



An Assessment of A Midsize, Urban, Midwestern Fire Department

MOUNTAIN

MILITARY

LAW ENFORCEMENT

FIRE/RESCUE

HUMAN PERFORMANCE

An Assessment of A Midsize, Urban, Midwestern Fire Department

Part I: Our Approach to Fire/Rescue Fitness
Part II: Key Findings and Recommendations
Part III: Fire Department and Survey Demographics
Part IV: Fitness Culture Assessment
Part V: Job Task Analysis

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Preface:

The Fire/Rescue profession is a physically demanding, high risk occupation. In fire departments many individual Fire/Rescue Athletes (F/RAs) agree fitness is important, but many fire departments also have notably weak fitness cultures which demonstrate inadequate support for fitness and poor participation in fitness training.

With this project we developed and applied a Fitness Culture Assessment for tactical units, and applied it to a Midwestern, urban/suburban fire department. The assessment deployed three specific research methods; (1) An online survey; (2) 3-days of on-site observation, and; (3) In-person interviews.

As well, we conducted a Job Task Analysis for the Fire/Rescue Athletes (F/RAs) in this specific department. The Job Task Analysis also deployed three research methods: (1) In-Person Observation; (2) Historical Data Analysis; and (3) In-formal interviews. The objective of the Job Task Analysis was to develop a Department-specific fitness assessment and to create a functional, job-specific training program which could be applied to the Department.

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Part I

Our Approach to Fire/Rescue Fitness

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Jackson, Wyoming

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Part I - Our Approach to F/R Fitness

- (1) **Fire/Rescue professionals are professional athletes.** Professional athletes used their bodies to earn a living. For tactical athletes, their livelihood depends not only on their fitness, but so does their job performance, and survivability. Because they often put themselves in harm's way, fire/rescue professionals can be considered tactical athletes or *Fire/Rescue Athletes (F/RA)*.
- (2) **Athletic professions carry implicit physical requirements that can be identified, assessed and trained.** It is possible to observe a tactical athlete working to identify the physical requirements of their profession (for example; weight of gear, common movements, length of job tasks). It is also possible to develop a method to assess their professional readiness and train specifically to enhance job performance and safety. The job itself is not enough to increase any of these qualities, so physical training is necessary in order to build the fitness needed to carry out job tasks.
- (3) **For tactical athletes (fire/rescue, military and law enforcement), physical requirements can be a matter of life or death.** For tactical athletes, we believe fitness is crucial to one's own safety and the safety of his/her teammates. Fire/rescue is a team event and F/RA must be able to rely on their teammates technically, tactically and physically.
- (4) **Fitness is not the same as wellness.** Fitness may lead to wellness, however, when the goal outcome is job performance, fitness and wellness can often be mutually exclusive. In terms of fire rescue, fitness is necessary to perform job tasks safely and efficiently, where wellness is related to the individuals' overall sense of wellbeing (mental and spiritual) and health. Fitness training must be focused on job performance. Programs that highlight wellness or injury prevention lack often lack the volume, intensity and duration to elicit improvements in job performance.
- (5) **Fitness is the individual's responsibility.** It is a professional obligation to be able to do the most demanding job tasks. Leadership has the critical role of establishing and supporting a strong fitness culture. However, the ultimate responsibility for job performance rests with the individual F/RA. It helps greatly if leadership provides the means (time, space, equipment, fitness programming) to become fit. Yet, it is not acceptable for a weaker member of a team to blame their shortcomings on leadership, age or lack of motivation. In a profession such as fire rescue, where your life, or the life of a teammate may be compromised due to being overweight or unfit, lack of individual responsibility for one's own fitness is unacceptable. A strong fitness culture demands and expects strong individual accountability.
- (6) **The physical demands of tactical professions do not discriminate.** Enemies and criminals don't shoot slower bullets for unfit soldiers and law enforcement officers. Likewise, there are no cooler, slower-moving fires for unfit fire/rescue professionals. If an individual wants to be on the front line fighting fires, he or she needs to maintain the level of fitness and physical capability demanded by the most dangerous situation in a fire or emergency.
- (6) **A strong fitness culture will build fit athletes.** If a strong fitness culture exists and a new individual is introduced to this culture, that individual will adopt the existing culture or selectively remove themselves from that culture. A strong fitness culture will foster fitness of its members by setting a standard that is acceptable in that unit.
- (7) **Fitness training helps everything.** A fire rescue professional's body is his or her most important piece of equipment. If he or she is not caring for and maintaining their fitness, it casts doubt as to their commitment to their profession - how they care for other pieces of equipment, their commitment to training and readiness, their tactical and professional job preparation, etc. We've seen this many times - when an individual or unit commits to professional fitness training for their job, this

