete STOP - Witnessed arrest
9. Position Patient	START- Touch patient to move to floor STOP- Patient supine on floor
10. A, B, C's	START- Personnel touches patient STOP- Airway, breathing, and pulse checked and reported "No pulse, no breathing"
11. Apply defibrillator pads	START- Access defibrillation equipment (pads) STOP- Pads in place (4)- push analyze button
12. Defibrillate- shock #1 Shock works = NO	START- Push button to charge machine STOP- Shock delivered
13. A, B, C's	START- Personnel touches patient STOP- Airway, breathing and pulse checked and reported "No pulse, no breathing"
14. CPR- bag valve	START- Lead personnel says "start CPR" STOP- CPR begun- including chest compressions and bag valve mask
15. Airway intubation- ET	START- Paramedic (and assisting personnel) accesses equipment including laryngeal scope, ET tube, syringe, and tape STOP- ET tube in place, cuff inflated, and lung sounds checked and tube secured
16. Intravenous (IV) access	START- Paramedic (and assisting personnel) accesses equipment including catheter, bag, tubing, tourniquet, and tape STOP- IV in place, taped, and fluid running
17. Meds- 1 Epinephrine (Epi)	START- Paramedic (and assisting personnel) accesses equipment- "let's push 1 Epi" STOP- Epi pushed in IV line- "Epi in"
18. AED auto countdown "Analyze patient"	START- push button to analyze >>>>>>>>>>>>
19. Defibrillate- shock #2 Shock works = YES	START- Push button to charge machine STOP- Shock delivered
20. Check vitals (Pulse, Respiratory rate, BP, pulse oximetry) Patient unconscious	START- Accessing equipment for vitals check (BP cuff, stethoscope, cardiac monitor, or pulse oximeter) STOP- All vitals checked and reported (pulse, respiratory rate, BP, pulse oximetry)
21. Meds (1 lidocaine bolus)	START- Paramedic (and assisting personnel) accesses equipment "Let's push 1 bolus lidocaine" STOP- Lidocaine pushed in IV line "Lidocaine in"
22. Package patient	START- Access equipment- (board, spider straps) STOP- Stretcher personnel, and equipment out door

Table 5: Time-to-Task Measures for Cardiac Scenerio

Analysis of Experimental Results

This section describes the analytic approaches used to address the research objectives of the study. The statistical methods used to analyze the EMS time-to-task observations are presented. Then the time-to-task results are reported for EMS responses in three scenarios:

- access and removal of patient;
- a trauma event; and
- a cardiac event.

Time-to-Task Analysis

Time-to-task data were compiled into a database and assessed for outliers and missing entries. As is common in a repeated experiment with many pieces of data to be entered, occasionally data elements were not collected. Missing data occurred in less than 1 % of timing observations. Such instances were reviewed via video and/or radio tapes. Missing data attributable to timer error were replaced by the time observed in the video. Where video and/or radio documentation proved inadequate, missing data were imputed with the mean of the observed corresponding task times from the other two experiments. The extremely low occurrence of missing data and associated imputation should have a negligible impact on the statistical findings in the analyses.

Data Queries

The statistical methods used to analyze the time-to-task data were driven by the principal goals of this research project —- to assess the effect of crew size, ALS placement on the responding crews, and the number of ALS trained personnel in the crew configuration on time-to-task for critical steps in each EMS scenario. The research goal motivated the development of four specific research questions (see Figure 14) that in turn pointed to specific statistical analyses to generate inference and insight.

TIME-TO-TASK RESEARCH QUESTIONS

For Response Access & Removal:

1. What are the effects of first responder crew size regardless of ALS placement with respect to:

   a. reaching a patient?
   b. removing a patient after packaging?

For Cardiac and Trauma Scenarios (task timings measured between *arrival at patient* to the *completion of patient packaging*)**:**

1. What is the effect of crew size on EMS task times?
2. What is the effect of ALS personnel placement on EMS task times?
3. What is the effect of the number of ALS trained personnel on EMS task times?

Figure 14: Research Questions for Time-to-Task Experiments

Statistical Methods

The analysis of the time-to-task data involved a sequence of ordinary least squares regression models. The models relate the *experimental outcomes* (i.e., various measures of time — start time, completion time, or duration of the task) to *key dimensions* for each scenario as follows:

For Access and Removal:

- first responder crew size (regardless of ALS placement), and
- ambulance-only versus ambulance with first responder engine with varying crew sizes.

For Trauma and Cardiac scenarios:

- presence of an engine at the scene,
- crew size on the first responder engine, and
- placement and number of ALS personnel (on the engine, on the ambulance, or both).

To account for these dimensions in the analyses, indicator variables representing each key dimension were employed. For example, for the trauma and cardiac scenarios there were indicators for the number of first responders on the engine, three indicators of the assignment of ALS personnel to the ambulance or engine, and indicators for the "no engine" scenarios.

Using these indicators, sets of regression equations were developed for the analysis of each scenario. Indicators corresponding to the three scenarios and multiple dimensions listed above were included. For example, when an engine was sent, the number of first responders (two, three, or four) assigned to the engine were varied, as well as the placement of ALS personnel (one ALS on the engine only; one on the ambulance only; two on the ambulance; and one ALS each on the ambulance and engine). When no engine was sent, zero, one, or two ALS personnel were placed on the ambulance.

The regression equations took the form:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik} + \varepsilon_i$$

Where the x_k represented the test conditions such as presence of an engine or placement of ALS personnel, and the dependent variable y represents the observed outcome (e.g., task duration).

The model coefficients from the completed regressions provided direct estimates of the change in time associated with the number of first responders (e.g., four versus two, three versus two), as well as the change in time associated with alternative assignments of ALS personnel. These estimates are generally the same as those obtained by comparing the difference in means across groups. However, for a small number of outcomes, the estimates differ from those obtained using difference in means by appropriately accounting for data that are missing in particular scenarios.

Table 6 to Table 8 present the list of time-related outcomes that were used to explore effects on outcomes for patient access/removal, as well as for cardiac and trauma scenarios, respectively. Not all tasks were subjected to testing for this report. Only substantively critical milestones in the task sequence were considered. For instance, the *assembly of equipment* and *conduct*

of size-up were **not** assessed for the Access and Removal scenario. Instead, the elapsed time from arrival on scene to reaching the patient (as denoted by completing the ascent of stairs) was determined to be of primary importance. Similarly, the elapsed time between packaging patient and the completion of loading the ambulance was assessed rather than individual timings of any task in the sequence between these two major milestones. Similar judicious choices of critical milestones were made in the assessments of trauma and cardiac, and these are depicted in the outcome measures tables.

Although several of the analytic questions of interest can be obtained directly from the model, others require a linear combination of the coefficients. The statistical software (Stata) calculates both the desired combination of coefficients and the measure of statistical significance via t-test.

	ACCESS & REMOVAL -- Outcome Measures		
	Task:	***Elapsed Time Arrival to Completion***	***Elapsed Time Package Patient to End of Loading***
1	**Arrive on Scene**		
2	Assemble Equipment		
3	Conduct Size Up - Scene Safety		
4	Enter Door - Building - 'Knox box'		
5	**Ascend - Stairs (2 stories—ground floor to third floor)**	X	
6	**Package Patient - stair chair**		
7	Descend Stairs (2 stories – third floor to ground) with Patient		
8	Exit Door - Building		
9	Transfer Patient to Cot/stretcher		
10	Turn Ambulance for Loading		
11	**Load Ambulance / Seat Belt**		X

Table 6: Outcome Measures for Access and Removal Scenario by Task

	TRAUMA -- Outcome Measures			
	Task:	*Elapsed Time Until Start*	*Task Duration*	*Elapsed Time to Completion*
1	At Patient - Engine			
2	At Patient - Ambulance			
3	Spinal Motion Restriction	X		
4	ABC's	X	X	
5	Patient Interview	X		
6	Body Sweep	X	X	
7	O^2 Administration	X		
8	Check Vitals	X	X	
9	Expose Patient	X		
10	Wound Bandaged	X		
11	Splint Leg	X	X	
12	Back Board	X	X	
13	Airway - Intubation ET	X	X	
14	Bag Valve Mask	X		
15	Package Patient /Equipment	X		X

Table 7: Outcome Measures for Trauma Scenario by Task

	CARDIAC -- Outcome Measures			
	Task:	*Elapsed Time Until Start*	*Task Duration*	*Elapsed Time to Completion (from arrest)*
1	At Patient			
2	ABCs	X	X	
3	Patient Interview	X		
4	O^2 Administration	X		
5	Check Vitals	X	X	
6	ALS Vitals 12-Lead	X		
7	Expose Chest	X		
8	Patient Arrest			
9	Position Patient			
10	ABC's *(from Arrest time)*	X		
11	Defibrillator pads *(from Arrest time)*	X		
12	Analyze / Shock #1	X		
13	ABC's after Shock #1 *(from Arrest time)*	X		
14	CPR			
15	Airway Intubation *(from Arrest time)*		X	
16	IV Access	X	X	
17	Meds (Epinephrine) *(from Arrest time)*	X		
18	Analyze / Shock #2 *(from Arrest time)*	X		
19	ROSC			
20	Meds (Lidocaine) *(from Arrest time)*	X		
21	Package Patient/Equip *(from Arrest time)*	X		X

Table 8: Outcome Measures for Cardiac Scenario by Task

The objective of the experiments was to determine the relative effects of first responder crew size, ALS provider placement and the number of ALS providers on the effectiveness of the EMS crews relative to key milestones among the task intervention times for each of the three scenarios. The experimental results are discussed below.

Of the various EMS tasks measured during the experiments, those described in the remainder of this section were determined to have significant differences based on the crew configurations studied. Their differential outcomes based on variation of first responder crew size, ALS crew configuration, and the number of ALS level providers on scene, are statistically significant at the 95 % confidence level or better. Times reported in seconds are rounded to the nearest five seconds. As a final technical note, we did not adjust significance levels to take into account the large number of tests being conducted. The observed number of significant results far exceeds what would be expected simply by chance.

Measurement Uncertainty

The measurement of tasks using stopwatch timing has unique components of uncertainly that must be evaluated in order to determine the fidelity of the data. All timers were equipped with the same model of digital stopwatch with a resolution of 0.01s and an uncertainty of $\pm$ 3s per 24 hr. The uncertainty of the timing mechanism in the stopwatches is small enough over the duration of an experiment that it can be neglected.

There are three components of uncertainty when using people to time the EMS tasks. First, timers may have a bias depending on whether they record the time in anticipation of, or in reaction to an event. Second, multiple timers were used to record all tasks. Third, the mode of the stimulus to which the timer is reacting—audible or visual.

Milestone events in the EMS experiments were recorded both audibly and visually. A test series described in the *NIST Recommended Practice Guide for Stopwatch and Timer Calibrations* noted that reaction times for the two modes of stimulus to be approximately the same, so this component can be neglected. Based on the assumptions made in the Residential Fireground Experiments (Averill et al., 2010), bias estimated for timer reaction time was determined to be 230 ms as a worst case scenario.

Considering the above, the total estimated combined standard uncertainty is $\pm$ 3.23 s. The magnitude of uncertainty associated with these measurements has no impact on the statistical inferences presented in this report.

How to Interpret the Time-to-Task Graphs

Figure 15 presents a sample of a time-to-task results graph. Each crew size/configuration has a bar graphic showing the start time and completion time for the task. Visually, bars start from the left and extend horizontally across the graph based on time expended by various EMS crew configurations. The length of the bar graphic is a visualization of the duration of the task. Longer bars indicate longer duration times. Actual time data are also shown on each bar.

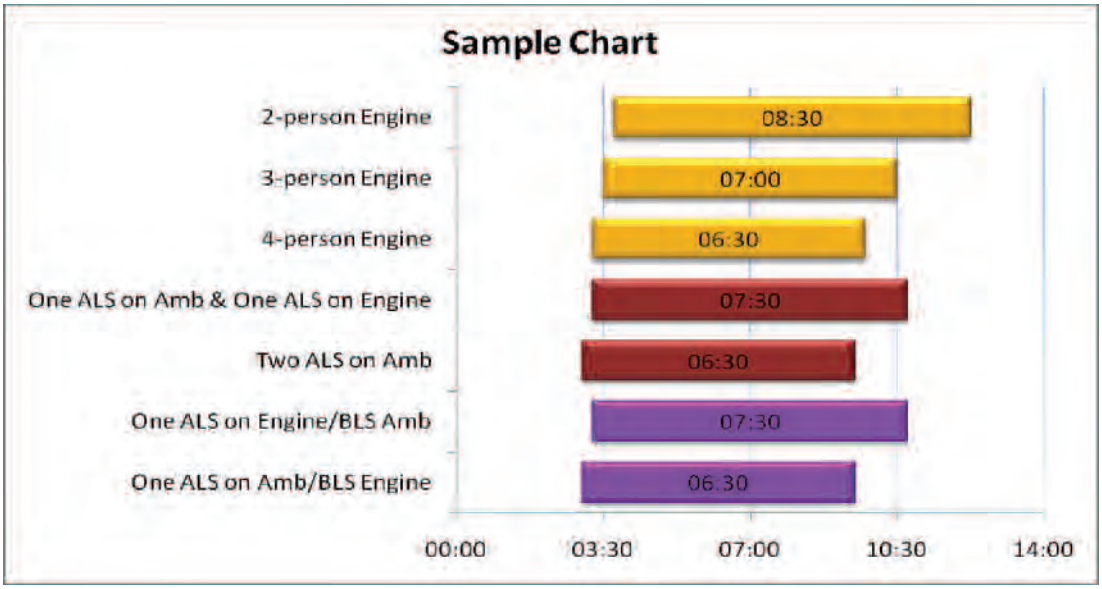


Figure 15: Sample Time-to-Task Graph

Time-to-Task Graphs

Part 1- Patient Access and Removal

Overall Scene Time (Time to complete all EMS tasks for Patient Access and Removal)

Access

The crews can differ in the time required to reach the patient (*access*) and in the time needed for patient *removal*. To address these tasks, sets of simulations were conducted by varying crew size on the first responding engine. Ambulance crews were held constant at two persons. As noted previously, the arrival times were staggered between the engine and the ambulance. When an ambulance was sent without a first responder engine, for measurement consistency, it was assumed to arrive at the scene *at the same time* as would an engine (i.e., there is no systematic, built-in delay).

The results for *patient access* show that two-person first responder crews take longer to reach a patient than configurations with larger crew sizes. Two-person crews finished the patient access tasks approximately *half a minute* later than larger first responder crews. Moreover, the ambulance crew alone finished with a time between that of the two-person and the larger first responder crews. The *ambulance alone* result is likely attributed to the removal of the staggered arrival time when first responder crews were not sent. (See Appendix E for the timings by staffing configuration, difference of means and associated t-tests.)

Patient Removal

The patient removal results show substantial differences associated with crew size. Crews with two-person first responder crews completed patient removal between (1.2 – 1.5) minutes slower than larger crews, depending on crew size. This is largely the result of work load in carrying equipment, supplies and the patient with fewer crew members. All crews with first responders completed removal substantially faster (by 2.6 min. - 4.1 min.) relative to the ambulance-only crew. Again, this is largely the result of the difficulty of carrying and loading the patient, as well as the equipment and supplies with only a two-person crew, given that one person must remain with the patient at all times. (See Appendix E)

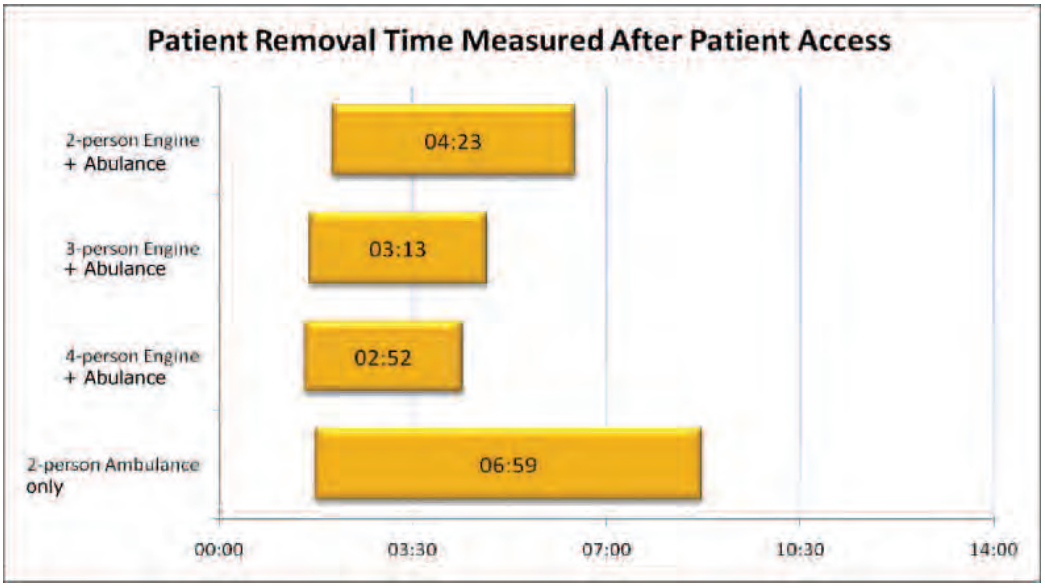


Figure 16: Patient Removal Time

Part 2- Multi-System Trauma

Overall Scene Time (Time to complete all EMS tasks for Trauma Patient)

As previously noted, for the trauma scenario part of the experiments, there was an assumed three minute stagger in arrival between the first responder crew and the ambulance crew.

Crews responding with one ALS provider on the engine and on the ambulance completed all trauma tasks 2.3 minutes (2 minutes and 16 seconds) faster than crews with a BLS engine and an ALS ambulance with two ALS level providers.

Crews responding with four-person first responder crews, regardless of ALS configuration, completed all trauma tasks 1.7 minutes (1 minute and 50 seconds) faster than first responder crews with three persons, and 3.4 minutes (3 minutes and 25 seconds) faster than first responder crews with two persons. This suggests that for trauma scenarios, the more hands available, the easier it is to implement the full portfolio of tasks to be completed.

The statistical tests that correspond to these findings appear in Appendix F. Appendix H shows the original regression coefficient estimates upon which the tests in Appendix F were constructed.

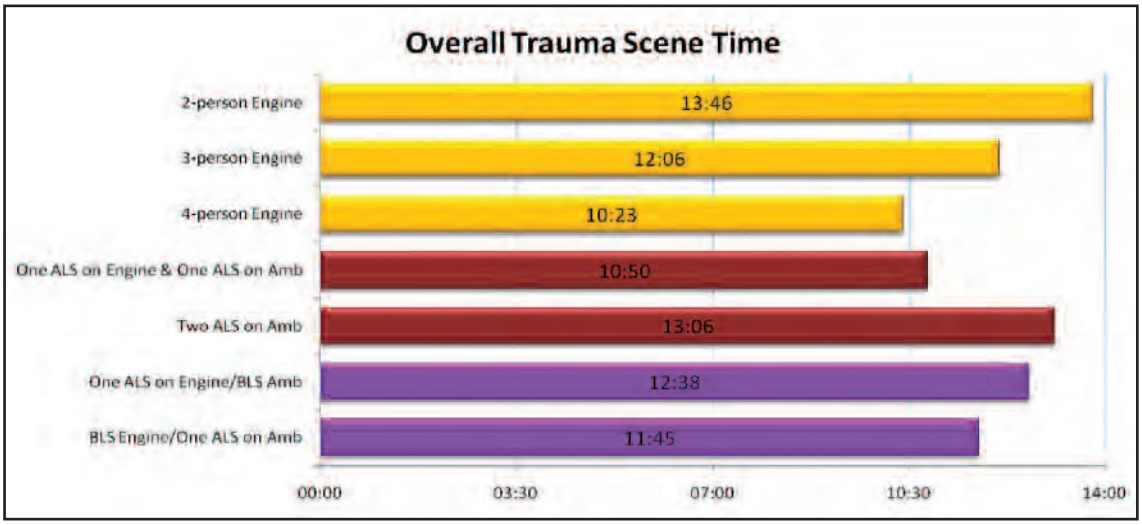


Figure 17: Overall Trauma Scene Time

Individual Task Times

Oxygen Administration

First responders with four-person crews were able to begin oxygen administration to the patient nearly a full minute (55 seconds) sooner than the three-person crew.

Vital Sign Assessment

First responders with four-person crews were able to begin checking the patient's vital signs nearly one minute (55 seconds) sooner than a two-person crew. They also completed the check about 80 seconds faster than the two-person crew. First responders with four-person crews were able to begin checking the patient's vital signs 30 seconds sooner than a three-person crew. To the extent that checking vitals is a critical task in a trauma response sequence, the reduction of half a minute to a minute of time could be seen as an important improvement.

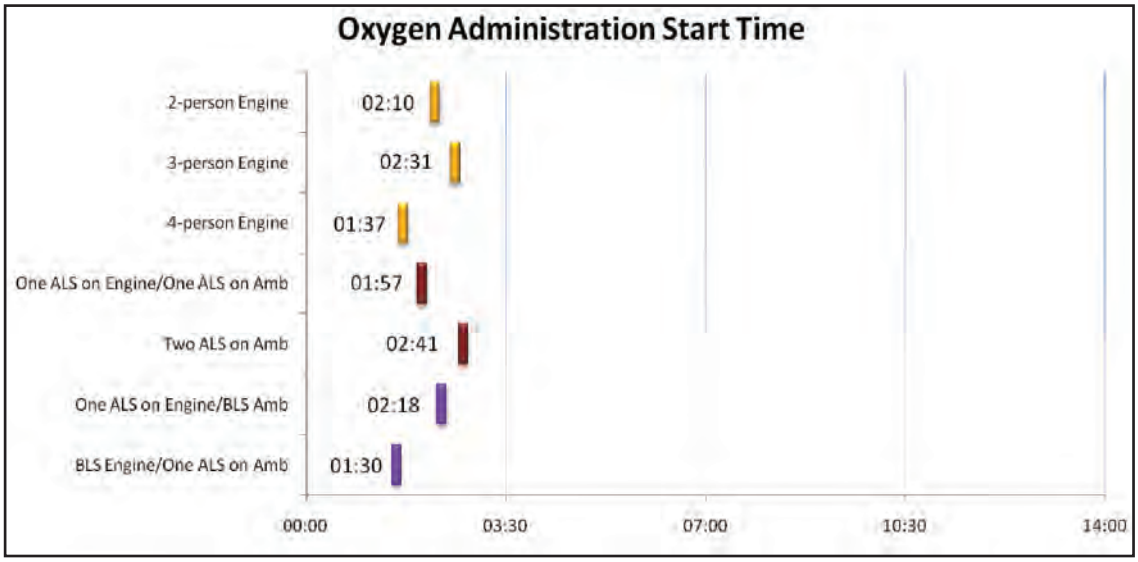


Figure 18: Oxygen Administration Start Time

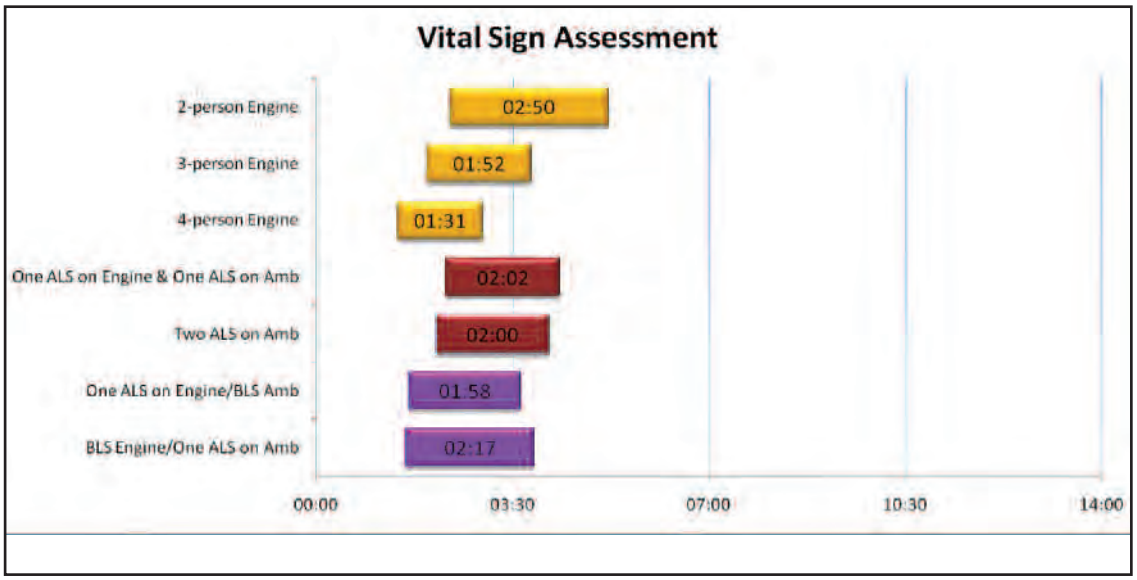


Figure 19: Vital Sign Assessment Start and Duration

Wound Bandaging

First responders with three-person crews were able to begin bandaging the patient's wounds a minute and 40 seconds sooner than first responders with two-person crews. The value of a four-person crew witnessed in the earlier tasks (e.g., checking vitals) did not manifest for this task.

Splint Leg

First responders with four-person crews were able to begin splinting the patient's leg approximately a minute faster than either the two- or three-person crews. A small advantage of a four-person crew re-emerges at this next step (i.e., following bandaging) in the response task sequence.

Crew configurations with one ALS provider on the first responding engine and one on the ambulance were able to begin splinting the patient's leg 40 seconds sooner than crews with two ALS providers on the ambulance.

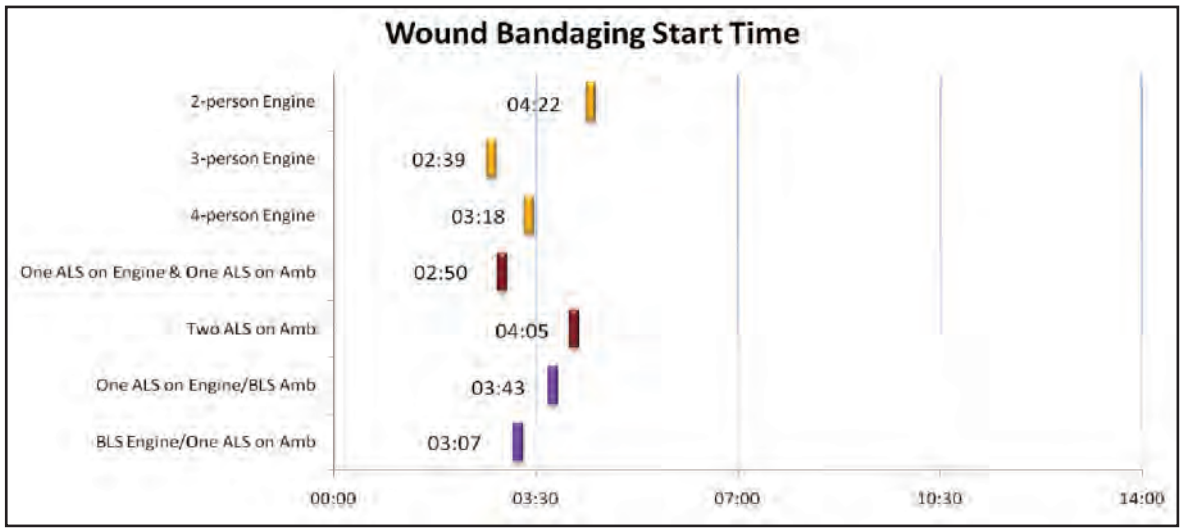


Figure 20: Wound Bandaging Start Time

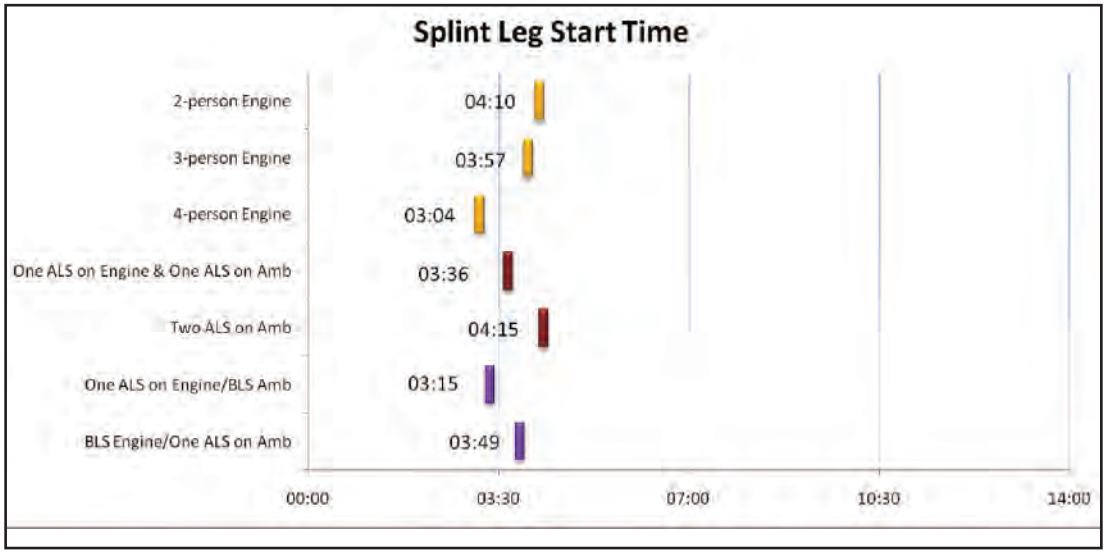


Figure 21: Splint Leg Start Time

Spinal Immobilization/ Back board

First responders with four-person crews were able to conduct spinal immobilization/back-boarding of the patient two minutes faster than either two- or three-person crews. No differences were observed based on placement or number of the ALS personnel.

Airway — Endotracheal Intubation

First responders with four-person crews were able to begin securing the patient's airway using endotracheal intubation two and one-half minutes (2 minutes and 35 seconds) sooner than the two-person crews and two minutes sooner than the three-person crews.

Crew configurations with one ALS provider on the first responding engine and one on the ambulance were able to begin securing the airway using endotracheal intubation one minute and 25 seconds sooner than crews with two ALS providers on the ambulance.

Additional personnel marginally speed up the intubation procedure. A second ALS person and having more than two persons on the engine each reduce the time of the intubation by half a minute.

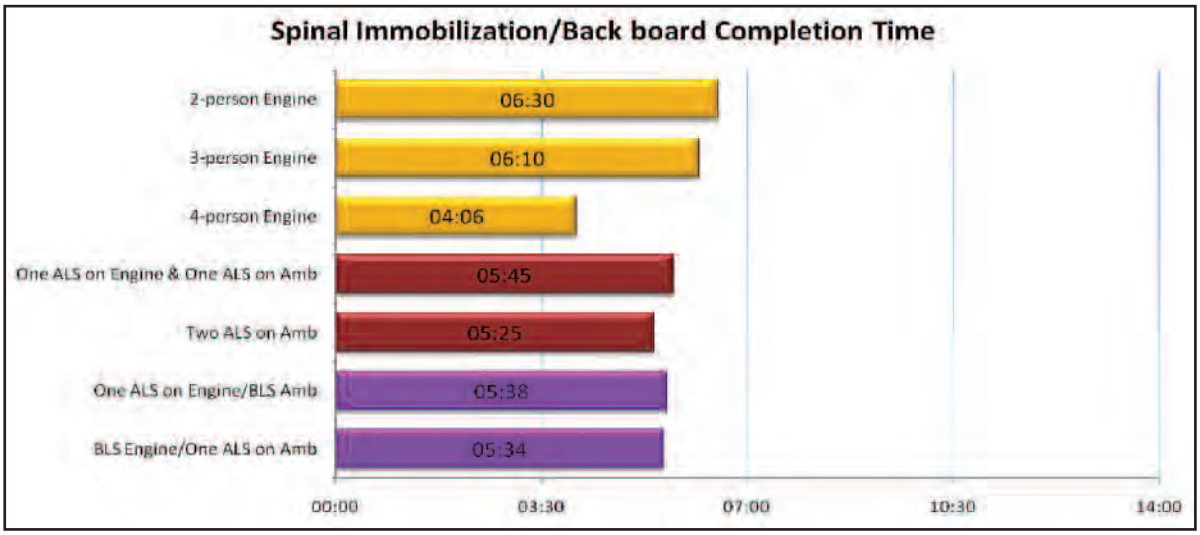


Figure 22: Spinal Immobilization Time Airway – Endotracheal Intubation

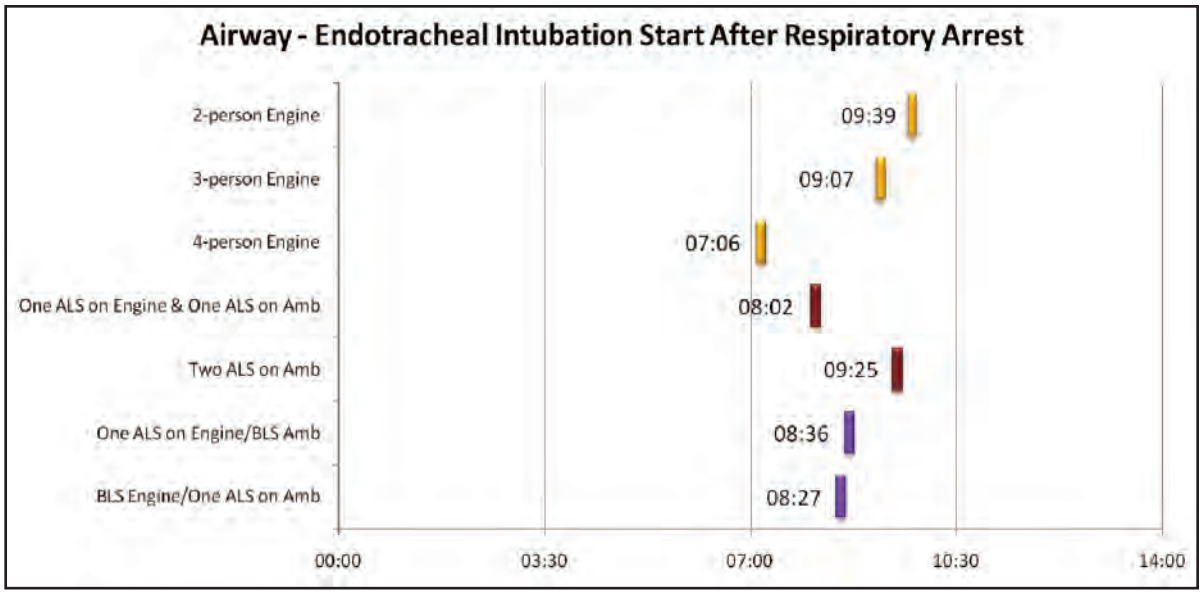


Figure 23: Airway – Intubation Start Time

Bag Valve Mask

First responders with four-person crews were able to begin bag valve mask ventilation after intubation two minutes and 35 seconds sooner than the two–person crews and nearly two minutes (110 seconds) sooner than the three-person crews.

Crew configurations with one ALS provider on the first responding engine and one on the ambulance were able to begin bag valve mask ventilation after intubation one and one-half minutes (one minute and 29 seconds) sooner than crews with two ALS providers on the ambulance.

Patient Packaging

Additional first responders reduce the times until the start and completion of packaging. First responders with four-person crews were able to begin patient packaging 3.1 minutes (three minutes and 5 seconds) sooner and complete all packaging activities moving toward transport nearly 3.4 minutes (three minutes and 25 seconds) sooner than the two-person crews. In addition, the four-person crews were able to begin patient packaging 1.6 minutes (one minute 35 seconds) sooner and complete all packaging activities moving toward transport 1.7 minutes (one minute 40 seconds) sooner than the three–person crews.

Crew configurations with one ALS provider on the first responding engine and one on the ambulance were able to begin patient packaging 2.1 minutes (two minutes and 5 seconds) sooner and complete all packaging activities moving toward transport 2.3 minutes (two minutes and 15 seconds) sooner than crews with both ALS personnel arriving on the ambulance. No differences were associated with placement of a single ALS

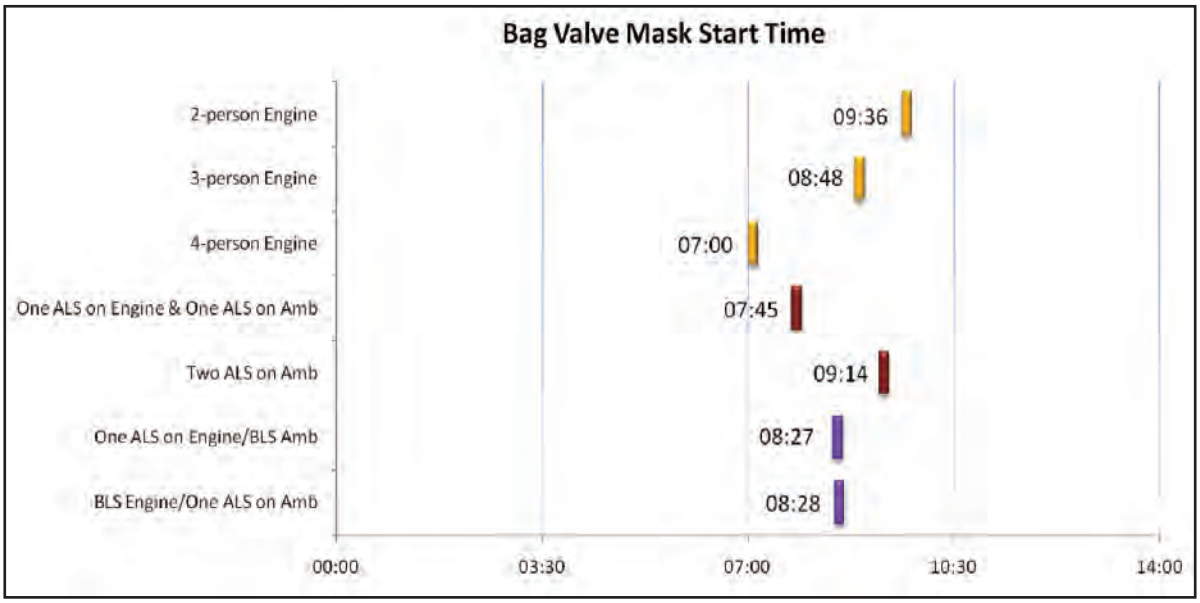


Figure 24: Bag Valve Mask Start Time

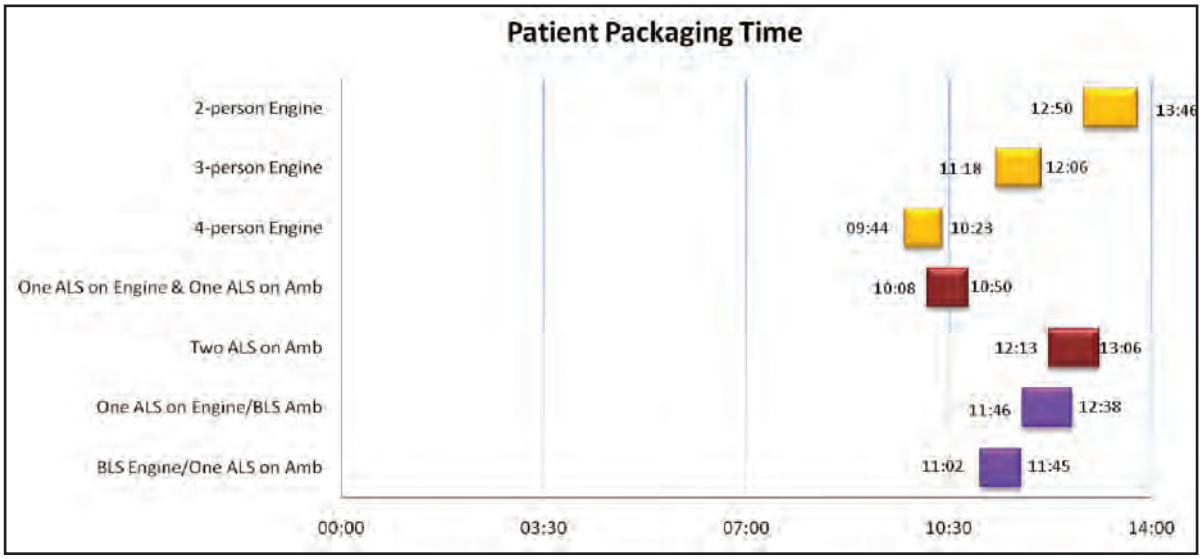


Figure 25: Patient Packaging Start and End Times

provider or with the availability of a second ALS provider.

Patterns in the Trauma Scenario

The preceding presentation focuses on the specific tasks that comprise the overall trauma response sequence. Examination of the collection of findings across tasks, reveals patterns that provide insight into how crew configurations affect trauma response. To examine this, the occurrences of significant differences of elapsed time to start by task were tabulated. Table 9 presents the task sequence and statistically significant differences when comparing ALS placement (Columns A and B) and contrasting crew sizes (Columns C – E) for the outcome "elapsed time to the start of a task." Column A shows a clear advantage to placing one ALS on the engine (with one on an ambulance that arrives three minutes later) versus two ALS on a later arriving ambulance. The time advantage manifests in the last third of the task sequence, beginning with splinting the leg. One explanation for this would be that that having an ALS on the engine creates small increments of time that cumulate and finally manifest (at a statistically significant level) beginning with splinting the leg and carrying forward to all subsequent tasks. Another factor may be that certain tasks may be performed concurrently rather than sequentially when enough hands are available at the scene and this leads to overall time reductions relative to smaller crews that are forced to complete some set of tasks sequentially.

No clear pattern emerges for starting time significant differences when contrasting the addition of a second ALS person (Column B). The same appears to be true for comparing the crew sizes of three versus two (see Column C).

On the other hand, distinct patterns are seen in Columns D and E of Table 9 which depict the comparison of four versus two and four versus three crew sizes, respectively. Although there is some evidence of real time savings (as far as elapsed time to start a task) for the middle third of tasks in the sequence (for example between O^2 administration and splint leg), a consistent pattern favoring a crew size of four is seen beginning with airway intubation and continuing through patient packaging.

Taken as a whole, Table 9 suggests that while a crew size of four may not consistently produce time savings in the start of tasks initially in the trauma task sequence, there are clear advantages as work progresses, beginning with airway intubation through patient packaging. The same can be seen (beginning earlier with leg splinting) when comparing the start times for one ALS on the engine and one on the ambulance versus two ALS on the ambulance. No such pattern emerges for the single ALS provider regardless of placement on the engine versus the ambulance.

Trauma Scenario Coefficient Direction and Significant Differences for Elapsed Time to Start* by Task and Staff Configuration**

TRAUMA Task Sequence:	A PLACEMENT: 1 ALS on Amb and 1 ALS on Engine vs 2 on Ambulance	B PLACEMENT: 2 ALS vs 1 ALS	C CREW SIZE: 3 vs. 2	D CREW SIZE: 4 vs. 2	E CREW SIZE: 4 vs. 3
Spinal Motion Restriction					
ABCs			S +		
Patient Interview		S +			
Body sweep					
O2 administration					S -
Check Vitals		S +		S -	S -
Expose patient					
Wound Bandaged					
Splint Leg	S -			S -	S -
Back Board	S -				
Airway - intubation	S -			S -	S -
Bag Valve Mask	S -			S -	S -
Package Patient / move for transport	S -		S -	S -	S -

* An 'S' cell entry denotes a statistically significant difference at the 0.05 level for Elapsed Time to Start under the test shown in the Column heading. Also, a '+' indicates a positive coefficient value (longer time) ; a '-' denotes a negative coefficient value (shorter time).
** The contrast of one ALS on Engine vs one ALS on Ambulance showed no statistically significant differences for start time and therefore is not presented in this table.

Table 9: Trauma Scenario Coefficient Direction and Significant Differences

Part 3- Chest Pain and Witnessed Cardiac Arrest

Overall Scene Time

Crews responding with four first responders, regardless of ALS configuration, completed all cardiac tasks from the "at patient time" 70 seconds faster than first responder crews with three persons, and two minutes and 40 seconds faster than first responder crews with two persons.

Additionally, crews responding with one ALS provider on both the engine and ambulance completed all scene tasks from the "at patient time" 45 seconds sooner than crews with two ALS providers on the ambulance and a BLS engine.

Crews responding with an ALS Engine and a BLS Ambulance completed tasks from "at patient time" two minutes 36 second sooner than crews with a BLS Engine and one ALS provider on the Ambulance.

These results echo the trauma findings.

Due to the nature of the cardiac scenario, where crews began the experiment with a chest pain patient who then went into cardiac arrest (no pulse and no respirations), it was necessary to assess some tasks relative to the time the patient arrested. The arrest was cued from the end time for the 12-Lead ECG task.

Crews responding with four first responders, regardless of ALS configuration, completed cardiac tasks following the patient going into cardiac arrest 85 seconds faster than first responder crews with two persons.

Crews responding with a BLS engine and an ambulance with two ALS level providers completed all cardiac tasks following the patient arrest 50 seconds sooner than crews with an ALS provider on both the engine and ambulance. This counter-intuitive difference in the results may be attributable to the delay of the patient arrest time based on the arrival of the 12-Lead ECG monitor with the two-person ALS Ambulance crew. The 12-Lead ECG task *end time* was the arrest *start time*. In this scenario, there were instantaneously two ALS providers present at the arrest rather than the one ALS provider placing the 12-Lead ECG device in the ALS engine /ALS Ambulance crew.

The statistical tests that correspond to these findings appear in Appendix G. Appendix H shows the original regression coefficient estimates upon which the tests in Appendix G were constructed.

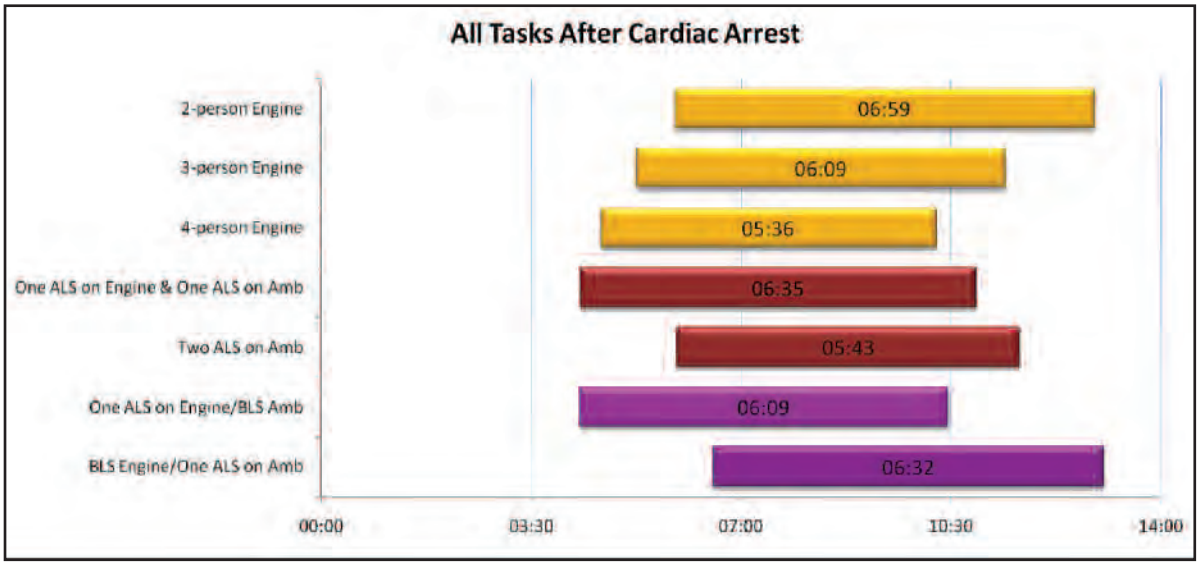


Figure 27: Total Cardiac Completion Time

Individual Task Times

12-Lead ECG Monitor

Crew configurations with one ALS provider on the first responding engine and one ALS level provider on the ambulance were able to apply the 12-lead ECG device two minutes and 20 seconds sooner than crews with both ALS providers on the ambulance.