commitment and professionalism migrates to all other areas of their work life. Every element of job performance improves.

- (8) **There are no “Big Boy Rules” for fitness.** Tactical athletes who are allowed to train on their own, and do their own fitness programming end up doing what they’ve always done, what they are good at, or training for their non-job sport or recreational interest. Tactical athletes at a unit must be required to do the same fitness training, which is job-focused and specific.

Part II

Key Findings and Recommendations

- Fitness Culture**
- Job Task Analysis and Physical Requirements**

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Part II: Key Findings and Recommendations - Fitness Culture

Key Findings:

Figure I: Overall Fitness Culture Assessment Score

Overall Score	47
Score	
0-25	Very Low
26-50	Low
51-75	Moderate
76-100	High

Matrix Analysis:

F/RA Attitudes	SCORE: 41/100	LOW
Leadership Attitudes	SCORE: 45/100	LOW
F/RA Actions	SCORE: 55/100	MODERATE
Leadership Actions	SCORE: 55/100	MODERATE

Fitness Culture Assessment Score:

This department's fitness culture assessment score was 47 out of a possible 100 points. A score of 100 represents a very strong fitness culture. A score of 47 represents a weak fitness culture.

Summary of Results:

- Assessed fitness actions (55 points) scored higher than fitness attitudes (41 and 45 points) in both F/RAs and leadership. Actions and attitudes are described in detail in Part I.
- 74% of respondents feel the fitness is at least "somewhat important" to their job.
- 68% of station leadership, based on survey responses, is in favor of a mandatory fitness assessment. However, when interviewed, none in administrative leadership supported a mandatory fitness assessment - even one without punitive ramifications. This demonstrates a disconnect between front-line F/RAs, and the administration.
- No one at the department is training for the demands of their job. 75% of F/RA training is completely unplanned/programmed. The 25% that is planned, is not planned around F/R job performance.
- The vast majority (over 80%) of F/RAs who do training on duty, train alone. Teams don't train together.
- The existing fitness assessment is voluntary and the test battery is impractical for a large volume of F/RAs. Thus it goes unused and serves virtually no functional purpose.
- The department currently has in place a mandatory 30 minute, on-duty training requirement. However, 30 minutes is not sufficient to train appropriately. As well, many department F/RAs

falsely report they actually train. This wide-spread integrity deficit is a major hurdle to building a strong fitness culture and creates resentment.

- There's a significant disconnect between younger and older F/RAs around the importance of fitness at the department and the fitness of their peers. This age-based disconnect is a major hurdle to building a strong fitness culture. These differences are outlined in Table 1.

Table 1: Difference Between Younger and Older F/RA Opinions

	Younger (<45 years old)	Older (>45 years old)
In favor of annual fitness assessment	81%	63%
Provided negative comments concerning a required fitness assessment	10%	33%
Feel that their peers are fit for duty	46%	78%

Recommendations:

Below are five recommendations to improve the department's fitness culture. Each recommendation is accompanied by a detailed description of how this recommendation might be implemented. They are broken into three tiers:

- **Tier I:** Easily implemented - These could be done quickly with little additional cost or disruption.
- **Tier II:** Less easily implemented - These could likely be done within 1-2 years, with little to moderate additional cost and little disruption.
- **Tier III:** More difficult to implement - These could take between 2-5 years to implement and would likely require additional funding and administrative changes. However, they are likely to have the biggest impact over the longer-term.