Similarly, crew configurations with one ALS provider on the first responding engine and no medic on the ambulance also were able to apply the 12-lead ECG device two minutes and 20 seconds sooner than crews with no ALS on the first responding engine and a single ALS level provider on the ambulance.

These results may be influenced by the fact that this task can only be administered by ALS level providers. When ALS personnel are only on the ambulance, the task cannot begin until three minutes after the start of the experiment – the ambulance arrival time built into the experiments. Nonetheless, this finding is noteworthy given that national data show that ambulances typically arrive later than first responder crews.

Only a small difference in the time to begin applying the ECG device was associated with having a second ALS provider on the scene. This is not surprising, as ECG application typically requires a single ALS trained provider. Other ALS tasks later in the sequence show greater significance for having two ALS personnel on scene.

IV Access

Crew configurations with one ALS provider on the first responding engine and no medic on the ambulance were able to start the procedure for IV access two minutes and 30 seconds sooner than crews with no ALS on the first responding engine and a single ALS level provider on the ambulance. No reductions in the time to IV access were associated with a second ALS on scene. Although likely a by-product of the three-minute ambulance stagger, this finding is noteworthy because of the typical lag (behind first responders) in the arrival of an ambulance.

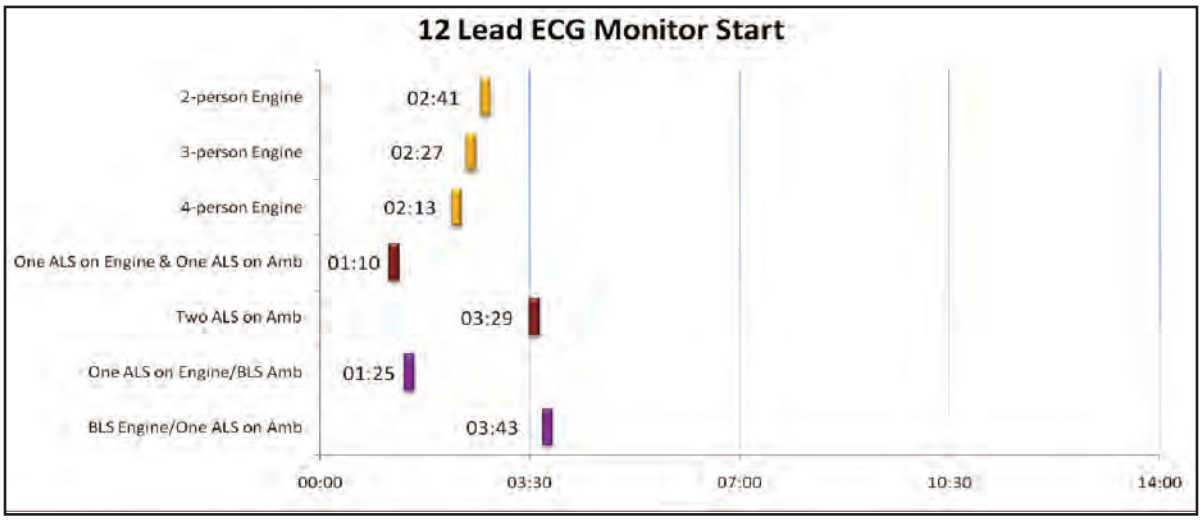


Figure 28: 12-Lead ECG Start Time

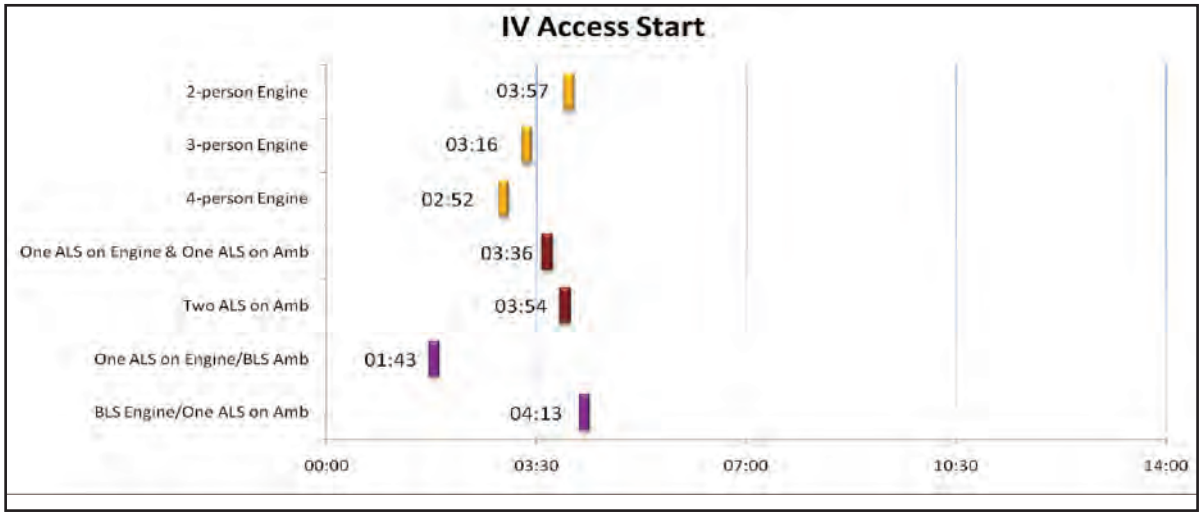


Figure 29: IV Access Start Time

Airway- Endotracheal Intubation

Crew configurations with two ALS level providers were able to begin to secure the patient's airway using endotracheal intubation over a minute (65 seconds) sooner than crew configurations with one ALS provider.

Patient Packaging

Measured from the time of arrest, first responders with four-person crews were able to begin patient packaging one minute sooner and complete all packaging activities moving toward transport one minute and 25 seconds sooner than the two-person crews.

First responders with three-person crews were able to complete all patient packaging activities moving toward transport 50 seconds sooner than the two-person crews, while four-person crews were able to complete all patient packaging activities moving toward transport 85 seconds sooner than the two-person crews.

Crew configurations with two ALS personnel arriving on the ambulance were able to complete all packaging activities, post arrest and move toward transport 50 seconds sooner than crews with one ALS provider on the first responding engine and one on the ambulance.

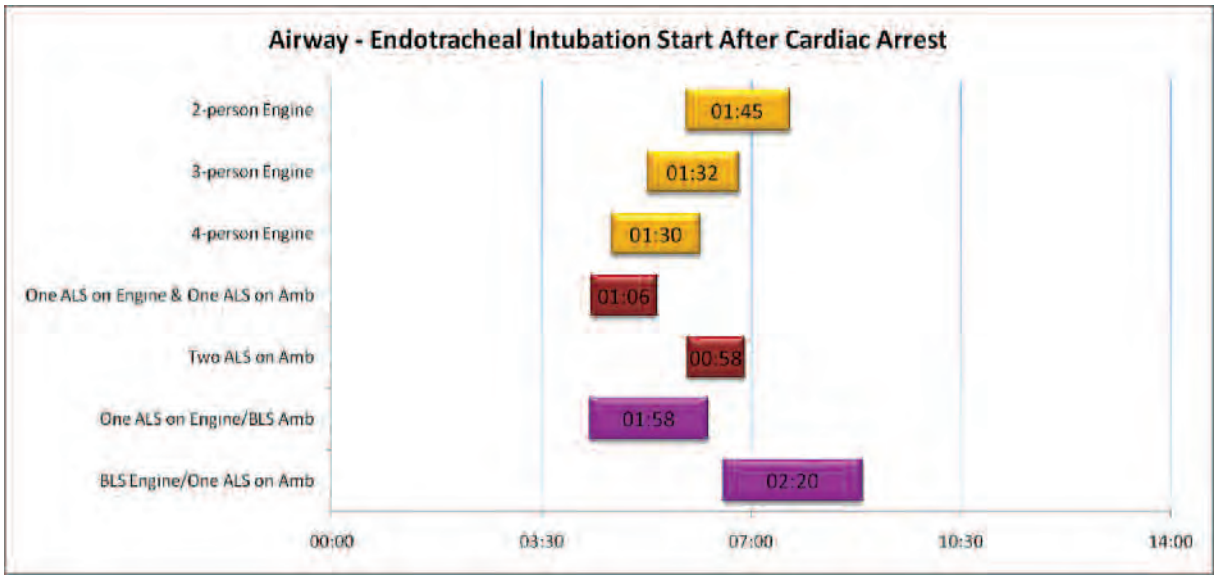


Figure 30: Airway- Intubation After Patient Arrest

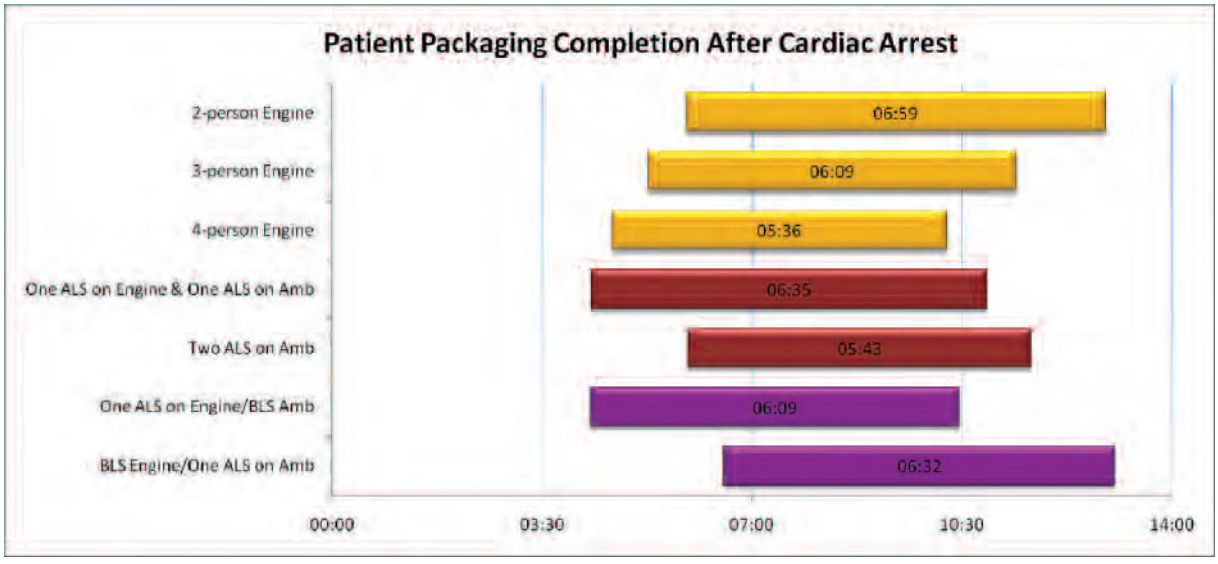


Figure 31: Patient Packaging Completion After Patient Arrest

Patterns in the Cardiac Scenario

As with the trauma analysis, the preceding presentation of findings focused on specific tasks that comprise an EMS cardiac response. The significant differences of elapsed task start times were tabulated by task and appear as Table 10. The table presents the task sequence and statistically significant differences when comparing ALS placement (Columns A – C) and contrasting crew sizes (Columns D – F) for the outcome "elapsed time to the start of a task."

The results appear mixed. Column A shows that an ALS provider on an engine has advantages over an ALS provider on an ambulance for start times in earlier tasks – ALS Vitals 12-Lead through IV access. No other ALS provider placement advantages appear for the remainder of the response sequence.

Columns B and C show sporadic task-specific advantages for start times in a few tasks. For example, when comparing crews with one ALS provider on the engine and one ALS provider on the ambulance versus two ALS providers on ambulance, and when comparing crew configurations with two ALS providers (regardless of placement) to crews with one ALS provider. A Similar sporadic advantage appears when comparing first responder crew sizes of three versus a crew size two.

A pattern similar to that observed with trauma appears when comparing the start times for a first responder crew of four versus a first responder crew of two. The advantage of the four-person crew appears in a few early tasks with at least two tasks being completed sequentially, including the initial ABC's being completed with the vital sign check, and the 12-Lead ECG being completed with exposing the patient's chest task. However, comparing these first responder crew sizes, a greater sequential time advantage is revealed for the last three tasks (analyze shock #2 through package patient), as shown in the last three rows of Column E.

Cardiac Scenario Coefficient Direction and Significant Differences for Elapsed Time to Start* by Task and Staff Configuration**

CARDIAC Tasks:	A PLACEMENT: 1 ALS on Engine vs 1 ALS on Ambulance	B PLACEMENT: 1 ALS on Amb and 1 ALS on Engine vs 2 on Ambulance	C PLACEMENT: 2 ALS vs 1 ALS	D CREW SIZE: 3 vs. 2	E CREW SIZE: 4 vs. 2
ABCs				S -	S -
Patient Interview					
O2 administration					
Check Vitals					
ALS Vitals 12-Lead	S -	S -			S -
Expose Chest	S -	S -			S -
IV Access	S -				
Position Patient (from arrest)			S -		
ABCs (from arrest)					
Defib pads (from arrest)					
Analyze / Shock #1 (from arrest)					
ABCs – After Shock #1 (from arrest)					
CPR – CPR (from arrest)					
Airway Intubation (from arrest)			S -		
Meds (Epi) (from arrest)		S +			
Analyze / Shock #2 (from arrest)				S -	S -
Medis (Lidocaine) (from arrest)			S -		S -
Package Patient/Equip (from arrest)					S -

Table 10: Cardiac Scenario Coefficient Direction and Significant Differences

Conclusions

The objective of the experiments was to determine how first responder crew size, ALS provider placement, and the number of ALS providers is associated with the effectiveness of EMS providers. EMS crew effectiveness was measured by task intervention times in three scenarios including patient access and removal, trauma, and cardiac arrest. The results were evaluated from the perspective of firefighter and paramedic safety and scene efficiency rather than as a series of distinct tasks. More than 100 full-scale EMS experiments were conducted for this study.

As noted in the literature review, hundreds of firefighters and paramedics are injured annually on EMS responses. Most injuries occur during tasks that require *lifting or abnormal movement* by rescuers. Such tasks include lifting heavy objects (including human bodies both conscious and unconscious), manipulating injured body parts and carrying heavy equipment. Several tasks included in the experiments fall into this category, including splinting extremities, spinal immobilization (back boarding) and patient packaging. During the experiments larger crews completed these tasks more efficiently by distributing the workload among more people thereby reducing the likelihood of injury.

A number of tasks are also *labor intensive*. These tasks can be completed more efficiently when handled by multiple responders. Several tasks in the experiments are in this category. These include checking vital signs, splinting extremities, intubation with spinal restriction, establishing IV access spinal immobilization, and patient packaging. Similar to the lifting or heavy work load task, larger crews were able to complete labor intensive tasks using multiple crew members on a single task to assure safe procedures were used reducing the likelihood of injury or exposure.

Finally, there are opportunities on an EMS scene to reduce scene time by completing tasks simultaneously rather than concurrently thus increasing operational efficiency. Since crews were required to complete all tasks in each scenario regardless of their crew size or configuration, overall scene times reveal operational efficiencies.

Each of these perspectives is discussed below for the patient access/removal scenario, as well as both the trauma and the cardiac scenarios.

Patient Access and Removal

With regard to accessing the patient, crews with three or four first responders reached the patient around half a minute faster than smaller crews with two first responders. With regard to completing patient removal, larger first responder crews in conjunction with a two-person ambulance were more time efficient. The removal tasks require heavy lifting and are labor intensive. The tasks also involve descending stairs while carrying a patient, carrying all equipment down stairs, and getting patient and equipment out multiple doors, onto a stretcher and into an ambulance.

The patient removal results show substantial differences associated with crew size. Crews with three- or four-person first responders complete removal between (1.2 – 1.5) minutes faster than smaller crews with two first responders. All crews with first responders complete removal substantially faster (by 2.6 min. - 4.1 min.) than the ambulance-only crew.

These results suggest that time efficiency in access and removal can be achieved by deploying three-or four-person crews on the first responding engine (relative to a first responder crew of two). To the extent that each second counts in an EMS response, these staffing features deserve consideration. Though these results establish a technical basis for the effectiveness of first responder crews and specific ALS crew configurations, other factors contributing to policy decisions are not addressed.

Trauma

Overall, field experiments reveal that four-person first responder crews completed a trauma response faster than smaller crews. Towards the latter part of the task response sequence, four-person crews start tasks significantly sooner than smaller crews.

Additionally, crews with one ALS provider on the engine and one on the ambulance completed all tasks faster and started later tasks sooner than crews with two ALS providers on the ambulance. This suggests that getting ALS personnel to the site sooner matters.

A review of the patterns of significant results for task start times reinforced these findings and suggests that (in general) small non-significant reductions in task timings accrue through the task sequence to produce significantly shorter start times for the last third of the trauma tasks.

Finally, when assessing crews for their ability to increase on-scene operational efficiency by completing tasks simultaneously, crews with an ALS provider on the engine and one ALS provider on the ambulance completed all required tasks 2.3 minutes (2 minutes 15 seconds) faster than crews with a BLS engine and two ALS providers on the ambulance. Additionally, first responders with four-person first responder crews completed all required tasks 1.7 minutes (1 minute 45 seconds) faster than three-person crews and 3.4 minutes (3 minutes and 25 seconds) faster than two-person crews.

Cardiac

The overall results for cardiac echo those of trauma. Regardless of ALS configuration, crews responding with four first responders completed all cardiac tasks (from at-patient to packaging) more quickly than smaller first responder crew sizes. Moreover, in the critical period following cardiac arrest, crews responding with four first responders also completed all tasks more quickly than smaller crew sizes. As noted in the trauma scenario, crew size matters in the cardiac response.

Considering ALS placement, crews responding with one ALS provider on both the engine and ambulance completed all scene tasks (from at-patient to packaging) more quickly than a crew with a BLS engine and two ALS providers on the ambulance. This suggests that ALS placement can make a difference in response efficiency. One curious finding was that crews responding with a BLS engine and an ambulance with two ALS providers completed the tasks that follow cardiac arrest 50 seconds *sooner* than crews with an ALS provider on both the engine and ambulance. As noted, this counter-intuitive difference in the results may be attributable to the delay of the patient arrest time based on the arrival of the 12-Lead ECG monitor with the two-person ALS Ambulance crew. The 12 -Lead ECG task *end time* was the arrest *start time*. In this scenario, there were instantaneously two ALS providers present at the arrest rather than the one ALS provider

placing the 12-Lead ECG device in the ALS engine /ALS Ambulance crew.

A review of the patterns of significant results across task start times showed mixed results. An ALS on an engine showed an advantage (sooner task starting times) over an ALS on an ambulance for a few tasks located earlier in the cardiac response sequence (specifically, ALS Vitals 12-Lead through IV access). A crew size of four also showed shorter start times for a few early tasks in the cardiac response sequence (initial ABC's, and the ALS Vitals 12-Lead and expose chest sequence). More importantly, a sequential time advantage appears for the last three tasks of the sequence (analyze shock #2 through package patient).

Finally, when assessing crews for their ability to increase on-scene operational efficiency by completing tasks simultaneously, crews with an ALS provider on the engine and one ALS provider on the ambulance completed all required tasks 45 seconds faster than crews with a BLS engine and two ALS providers on the ambulance. Regardless of ALS configuration, crews responding with four first responders completed all cardiac tasks from the "at patient time" to completion of packaging 70 seconds faster than first responder crews with three persons, and two minutes and 40 seconds faster than first responder crews with two persons. Additionally, *after the patient arrested*, an assessment of time to complete remaining tasks revealed that first responders with four-person crews completed all required tasks 50 seconds faster than three-person crews and 1.4 minutes (1 minute 25 seconds) faster than two-person crews.

Summary

While resource deployment is addressed in the context of three basic scenarios, it is recognized that public policy decisions regarding the cost-benefit of specific deployment decisions are a function of many factors including geography, resource availability, community expectations as well as population demographics that drive EMS call volume. While this report contributes significant knowledge to community and fire service leaders in regard to effective resource deployment for local EMS systems, other factors contributing to policy decisions are not addressed. The results however do establish a technical basis for the effectiveness of first responder crews and ALS configuration with at least one ALS level provider on first responder crews. The results also provide valid measures of total crew size efficiency in completing on-scene tasks some of which involve heavy lifting and tasks that require multiple responders to complete.

These experimental findings suggest that ALS provider placement and crew size can have an impact on some task start times in trauma and cardiac scenarios, especially in the latter tasks leading to patient packaging. To the extent that creating time efficiency is important for patient outcomes, including an ALS trained provider on an engine and using engine crew sizes of four are worth considering. The same holds for responder safety – for access and removal and other tasks in the response sequence, the availability of additional hands can serve to reduce the risks of lifting injuries or injuries that result from fatigue (e.g., avoid having small crews repeatedly having to ascend and descend stairs). Cost considerations for EMS response and crew configurations were not considered in this study.

Study Limitations

The scope of this study is limited to understanding the relative influence of deployment variables on labor-intensive emergency medical incidents, specifically multi-system trauma and cardiac arrest events. It should be noted that the applicability of the conclusions from this report to a large scale hazardous or multiple-casualty event have not been assessed and should not be extrapolated from this report.

The crews involved in this study typically operate using three- to four-person engine crews, and two-person ambulance crews. However, other departments across the United States vary in crew sizes, some using two- to five-person first responder engine crews and three-person ambulance crews.

Every attempt was made to ensure the highest possible degree of realism in the experiments including the use of multiple crews from multiple shifts in the participant departments. However, as the trauma and cardiac experiments were repeated a minimum of 45 times, for crews involved in more than one experiment, a learning curve on the part of the participants may have been established.

All experiments were conducted indoors, during daylight hours. Treating patients outside among varying weather conditions or at night, when visibility is lower, could pose additional obstacles. Additionally, the actual effect of ALS interventions on patient outcome is beyond the scope of this study. Patient outcomes were not quantified or estimated.

The design of the experiments limited the patient care scenarios to a systemic trauma event and a medical cardiac event. Other patient illnesses and injuries including diabetes, seizures, gunshot wounds, stabbings, and motor vehicle accidents were not considered.

EMS protocols pertaining to the treatment and transport of patients vary by departments. For the purpose of this study, tasks were standardized by technical experts and individual times were recorded for each task. In real-world situations, as in this study, many of these can be performed simultaneously based on the number and training level of responding personnel. Attempts to generalize the results from these experiments to individual departments must take into account protocols and equipment that vary from those used in the experiments.

Finally, data from U.S. fire departments were used to set response and arrival time assumptions. For departments with different deployment capability for both first responder crews and ambulances, the results may vary.

Future Research

In order to realize a significant reduction in firefighter and paramedic line-of-duty injury, fire service leaders must focus directly on resource allocation and the deployment of resources, a known contributing factor to LOD injury. Future research should use similar methods to evaluate firefighter/paramedic deployment to other medical emergencies as well as combination scenes where both fire suppression and EMS resources are needed. Additionally, resource deployment to multiple-casualty disasters or terrorism events should be studied to provide insight into levels of risks specific to individual communities and to recommend resource deployment proportionate to such risk. Future studies should continue to investigate the effects of resource deployment on the safety of firefighters, paramedics and the civilian population to better inform public policy. Finally, the ability to relate response and task timing to patient outcomes and survival rates should be quantified.

Acknowledgements

A project of this magnitude extends well beyond the capabilities and expertise of the authors of this report. The following individuals were instrumental to the success of the EMS experiments.

- Technical Experts – Phil Pommerening, Captain II, Station 34A from Fairfax County Fire and Rescue Department, Michael McAdams, EMS Chief, Montgomery County Fire and Rescue Department, Dr. Greg Mears, Medical Director, University of North Carolina, Paul Neal, Safety Officer for Montgomery County Fire and Rescue Department, Lt. Tom Papoutsis, EMS Training, Fairfax County Fire and Rescue Department, and Adam Barowy, National Institute of Standard and Technology.

- Project Support — Montgomery County Fire and Rescue Department – Chief Richard Bowers AND Fairfax County Fire and Rescue Department – Chief Ronald Mastin for supporting this study over a period of years to an unprecedented degree.

- IAFF Staff/Data Entry/ Timer supervision – Nicole Taylor, Randy Goldstein, and Ron Benedict

- Timers – Cliff Berner, Lead, DeWayne Dutrow, Alyssa Vance, Nicole Taylor, Ron Benedict, Randy Goldstein, and Adam Barowy.

- The dedicated Fire and EMS Officers and Firefighters/Paramedics from Montgomery County Fire and Rescue and Fairfax County Fire and Rescue, who performed the difficult work of EMS response and patient care safely and effectively.

References

- American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiac Care (2005). Circulation, Vol. 112, No. 24 (Suppl), Pg 1-88.
- Averill, J.D., et al.; Moore-Merrell, L. ;Barowy, A.; Santos, R.; Peacock, R.; Notariann, K.; Wisooker, D. (2010), NIST Report on Residential Fireground Field Experiments. Natl. Inst. Stand. Technol, NIST Technical Note 1661.
- Becker, L.B.; Ostrander, M.P.; Barrett, J.; Kondon, G.T. (1991). Outcome of CPR in a Large Metropolitan Area- Where are the Survivors? Ann Emerg Med, Vol. 20, No. 4, Pg. 355.
- Boyd, C.R.; Tolson, M.A.; and Copes, W.S. (1987). Evaluating Trauma Care: The TRISS Method. J. Trauma, Vol. 27, No. 4, 370-378.
- Braun, O.; McCallion, R.; Fazackerley, J. (1990). Characteristics of Midsized Urban EMS Systems. Ann Emerg Med, Vol. 19, No. 5, Pg. 536.
- Brown, L. H.; Owens Jr., C. F.; March, J. A.; Archino, E. A. (1996). Does Ambulance Crew Size Affect On-Scene Time or Number of Prehospital Interventions? Prehosp Disast Med, Vol. 11, No. 3, Pg. 214.
- Commission on Fire Accreditation International (CFAI) Standards of Cover, Fifth Edition (2008) Chantilly, VA
- Chu, K.;Swor, R.; Jackson, R.; Domeier, R.; Sadler, E.; Basse, E.; Zaleznak, H.; Gitlin, J. (1998). Race and Survival after Out-of-Hospital Cardiac Arrest in a Suburban Community. Ann Emerg Med, Vol. 31, No. 4, Pg. 478.
- Cummins, R. O.; Ornato, J. P.; Thies, W. H.; Pepe, P. E. (1991). Improving Survival from Sudden Cardiac Arrest: The "Chain of Survival Concept." Circulation, Vol. 83, No. 5, Pg. 18-32.
- DeMaio, V.J.; Stiell, I.G.; Nesbitt, L.; Wells, G.A. (2005). Faster Advanced Life Support Response Intervals May Improve Cardiac Arrest Survival. Acad Emerg Med, Vol. 12, No. 5, Pg. 16.
- Eisenberg, M.S.; Horwood, B.T.; Cummins, R.O.; Reynolds-Haertle, R.; Hearne, T.R. (1990). Cardiac Arrest and Resuscitation: A Tale of 29 Cities. Ann Emerg Med, Vol. 19, No. 2, Pg. 179-186.
- Hallstrom, A.P.; Ornato, J.P.; Weisfeldt, M.; Travers, A.; Christenson, J.; McBurnie, M.A.; Zalenski, R.; Becker, L.B.; Schron, E.B.; Proschan, M. (2004). Public-Access Defibrillation and Survival after Out-of-Hospital Cardiac Arrest. N Engl J Med, Vol. 21, No. 7, Pg. 637.
- Heick, R.; Young, T.;Peek-Asa, C. (2009). Occupational Injuries Among Emergency Medical Service Providers in the United States. J Occup Med, Vol. 51, No. 8, Pg. 963-968.
- IAFC/IAFF Fire and EMS Operation Database: Analysis of Response Times (2005).
- Karter, M.J. Jr.; Molis, J.L. (2009). U.S. Firefighter Injuries-2008. NFPA Journal, November/December 2009.
- Kellerman, A.L.; Hackman, B.B.; Somes, G.; Kreth, T.K.; Nail, L.; Dobyns, P. (1992). Impact of First Responder Defibrillation in an Urban EMS System. Ann Emerg Med, Vol. 21, No. 14, Pg. 1708.
- Laerdal Medical Corporation. (n.d.) Retrieved from http://www.laerdal.com/doc/7320252/SimMan.html.
- Litwin, P. E.; Eisenberg, M. S.; Hallstrom, A. P.; Cummins, R. O. (1987). The Location of Collapse and its Effect on Survival from Cardiac Arrest. Ann Emerg Med, Vol. 16, No. 7, Pg. 787.
- Maguire, B.J.; Hunting, K.L., Guidotti, T.L.; Smith, G.S. (2005). Occupational Injuries Among Emergency Medical Services Personnel. Prehop Emerg Care, No. 4, Pg. 405-411.
- Moore, L.L. Quality Performance Measures for Fire Department-Based EMS Systems. UMI, Ann Arbor, Michigan (2002).
- Morrison, L.J.; Angelini, M.P.; Vermeulen, M.J.; Schwartz, B. (2005). Measuring the EMS Patient Access Time Interval and the Impact of Responding to High-rise Buildings. Prehosp Emerg Care, Vol. 9, No. 1, Pg. 14-18.
- National Fire Academy (1981). Fire Engines are Becoming Expensive Taxi Cabs: Inadequate Manning. United States Fire Administration, Emmitsburg, MD.
- NFPA (2009). 450: Standard for Emergency Medical Services and Systems. National Fire Protection Association, Quincy, MA.
- NFPA (2007). 1500: Standard on Fire Department Occupational Safety and Health Program. National Fire Protection Association, Quincy, MA.
- NFPA (2010). NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. National Fire Protection Association, Quincy, MA.
- NFPA (2010). NFPA 1720: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments. National Fire Protection Association, Quincy, MA.
- NFPA (2008) 1999: Standard on Protective Clothing for Emergency Medical Operations. National Fire Protection Association, Quincy, MA.
- Olson, D.W.; LaRochelle, J.; Fark, D.; et al. (1989). EMT-Defibrillation: The Wisconsin Experience. Ann Emerg Med, Vol. 18, No. 8, Pg. 806.

- Pratt, F.D.; Katz, S.; Pepe, P.E.; Persse, D. (2007). Prehospital 9-1-1 Emergency Medical Response: The Role of the United States Fire Service in Delivery and Coordination. White paper.

- Studnek, J.R.; Ferketich, A.; Crawford, J.M. (2007) On the Job Illness and Injury Resulting in Lost Work Time Among a National Cohort of Emergency Medical Services Professionals. Am J Indus Med, Vol. 50, No.12, Pg. 921-931.

- Sweeney, T.A.; Runge, J.W.; Gibbs: et al. (1998). EMT Defibrillation Does Not Increase Survival from Sudden Cardiac Death in a Two-Tiered Urban-Suburban EMS System. Ann Emerg Med, Vol. 31, No. 2, Pg. 234.

Glossary

12-Lead Electrocardiogram (ECG) — A representation of the heart's electrical activity recorded from 10 electrodes placed in standard positions on the body's surface.

Advanced Cardiac Life Support (ACLS) — A set of clinical interventions for the urgent treatment of cardiac arrest and other life threatening medical emergencies, as well as the knowledge and skills to use those interventions.

Advanced Life Support (ALS) — Emergency medical treatment beyond basic life support that provides for advanced airway management including intubation, advanced cardiac monitoring, defibrillation, establishment and maintenance of intravenous access, and drug therapy.

Ambulance Transport Unit — Provides transport for patients from the incident scene to a health care facility.

Automated External Defibrillator (AED) — A portable electronic device that automatically diagnoses potentially life-threatening cardiac arrhythmias of ventricular fibrillation, and is able to treat them through defibrillation, the application of electrical therapy which stops the arrhythmias, allowing the heart to reestablish an effective rhythm.

Basic Life Support (BLS) — A specific level of prehospital medical care provided by trained responders, focused on rapidly evaluating a patient's condition; maintaining a patient's airway, breathing, and circulation; controlling external bleeding; preventing shock; and preventing further injury or disability by immobilizing potential spinal or other bone fractures.

Cardiac Arrest — Sudden cessation of heartbeat and heart functions, resulting in the loss of effective circulation.

Cardiopulmonary Resuscitation (CPR) — Procedure designed to support and maintain breathing and circulation for a person who has stopped breathing (respiratory arrest) or whose heart has stopped (cardiac arrest).

Chain of Survival — The four components of EMS response to out-of-hospital cardiac arrest that are thought to effect the most optimal patient outcome. The four components include early recognition and EMS access, early CPR, rapid defibrillation, and advanced life support.

Combination Fire Department — Fire department consisting of both paid (career) and volunteer personnel.

Crew configurations — Specific ways of staffing or organizing members of the work force.

Definitive Medical Care — Medical treatment or services beyond emergency medical care, initiated upon inpatient admission to a hospital or health care facility.

Emergency Medical Services (EMS) — The treatment of patients using first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other medical procedures prior to arrival at a hospital or other health care facility.

EMS Protocols — Written medical instructions authorized by an EMS medical director to be used by personnel in the field without the necessity of on-line or real-time consultation with a physician or nurse.

Emergency Medical Technician (EMT) — A member of the emergency medical services team who provides out-of-hospital emergency care, trained to any level of emergency medical services.

Emergency Medical Technician- Basic (EMT-B) — A member of the emergency medical services team who provides out-of-hospital emergency care, trained in the delivery of Basic Life Support services.

Emergency Medical Technician- Defibrillator (EMT-D) — A member of the emergency medical services team with special training in the use of cardiac defibrillating equipment. (Defibrillation training is now part of Basic Emergency Medical training.)

Emergency Medical Technician- Paramedic (EMT-P) — A member of the emergency medical services team who provides out-of-hospital emergency care, trained in the delivery of Advanced Life Support services.

Endotrachael Tube (ET) — Flexible plastic catheter placed into the trachea to protect the airway and provide a means of mechanical ventilation.

First Responder — Functional provision of initial assessment (i.e., airway, breathing, and circulatory systems) and basic first-aid intervention, including CPR and automatic external defibrillator capability.

First Responder Unit — The first arriving unit at an emergency medical incident, whether it be a fire suppression vehicle or ambulance.

Intervention — Act designed to alter or hinder an action or development.

Intravenous (IV) — An injection administered into a vein.

Intubation — Insertion of a tube through the mouth or nose and into a patient's lungs to help them breathe.

Knox Box Rapid Entry System — Small, wall-mounted safe that holds building keys for firefighters and EMTs to retrieve in emergencies.

Mayocardial Infarction — Heart attack.

Measurement uncertainty — Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measure.

National Fire Protection Association (NFPA) — A nonprofit organization, established in 1896, with the mission to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training and education.

NFPA 450— Guide for emergency medical services and systems.

NFPA 1500 — Standard on fire department occupational safety and health program.

NFPA 1710 — Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments.

NFPA 1720 — Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by volunteer fire departments.

NFPA 1999 — Standard on protective clothing for emergency medical operations.

One-Tier EMS System — EMS system in which all units are advanced life support.

Operational Effectiveness — Capable of producing a particular desired effect in "real world" circumstances.

Operational Efficiency — The effect or results achieved in relation to the effort expended.

Ordinary Least Squares (OLS) — In statistics and econometrics, OLS or linear least squares is a method for estimating the unknown parameters in a linear regression model.

Out-of-hospital — Care for the sick or injured in settings other than hospitals or hospital-affiliated outpatient medical or surgical facilities, typically beginning with a call to 9-1-1.

Patient Packaging — Securing a patient to a mobile contrivance (e.g., stretcher or stair chair) for moving to the transport unit.

Pulse Oximeter — Medical device that measures the oxygen saturation of a patient's blood.

Regression analysis — Includes any techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held.

Standard of Response Cover (SORC) — Policies and procedures that determine distribution, concentration, and reliability of fixed and mobile resources for an emergency response system.

Standard t-test — Measures whether there is any statistical difference in the mean of two groups.

Statistical significance — A number that expresses the probability that the result of a given experiment or study could have occurred purely by chance. This number can be a margin of error or it can be a confidence level.

System resources — Personnel, vehicles, and equipment used in providing EMS.

Systemic trauma — Injury or shock affecting the body generally.

Transport — Conveyance of the sick or injured in an ambulance or emergency vehicle to a hospital setting.

Trauma and Injury Severity Scores (TRISS) — A system developed in the 1980's to improve the prediction of patient outcomes through the use of physiological and anatomical criteria.

Two-Tier EMS System — EMS system that uses first responder or BLS units that typically arrive and begin treatment prior to the arrival of a transport unit.

Acronyms

- **A, B, C's —** Airway, Breathing, and Circulation
- **ACLS —** Advanced Cardiac Life Support
- **AED —** Automated External Defibrillator
- **AHA —** American Heart Association
- **ALS —** Advanced Life Support
- **BLS —** Basic Life Support
- **CFAI —** Commission on Fire Accreditation International
- **CPR —** Cardiopulmonary resuscitation
- **DHS —** Department of Homeland Security
- **DOL —** Department of Labor
- **ECG —** Electrocardiogram
- **EMS —** Emergency Medical Services
- **EMT —** Emergency Medical Technician
- **EMT-B —** Emergency Medical Technician- Basic
- **EMT-D —** Emergency Medical Technician- Defibrillator
- **EMT-P —** Emergency Medical Technician- Paramedic
- **FEMA —** Federal Emergency Management Agency
- **IAFC —** International Association of Fire Chiefs
- **IAFF —** International Association of Fire Fighters
- **LOD —** Line-of-Duty
- **NFPA —** National Fire Protection Association
- **NIST —** National Institute of Standards and Technology
- **OHCA —** Out-of-hospital cardiac arrest
- **OPQRST —** Onset, Provokes, Quality, Radiates, Severity, Time
- **SAMPLE —** Signs and Symptoms, Allergies, Previous history, Medications, Last oral intake, Events leading up to
- **SORC —** Standard of Response Cover
- **TBI —** Traumatic brain injury
- **TRISS —** Trauma and Injury Severity Scores
- **WPI —** Worcester Polytechnic Institute

Appendix A: Time to Task Measures

Time-to-Task Data Collection Chart -EMS

(Overall Response- Patient Access and Removal)

Date _____ Start Time_____ End Time (all tasks complete) _____

Crew Used: ❑ Montgomery County ❑ Fairfax County

Timer Name_____

Task	Start Time	Completion Time	Difference
Arrive on Scene			
Assemble Equipment			
Conduct Size-up – Scene Safety			
Enter Door- Building- 'Knox box'			
Ascend – Stairs (3 stories)			
Package Patient – stair chair			
Descent – Stairs (3 stories) with patient in stair chair			
Exit Door – Building			
Transfer Patient to cot/stretcher			
Turn Ambulance for Loading			
Load Ambulance/ Seat Belt			

Time-to-Task Data Collection Chart -EMS

(Trauma — BLS — ALS on scene)

Date _____ Start Time_____ End Time (all tasks complete) _____

Timer Name_____

Task	Start Time	Completion Time	Difference
At Patient			
Spinal motion restriction			
A, B, C's			
Patient Interview			
Body sweep – find laceration on head and angulated fracture of tib/fib (closed) on Right leg			
O^2 Administration – face mask			
Check Vitals (Pulse, Resp., BP, Pulse Ox)			
Expose patient as indicated			
Control Bleeding			
Splint leg			
Back Board			
Movement causes labored breathing – Agonal Respiration → Patient vomits (projectile)			
Airway – Intubation ET with spinal motion restriction – on ground due to distance from transport unit			
Bag Valve Mask			
Package patient / move for transport			

Time-to-Task Data Collection Chart -EMS

(Medical — Cardiac)

Date _____ Start Time_____ End Time (all tasks complete) _____

Timer Name_____

Task	Start Time	Completion Time	Difference
At Patient			
A, B, C's			
Patient Interview			
O^2 Administration			
Check Vitals (Pulse, Resp., BP, pulse Ox)			
ALS Vitals - ECG 12-Lead			
Expose patient as indicated			
Patient Arrest >>>>>>>>			
Position patient			
ABC's			
Apply Defibrillator pads			
Defibrillate – Shock # 1 – Shock works = NO			
ABC's			
CPR – Bag Valve			
Airway Intubation - ET			
IV access			
Meds (1 Epi)	>>>>	>>>>>>>>>	>>>>>
AED Auto Countdown- "Analyze Patient"			
Defibrillate – Shock #2 – Shock works = **YES**			
Check Vitals – ROSC - unconscious			
Meds (1 Lidocaine Bolus)			
Package Patient			

Appendix B: Trauma Patient Assessment and Interview Form

Name:_____ Age: _____ Male / Female

Chief Complaint: _____

Mechanism of Injury: _____

Primary Survey:

Airway status: open / occluded

Breathing: normal / labored-abnormal / none

Circulation: normal / shocky / none

Mental Status: alert / voice / pain / unresponsive

Body Sweep Findings? _____

Secondary / Focused Survey Findings:

Head	L Arm
Face	R Arm
Neck	Abdomen
Chest	L Leg
Back	R Leg

Vital Signs:

BP _____ Pulse: _____ Resp:_____ PulseOx: _____

BP _____ Pulse: _____ Resp:_____ PulseOx: _____

Treatment:

❑ oxygen ❑ C-spine ❑ Splinting ❑ Bandaging

Appendix C: Medical Patient Interview Form

Name:_____ Age: _____ Male / Female

Chief Complaint: _____

Mechanism of Injury: _____

"SAMPLE" history
Signs & Symptoms
Allergies
Medications
Previous Medical History
Last Oral Intake
Events Leading Up to?

"OPQRST" pain survey
Onset? What were you doing?
Provokes? What makes it better or worse?
Quality? "What does it feel like?
Radiation? "Does it go anywhere?"
Severity? 1-10 scale
Time? When did it begin?

Vital Signs:

BP _____ Pulse: _____ Resp: _____ PulseOx: _____

Treatment:

❑ oxygen ❑ ECG ❑ 12-lead ❑ IV

❑ medications? _____

Appendix D: Medical Patient Assessment/Interview Form

"SAMPLE HISTORY"		
	Signs & Symptoms "What is bothering you this morning?	Pain under my breastbone.
	Allergies "Are you allergic to any medications?"	None
	Medications "Do you take any medications?"	Aspirin and Cardizem.
	Previous History "Do you have any medical problems? Has this ever happened to you before?"	I was diagnosed with high blood pressure two years ago. No, I have never felt pain like this before.
	Last Oral Intake "Have you been eating normally?"	Yes. Had a full breakfast this morning.
	Events Leading Up to? "What happened prior to you developing this pain?"	Nothing, I was feeling fine before this.

PAIN SURVEY		
	PAIN SURVEY Onset? "What were you doing when pain began?"	I was sitting on the couch watching television.
	Provokes? "Have you done anything that makes the pain better?"	No, it is a steady pain and I can't get in a comfortable position.
	Radiates? "Do you feel the pain anywhere besides your chest?"	Yes, I feel it in my spine also.
	Severity? "On a scale of 1 to 10, with ten worst pain you can imagine, how severe is your pain now?"	It is a 6.
	Time? "When did your chest pain begin?"	About 30 minutes ago.

Appendix E: Statistical Analysis of Time to Task Data Patient Access and Removal

Average Timing in Seconds by Numbers of First Responders Regardless of ALS Placement				
Task:	**No First Responder**	**2-person First Responder Crews**	**3-Person First Responder Crews**	**4- Person First Responder Crews**
Arrive Scene				
Assemble equipment	29.7	46.7	26.7	22.7
Conduct scene size up	31.7	181.7	167.3	172.0
Enter building	19.7	13.3	15.7	7.3
Ascend stairs	22.0	30.0	20.3	23.3
Time between Arrival and ascent of stairs	***104.7***	***123.0***	***98.3***	***93.0***
Package patient	59.7	46.3	59.0	36.0
Descend stairs	87.0	69.7	78.7	91.0
Exit door	102.7	114.3	92.3	89.0
Transfer patient	55.0	54.0	42.0	31.7
Turn ambulance	56.3	84.3	87.0	60.3
Load ambulance	76.3	53.3	31.0	18.3
Time between packaging patient and completion of loading patient	***418.7***	***263.3***	***192.7***	***171.7***

Access and Removal Differences of Means and Associated T-Tests (Time in Minutes)						
Dependent Variable:	**Ambulance vs. 2 Crew**	**Ambulance vs. 3 Crew**	**Ambulance vs. 4 Crew**	**Value of 3 vs. 2 Crew**	**Value of 4 vs. 2 Crew**	**Value of 4 vs. 3 Crew**
ACCESS: Arrival end to ascend stairs	**-0.306**	**0.106**	**0.194**	**-0.411**	**-0.500**	**-0.089**
SE	0.167	0.167	0.167	0.167	0.167	0.167
p-value	0.105	0.546	0.279	0.039	0.017	0.610
REMOVAL: Package patient to end	**2.589**	**3.767**	**4.117**	**-1.178**	**-1.528**	**0.350**
SE	0.521	0.521	0.521	0.521	0.521	0.521
p-value	0.001	0.000	0.000	0.054	0.019	0.521

Appendix F: Statistical Analysis of Time to Task Data Patient Systemic Trauma Patient