(1) Institute a required annual job task-specific fitness assessment.

Implementation of a job task-specific fitness assessment will reduce the existing culture split between younger and older F/RAs at the department (if everyone must pass the same fitness assessment, then everyone should be perceived as being fit enough to perform). Aligning the fitness assessment events to actual job tasks will give it instant currency with F/RAs, and set an equal standard for all front line F/RAs. The majority of F/RAs are currently in favor of an appropriate fitness assessment. More specifics are presented in Part 2.

How:

- **Tier I:** Institute a mandatory, non-punitive fitness assessment that must be completed 1x per year (during the same week at every station). Fitness testing will be completed at the F/RAs station with their division. The Fire Captain or a residing Peer Fitness Trainer will be responsible for conducting the assessment and reporting scores to administration. The assessment will be non-punitive, but individual scores will be distributed department-wide. The stress of having to complete a non-punitive fitness assessment, and having their scores distributed department-wide will be enough to motivate some unfit F/RAs to improve their fitness. Individuals and stations with the highest assessment scores recognized and celebrated.
- **Tier II:** Institute a mandatory fitness assessment that must be completed 2x per year with individual scores distributed department-wide as outlined above. Failure to meet the

assessment's minimum standard will result in the individual F/RAs being removed from front-line duty and transferred to a temporary administrative position until the individual reassesses and meets the standard. Individuals and stations with the highest assessment scores should be recognized and celebrated.

- **Tier III:** For new F/RAs, institute a high-jeopardy bi-annual mandatory fitness assessment with minimum standard immediately (see ramifications for failure below). For incumbent F/RAs, institute the mandatory bi-annual fitness assessment as discussed in Tier II. The first 2 years will serve as a probationary period for incumbent F/RAs. This initial 2 years will allow incumbent F/RAs ample time to adopt new training habits and develop individual fitness. After the 2 year period, the fitness assessment will become high jeopardy for incumbent F/RAs.

The assessment should have a reasonable disciplinary penalty for failure to meet the minimum standard. Our recommendations include; failure of 2 assessments in a row results in a 4-week suspension that will extend until the F/RA is able to pass the fitness assessment and a 3-strike rule where failure of the assessment 3 times in a row results in termination of employment or change in F/RAs role within the department at the discretion of the Fire Chief.

The assessment may also have recognition for (1) improvement and (2) excellence. Each assessment, the most improved individual may be recognized and the most fit individual may be recognized at the discretion of the Fire Chief.

(2) Implement a department-wide, job-specific strength and conditioning program.

The majority of F/RAs do not have a training plan. A professionally written training program that has been designed with the performance and recovery needs of F/RAs in mind is necessary. Unplanned/un-programmed training lacks many of the basic components of a sound program; proper volume, intensity, exercise selection and progression. F/RAs end up doing what they've always done, or what they are good at. They don't train for the job. More specifics are presented in Part II: Job Task Analysis and Physical Requirements.

How:

- **Tier I:** Strengthen the existing Peer Fitness Trainer system. Peer Fitness Trainers must be given additional education regarding program design. Peer Fitness Trainers should meet 2x per month to organize training programs and discuss issues within their divisions. Peer Fitness Trainers should be paid overtime to attend meetings, create sound on-going programming, and lead physical training programs.
- **Tier II:** Work with an independent organization to provide training programs that will be deployed by the Peer Fitness Trainers. An external organization or coach would take pressure off of Peer Fitness Trainers and alleviate the cost and time of educating them to design programs. Peer fitness trainers will be responsible for ensuring that F/RAs are doing exercises correctly and with appropriate intensity.
- **Tier III:** Hire an on-staff coach/professional to create programming and manage the Peer Fitness Trainer program. An on-staff strength and conditioning coach/exercise physiologist could maintain programming for the entire department and would be responsible for collecting information regarding fitness assessments and mandatory fitness training. This individual could also provide education on various other subjects such as nutrition, recovery and lifting/training technique.

(3) Have all F/RAs doing the same training.