Testing the Effects of ALS, Engine Placements, and Crew Size on Engine to Address Research Questions for the Trauma Analysis (Contrasts are in Minutes)						
TRAUMA Task:	Q1: One ALS -- Engine vs. Ambulance	Q2: Two ALS: One Amb One Engine vs. Two on Ambulance	Q3: Value of 2nd ALS	Q4: Value of 3 vs. 2 Crew	Q5a: Value of 4 vs. 2 Crew	Q5b: Value of 4 vs. 3 Crew
Spinal Motion Restriction – start	**-0.200**	**-0.106**	**0.064**	**-0.007**	**-0.092**	**-0.085**
SE	0.104	0.083	0.066	0.090	0.086	0.066
p-value	0.062	0.213	0.343	0.939	0.296	0.206
ABCs – start	**-0.026**	**-0.067**	**0.078**	**0.100**	**0.035**	**-0.065**
SE	0.041	0.065	0.039	0.046	0.051	0.044
p-value	0.536	0.313	0.052	0.037	0.503	0.149
ABCs – duration	**-0.130**	**-0.280**	**-0.234**	**-0.079**	**-0.157**	**-0.078**
SE	0.229	0.160	0.140	0.191	0.163	0.156
p-value	0.574	0.090	0.102	0.681	0.344	0.622
Patient Interview – start	**-0.017**	**-0.002**	**0.124**	**0.115**	**0.025**	**-0.090**
SE	0.056	0.104	0.059	0.070	0.068	0.078
p-value	0.767	0.986	0.043	0.111	0.715	0.257
Body sweep - – start	**-0.383**	**0.048**	**0.425**	**-0.247**	**-0.614**	**-0.367**
SE	0.274	0.509	0.289	0.425	0.376	0.233
p-value	0.170	0.925	0.151	0.564	0.112	0.125
Body sweep - duration	**-0.076**	**-0.248**	**-0.003**	**-0.093**	**-0.168**	**-0.075**
SE	0.245	0.365	0.220	0.317	0.280	0.197
p-value	0.759	0.501	0.990	0.771	0.552	0.706
O2 administration – start	**0.793**	**-0.724**	**0.414**	**0.347**	**-0.551**	**-0.899**
SE	0.404	0.543	0.338	0.457	0.377	0.404
p-value	0.058	0.191	0.229	0.453	0.153	0.033
Check Vitals – start	**0.065**	**0.165**	**0.596**	**-0.414**	**-0.932**	**-0.518**
SE	0.260	0.448	0.259	0.360	0.328	0.254
p-value	0.727	0.302	0.140	0.842	0.300	0.070
Wound Bandaged – start	**0.604**	**-1.239**	**0.045**	**-1.708**	**-1.064**	**0.644**
SE	0.618	0.714	0.472	0.548	0.607	0.578
p-value	0.335	0.092	0.924	0.004	0.089	0.273
Splint Leg – start	**-0.554**	**-0.650**	**0.385**	**-0.206**	**-1.099**	**-0.893**
SE	0.450	0.294	0.269	0.308	0.348	0.331
p-value	0.227	0.034	0.161	0.509	0.003	0.011
Splint Leg – duration	**0.830**	**-0.509**	**-0.277**	**-0.135**	**-0.340**	**-0.206**
SE	0.268	0.380	0.233	0.283	0.250	0.317
p-value	0.004	0.189	0.242	0.638	0.183	0.521
Back Board – start	**-0.250**	**-1.654**	**0.235**	**-0.293**	**-0.058**	**0.235**
SE	0.539	0.604	0.405	0.536	0.514	0.432
p-value	0.646	0.010	0.565	0.588	0.910	0.590
Back Board – duration	**0.063**	**0.330**	**-0.024**	**-0.340**	**-2.410**	**-2.069**
SE	0.426	0.535	0.342	0.427	0.484	0.330
p-value	0.883	0.542	0.944	0.431	0.000	0.000
Airway - intubation – start	**0.137**	**-1.389**	**0.194**	**-0.535**	**-2.558**	**-2.024**
SE	0.692	0.500	0.427	0.582	0.432	0.542
p-value	0.844	0.009	0.652	0.365	0.000	0.001
Airway - intubation – duration	**0.465**	**-0.437**	**-0.460**	**-0.775**	**-0.363**	**0.413**
SE	0.268	0.291	0.198	0.193	0.281	0.244
p-value	0.091	0.142	0.026	0.000	0.206	0.100
Bag Valve Mask – start	**-0.020**	**-1.487**	**0.031**	**-0.797**	**-2.603**	**-1.806**
SE	0.622	0.519	0.405	0.550	0.439	0.493
p-value	0.974	0.007	0.939	0.157	0.000	0.001
Package Patient / move fo r transport – start	**0.733**	**-2.089**	**-0.232**	**-1.525**	**-3.106**	**-1.581**
SE	0.763	0.692	0.515	0.641	0.589	0.660
p-value	0.343	0.005	0.656	0.023	0.000	0.022

Appendix G: Statistical Analysis of Time to Task Data Cardiac Arrest Patient

Testing the Effects of ALS , Engine Placements, and Crew Size on Engine to Address Research Questions for the Cardiac Analysis (Contrasts are in Minutes)						
CARDIAC Tasks:	**Q1: One ALS -- Engine vs Ambulance**	**Q2: Two ALS: One Amb and One Engine vs Two on Ambulance**	**Q3: Value of 2nd ALS**	**Q4: Value of 3 vs. 2 Crew**	**Q5a: Value of 4 vs. 2 Crew**	**Q5b: Value of 4 vs. 3 Crew**
ABCs—start	**-0.019**	**0.020**	**0.029**	**-0.057**	**-0.069**	**-0.013**
SE	0.022	0.026	0.017	0.023	0.021	0.019
p-value	0.395	0.446	0.101	0.020	0.002	0.505
ABCs-- duration	**-0.009**	**0.028**	**-0.004**	**0.022**	**-0.026**	**-0.049**
SE	0.040	0.026	0.024	0.029	0.033	0.026
p-value	0.820	0.290	0.878	0.445	0.427	0.072
Patient Interview - start	**0.000**	**0.031**	**0.016**	**-0.024**	**-0.024**	**0.000**
SE	0.006	0.031	0.016	0.024	0.024	0.006
p-value	1.000	0.323	0.331	0.323	0.323	1.000
O2 administration- start	**-0.120**	**-0.039**	**-0.106**	**-0.121**	**-0.169**	**-0.049**
SE	0.140	0.111	0.089	0.095	0.120	0.113
p-value	0.396	0.729	0.246	0.210	0.166	0.669
Check Vitals – start	**-0.100**	**-0.031**	**0.086**	**-0.268**	**-0.286**	**-0.018**
SE	0.146	0.157	0.107	0.142	0.151	0.095
p-value	0.499	0.843	0.428	0.067	0.067	0.850
Check Vitals – duration	**0.024**	**0.230**	**-0.008**	**0.031**	**-0.208**	**-0.239**
SE	0.322	0.211	0.193	0.256	0.214	0.236
p-value	0.941	0.285	0.966	0.906	0.338	0.319
ALS Vitals 12-Lead - start	**-2.309**	**-2.330**	**-0.240**	**-0.235**	**-0.471**	**-0.236**
SE	0.277	0.239	0.183	0.233	0.222	0.216
p-value	0.000	0.000	0.198	0.321	0.041	0.281
Expose Chest - start	**-1.665**	**-1.404**	**-0.094**	**-0.593**	**-0.985**	**-0.392**
SE	0.447	0.490	0.331	0.392	0.397	0.428
p-value	0.551	0.113	0.081	0.476	0.358	0.811
Position Patient – start (difference from Arrest time)	**0.039**	**-0.044**	**-0.042**	**0.028**	**0.000**	**-0.028**
SE	0.029	0.024	0.019	0.023	0.022	0.025
p-value	0.183	0.077	0.034	0.229	1.000	0.265
ABCs – Start (difference from arrest time)	**0.000**	**-0.033**	**0.067**	**-0.079**	**-0.131**	**-0.051**
SE	0.072	0.122	0.071	0.093	0.093	0.071
p-value	1.000	0.786	0.352	0.402	0.170	0.473
Defib pads – Start (difference from arrest time)	**0.006**	**-0.056**	**-0.055**	**-0.086**	**-0.156**	**-0.069**
SE	0.120	0.119	0.084	0.120	0.118	0.061
p-value	0.963	0.642	0.521	0.477	0.195	0.265
Analyze / Shock #1 – Start (difference from arrest time)	**-0.078**	**-0.069**	**-0.071**	**-0.133**	**-0.179**	**-0.046**
SE	0.158	0.157	0.112	0.157	0.149	0.095
p-value	0.626	0.666	0.527	0.402	0.238	0.633

Appendix G: Statistical Analysis of Time to Task Data Cardiac Arrest Patient

Continued

Testing the Effects of ALS, Engine Placements, and Crew Size on Engine to Address Research Questions for the Cardiac Analysis (Contrasts are in Minutes)						
CARDIAC Tasks:	**Q1: One ALS -- Engine vs Ambulance**	**Q2: Two ALS: One Amb and One Engine vs Two on Ambulance**	**Q3: Value of 2nd ALS**	**Q4: Value of 3 vs. 2 Crew**	**Q5a: Value of 4 vs. 2 Crew**	**Q5b: Value of 4 vs. 3 Crew**
ABCs – Start – After Shock #1 (difference from arrest time)	**-0.098**	**0.026**	**-0.034**	**-0.178**	**-0.239**	**-0.061**
SE	0.153	0.214	0.132	0.187	0.182	0.098
p-value	0.526	0.904	0.796	0.349	0.198	0.539
CPR – CPR—Start (difference from arrest time)	**0.207**	**0.026**	**-0.057**	**-0.015**	**-0.021**	**-0.006**
SE	0.183	0.234	0.148	0.196	0.187	0.161
p-value	0.264	0.912	0.701	0.938	0.912	0.973
Airway Intubation- Start – (difference from arrest time)	**-0.359**	**0.128**	**-1.123**	**-0.207**	**-0.247**	**-0.040**
SE	0.438	0.254	0.253	0.321	0.256	0.347
p-value	0.418	0.618	0.000	0.524	0.340	0.908
Airway Intubation-- Duration	**0.081**	**-0.037**	**0.582**	**-0.172**	**-0.594**	**-0.422**
SE	0.346	0.315	0.234	0.319	0.301	0.232
p-value	0.681	0.097	0.009	0.135	0.021	0.328
Package Patient/Equip- Start (difference from arrest time)	**-0.606**	**0.991**	**-0.193**	**-0.733**	**-1.013**	**-0.279**
SE	0.551	0.583	0.401	0.538	0.450	0.480
p-value	0.279	0.098	0.634	0.182	0.031	0.565
Package Patient/Equip- Completion (difference from arrest time)	**-0.380**	**0.867**	**-0.190**	**-0.843**	**-1.394**	**-0.551**
SE	0.402	0.418	0.290	0.393	0.340	0.329
p-value	0.352	0.046	0.517	0.039	0.000	0.103

Appendix H: All Regression Coefficients Continued

Regression Analysis Coefficients, Standard Errors and P-Values For Addressing Research Questions about Cardiac Time from Arrest (Coefficients are in Minutes) : Each Task Row Represents a Separate Regression								
TRAUMA Tasks:	**no engine**	**no engine & 2 ALS on ambulance**	**crew size 3 on engine**	**crew size 4 on engine**	**1 ALS on engine & 0 ALS on Ambulance**	**0 ALS on engine & 1 ALS on Ambulance**	**0 ALS on engine & 2 ALS on Ambulance**	**Constant**
p-value	0.000	0.002	0.453	0.153	0.496	0.290	0.191	0.000
Check Vitals – start	**3.290**	**0.950**	**-0.414**	**-0.932**	**-0.646**	**-0.711**	**-0.165**	**2.754**
SE	0.501	0.611	0.360	0.328	0.384	0.419	0.448	0.474
p-value	0.000	0.130	0.259	0.008	0.102	0.099	0.715	0.000
Check Vitals – duration	**0.571**	**-0.572**	**-0.964**	**-1.311**	**-0.052**	**0.259**	**-0.028**	**2.784**
SE	1.458	1.434	0.601	0.546	0.524	0.574	0.687	0.658
p-value	0.698	0.692	0.118	0.022	0.922	0.654	0.968	0.000
Expose patient – start	**3.266**	**-0.317**	**0.067**	**-0.325**	**-0.187**	**-0.102**	**0.424**	**1.879**
SE	0.329	0.148	0.333	0.309	0.273	0.259	0.404	0.298
p-value	0.000	0.040	0.842	0.300	0.497	0.697	0.302	0.000
Wound Bandaged – start	**4.831**	**-1.533**	**-1.708**	**-1.064**	**0.876**	**0.272**	**1.239**	**3.763**
SE	2.074	2.549	0.548	0.607	0.764	0.667	0.714	0.677
p-value	0.026	0.551	0.004	0.089	0.260	0.686	0.092	0.000
Splint Leg – start	**4.250**	**-1.689**	**-0.206**	**-1.099**	**-0.337**	**0.217**	**0.650**	**4.027**
SE	1.142	1.128	0.308	0.348	0.441	0.278	0.294	0.271
p-value	0.001	0.144	0.509	0.003	0.450	0.442	0.034	0.000
Splint Leg – duration	**0.697**	**-0.700**	**-0.135**	**-0.340**	**0.946**	**0.117**	**0.509**	**2.281**
SE	0.650	1.018	0.283	0.250	0.266	0.226	0.380	0.192
p-value	0.291	0.496	0.638	0.183	0.001	0.609	0.189	0.000
Back Board – start	**4.438**	**-0.017**	**-0.293**	**-0.058**	**0.467**	**0.717**	**1.654**	**2.134**
SE	0.865	1.087	0.536	0.514	0.547	0.224	0.604	0.367
p-value	0.000	0.988	0.588	0.910	0.399	0.003	0.010	0.000
Back Board – duration	**4.283**	**-5.567**	**-0.340**	**-2.410**	**-0.109**	**-0.172**	**-0.330**	**6.661**
SE	1.165	1.465	0.427	0.484	0.419	0.438	0.535	0.506
p-value	0.001	0.001	0.431	0.000	0.796	0.697	0.542	0.000
Airway - intubation – start	**8.904**	**-5.561**	**-0.535**	**-2.558**	**0.569**	**0.432**	**1.389**	**9.057**
SE	1.753	1.755	0.582	0.432	0.696	0.417	0.500	0.493
p-value	0.000	0.003	0.365	0.000	0.420	0.308	0.009	0.000
Airway - intubation – duration	**0.293**	**0.772**	**-0.775**	**-0.363**	**0.911**	**0.446**	**0.437**	**2.296**
SE	0.481	0.706	0.193	0.281	0.229	0.305	0.291	0.250

Appendix H: All Regression Coefficients Continued

Regression Analysis Coefficients, Standard Errors and P-Values For Addressing Research Questions about Cardiac Time from Arrest (Coefficients are in Minutes) : Each Task Row Represents a Separate Regression								
TRAUMA Tasks:	**no engine**	**no engine & 2 ALS on ambulance**	**crew size 3 on engine**	**crew size 4 on engine**	**1 ALS on engine & 0 ALS on Ambulance**	**0 ALS on engine & 1 ALS on Ambulance**	**0 ALS on engine & 2 ALS on Ambulance**	**Constant**
p-value	0.546	0.282	0.000	0.206	0.000	0.153	0.142	0.000
Bag Valve Mask – start	**8.867**	**-5.556**	**-0.797**	**-2.603**	**0.702**	**0.722**	**1.487**	**8.878**
SE	1.830	1.812	0.550	0.439	0.643	0.444	0.519	0.499
p-value	0.000	0.004	0.157	0.000	0.283	0.113	0.007	0.000
Package Patient / move for transport – start	**10.330**	**-5.544**	**-1.525**	**-3.106**	**1.643**	**0.909**	**2.089**	**11.670**
SE	2.542	2.644	0.641	0.589	0.738	0.546	0.692	0.611
p-value	0.000	0.044	0.023	0.000	0.033	0.105	0.005	0.000
Package Patient / move for transport – completion	**11.030**	**-5.039**	**-1.672**	**-3.390**	**1.806**	**0.915**	**2.267**	**12.520**
SE	2.612	2.760	0.657	0.597	0.773	0.565	0.704	0.617
p-value	0.000	0.077	0.016	0.000	0.025	0.115	0.003	0.000

Appendix H: All Regression Coefficients

Regression Analysis Coefficients, Standard Errors and P-Values For Addressing Research Questions about Cardiac Time from Arrest (Coefficients are in Minutes) : Each Task Row Represents a Separate Regression								
CARDIAC Tasks:	**no engine**	**no engine & 2 ALS on ambulance**	**crew size 3 on engine**	**crew size 4 on engine**	**1 ALS on engine & 0 ALS on Ambulance**	**0 ALS on engine & 1 ALS on Ambulance**	**0 ALS on engine & 2 ALS on Ambulance**	**Constant**
ABCs—start	**3.017**	**-0.017**	**-0.057**	**-0.069**	**-0.048**	**-0.030**	**-0.020**	**0.316**
SE	0.047	0.041	0.023	0.021	0.027	0.025	0.026	0.028
p-value	0.000	0.687	0.020	0.002	0.084	0.249	0.446	0.000
ABCs-- duration	**0.012**	**-0.044**	**0.022**	**-0.026**	**-0.015**	**-0.006**	**-0.028**	**0.172**
SE	0.046	0.051	0.029	0.033	0.041	0.033	0.026	0.035
p-value	0.805	0.391	0.445	0.427	0.722	0.869	0.290	0.000
Patient Interview - start	**2.953**	**0.000**	**-0.024**	**-0.024**	**-0.031**	**-0.031**	**-0.031**	**0.047**
SE	0.046	0.000	0.024	0.024	0.031	0.031	0.031	0.046
p-value	0.000	0.358	0.323	0.323	0.323	0.323	0.323	0.311
O2 administration- start	**3.207**	**0.044**	**-0.121**	**-0.169**	**0.065**	**0.185**	**0.039**	**0.815**
SE	0.283	0.452	0.095	0.120	0.132	0.123	0.111	0.094
p-value	0.000	0.922	0.210	0.166	0.625	0.141	0.729	0.000
Check Vitals – start	**2.728**	**-0.050**	**-0.268**	**-0.286**	**-0.120**	**-0.020**	**0.031**	**1.005**
SE	0.133	0.052	0.142	0.151	0.130	0.141	0.157	0.128
p-value	0.000	0.340	0.067	0.067	0.360	0.886	0.843	0.000
Check Vitals – duration	**0.335**	**-0.689**	**0.031**	**-0.208**	**-0.094**	**-0.119**	**-0.230**	**1.948**
SE	0.410	0.399	0.256	0.214	0.229	0.300	0.211	0.218
p-value	0.419	0.094	0.906	0.338	0.683	0.695	0.285	0.000
ALS Vitals 12-Lead - start	**2.789**	**0.678**	**-0.235**	**-0.471**	**0.250**	**2.559**	**2.330**	**1.394**
SE	0.437	0.472	0.233	0.222	0.346	0.240	0.239	0.255
p-value	0.000	0.160	0.321	0.041	0.474	0.000	0.000	0.000
Expose Chest - start	2.772	-0.433	-0.593	-0.985	-0.037	1.628	1.404	2.267
SE	0.583	0.479	0.392	0.397	0.496	0.501	0.490	0.470

Appendix H: All Regression Coefficients Continued

Regression Analysis Coefficients, Standard Errors and P-Values For Addressing Research Questions about Cardiac Time from Arrest (Coefficients are in Minutes) : Each Task Row Represents a Separate Regression

CARDIAC Tasks:	no engine	no engine & 2 ALS on ambulance	crew size 3 on engine	crew size 4 on engine	1 ALS on engine & 0 ALS on Ambulance	0 ALS on engine & 1 ALS on Ambulance	0 ALS on engine & 2 ALS on Ambulance	Constant
Airway Intubation-- Duration	**1.768**	**1.106**	**-0.696**	**-1.083**	**-1.889**	**0.619**	**0.298**	**4.199**
SE	0.958	1.398	0.563	0.570	0.783	0.761	0.809	0.893
p-value	0.074	0.434	0.225	0.066	0.021	0.422	0.715	0.000
IV Access – start	**0.382**	**-0.578**	**-0.194**	**-0.243**	**0.080**	**0.282**	**-0.361**	**1.785**
SE	0.462	0.410	0.270	0.261	0.253	0.351	0.222	0.260
p-value	0.414	0.168	0.476	0.358	0.755	0.428	0.113	0.000
IV Access – duration	**0.394**	**-0.261**	**0.028**	**0.000**	**0.083**	**0.044**	**0.044**	**0.072**
SE	0.259	0.272	0.023	0.022	0.032	0.021	0.024	0.021
p-value	0.138	0.343	0.229	1.000	0.015	0.040	0.077	0.002
Position Patient – start (difference from Arrest time)	**0.104**	**-0.383**	**-0.079**	**-0.131**	**-0.050**	**-0.050**	**0.033**	**0.307**
SE	0.364	0.336	0.093	0.093	0.113	0.108	0.122	0.141
p-value	0.776	0.261	0.402	0.170	0.660	0.645	0.786	0.036
ABCs – Start (difference from arrest time)	**0.345**	**-0.378**	**-0.086**	**-0.156**	**0.085**	**0.080**	**0.056**	**0.555**
SE	0.247	0.265	0.120	0.118	0.093	0.130	0.119	0.117
p-value	0.171	0.163	0.477	0.195	0.364	0.544	0.642	0.000
Defib pads – Start (difference from arrest time)	**0.242**	**-0.194**	**-0.133**	**-0.179**	**0.067**	**0.144**	**0.069**	**0.991**
SE	0.283	0.269	0.157	0.149	0.142	0.189	0.157	0.174
p-value	0.399	0.475	0.402	0.238	0.641	0.449	0.666	0.000
Analyze / Shock #1 – Start (difference from arrest time)	**0.089**	**-0.189**	**-0.178**	**-0.239**	**-0.028**	**0.070**	**-0.026**	**1.522**
SE	0.331	0.239	0.187	0.182	0.188	0.226	0.214	0.256
p-value	0.790	0.434	0.349	0.198	0.883	0.757	0.904	0.000
ABCs – Start – After Shock #1	**0.477**	**-0.356**	**-0.015**	**-0.021**	**0.148**	**-0.059**	**-0.026**	**0.779**
SE	0.459	0.460	0.196	0.187	0.191	0.182	0.234	0.186
p-value	0.306	0.445	0.938	0.912	0.444	0.746	0.912	0.000
CPR – CPR—Start (difference from arrest time)	**1.545**	**0.183**	**-0.207**	**-0.247**	**0.880**	**1.239**	**-0.128**	**1.244**

Appendix H: All Regression Coefficients Continued

Regression Analysis Coefficients, Standard Errors and P-Values For Addressing Research Questions about Cardiac Time from Arrest (Coefficients are in Minutes) : Each Task Row Represents a Separate Regression								
CARDIAC Tasks:	**no engine**	**no engine & 2 ALS on ambulance**	**crew size 3 on engine**	**crew size 4 on engine**	**1 ALS on engine & 0 ALS on Ambulance**	**0 ALS on engine & 1 ALS on Ambulance**	**0 ALS on engine & 2 ALS on Ambulance**	**Constant**
SE	0.588	1.163	0.321	0.256	0.313	0.374	0.254	0.236
p-value	0.013	0.876	0.524	0.340	0.008	0.002	0.618	0.000
Airway Intubation- Start and duration – (difference from arrest time)	**-0.244**	**-0.078**	**-0.172**	**-0.594**	**-0.522**	**-0.604**	**0.037**	**2.800**
SE	0.417	0.453	0.319	0.301	0.322	0.286	0.315	0.260
p-value	0.562	0.865	0.593	0.057	0.114	0.043	0.907	0.000
Meds (Epi)- Start (difference from arrest time)	**0.632**	**-0.542**	**-0.228**	**-0.508**	**-0.504**	**-0.394**	**-1.022**	**2.751**
SE	0.957	1.262	0.339	0.303	0.365	0.390	0.408	0.430
p-value	0.513	0.671	0.506	0.103	0.177	0.318	0.017	0.000
Analyze / Shock #2 -- Start time	**-0.070**	**-0.300**	**-0.442**	**-0.479**	**-0.009**	**-0.137**	**-0.133**	**4.003**
SE	0.394	0.237	0.216	0.208	0.245	0.255	0.250	0.315
p-value	0.860	0.214	0.049	0.027	0.970	0.594	0.597	0.000
Medis (Lidocaine) - Start (difference from arrest time)	**2.054**	**-2.278**	**-0.440**	**-0.721**	**0.293**	**0.424**	**-0.596**	**4.763**
SE	0.424	0.404	0.287	0.297	0.296	0.359	0.350	0.258
p-value	0.000	0.000	0.135	0.021	0.329	0.246	0.097	0.000
Package Patient/Equip- Start	**1.444**	**0.328**	**-0.733**	**-1.013**	**-0.606**	**0.000**	**-0.991**	**5.795**
SE	0.673	1.375	0.538	0.450	0.554	0.530	0.583	0.480
p-value	0.039	0.813	0.182	0.031	0.282	1.000	0.098	0.000
Package Patient/Equip- Completion	**2.173**	**-0.072**	**-0.843**	**-1.394**	**-0.433**	**-0.054**	**-0.867**	**7.327**
SE	0.610	1.248	0.393	0.340	0.365	0.458	0.418	0.402
p-value	0.001	0.954	0.039	0.000	0.244	0.907	0.046	0.000

NOTES:

STAFF REPORT

TOWN OF SAN ANSELMO Item #: 2.3

MEETING DATE: October 24, 2023

AGENDA TITLE: Resolution Adopting Required Findings Pursuant to Government Code Section 4217 Approving Sole Source Energy Services Contract with EcoGreen Solutions LLC for Energy Efficient Lighting Improvements for Town Owned Facilities and Authorizing Town Manager to Execute Associated PG&E On-Bill Loan Financing

FROM: Sean Youra, Climate Action Coordinator
Sean Condry, Public Works and Building Director

RECOMMENDATION:

Conduct Public Hearing and adopt the proposed Resolution (Attachment 2).

BACKGROUND

Town staff have continuously sought to implement energy efficiency and electrification projects in Town-owned facilities to help reduce operating costs and greenhouse gas emissions. The Public Works Director has been trying to upgrade the lighting in Town-owned facilities to LEDs for several years, but there has been insufficient funding to move forward with this project.

In May 2023, EcoGreen Solutions LLC, conducted an energy efficiency survey of Town-owned facilities at no cost to the Town. EcoGreen identified several Town facility lighting improvements that would save energy and money for the Town. EcoGreen is an energy services company that specializes in energy efficiency upgrades and is an authorized agent for utility programs such as PG&E's Energy Efficiency Retrofit Loan Program. After the survey of the facilities was completed, EcoGreen finalized a scope of work for each facility to receive PG&E approval and funding in the form of no-interest loans for the project.

The California legislature has encouraged energy efficient improvements for public facilities by allowing flexible contracting and associated financing for certain energy-

related projects without the need to follow formal procurement rules if the required findings are made.

Government Code sections 4217.10 – 4217.18 authorize the Town Council to enter into an energy services contract and financing if it finds that: 1) the energy efficient improvements are in the best interest to the Town; 2) and that the costs of the project will be less than the anticipated marginal cost to the Town of the energy that would have been consumed in absence of the improvement (i.e., the energy cost savings exceed the project costs). These findings must be made at a public hearing with two weeks' notice (Attachment 1). This process saves costs and time for the Town because it eliminates the need to separately contract for the design and construction phases of a qualifying project. The Town may instead enter into a "sole-source" contract without formal bidding.

As explained below, staff suggests that the required findings can be made because the Town facility lighting improvements are in the best interests of the Town, and the energy cost savings will exceed project costs.

DISCUSSION/ANALYSIS

The project includes the removal and replacement of various lighting components at Town Hall, the Historical Museum, Library, Corporation Yard, Memorial Park, and Isabel Cook Community Center to upgrade them to higher efficiency LEDs.

As required under Government Code section 4217, the energy cost savings will exceed the project costs and the improvements are in the best interests of the Town. The total project cost is $147,331.28 and would be paid off over 120 monthly PG&E bill payments at a fixed payment amount of $1,207.43 per month. The estimated monthly energy cost savings resulting from the lighting upgrades is $1,219.62. Therefore, the estimated monthly cost savings would more than offset the monthly repayment of the loan, and the estimated cost savings to the Town over the life of the loan is estimated at $192,906.68. The simple payback is estimated at 9.9 years for this project.

This work will be funded through On-Bill Financing (OBF) provided by PG&E. This program provides the opportunity for public agencies to pay back a no-interest loan based on projected energy savings, via installments on their monthly PG&E bill. The payments of this loan will be a flat monthly rate, irrespective of seasonal energy use/savings variations. After the loan is repaid, any energy savings that result from the new energy efficiency equipment will translate into lower utility costs. To attempt to meet bill neutrality, actual savings from the project are used to calculate the loan by PG&E.

FISCAL IMPACT

The monthly cost of the loan (i.e., $1,207.43) will be added to the Town's PG&E electric bill but should be offset by expected energy savings from the lighting upgrades. There is no upfront cost to the Town to enroll in the program and complete the project.

GENERAL PLAN CONSISTENCY

The proposed Resolution is consistent with the Town's General Plan including Conservation Element Policy Guideline 13 to "take measures to reduce existing and future inefficient or unnecessary energy or natural resources consumption."

CEQA AND CLIMATE ACTION PLAN CONSISTENCY

The project and associated on-bill financing are exempt from the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines section 15061 "common sense exemption" because it can be seen with certainty that they will not cause a significant effect on the environment; CEQA Guidelines section 15301 "Existing Facilities", because the project consists of the minor alteration to existing lighting in Town owned facilities.

The project is consistent with the following measures in the Town's Climate Action Plan including:

- **E-7: Municipal Energy Efficiency Audit and Retrofits:** Work with the Marin Energy Management Team to identify and implement energy efficiency projects in municipal buildings and facilities and electrification of existing building systems and equipment that use natural gas.

CONCLUSION

Staff respectfully requests the Council's adoption of the proposed Resolution.

ATTACHMENTS

Attachment 1 – Copy of Public Notice
Attachment 2 – Proposed Resolution

Marin Independent Journal
4000 Civic Center Drive, Suite 301
San Rafael, CA 94903
415-382-7335
legals@marinij.com

2072661

TOWN OF SAN ANSELMO
525 SAN ANSELMO AVE
SAN ANSELMO, CA 94960-2613

Legal No. **0006783588**

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Marin

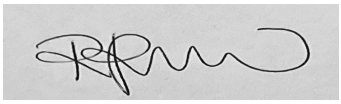
FILE NO. Approval of Resolution #4519

I am a citizen of the United States and a resident of the County aforesaid: I am over the age of eighteen years, and not a party to or interested in the above matter. I am the principal clerk of the printer of the MARIN INDEPENDENT JOURNAL, a newspaper of general circulation, printed and published daily in the County of Marin, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Marin, State of California, under date of FEBRUARY 7, 1955, CASE NUMBER 25566; that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

10/06/2023

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Dated this 9th day of October, 2023.



Signature

NOTICE IS HEREBY GIVEN that the Town Council of the Town of San Anselmo will conduct a public hearing on October, 24, 2023 for the purpose of considering a Resolution adopting the required findings pursuant to Government Code section 4217 approving a sole-source energy services contract with EcoGreen Solutions LLC for the design and installation of energy efficient lighting improvements for certain Town owned facilities, and authorizing the Town Manager to execute associated PG&E on-bill loan financing.

Copies of the proposed Resolution and associated staff report are available for review at San Anselmo Town Hall, 525 San Anselmo Avenue, San Anselmo California or online at: www.townofsananselmo.org .

All persons wishing to make public comment may appear and be heard before the Town Council at 7:00 p.m., or as soon thereafter, on October 24, 2023 at Town Hall, 525 San Anselmo Avenue, San Anselmo California and via remote teleconferencing (Zoom), which link may be found in the Town Council agenda at www.townofsananselmo.org . Public comment may also be submitted by email at: syoura@townofsananselmo.org or by mail to Town of San Anselmo, 525 San Anselmo Avenue, San Anselmo, California 95960.
0006783588 October 6, 2023

PROOF OF PUBLICATION

RESOLUTION NO. XXXX

RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF SAN ANSELMO ADOPTING REQUIRED FINDINGS PURSUANT TO GOVERNMENT CODE SECTION 4217 APPROVING SOLE SOURCE ENERGY SERVICES CONTRACT WITH ECOGREEN SOLUTIONS LCC FOR ENERGY EFFICIENT LIGHTING IMPROVEMENTS FOR TOWN OWNED FACILITIES AND AUTHORIZING ASSOCIATED PG&E ON-BILL LOAN FINANCING

WHEREAS, Town staff have continuously pursued energy efficiency projects for Town-owned facilities to reduce operating costs and greenhouse gas emissions; and

WHEREAS, Government Code section 4217 *et seq.* authorizes the Town to forgo the standard procurement process for qualifying energy services contracts and associated financing if the Town Council makes findings that it is in the best interest of the Town, and that the anticipated cost to the Town will be less than the anticipated marginal costs that are directly related to the project that would have been consumed by the Town in absence of implementation of the improvements; and

WHEREAS, EcoGreen Solutions LLC ("EcoGreen") is an energy services company that specializes in energy efficiency upgrades and is an authorized agent for utility programs such as Pacific Gas and Electric's ("PG&E") Energy Efficiency Retrofit Loan Program; and

WHEREAS, in May 2023 at no cost to the Town, the Town received an energy efficiency survey of Town-owned facilities by EcoGreen identifying several Town facility lighting improvements and upgrades that would improve energy efficiency and result in cost savings; and

WHEREAS, the Town wishes to contract with EcoGreen as a "sole-source" vendor pursuant to Government Code section 4217 *et seq.* to undertake the recommended improvements as set forth in the "Statement of Work" attached hereto and incorporated herein as Exhibit "A" (the "Project"); and

WHEREAS, PG&E provides no-interest loans for the purpose of lighting upgrades to reduce energy usage for public agencies through their Energy Efficiency Retrofit Loan Program; and

WHEREAS, the Town wishes to utilize said on-bill financing at 0% interest for up to 10 years through PG&E for all eligible costs for the Project anticipated to be $147,331.28 as set forth in the On-Bill Loan Financing Agreement attached hereto and incorporated herein as Exhibit "B" ("Financing"); and

WHEREAS, the Town desires to use Government Code 4217 *et seq.* as a basis to for the Project and its Financing; and

WHEREAS, on October 24, 2023, the Town Council held a public hearing at a regularly scheduled Council meeting noticed at least two weeks in advance for the

purposes of considering the Project and Financing pursuant to Government Code section 4217 *et seq.*; and

WHEREAS, the findings of Government Code section 4217 *et seq.* are satisfied because the Project and Financing are in the best interests of the Town, and the costs of the Project will be less than the anticipated marginal cost to the Town of the energy that would have been consumed in absence of the Project as the estimated cost savings from the Project is $1,219.62 per month, and the monthly fixed payment is 1,207.43 to be paid over 120 monthly PG&E bill payments resulting in a total cost savings of approximately $192,906.68 over the life of the loan; and

WHEREAS, the Project is consistent with the Town's Climate Action Plan, Measure E-7, related to Municipal Energy Efficiency Audits and Retrofits, which provides that the Town will "identify and implement energy efficiency projects in municipal buildings and facilities;" and

WHEREAS, the Project and Financing are exempt from the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines section 15061 "common sense exemption" because it can be seen with certainty that they will not cause a significant effect on the environment; CEQA Guidelines section 15301 "Existing Facilities", because the Project consists of the minor alteration to existing lighting in Town owned facilities; and

NOW, THEREFORE BE IT RESOLVED that the Town Council of the Town of San Anselmo does hereby**:**

1. Find that the recitals stated above are true and correct and incorporated herein by reference.
2. Find that the Project and Financing are in the best interests of the Town because the Town facility lighting improvements will result in a reduction of greenhouse gas emissions and operating costs.
3. Find that the anticipated costs of the Project are less than the anticipated marginal cost to the Town of the energy that would have been consumed in absence of the Project because the estimated energy cost savings from the Project is $1,219.62 per month, and the monthly fixed payment is $1,207.43 to be paid over 120 monthly PG&E bill payments, with a total estimated cost savings of $192,906.68 over the life of the loan.
4. Authorize the Town Manager to execute the On-Bill Financing Loan Agreement and any other necessary documents for the Project.
5. Authorize the Town Manager to execute a "sole source" agreement with EcoGreen to implement the Project; and
6. The Project and Financing are exempt from the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines section 15061 "common sense exemption" because it can be seen with certainty that they will not cause a significant effect on the environment; CEQA Guidelines section 15301 "Existing Facilities", because the Project consists of the minor alteration to existing lighting in Town owned facilities.

RESOLUTION PASSED AND ADOPTED, at the regular meeting of the San Anselmo Town Council on the 24th day of October, 2023, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Steve Burdo, Mayor

ATTEST:

_____
Serge Avila, Town Clerk

EXHIBITS

A. Statement of Work
B. On-Bill Loan Financing Agreement

EXHIBIT A: STATEMENT OF WORK

Statement of Work

1. SCOPE OF WORK: EcoGreen Solutions shall furnish all the materials and perform all of the work shown and/or described in the Energy Audit and Quote. EcoGreen Solutions is not responsible for touch up work i.e. – paint where replacement fixtures don't exactly match existing fixtures, ceiling tiles, etc...

a. VFD/VSD installation: If the project includes a VFD/VSD, standard installation costs include – VFD, startup, card, programming, installation of any conduit, running power, concrete footing (if needed), VFD mounting and interconnect to SCADA panel. Installation costs that are not included and would be an additional cost – wiring diagrams, fencing, gates, enclosures, relay box, controls.

2. PROJECT COST: The amount due for material and labor to be performed is $147,331.28, subject to additions and deductions pursuant to authorized change orders/adjustment letters.

3. PAYMENT & UTILITY FINANCING: EcoGreen Solutions has worked with Customer to secure Utility financing on behalf of the Customer to fund payment of this project, of which, terms and payback periods are detailed in the Utility On-Bill Financing (OBF) documentation – PGE Project #/TIF # 14437.

Payment of the project shall be paid in the manner following:

Project Cost	$147,331.28
Estimated Tax Benefit	$0
Estimated Utility OBF	$147,331.28
SUBTOTAL	$0
Estimated Customer Out of Pocket Contribution	$0

a. Customer understands that final utility rebate and OBF amounts issued may vary based on final installation counts and subject to additions and deductions pursuant to authorized change orders/adjustment letters.

b. Customer understands that should utility determine that OBF loan proceeds shall not be issued due to customer's credit standing or has otherwise placed customer's repayment of the loan at risk, Customer shall be liable for payment of any product, labor, and installation due. This includes any product demos that aren't returned to EcoGreen Solutions.

c. Notice to Proceed: Once Utility On-Bill Financing is approved, if required, EcoGreen Solutions will provide LED demo fixture/lamps to assure proper light levels, color and aesthetics. Written confirmation from the Customer that demos are approved and approval to move forward with the ordering of product and installation will serve as formal Notice To Proceed.

4. GENERAL TERMS AND CONDITIONS

a. All work shall be completed in a workmanlike manner and in compliance with all building codes and other applicable laws.

b. To the extent required by law all work shall be performed by individuals duly licensed and authorized by law to perform the work.

c. EcoGreen Solutions may at its discretion engage subcontractors to perform work hereunder, provided EcoGreen Solutions shall fully pay said subcontractor and in all instances remain responsible for the proper completion of the project.

d. EcoGreen Solutions warrants it is adequately insured for injury to its employees and others incurring loss or injury as a result of the acts of EcoGreen Solutions or its employees and subcontractors.

e. Customer shall at its own expense obtain all permits necessary for the work to be performed.

f. EcoGreen Solutions agrees to remove all debris and leave the premises in clean condition unless instructed by Customer to do otherwise.

g. EcoGreen Solutions shall dispose of all hazardous lamps and tubes utilizing a proper recycling program unless instructed by Customer to do otherwise.

h. EcoGreen Solutions shall not be liable for any delay due to circumstances beyond its control including strikes, casualty or general unavailability of materials.

i. Customer is responsible for verification of fixture counts and hours of operation reflected in the Energy Audit.

5. HAZARDOUS CONDITIONS: In the event that EcoGreen Solutions discovers existing or developing spore or mold growth, asbestos or other potentially hazardous conditions at the Project location, EcoGreen Solutions will stop work and will not attempt to test, repair or remediate such conditions. At Customer's sole expense, Customer must arrange to have the hazardous condition removed by a third party in compliance with applicable laws within a reasonable period of time, or EcoGreen Solutions may cancel this project. If the project is canceled, Customer agrees to pay EcoGreen Solutions the costs of materials, labor and services provided through the date of cancellation.

6. WARRANTIES:

a. MANUFACTURER WARRANTIES. Products installed as part of the scope of work are covered by separate manufacturers' warranties (hereinafter, "Manufacturer Warranties"). EcoGreen Solutions will assign to Customer any Manufacturer Warranties in effect upon installation. EcoGreen Solutions will also provide Customer reasonable assistance in contacting manufacturers. If manufacturer files for bankruptcy or goes out of business, EcoGreen Solutions is not liable or responsible for continued warranty support.

b. LIMITED WARRANTY. EcoGreen Solutions provides a limited warranty of 90 days (the "Limited Warranty Period"), after the date of invoice. For the avoidance of doubt, this Limited Warranty does not cover parts already covered by the Manufacturer Warranties set forth in above. During the Limited Warranty Period, EcoGreen Solutions will at its expense repair or replace any parts or labor covered by the Limited Warranty.

c. OBTAIN WARRANTY SERVICE. To obtain warranty service, you must notify EcoGreen Solutions in writing or via email at repairs@ecogreen-solutions.net of any defect. Provided that the Warranty has not expired, has otherwise voided, or is subject to an exclusion, EcoGreen Solutions will repair or replace the defect within a reasonable time after you notify EcoGreen Solutions.

If a fixture fails, please take a photo and send it to repairs@ecogreen-solutions.net, and include location information in your email. The photo should be close up so we can properly match the product with the replacement. We will order replacement products and schedule the installation. If a product is in stock, EcoGreen Solutions will ship the replacement immediately. If the product is not in stock EcoGreen Solutions will order the replacement parts from the factory. Please be aware that some of our suppliers require 6-8 weeks lead time. EcoGreen Solutions does not cover shipping and handling for fixtures.

If a fixture has failed and is past our 3 months parts and labor period, EcoGreen Solutions will work with the factory to get the replacement material for you. We do not cover the cost of shipping and handling from the factory to our warehouse or to your location. If you do not have a qualified electrician to install the replacement product, please contact us at the email address above. A quote for the labor to install the product will be provided in 1-2 business days.

If a lamp fails, please follow the same procedure as for fixtures. EcoGreen Solutions will send Customer the replacement lamp. Labor is not covered for lamps. Shipping and handling also is not covered on warranty claims for lamps.

Warranty claims will not apply for:

- Product that has been modified by the customer.
- Product that was subject to misuse, vandalism or negligence.

IMPORTANT EcoGreen Solutions must receive the fixture/lamp/driver back once your product has been replaced. We can receive credit for the replacement product only if the factory receives the failed unit back. Failure to return the failed product to EcoGreen Solutions within 30 days will result in an invoice for the full retail price of the product.

If the failed product has been discontinued by the manufacturer and is no longer supported by a factory, EcoGreen Solutions will suggest a similar replacement LED fixture or lamp. EcoGreen Solutions cannot be held responsible for product lines that have been discontinued; however, we will make every effort to find a similarly performing product.

7. MAINTENANCE AND REPAIR: If the products require maintenance or repair that is not covered by the warranties set forth above, EcoGreen Solutions will not perform this work unless you enter into a separate agreement to perform these services at your expense.

EcoGreen Solutions

27671 La Paz Rd, Suite 100
Laguna Niguel, CA. 92677
info@ecogreen-solutions.net
(949) 364 - 6800

Quote

Quote # 200676
DATE 5/12/2023

Town of San Anselmo
Town Hall and Library
525 San Anselmo Ave
San Anselmo, CA 94960
Acct: 3658011546; SAID: 3657715227

Quotes are valid for 30 days from the above date.

Light EPN	INT/ EXT	DESCRIPTION		QTY*	Unit Price	Amount
EGTU-TC10-4ft-4000-T8-B	Int	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	98	$11.97	$1,173.06
EGWP-HL15-CCT-UNV-PH	ext	LED Wallpack, CCT, UNV, PH	15.52 w	11	$115.00	$1,265.00
EGCL-ML13-6"-CS-UNV-REC	Int	LED 6" Can Downlight,3000K, 3500K, 4000K, REC	13 w	2	$105.00	$210.00
EGAL-NL30Q-5000-UNV-SF-PH	ext	LED Area Light, 5000K, UNV, PH w/ Slip Fitter	30 w	8	$197.00	$1,576.00
EGTU-TC10-4ft-4000-T8-B	Int	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	24	$11.97	$287.28
EGLB-EN14-11"-CS-UNV-RND	Int	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	5	$89.00	$445.00
EGWP-HL15-CCT-UNV-PH	ext	LED Wallpack, CCT, UNV, PH	15.52 w	1	$115.00	$115.00
EGLN-TC20-4ft-4000-UNV-SMT-VT	Int	LED 4' Linear Vapor Tight Fixture, 4000K, UNV, SMT	23 w	2	$135.00	$270.00
EGFL-HL30-CS-UNV-KM	ext	LED Flood Light, 3K, 4K, 5K, UNV, Knuckle Mount	30 w	1	$105.00	$105.00
EGTU-TC10-4ft-4000-T8-B	Int	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	101	$11.97	$1,208.97
EGTU-TC10-4ft-4000-T8-B	Interior	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	192	$11.97	$2,298.24
EGLB-EN14-11"-CS-UNV-RND	Int	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14	1	$89.00	$89.00
EGLB-EN14-11"-CS-UNV-RND	Interior	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14	2	$89.00	$178.00
EG24-SF21-4000-UNV-REC	Interior	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	11	$149.00	$1,639.00
EGLN-ML33.16-4ft-CS-UNV-SMT-WRP	Interior	LED 4' Linear Wrap Fixture, 35K, 4K, 5K, UNV	33.2 w	5	$179.00	$895.00
EGFL-HL12-CS-UNV-KM	ext	LED Flood Light, 3K, 4K, 5K, UNV, Knuckle Mount	12 w	10	$97.00	$970.00
EGHB-TC85.92-5000-UNV	Int	LED Round Highbay, 5000K, UNV	80.1 w	10	$159.00	$1,590.00
EG22-ML18-4000-UNV-REC	Interior	LED Troffer 2x2,Retrofit Kit 4000K, UNV, REC	18 w	1	$135.00	$135.00
EGLN-TC65-8ft-4000-UNV-SMT-D	Interior	LED 8' Linear Fixture, 4000K, UNV, SMT	65 w	35	$159.00	$5,565.00
EGTU-TC10-4ft-4000-T8-B	Int	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	164	$11.97	$1,963.08
EG22-MLWS-CS-UNV-VT	Int	LED Troffer 2x2, 35K, 4K, 5K, SMT Kit	20	8	$269.00	$2,152.00
EG24-MLWS-CS-UNV-VT	Int	LED Troffer 2x4. 35K, 4K, 5K. w/ SMT Kit	30 w	54	$315.00	$17,010.00
EGLN-TC18-4ft-4000-UNV-SMT	Int	LED 4' Linear Fixture, 4000K, UNV, SMT	18 w	3	$115.00	$345.00
EGCL-ML13-8"-CS-UNV-REC	Int	LED 8" Can Downlight,3000K, 3500K, 4000K, REC	13 w	8	$120.00	$960.00
EGLA-TCA2116-5000-D-E26	ext	LED A21, 5000K	16 w	3	$18.50	$55.50
EGAL-RL70-5000-UNV-PH-SF	ext	LED Area Light, 5000K, UNV, PH w/ Slip Fitter	70 w	1	$335.00	$335.00
EGWP-AL40-5000-UNV-PH	ext	LED Wallpack, 5000K, UNV, PH	40 w	3	$215.00	$645.00
EGFL-HL30-CS-UNV-YM	ext	LED Flood Light, 3K, 4K, 5K, UNV, Yoke Mount	30 w	3	$105.00	$315.00
EGLB-EN14-11"-CS-UNV-RND	Int	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	1	$89.00	$89.00
EGLB-EN14-11"-CS-UNV-RND	Int	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	3	$89.00	$267.00
EGLA-EKMR167-4000-GU5.3	Int	LED MR16, 4000K, GU5.3	7 w	10	$16.89	$168.90
EGWP-HL15-CCT-UNV-PH	ext	LED Wallpack, CCT, UNV, PH	15.52 w	1	$115.00	$115.00
EG14-TL30-CS-UNV-REC-D	Int	LED Troffer 1x4, Color Selectable, UNV, REC	30 w	4	$225.00	$900.00
EG14-SI16-4000-UNV-REC-D	Int	LED Troffer 1x4, 4000K, UNV, REC	16 w	2	$159.00	$318.00
EG24-SF21-4000-UNV-REC	Int	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	12	$149.00	$1,788.00
EGPL-GC10.5-3000-UNV-H	Int	LED Horizontal PL Replacement, 3000K, UNV	10 w	18	$23.00	$414.00
EGLN-CP56-8FT-4000-UNV-SUS	Int	LED 8' Direct/ Indirect Linear, 4000K, UNV, SUS	61.4 w	4	$2,299.94	$9,199.76
EGLN-ML23.86-4ft-CS-UNV-SMT-WRP	Int	LED 4' Linear Wrap Fixture, 35K, 4K, 5K, UNV	23.9 w	3	$179.00	$537.00

TERMS AND CONDITIONS

WHEN SIGNED OR APPROVED BY CLIENT, THIS FORM BECOMES AN OFFICIAL ORDER AND A LEGALLY BINDING COMMITMENT SUBJECT TO THE TERMS AND CONDITIONS OF THIS FORM. BY ACCEPTING THIS PROJECT AND MOVING FORWARD, CUSTOMER AGREES TO HAVE ECOGREEN SOLUTIONS PURCHASE AND INSTALL THE PRODUCTS LISTED ABOVE. All returned checks are subject to a $20 service charge. If customer is utilizing a utility program where they default or get disqualified post install and the pre approved utility funding is canceled, the customer is liable for the project amount in full and the terms and conditions above will need to be met. Subject to collections and or litigation. If this invoice is not paid in full when due, a 1.5% per month late charge will be imposed. In this event, customer will be liable to pay reasonable collection charge, attorney fee and court cost. Warranty to be serviced by factory (see EcoGreen Scope of Work and warranty statement provided by the factory).