Having all F/RAs on the same training program while on-duty will build team unity and positively impact the fitness culture. A single training program could easily be scaled to accommodate the differences in individual fitness levels. This would allow everyone to participate in a common program, but begin at a safe and challenging level. Further, if everyone is on the same training program it can be altered in terms of expected yearly/monthly call volume and call types. An example of a 12-month training program is provided in Part II: Job Task Analysis and Physical Requirements.

How:

- **Tier I:** Implement a training program which provides daily training plans for all F/RAs. F/RAs are provided with their daily training requirements and are responsible for completing the prescribed training sessions during their on-duty days. However, they are allowed to do so as their individual schedules allow. The resident Fire Chief or Peer Fitness Trainer will oversee completion of programs.
- **Tier II:** Implement a similar program as Tier I, however require all F/RAs to complete their daily mandatory physical training as a unit during their on-duty days (i.e.; a mandated PT time). The resident Fire Chief or Peer Fitness Trainer will be responsible for leading the session.
- **Tier III:** Implement a similar program as Tier II, however now all F/RAs will also be responsible for completing training during their off-duty days. As a part of their daily training program, F/RAs would be provided with an additional training session which must be completed during their off-duty time. This training would be self-reported by the F/RA, but could be completed as a unit if logistically possible.

(4) Increase mandated on-duty training time to 60 minutes. Work to make it un-interrupted. Fix the reporting system.

If at all possible F/RAs must be allowed to train uninterrupted: 30 minutes of physical activity, 5 days a week is the minimum recommendation for health of the general population. F/RAs however, need to be more fit than the general population and their training must reflect that need. Since fitness is inarguably associated with job performance, enough time should be given to improve fitness. Training interruptions appear to be a solvable problem. To fix the reporting system, fitness training should be enforced and reported by the residing Fire Captain or Peer Fitness Trainer. Individuals and leadership should be held personally accountable for the accuracy of the information.

How:

- **Tier I:** Allow 2-3 F/RAs to train at a time, while others cover the duties and calls during this time. Do this until everyone has had the opportunity to train. Complete training during the least busy times of day in the respective station (this information is available through technical support).
- **Tier II:** F/RAs will be paid overtime to report to the station 1 to 1.5 hours early for their shift, allotting enough time to train, shower and begin to field calls for the outgoing division.
- **Tier III:** Create a rotating "last call" schedule where station 1 is last to a call 8am-9:15am, station 2 is last to a call at 9am-10:15am and so on. This should allow each station 1 uninterrupted hour per day to train as a group, followed by 15 minutes to shower and dress.

(5) Make station training areas available for off-duty F/RAs.

Training 2 to 3 days per week while on-duty is not enough to increase or maintain fitness. Allowing off-duty F/RAs to train at a central location or their respective station will allow them to continue with the programming in a familiar setting, without additional cost to themselves.

How:

- **Tier I:** Allow off-duty F/RAs to train at Station 1 or their respective fire station 24 hours per day.
- **Tier II:** Create partnerships with local gyms/YMCA's/Sports Performance Centers to offer free or reduced rate for F/RAs.

Part II: Key Findings and Recommendations - Job Task Analysis and Physical Requirements

Key Findings:

- **EMS, Service and Non-Fire calls account for 95% of the department's emergency call volume.**

General Characteristics:

- Predominantly short duration (20-35 minutes).
 - Consist of low physical activity (Rare or Occasional activity - less than 1/3 of total time)
 - Most common physical requirements experienced during these situations are: (1) Squatting and (2) Bending.
 - Most movements are unweight. Weighted movements use light to moderate loads (15-45 lbs).
- **Fire calls account for 95% of the department's emergency call volume - fitness demands vary greatly, but are often extremely high.**

General Characteristics:

- Vary from moderate to long duration (45 minutes - over 2 hours)
- Physical demands are typically broken into 10-15 minute segments. These segments are often extremely active and can be repeated multiple times with very small breaks.
- A combination of strength, endurance, work capacity and stamina are required from the F/RA. High levels of muscular strength and muscular endurance were often required when completing the most common job tasks associate with fire emergencies.
- F/RA can expect to carry a load of at least 60 lbs. at all times during these calls.
- The most common movement groups are: (1) Stationary, (2) Locomotion, (3) Balance, Rotation, Anti-Rotation, (4) Squatting and (5) Bending.
- In addition to moving under load, the F/RA responding to a fire emergency is almost guaranteed to to lift, carry, swing, push and pull objects of at least 30 pounds, and often over 75 pounds.