SIGNATURE: **DATE:**

* All quantities to be verified by owner	SUBTOTAL $57,591.79
	LABOR $64,825.83
	SALES TAX Included
	ADMINISTRATION & INSURANCE $2,015.71
(Brackets, Wiring, Sockets, Travel, Tiewire, Screws, Lifts, Lamp Recycling / Disposal, Shipping, Package, ETC.)	MISC. CHARGES $14,397.95
	ICP Developer/Engineering Cost $8,500.00
	TOTAL PROJECT COST **$147,331.28**
	Estimated IRS Federal Tax Deduction per 179D: $22,683.00
	Estimated Annual Energy Savings: $14,635.44

ENERGY AUDIT

Town of San Anselmo

Town Hall and Library
525 San Anselmo Ave
San Anselmo, CA 94960
Acct: 3658011546; SAID: 3657715227

EcoGreen Sales Rep: Matt

Customer Contact: Sean Condry
Title of Contact: Public Works Director
Customer Phone: (415) 258-4676
Customer Email: scondry@townofsananselmo.org

Approx. Building Size 37,805 SF
Energy Rate $ 0.29 /kWh
Interest Rate 0%

EcoGreen Solutions

In Reference to Quote # 200676

EXISTING				Location		Suggested Replacements								Savings
Existing	Watts/ Fix	# of Fixtures	Existing Operating Hours-Day / Yr.	Building/Zone	Room/Area	Suggested Replacement	Watts/Fix	# of Fixtures	# of Lamps	Watts/bulbs Saved	Usage Saved	KWh Saved	Annual Savings
1x4 box w 2 t12	74 w	3	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	3	6	159 w	71.6%	326.18	$95.69
1x4 box w 2 t12	74 w	4	7.9 5 / 2051	San Anselmo/town hall	2nd floor/hallway to finance	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	434.90	$127.58
1x4 box w 2 t12	74 w	4	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	434.90	$127.58
1x4 box w 2 t12	74 w	6	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 5	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	318 w	71.6%	652.35	$191.37
1x4 box w 2 t12	74 w	4	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 6	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	434.90	$127.58
1x4 box w 2 t12	74 w	6	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 7	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	318 w	71.6%	652.35	$191.37
1x4 box w 2 t12	74 w	2	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 8	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	217.45	$63.79
1x4 box w 2 t12	74 w	2	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/breakroom	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	217.45	$63.79
1x4 box w 2 t12	74 w	6	7.9 5 / 2051	San Anselmo/town hall	2nd floor/finance/office 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	318 w	71.6%	652.35	$191.37
1x4 box w 2 t12	74 w	2	3.9 5 / 1026	San Anselmo/town hall	2nd floor/finance/file wall	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	108.73	$31.90
1x4 box w 2 t12	74 w	4	7.9 5 / 2051	San Anselmo/town hall	2nd floor/finance/office 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	434.90	$127.58
1x4 box w 2 t8	59 w	3	7.9 5 / 2051	San Anselmo/town hall	2nd floor/finance/near stairwell	LED 4' Linear Wrap Fixture, 35K, 4K, 5K, UNV	23.9 w	3	3	105 w	59.5%	215.02	$63.12
4ft linear wrap w 2 t8	59 w	1	7.9 5 / 2051	San Anselmo/library	library/basement/back stairs to library	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	77.95	$22.87
1x4 w 2 t8	59 w	2	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/admin area	LED Troffer 1x4, 4000K, UNV, REC	16 w	2	2	86 w	72.9%	176.42	$51.76
1x4 w 2t8	59 w	8	4.9 5 / 1282	San Anselmo/historical museum	museum main lobby	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	8	16	304 w	64.4%	389.77	$114.34
1x4 w 2t8	59 w	3	4.9 5 / 1282	San Anselmo/historical museum	museum main lobby	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	3	6	114 w	64.4%	146.16	$42.88
1x4 w 2t8	59 w	3	4.9 5 / 1282	San Anselmo/historical museum	museum friends library	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	3	6	114 w	64.4%	146.16	$42.88
2x2 box w 2 utbes	59 w	8	7.9 5 / 2051	San Anselmo/town hall	2nd floor/lobby	LED Troffer 2x2, 35K, 4K, 5K, SMT Kit	26 w	8	8	312 w	66.1%	640.05	$187.76
2x4 box w 2 t8	64 w	6	3 5 / 769	San Anselmo/town hall	2nd floor/hallway to finance/conference room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	258 w	67.2%	198.48	$58.22
2x4 box w 4 t8	112 w	4	7.9 5 / 2051	San Anselmo/library	library/basement/work room	LED Troffer 2x4, 35K, 4K, 5K, w/ SMT Kit	30 w	4	4	328 w	73.2%	672.87	$197.39
2x4 w 2 t8	59 w	1	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 3	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	1	1	38 w	64.4%	77.95	$22.87
2x4 w 2 t8	59 w	2	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/office 4	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	2	2	76 w	64.4%	155.91	$45.74
2x4 w 2 t8	59 w	9	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/admin area	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	9	9	342 w	64.4%	701.59	$205.82
2x4 w 2 t8	59 w	5	7.9 5 / 2051	San Anselmo/town hall	2nd floor/finance	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	5	10	190 w	64.4%	389.77	$114.34
2x4 w 2 t8	59 w	2	7.9 5 / 2051	San Anselmo/town hall	2nd floor/finance/office 3	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	155.91	$45.74
2x4 w 2 t8	59 w	1	5.9 5 / 1539	San Anselmo/town hall	2nd floor/finance/office 4	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	58.47	$17.15
1x4 box w 2 t8	59 w	4	7.9 5 / 2051	San Anselmo/town hall	2nd floor/lobby	LED Troffer 1x4, Color Selectable, UNV, REC	30 w	4	4	116 w	49.2%	237.97	$69.81
4ft linear wrap w4 t8	112 w	1	2 4 / 410	San Anselmo/town hall	2nd floor/lobby/supply	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	42 w	1	4	70 w	62.5%	28.72	$8.43
4ft lin cage w 2 t8	59 w	1	2 3 / 308	San Anselmo/town hall	2nd floor/finance/elevator room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	11.69	$3.43
4ft lin cage w 2 t8	59 w	1	2 3 / 308	San Anselmo/historical museum	museum elevator room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	11.69	$3.43
4ft lin strip w 2 t12	74 w	2	2 4 / 410	San Anselmo/town hall	2nd floor/lobby/server rm	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	43.49	$12.76
4ft lin strip w 2 t8	59 w	3	7.9 5 / 2051	San Anselmo/library	library/basement/work room	LED 4' Linear Fixture, 4000K, UNV, SMT	18 w	3	3	123 w	69.5%	252.33	$74.02
4ft lin wrap w 2 t8	59 w	1	7.9 5 / 2051	San Anselmo/town hall	2nd floor/public works/copy room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	77.95	$22.87
4ft lin wrap w 2 t8	59 w	1	4.9 5 / 1282	San Anselmo/town hall	2nd floor/public works/mens room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	48.72	$14.29
4ft lin wrap w 2 t8	59 w	2	4.9 5 / 1282	San Anselmo/town hall	2nd floor/public works/womens room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	97.44	$28.58
2x4 box w 4 t8	112 w	20	8.9 6 / 2769	San Anselmo library	library main entrance	LED Troffer 2x4, 35K, 4K, 5K, w/ SMT Kit	30 w	20	20	1,640 w	73.2%	4,541.86	$1,332.40
2x4 box w 4 t8	112 w	6	8.9 6 / 2769	San Anselmo library	library/Aid section	LED Troffer 2x4, 35K, 4K, 5K, w/ SMT Kit	30 w	6	6	492 w	73.2%	1,362.56	$399.72
2x4 box w 4 t8	112 w	24	8.9 6 / 2769	San Anselmo library	library/back section	LED Troffer 2x4, 35K, 4K, 5K, w/ SMT Kit	30 w	24	24	1,968 w	73.2%	5,450.23	$1,598.88
8ft linear w 2 t8 DIRUND	59 w	4	7.9 5 / 2051	San Anselmo/library	library/basement/breakroom	LED 8' Direct/ Indirect Linear, 4000K, UNV, SUS	61.4 w	4	4	w	-4.1%	(19.69)	-$5.78
6in can w 2 clf	45 w	8	11 5 / 2880	San Anselmo/town hall	entry lobby	LED 6" Can Downlight,3000K, 3500K, 4000K, REC	13 w	8	8	256 w	71.1%	737.33	$216.30
globe area light w1 mh pole	95 w	3	11 7 / 4032	San Anselmo/town hall	town hall outside front entrance	LED A21, 5000K	16 w	3	3	237 w	83.2%	955.65	$280.35
area pot light w 1 mhl	295 w	1	11 7 / 4032	San Anselmo/library	library/north side	LED Area Light, 5000K, UNV, PH w/ Slip Fitter	70 w	1	1	225 w	76.3%	907.26	$266.16
Deco HB w 6 clf	26 w	18	3 3 / 462	San Anselmo/town hall	council chambers	LED Horizontal PL Replacement, 3000K, UNV	10 w	18	18	288 w	61.5%	132.93	$39.00
fl w 1 hps	138 w	1	11 7 / 4032	San Anselmo town hall	library/north side	LED Wallpack, 5000K, UNV, PH	40 w	1	1	98 w	71.0%	395.16	$115.93
flood light w 1 hps	138 w	3	11 7 / 4032	San Anselmo town hall	library/north side	LED Flood Light, 3K, 4K, 5K, UNV, Yoke Mount	30 w	3	3	324 w	78.3%	1,306.46	$383.26
wp w 1 hps	138 w	2	11 7 / 4032	San Anselmo town hall	library/north side	LED Wallpack, 5000K, UNV, PH	40 w	2	2	196 w	71.0%	790.33	$231.88
hvac	w		5.9 7 / 2154	town hall	rooftop	Skip	w			w			
hvac	w		5.9 7 / 2154	town hall	rooftop	Skip	w			w			
hvac 2	w		5.9 7 / 2154	town hall	rooftop	Skip	w			w			
lb w 1 w19	60 w	1	1 2 / 103	San Anselmo/town hall	2nd floor/hallway to finance/supply clst	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	1	1	46 w	76.7%	4.72	$1.38
wp w 1 w19	60 w	3	1 2 / 103	San Anselmo/library	library/basement storage closet	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	3	3	138 w	76.7%	14.15	$4.15
lantern lb w 1 clf	33 w	1	11 7 / 4032	San Anselmo town hall	police station front porch	Skip	33 w	1	1	w			
LED 8ft lin w 4 t8	w	6	7.9 5 / 2051	San Anselmo/town hall	council chambers	Skip	w	6		w			
led lb w 1 w19	w	3	7.9 5 / 2051	San Anselmo/library	library/basement hallway	Skip	w	3		w			
PG&E meter	w		/		town hall	electrical room between basement & main level	Skip	w		w			
track w 5 mr 16	52 w	10	3 3 / 462	San Anselmo/town hall	council chambers	LED MR16, 4000K, GU5.3	7 w	10	10	450 w	86.5%	207.71	$60.93
wp w 1 clf	17 w	1	11 7 / 4032	San Anselmo library	library/southwest side	LED Wallpack, CCT, UNV, PH	15.52 w	1	1	1 w	8.7%	5.97	$1.75
wp w 2 clf	62 w	8	11 7 / 4032	San Anselmo town hall	town hall outside front entrance	LED Decorative Lantern Wallmount Square, 3000K,3500K 4000K,4100K,5000K	11 w	8	8	408 w	82.3%	1,645.17	$482.63
	w		/			ICP Project Development/Engineering Certification	w			w			
2x4 w 2 t8	59 w	5	6.3 4 / 1311	san anselmo/corporate yard	meeting office	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	5	10	190 w	64.4%	249.06	$73.07
2x4 w 2 t8	59 w	4	2.8 4 / 583	san anselmo/corporate yard	meeting office/locker room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	152 w	64.4%	88.56	$25.98
2x4 w 2 t8	59 w	2	5.6 4 / 1165	san anselmo/corporate yard	meeting office/Jerry's office	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	88.56	$25.98
4ft cage w 2 t8	59 w	2	2.8 4 / 583	san anselmo/corporate yard	main shop/left side entrance office	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	44.28	$12.99
4ft lin cage w 2 t8	59 w	2	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	44.28	$12.99
4ft linear cage w 2 t8	59 w	3	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	3	6	114 w	64.4%	66.42	$19.48
4ft linear w 2 t8	59 w	1	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	22.14	$6.49
6in can w 1 clf	85 w	1	0.7 1 / 35	san anselmo/corporate yard	meeting office/shower	LED 6" Can Downlight,3000K, 3500K, 4000K, REC	13 w	1	1	72 w	84.7%	2.62	$0.77
6in can w 2 clf	85 w	1	2.8 4 / 583	san anselmo/corporate yard	meeting office/bathroom	LED 6" Can Downlight,3000K, 3500K, 4000K, REC	13 w	1	1	72 w	84.7%	41.95	$12.31
8ft lin cage w 2 t8 t8	109 w	4	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	352 w	80.7%	206.08	$60.16
8ft linear cage w 2 t8 t8	109 w	2	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	176 w	80.7%	102.54	$30.08
4ft linear w 2 t8	59 w	24	2.8 4 / 583	san anselmo/corporate yard	main shop	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	24	48	912 w	64.4%	531.34	$155.12
area wp w 1 clf	46 w	3	8.4 4 / 1748	san anselmo/corporate yard	meeting office/outside Jerry's office door	LED Wallpack, CCT, UNV, PH	15.52 w	3	3	91 w	66.3%	159.82	$46.88
area wp w 1 clf	46 w	8	7.7 7 / 2804	san anselmo/corporate yard	supply warehouse perimeter	LED Wallpack, CCT, UNV, PH	15.52 w	8	8	244 w	66.3%	683.68	$200.56
double switch	w	4	/			Skip	w	4		w			
flood w 1 pgt	46 w	8	8.4 4 / 1748	san anselmo/corporate yard	courtyard	LED Area Light, 5000K, UNV, PH w/ Slip Fitter	30 w	8	8	128 w	34.8%	223.72	$65.63
heat lamp w 2 R40	215 w	1	1 1 / 51	san anselmo/corporate yard	meeting office/shower	Skip	215 w	1	1	w			
motion sensor	w	3	/			Skip	w	3		w			
PG&E Meter	w		/	san anselmo/corporate yard	parking lot side of building	Skip	w			w			
quad switch	w	2	/			Skip	w	2		w			

ENERGY AUDIT

Town of San Anselmo

Town Hall and Library
525 San Anselmo Ave
San Anselmo, CA 94960
Acct: 3658011546; SAID: 3657718207

EcoGreen Sales Rep: Matt
Customer Contact: Sean Condry
Title of Contact: Public Works Director
Customer Phone: (415) 258-4676
Customer Email: scondry@townofsananselmo.org

Approx. Building Size 37,805 SF
Energy Rate $ 0.29 /kWh
Interest Rate 0%

EcoGreen Solutions

In Reference to Quote # 200676

EXISTING				Location		Suggested Replacements					Savings		
Existing	Watts/ Fix	# of Fixtures	Existing Operating Hours-Day / Yr.	Building/Zone	Room/Area	Suggested Replacement	Watts/Fix	# of Fixtures	# of Lamps	Watts/bulbs Saved	Usage Saved	kWh Saved	Annual Savings
single switch	w	11	/			Skip	w	11		w			
vanity w 3 cfl	w	1	3.9 5 / 1026	san anselmo/corporate yard	meeting office/bathroom	Skip	w	1		w			
vanity w 3 cfl	72 w	1	3 5 / 789	san anselmo/corporate yard	meeting office/locker room	Skip	72 w	1	3	w			
vanity w 3 cfl	w	1	2 4 / 410	san anselmo/corporate yard	meeting office/Jerry's office	Skip	w	1		w			
	w		/			ICP Project Development/Engineering Certification	w			w			
4ft lin vapor w 2 lt8.	59 w	1	5.9 7 / 2154	Memorial Park	mens bathroom	LED 4' Linear Vapor Tight Fixture, 4000K, UNV, SMT	23 w	1	1	36 w	61.0%	77.54	$22.75
4ft lin vapor w 2 lt8.	59 w	1	5.9 7 / 2154	Memorial Park	womens bathroom	LED 4' Linear Vapor Tight Fixture, 4000K, UNV, SMT	23 w	1	1	36 w	61.0%	77.54	$22.75
4ft lin wrap w 2 lt8.	59 w	2	1 1 / 51	Memorial Park/Old Race Bldg	Storage Garage	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	76 w	64.4%	3.90	$1.14
4ft lin w 2 lt8.	59 w	1	1 1 / 51	Memorial Park/Old Race Bldg	Storage Garage	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	38 w	64.4%	1.95	$0.57
8 w 1 ef/9	60 w	5	1 1 / 51	Memorial Park/Old Race Bldg	old main office	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	5	5	230 w	76.7%	11.80	$3.46
4ft lin wrap w 2 lt8.	59 w	5	3.9 3 / 615	Memorial Park/Old Race Bldg	old main office/kitchen	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	5	10	190 w	64.4%	116.93	$34.30
1x4 w 2 lt8.	59 w	4	3.9 3 / 615	Memorial Park/Snack Shack	old main office/kitchen	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	152 w	64.4%	93.55	$27.44
wp w 1 ef/9	75 w	1	8.9 7 / 3231	Memorial Park/Snack Shack	ed bldg lights	LED Wallpack, CCT, UNV, PH	15.52 w	1	1	59 w	79.3%	192.18	$56.38
flood w 1 hps	95 w	1	8.9 7 / 3231	Memorial Park/Snack Shack	ed bldg lights	LED Flood Light, 3K, 4K, 5K, UNV, Knuckle Mount	30 w	1	1	65 w	68.4%	210.01	$61.61
	w		/			ICP Project Development/Engineering Certification	w			w			
12in can w 1 cfl	17 w	1	1.2 3 / 190	san anselmo/parkside preschool	mount tam/bathroom hallway	Skip	17 w	1	1	w			
2x4 w 2 lt8	59 w	15	1.2 4 / 283	san anselmo/preschool	Vista room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	15	30	570 w	64.4%	144.34	$42.34
4ft lin wrap w 2 lt8	59 w	9	4.2 7 / 1551	san anselmo/parkside preschool	preschool classroom 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	9	18	342 w	64.4%	530.45	$155.61
4ft lin wrap w 2 lt8	59 w	10	4.2 7 / 1551	san anselmo/parkside preschool	preschool classroom 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	10	20	380 w	64.4%	589.39	$172.90
4ft linear strip w 1 lt8	31 w	4	1.2 3 / 190	san anselmo/preschool	Vista room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	4	4	82 w	66.1%	15.57	$4.57
4ft linear wrap w 2 lt8	64 w	12	2.4 5 / 633	san anselmo/parkside preschool	mount tam	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	12	24	516 w	67.2%	326.66	$95.83
4ft linear wrap w 2 lt8	64 w	1	1.2 4 / 283	san anselmo/parkside preschool	mount tam/bathroom hallway/unisex restroom	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	43 w	67.2%	10.89	$3.19
8ft linear strip w 2 lt12	74 w	1	1.2 3 / 190	san anselmo/parkside preschool	mount tam/bathroom hallway/storage closet	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	10.07	$2.95
8in can w 1 cfl	17 w	3	1.2 3 / 190	san anselmo/parkside preschool	mount tam	Skip	17 w	3	3	w			
flood w 1 hps	95 w	10	4.2 7 / 1551	san anselmo/parkside preschool	mount tam/gymnasium/northwest side	LED Flood Light, 3K, 4K, 5K, UNV, Knuckle Mount	12 w	10	10	830 w	87.4%	1,287.35	$377.66
hb w 1 mh	295 w	10	5.5 7 / 1094	san anselmo/parkside preschool	mount tam/gymnasium	LED Round Highbay, 5000K, UNV	80.1 w	10	10	2,149 w	72.8%	4,289.48	$1,257.19
8 w 1circle/w bulb	40 w	1	1.2 2 / 127	san anselmo/parkside preschool	mount tam/bathroom hallway/storage 2	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	1	1	26 w	65.0%	3.29	$0.97
Motion Sensor	w	2	/			Skip	w	2		w			
quad switch	w	2	/			Skip	w	2		w			
Single Switch	w	7	/			Skip	w	7		w			
vanity w 3 ef/9	180 w	1	1.8 5 / 475	san anselmo/parkside preschool	bathroom 2	Skip	180 w	1	3	w			
vanity w 3 G30.	w	1	1.8 5 / 475	san anselmo/parkside preschool	bathroom 1	Skip	w	1		w			
linear w 1 t12	46 w	1	1.8 5 / 475	san anselmo/parkside preschool	mount tam/kitchen are	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	10.5 w	1	1	36 w	77.2%	16.66	$4.94
	w		/			ICP Project Development/Engineering Certification	w			w			
1x4 box w 2 t12	74 w	2	0.6 3 / 95	san anselmo/cook community center	ground floor hallway/basement storage 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	10.07	$2.95
1x4 w 2 t12	74 w	4	1.8 5 / 475	san anselmo/cook community center	ground floor hallway	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	100.66	$29.53
1x4 w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/womens restroom	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	25.16	$7.38
2x2 w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	studio 22b	LED Troffer 2x2,Retrofit Kit 4000K, UNV, REC	18 w	1	1	56 w	75.7%	26.59	$7.80
2x4 w 2 t12	74 w	11	4.9 6 / 1519	san anselmo/cook community center	main entrance hallway	LED Troffer 2x4 Retrofit Kit, 4000K, UNV, REC	21 w	11	11	583 w	71.6%	885.79	$259.86
2x4 w 2 t12	74 w	6	1.8 5 / 475	san anselmo/cook community center	studio 22b	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	318 w	71.6%	150.99	$44.29
2x4 w 2 t12	74 w	2	1.8 5 / 475	san anselmo/cook community center	studio 22b/storage room 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	50.33	$14.76
4ft linear wrap w4 t12	148 w	1	3 5 / 791	san anselmo/cook community center	christin coy's studio/kitchen	LED 4' Linear Wrap Fixture, 3SK, 4K, 5K, UNV	33.2 w	1	1	115 w	77.6%	90.85	$26.65
2x4 w 4 t12	148 w	3	1.8 5 / 475	san anselmo/cook community center	studio 22a	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	42 w	3	12	318 w	71.6%	150.99	$44.29
4ft lin wrap w 2 t12	74 w	2	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 1/room 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	50.33	$14.76
4ft lin wrap w 2 t12	74 w	6	2.4 5 / 633	san anselmo/cook community center	ground floor hallway/door 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	6	12	318 w	71.6%	201.32	$59.06
4ft lin wrap w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 4/entrance hallway	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	25.16	$7.38
4ft lin wrap w 2 t12	74 w	4	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 4/room 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	4	8	212 w	71.6%	100.66	$29.53
4ft lin wrap w 2 t12	74 w	2	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 4/room 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	50.33	$14.76
4ft lin wrap w 2 t12	74 w	2	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 4/room 3	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	2	4	106 w	71.6%	50.33	$14.76
4ft lin wrap w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/mens restroom	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	25.16	$7.38
4ft lin wrap w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/unisex restroom	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	25.16	$7.38
4ft lin wrap w 2 t12	74 w	10	3 5 / 791	san anselmo/cook community center	ground floor hallway/classroom 1	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	10	20	530 w	71.6%	419.41	$123.04
4ft lin wrap w 2 t12	74 w	10	3 5 / 791	san anselmo/cook community center	ground floor hallway/classroom 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	10	20	530 w	71.6%	419.41	$123.04
4ft lin wrap w 4 t12	148 w	2	2.4 5 / 633	san anselmo/cook community center	rec department/office 5	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	42 w	2	8	212 w	71.6%	134.21	$39.37
4ft lin wrap w 4 t12	148 w	1	1.8 5 / 475	san anselmo/cook community center	rec department/copier room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	42 w	1	4	106 w	71.6%	50.33	$14.76
4ft lin wrap w 4 t12	148 w	1	1.8 5 / 475	san anselmo/cook community center	rec department/server room	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	42 w	1	4	106 w	71.6%	50.33	$14.76
4ft lin wrap w 4 lt8	148 w	4	3 5 / 791	san anselmo/cook community center	June yolsil studio	LED 4' Linear Wrap Fixture, 3SK, 4K, 5K, UNV	33.2 w	4	4	459 w	77.6%	363.38	$106.60
4ft linear w 2 t12	74 w	1	1.8 5 / 475	san anselmo/cook community center	ground floor hallway/door 1/room 2	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	1	2	53 w	71.6%	25.16	$7.38
4ft linear w 2 lt8	59 w	7	2.4 5 / 633	san anselmo/cook community center	studio 8	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	7	14	266 w	64.4%	168.40	$49.40
4ft linear w 2 lt8	59 w	12	2.4 5 / 633	san anselmo/cook community center	studio 8	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	12	24	456 w	64.4%	288.68	$84.69
4ft linear wrap w 2 lt8	59 w	8	2.4 5 / 633	san anselmo/cook community center	ground floor hallway/door 3	4' T8 LED Tube Double Ended Bypass(Type B), 4000K, UNV	21 w	8	16	304 w	64.4%	192.45	$56.46
8ft linear wrap w 4 t12	414 w	5	3 5 / 791	san anselmo/cook community center	christin coy's studio	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	5	5	1,745 w	84.3%	1,380.89	$405.10
8ft linear wrap w 4 lt8 t12	414 w	5	2.4 5 / 633	san anselmo/cook community center	Wendy Goldberg studio	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	5	5	1,745 w	84.3%	1,104.71	$324.08
8ft linear wrap w 4 lt8 t12	414 w	6	2.4 5 / 633	san anselmo/cook community center	studio fifteen	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	6	6	2,094 w	84.3%	1,325.65	$388.89
8ft linear wrap w 4 lt8 t12	414 w	2	2.4 5 / 633	san anselmo/cook community center	studio thirteen	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	441.88	$129.63
8ft linear wrap w 4 lt8 t12	414 w	2	2.4 5 / 633	san anselmo/cook community center	studio 13a	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	441.88	$129.63
8ft linear wrap w 4 lt8 t12	414 w	2	2.4 5 / 633	san anselmo/cook community center	studio 11a	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	441.88	$129.63
8ft linear wrap w 4 lt8 t12	414 w	2	2.4 5 / 633	san anselmo/cook community center	studio 11	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	441.88	$129.63
8ft linear wrap w 4 lt8 t12	414 w	2	3 5 / 791	san anselmo/cook community center	rec department/bulte 14	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	552.35	$162.04
8ft linear wrap w 4 lt8 t12	414 w	1	2.4 5 / 633	san anselmo/cook community center	rec department/office 1	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	1	1	349 w	84.3%	220.94	$64.82
8ft linear wrap w 4 lt8 t12	414 w	1	2.4 5 / 633	san anselmo/cook community center	rec department/office 3	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	1	1	349 w	84.3%	220.94	$64.82
8ft linear wrap w 4 lt8 t12	414 w	2	2.4 5 / 633	san anselmo/cook community center	rec department/office 4	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	2	2	698 w	84.3%	441.88	$129.63
8ft linear w 4 t8	112 w	4	2.4 5 / 633	san anselmo/cook community center	studio ten	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	4	4	188 w	42.0%	119.02	$34.91
8ft linear w 4 t8	112 w	1	2.4 5 / 633	san anselmo/cook community center	rec department/office 2	LED 8' Linear Fixture, 4000K, UNV, SMT	68 w	1	1	47 w	42.0%	29.76	$8.73
Double Switch	w	5	/			Skip	w	5		w			
8 w 1 ef/9	60 w	1	1.2 3 / 190	san anselmo/cook community center	ground floor hallway/electrical room entrance	Skip	60 w	1	1	w			
8 w 1 ef/9	60 w	1	1.2 3 / 190	san anselmo/cook community center	ground floor hallway/electrical room door 1	Skip	60 w	1	1	w			
8 w 1 cfl	w	4	0.6 3 / 95	san anselmo/cook community center	ground floor hallway/basement storage 2	Skip	w	4		w			
8 w 1 par38	75 w	1	1.2 3 / 190	san anselmo/cook community center	ground floor hallway/electrical room/boiler room	Skip	75 w	1	1	w			