Table 2: Comparison of EMS, Service, Non-Fire and Fire-Related Calls

	EMS, Service and Non-Fire Calls	Fire-Related Calls
Percent of Total Calls (Approx)	95%	5%
Duration (Approximation)	20-35 minutes	45 minutes - 2+ hours
Physical Activity (Overall)	Occasional (<33% of time)	Constant (near 100% of time)
Common Movement Groups	(1) Squatting (2) Bending	(1) Stationary (2) Locomotion (3) Balance, Rotation, Anti-Rot (4) Squatting (5) Bending
Common Load	5-10 pounds (gear) 10-30 pounds (equipment)	60 pounds (gear) 30-75+ pounds (equipment)
Additional Notes:	- Most movements are unweight and weighted movements use light to moderate loads (15-45 lbs).	- Multiple 10-15 minute bursts at near 100% effort - Lift, carry, swing, push and pull objects (often times well over 75 pounds)

- 24-Hour Cumulative Demand of all calls is high

One of the most important factors to note concerning the physical demands of a F/RA is the cumulative effect multiple calls can create. The volume at a single station can vary from as little as 1 call to over 15 calls. The only certainty is that each 24-hour shift will have an uncertain amount of physical demands.

General Characteristics (Approximations):

- F/RA physical activity can vary from 2 hours to well over 12 hours. Variations exist in over-all length (based on total call volume and duration) and intensity (based on call type).
- Our observations and interviews tend to support the typical 8-hour physical activity estimate.
- Applying the 8 hour assumption this gives us the follow estimates:
 - 7 hr and 36 min of low intensity activity (EMS, service and non-fire type demands) - 95%
 - 24 min of high to extremely high activity (fire type demands) - 5%
 - The 8 total hrs will likely be divided into 6-8 emergency call segments with an approximated gap of between 0 minutes and 2 hours between calls.
- However, the amount of uncertainty in these approximation means F/RAs can never be certain of the demands they face. Thus they need to over prepare for an "average" shift.

- Other Factors Contribute to Physical Demands

Lastly, we noticed three very important factors which, although not directly associated with physical activity have a profound effect on the over-all physical demands experienced by a F/RA. These are:

- Sleep
- Recovery
- Nutrition

Recommendations:

(1) All F/RAs should aim for a physical standard which allows them to perform the most difficult physical demands of their job - not necessarily the most common.

- Although the majority of a F/RAs work is low in physical demands, the F/R professional must maintain a level of physical ability which allows them to perform during the times in-which their job is at it's most physically demanding and most dangerous - fire related calls.
- Based on our observations, research and interviews these demands include:
 - Strength and Strength Endurance - Lifting, pulling and pressing loads of up to 100 lbs.
 - Repeated job-specific high intensity Work Capacity efforts of at least 10-15 minutes.

How?

- Implement a job task-specific fitness assessment built around station equipment. Our recommended assessment is below. This assessment measures the fitness demands required for this department, and is designed around the training equipment common to every station.
- Event #1: Upper Body Pulling Strength/Strength Endurance
- Event #2: Lower Body Strength and Endurance
- Event #3: Upper Body Pushing Strength
- Event #4: High-Intensity Job-Specific Work Capacity

Figure II: Example F/RA Fitness Assessment

	Event	Weight	Scoring
(1)	Max Rep Pull-Ups	Body Weight	1-25 points
3:00 Break (put on vest)			
(2)	5:00 Step-Ups at 8-10"	50 lb Vest	1-25 points
3:00 Break			
(3)	1:00 Max Rep Hand Release Push-Ups	50 lb Vest	1-25 points
3:00 Break			
(4)	Work Capacity Circuit Event		
	4 Rounds		
	(a) 100m Shuttle (4 x 25m)	50 lb. vest + 1x 25/45 lb. Plate	
	(b) 10x Floor to Chest Plate Pull	50 lb. vest + 1x 25/45 lb. Plate	
	(c) 10x Kneeling Half Moons	50 lb. Vest + 1x 25/45 lb. Plate	1-25 points
	(d) 25m All-Fours Crawl (2 x 12.5m)	50 lb Vest	Scored By Time