ENERGY AUDIT

Town of San Anselmo

Town Hall and Library
525 San Anselmo Ave
San Anselmo, CA 94960
Acct: 3658011546; SAID: 3657715227

EcoGreen Sales Rep: Matt

Customer Contact: Sean Condry
Title of Contact: Public Works Director
Customer Phone: (415) 258-4676
Customer Email: scondry@townofsananselmo.org

Approx. Building Size 37,805 SF
Energy Rate $ 0.29 /kWh
Interest Rate 0%

EcoGreen Solutions
In Reference to Quote # 200676

EXISTING					Location		Suggested Replacements						Savings	
Existing	Watts/ Fix	# of Fixtures	Existing Operating Hours-Day / Yr.		Building/Zone	Room/Area	Suggested Replacement	Watts/Fix	# of Fixtures	# of Lamps	Watts/bulbs Saved	Usage Saved	KWh Saved	Annual Savings
lb w 2 cfl	31 w	1	1.8 5 /	475	san anselmo/cook community center	restroom/toilet 1	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	1	1	17 w	54.8%	8.07	$2.37
lb w 2 cfl	31 w	1	1.8 5 /	475	san anselmo/cook community center	restroom/toilet 2	LED Lowbay White 11" Round Puff Fixture, 3K,4K,5K, UNV, SMT, Dimmable	14 w	1	1	17 w	54.8%	8.07	$2.37
led 4ft rlr wrap	w	1	2.4 5 /	633	san anselmo/cook community center	restroom	Skip	w	1		w			
Motion Sensor Switch	w	4	/				Skip	w	4		w			
PG&E Meter	w		/		san anselmo/cook community center	grage of old rec office building	Skip	w			w			
Quad Switch	w	3	/				Skip	w	3		w			
Single Switch	w	26	/				Skip	w	26		w			
Triple Switch	w	4	/				Skip	w	4		w			
	w		/		san anselmo/cook community center	studio 22b/storage room 2	Skip	w			w			
	w		/		san anselmo/cook community center	ground floor hallway/door 6	Skip	w			w			
	w		/					w			w			
	w		/					w			w			
	w		/					w			w			
	w		/					w			w			
Totals		639	Ave:	2108				w	639		37,422 w	71.9%	49,889.00	$14,635.44

37,422	Estimated Watts Saved	Total Project Cost	$147,331.28	Approximate Energy Savings Per Month	$1,219.62
49,889	Estimated Annual kWh Saved	Total After Rebate/Incentive Project Cost	$147,331.28	Estimated Energy Savings Per Year	$14,635.44
6.0	Estimated Avg Annual Res Powered by Savings	****Estimated Program Payback Period Yrs.	9.90	**Estimated Total Savings Over 5 Years	$82,501.31
37	Estimated Annual CO2 Savings (MT)			** Estimated Total Savings After 10 Years	$192,906.68
8,477,686	Estimated Btu Savings Per Month			Estimated Energy Rebate	$0.00
71.9%	Estimated Average Electrical Savings			Estimated IRS Tax Deduction 179D Available	$22,683.00
				***Estimated Federal Tax Savings	$7,939.05
10.07	Estimated Payback Period Yrs. - No Rebates, Tax Deductions or Bulb Replacement Savings			Estimated Bulb Replacement Savings Per Year	$294.39
9.34	Estimated Payback Period Yrs. Fully Comprehensive^			^^ Estimated Bulb Replacement Savings Per Avg. Est. Life of LED	$139,416.52
				Estimated Loan Payment	$1,207.43

*** Based on IRS 179D Deduction @ 35% federal tax rate
**** Program Payback Period Yrs. = (Total Project Cost - Available Program Rebates or Incentives) / Estimated $ Saved per Year
^Payback Period Yrs. = (Total Project Cost - Available Rebate or Incentive - Tax Savings) / (Estimated Savings Per Year + Bulb Replacement Savings Per Yr.)
^^Based on industry standard LED lifespan of 50,000 hrs.

NOTE: Attached calculations do not include depreciation deduction for project cost.
*Payment is based on a 9.9 year loan at 0% interest OAC, actual my vary.
** Reflects energy savings per year increasing at industry standard 6% per year + Bulb Replacement

EXHIBIT B: ON-BILL LOAN FINANCING AGREEMENT

Pacific Gas and Electric Company

LOCAL AGENCY AND DISTRICT CUSTOMERS ON-BILL FINANCING LOAN AGREEMENT

The undersigned Local Agency or District[1] Customer (**"Customer"**) has contracted for the provision of energy efficiency/demand response equipment and services (the **"Work"**) which qualify for one or more of PG&E's applicable rebate or incentive programs. Subject to the conditions (including the process for Adjustment and preconditions to funding) set forth below, Pacific Gas and Electric Company (**"PG&E"**) shall extend a loan (the **"Loan"**) to Customer in the amount of the loan balance (the **"Loan Balance"**) pursuant to the terms of this On-Bill Financing Loan Agreement (**"Loan Agreement"**) and PG&E's rate schedules E-OBF and/or G-OBF, as applicable (the **"Schedule"**).

To request the Loan, Customer has submitted a completed On-Bill Financing Application and associated documentation as required by PG&E (the **"Application"**). Collectively the Application and this Loan Agreement (including any Adjustment hereunder) comprise the "Agreement".

1. Customer shall arrange for its Contractor, as identified at the end of this Agreement (**"Contractor"**), to provide the Work as described in the Application.

2. The estimated Loan Balance is set forth below. The total cost of the Work as installed, rebate/incentive for qualifying energy efficiency measures, Loan Balance, monthly payment, and loan term specified in this Loan Agreement may be adjusted, if necessary, after the Work and the post-installation inspection described in the Application and/or herein are completed (the **"Adjustment"**). The Adjustment will be calculated using the actual total cost of the Work, as installed, and the estimated energy savings (as described in the Application) of such Work. In no event will the Loan Balance be increased without Customer's written consent, even if Customer is eligible for such increased Loan Balance. Moreover, in no event will the Loan Balance exceed the maximum loan amount stipulated in the Application. Customer understands that in order to be eligible for the Loan, the initial Loan Balance for Work may not fall below the minimum loan amount, nor may the payback period exceed the maximum payback period. **Accordingly, if after the Adjustment, the Loan Balance falls below the minimum loan amount or if the simple payback period exceeds the program maximum payback period, each as described in the Application, PG&E shall have no obligation to extend the Loan, as the Work would not meet program requirements.** The Adjustment described in this paragraph will be communicated to the Customer in writing and will automatically become part of this Loan Agreement, except that any proposed increase in the Loan Balance will only become part of this Loan Agreement upon Customer's written consent to such increase.

3. **PG&E shall have no liability in connection with, and makes no warranties, expressed or implied, regarding the Work.** The Parties acknowledge and agree that PG&E is only providing the Local Agency or District cited here with financing. The Customer has independently hired contractors ("Local Agency or District Contractors") to perform the work on behalf of the Customer to qualify for financing. The Customer acknowledges and agrees that the Local Agency or District Contractors are not third party beneficiaries to this agreement between the Customer and PG&E. To the extent authorized by law and subject to appropriation of the Legislature, the Customer agrees that it will look only to Local Agency or District Contractors for any claims related to the installed equipment or its performance and that PG&E shall have no responsibility or liability, except for the payment of the loan proceeds, and the Customer shall indemnify PG&E for any claims made by the Local Agency or District Contractors against PG&E.

4. Customer represents and warrants that (a) Customer is receiving this Loan solely for Work obtained in connection with Customer's business, and not for personal, family or household purposes; (b) Customer, if not an individual or a government agency, is duly organized, validly existing and in good standing under the laws of its state of formation, and has full power and authority to enter into this Agreement and to carry out the provisions of this Agreement. Customer is duly qualified and in good standing to do business in all jurisdictions where such qualification is required; (c) this Loan Agreement has been duly authorized by all necessary proceedings, has been duly executed and delivered by Customer and is a valid and legally binding agreement of Customer duly enforceable in accordance with its terms; (d) no consent, approval, authorization, order, registration or qualification of or with any court or regulatory authority or other governmental body having jurisdiction over Customer is required for, and the absence of which would adversely affect, the legal and valid execution and delivery of this Loan Agreement, and the performance of the transactions contemplated by this Loan Agreement; (e) the execution and delivery of this Loan Agreement by Customer hereunder and the compliance by Customer with all provisions of this Loan Agreement: (i) will not conflict with or violate any Applicable Law; and (ii) will not conflict with or result in a breach of or default under any of the terms or provisions of any loan agreement or other contract or agreement under which Customer is an obligor or by which its property is bound; and (f) all factual information furnished by Customer to PG&E in the Application and pursuant to this Agreement is true and accurate.

5. The Application must include the Federal Tax Identification Number or Social Security Number of the party who will be the recipient of the checks for the rebate/incentive or any Loan proceeds. Checks may be issued directly to the Customer or its designated Contractor or both, for the benefit of the Customer, as specified below. Customer acknowledges that PG&E will not be responsible for any tax liability imposed on the Customer or its contractor in connection with the transactions contemplated under the Agreement, whether by virtue of the Loan contemplated under the Agreement, or otherwise, and Customer shall indemnify PG&E for any tax liability imposed upon PG&E as a result of the transactions contemplated under the Agreement.

[1] Local Agency or District as defined in California Government Code §50001 and §58004.

6. Upon completion of the Work, Customer shall send a written confirmation of completion to PG&E's On-Bill Financing Program Administrator at the address listed in Section 15. Within 60 days after receiving the confirmation, PG&E (a) will conduct a post installation inspection and project verification, including review of invoices, receipts and other documents as required by PG&E to verify the correctness of any amounts claimed by Customer; and (b) will adjust, if necessary, the total cost, incentive, Loan Balance, monthly payment, and loan term as stated above. Customer shall give PG&E reasonable access to its premises and the Work. If the Work conforms to all requirements of the Agreement and all amounts claimed by Customer as Work costs are substantiated to PG&E's reasonable satisfaction, PG&E will issue a check ("**Check**") to Customer or Contractor (as designated by Customer in Section 15) for all amounts PG&E approves for payment in accordance with the Agreement. The date of such issuance is the "**Issuance Date**". If the Check is issued to Customer, Customer shall be responsible for paying any outstanding fees due to Contractor for the Work. If the Check is less than the amount due from Customer to Contractor, Customer shall be responsible for the excess due to the Contractor.

7. Customer shall repay the Loan Balance to PG&E as provided in this Loan Agreement irrespective of whether or when the Work is completed, or whether the Work is in any way defective or deficient, and whether or not the Work delivers energy efficiency savings to Customer.

8. The monthly payments will be included by PG&E on the Account's regular energy service bills, or by separate bill, in PG&E's discretion. Regardless whether the monthly payments are included in the regular utility bill or a separate loan installment bill, the following repayment terms will apply:

    a. The Customer agrees to repay to PG&E the Loan Balance in the number of payments listed below and in equal installments (with the final installment adjusted to account for rounding), by the due date set forth in each PG&E utility bill or loan installment bill rendered in connection with Customer's account (identified by the number set forth below) ("Account"), commencing with the bill which has a due date falling at least 30 days after the Issuance Date.

    b. If separate energy service bills and loan installment bills are provided, amounts due under this Loan Agreement as shown in the loan installment bill shall be deemed to be amounts due under each energy services bill to the Account, and a default under this Loan Agreement shall be treated as a default under the Account.

    c. If the Customer is unable to make a full utility bill payment in a given month, payment arrangements may be made at PG&E's discretion.

    d. Any partial bill payments received for a month will be applied in equal proportion to the energy charges and the loan obligation for that month, and the Customer may be considered in default of both the energy bill and the loan installment bill.

    e. Further payment details are set forth below.

9. Any notice from PG&E to Customer regarding the Program or the transactions contemplated under the Loan Agreement may be provided within a PG&E utility bill or loan installment bill, and any such notices may also be provided to Customer at the address below or to the Customer's billing address of record in PG&E's customer billing system from time to time, and in each case shall be effective five (5) days after they have been mailed.

10. The Loan Balance shall not bear interest.

11. Customer may, without prepayment penalty, pay the entire outstanding loan balance in one lump sum payment provided the customer first notifies PG&E by telephoning the toll free phone number (1-800-468-4743), and by sending written notice to PG&E On-Bill Financing Program Administrator at the address listed below, in advance of making the lump sum payment. Accelerated payments that are received from Customer without PG&E's prior approval may, at PG&E's sole discretion, be applied proportionally to subsequent energy charges and Loan repayments and PG&E shall have no obligation to apply accelerated payments exclusively to reduction of the outstanding Loan.

12. The entire outstanding Loan Balance will become immediately due and payable, and shall be paid by Customer within 30 days if: (i) the Account is closed or terminated for any reason; (ii) Customer defaults under the Agreement; (iii) Customer sells the equipment forming part of the Work to any third party; or (iv) Customer becomes Insolvent. Customer becomes "Insolvent" if: (i) Customer is unable to pay its debts as they become due or otherwise becomes insolvent, makes a general assignment for the benefit of its creditors, or suffers or permits the appointment of a receiver for its business or assets or otherwise ceases to conduct business in the normal course; or (ii) any proceeding is commenced by or against Customer under any bankruptcy or insolvency law that is not dismissed or stayed within 45 days.

13. Customer understands that without limiting any other remedy available to PG&E against Contractor or Customer, **failure to repay the Loan Balance in accordance with the terms of the Agreement could result in shut-off of utility energy service, adverse credit reporting, and collection procedures, including, without limitation, legal action.**

14. If there is any conflict among the documents comprising the Agreement, the following order of priority shall apply: 1. this Loan Agreement; 2. the Application; 3. any documents attached to the Application.

Item 2.3 Attachment 2

15. LOCAL AGENCY OR DISTRICT REQUIREMENT

a. All Payment Obligations Subject to Appropriation

The Customer acknowledges that the cost incurred pursuant to this Loan Agreement will be part of the monthly bill for electric use. All payment obligations and the Work replacement obligations of the Customer under this Loan Agreement or any related agreement or application is subject to appropriation by the Legislative body belonging to Local Agency or District cited in this loan agreement.

b. No Lien or Encumbrance; Subordination:

(1) Notwithstanding any other provision in this Loan Agreement – , PG&E acknowledges that nothing in this Loan Agreement shall constitute a mortgage, charge, assignment, transfer, pledge, lien or encumbrance upon either the Work or any part of the buildings, structures or related facilities in which the Work is constructed, installed or situated (collectively, the "Related Facilities"). Accordingly, PG&E agrees it will not record or file any instrument that would indicate or imply it has a security interest in the Related Facilities, including but not limited to a UCC-1.

(2) In addition to the preceding paragraph (a), if this Loan Agreement were ever construed or deemed to create any such encumbrance, then: (i) this Loan Agreement shall be junior and subordinate and subject in all respects to the terms and conditions of any and all leases, and indentures related to lease revenue bonds issued by the Local Agency or District cited here or any other issuer of bonds on behalf of the Local Agency or District concerning the Related Facilities entered into in the past, the present or the future (the "Senior Security Documents"); and (ii) any term or condition of this Loan Agreement relating to any right, title or interest in the Related Facilities or other benefits derived there from shall be in all respects junior and subordinate to, and subject to the terms of, the Senior Security Documents.

16. Loan Particulars.

This table is to be completed by PG&E						
Total Cost	Incentive	Customer Buy-Down (*if applicable*)	Loan Balance [1]	Monthly Payment	Term [2] (months)	Number of Payments
$ 147,331.28	$ -	$ 2,439.24	$ 144,892.04	$ 1,207.43	120	120

Check Made Payable to Customer □ or Contractor X
[customer to select payment method, Note that only one check can be issued]

17. This agreement at all times shall be subject to such modifications as the California Public Utilities Commission may direct from time to time in the exercise of its jurisdiction.

Federal Tax ID or Social Security #, Customer	Federal Tax ID or Social Security #, Contractor
94-6000413	

PG&E Account # / Service Agreement #
3658011546 / 3657715227

Account Name, Customer	Name, Contractor
Primary Customer Name: TOWN OF SAN ANSELMO - 525 SAN ANSELMO AVE Project ID: Parkside Pre-School	

Customer Address (For OBF Check Delivery)	Contractor Address (For OBF Check Delivery)

Name and Title of Authorized Representative of Customer	Name and Title of Authorized Representative of Contractor

Full Name & Title →

Signature of Authorized Representative of Customer

Full Signature →

Date

Date Signed →

ACCEPTED: Pacific Gas and Electric Company

By	Date
PG&E On-Bill Financing Authorized Representative	

[1] The Loan Balance shall not exceed two-hundred fifty thousand dollars ($250,000), except where, in PG&E's sole opinion, the opportunity for uniquely large energy savings exist, in which case the Loan Balance may exceed two-hundred fifty thousand dollars ($250,000) but shall not exceed four million dollars ($4,000,000).

[2] The loan term in months will be established by PG&E at the time of the OBF Loan Agreement initiation. The maximum loan term shall be one hundred and twenty (120) months.

On-Bill Financing Program (OBF)
Loan Calculation Summary Sheet
Simple project payback per meter

Customer Name: TOWN OF SAN ANSELMO - 525 SAN ANSELMO AVE

Project Number: FA ID 014437

Calculations from: Original

(A) PROJECT COST FOR MEASURES	(B) REBATES or INCENTIVES	Customer Down Payment or Buy-Down	CUSTOMER TOTAL LOAN AMOUNT	(C) CUSTOMER AVERAGE RATE *PER kWh*	(D) CUSTOMER AVERAGE RATE *PER Therm*	(E) ESTIMATED ANNUAL ENERGY SAVINGS *(kWh)*	(F) ESTIMATED ANNUAL GAS SAVINGS *(Therm)*	ESTIMATED ANNUAL ENERGY COST SAVINGS	SIMPLE PAYBACK IN YEARS
$ 147,331.28	$ -	$ 2,439.24	$ 144,892.04	$ 0.29	$ -	49,889.00	-	$ 14,635.44	9.90

PAYBACK IN MONTHS BASED ON EXPECTED ENERGY SAVINGS	LOAN TERM (MONTHS) (1 month added for bill neutrality)	CUSTOMER FIXED MONTHLY LOAN PAYMENT	ESTIMATED MONTHLY ENERGY COST SAVINGS
119	120	$ 1,207.43	$ 1,219.62

(C) = (From utility bill) Total $ amount (12-month) / Total kWh (same 12-month)
(D) = (From utility bill) Total $ amount (12-month) / Total therm (same 12-month)