- **Appendix F** contains a potential scoring chart of the the assessment
- **Appendix G** contains a break-down of scores by gender and age.
- **Appendix H** provides photographs of each exercise in each event.

(2) All F/RAs should participate in training which supports their job-specific physical demands.

- Training should take place 3-5 times per week and last between 45-90 minutes depending on the training session objective.
- Training should include all eight primary movement groups: (1) Stationary, (2) Locomotion, (3) Balance, Rotation, Anti-Rotation, (4) Squatting, (5) Bending, (6) Pushing, (7) Pulling and (8) Grasping/Gripping.
- Training should prioritize job-specific strength, stamina, endurance, and work capacity.
 - Strength - for performance and efficiency in job specific strength tasks - especially lifting, pushing and pulling (vertical and horizontal movements).
 - Stamina - for better performance during multiple, repeated higher intensity events.
 - Endurance - for overall cardio-respiratory health and recovery.
 - Work Capacity - for performance during shorter, single, very high intensity efforts.

How?

- Below is a basic example of a 12-month, periodized training program which could be used to train a F/RA. The program is based on the assumption of a bi-annual physical fitness assessment and an annual emergency call cycle which includes two peak periods (summer and winter) - this is similar to the F/R department we observed.

Figure III: Example of 12-Month Periodized Training Plan for F/RA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Fitness Test						#1						#2
Training	4-Week Strength	2-Wk Stam	4-Week Work Capacity	6-Week Strength Cycle	4-Week Test Prep	4-Week Work Capacity	4-Week Strength	2-Wk Stam	4-Week Work Capacity	6-Week Strength Cycle	4-Week Test Prep	4-Week Work Capacity
Call Vol (2014)	1,917*	1,657	1,747	1,708	1,862	1,907	1,933	1,964*	1,919	1,876	1,738	1,834

*Training program is designed with the highest call volume approximately 1-2 months after each fitness assessment. By prioritizing these months we ensure that an athlete is "peaking" at the busiest (and most intense) time of the year.

- We recommend job specific training 3-5 times per week. Sessions should range from 45 minutes (general strength sessions) to 90 mins (stamina sessions). One possible way to structure training would be to employ a 2-day On:1-Day Off training schedule. This would fit well into the F/RA's 1-Day On:2-Day off work schedule. An example can be found in Figure IV.

Figure IV: Example of 2-On:1-Off Training Schedule with 1-On:2-Off Duty Schedule

		Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Div 1	Duty		On			On			On			On			On
	Train	Ses 1	Ses 2		Ses 3	Ses 4		Ses 5	Ses 6		Ses 7	Ses 8		Ses 9	Ses 10
Div 2	Duty			On			On			On			On		
	Train		Ses 1	Ses 2		Ses 3	Ses 4		Ses 5	Ses 6		Ses 7	Ses 8		Ses 9
Div 3	Duty	On			On			On			On			On	
	Train	Ses 1		Ses 1	Ses 2		Ses 3	Ses 4		Ses 5	Ses 6		Ses 7	Ses 8	

(3) F/RA recovery should to be prioritized.

- The job of an F/RA can not only be physical demanding, but also mentally demanding. Therefore special attention should be given to optimizing recovery to maximize performance when it is needed.

How?

- On-Duty Recovery - Given that it is very unlikely that a F/RA will sleep through the night-time hours during their 24-hour shift we recommend leadership encourage sleep during down-time at the station.
- Off-Duty Recovery - The 48-hour period between on-duty shifts should be used to recover and prepare for the next on-duty shift. We believe a F/RA has a professional obligation to ensure that they are prepared to perform at an optimal level when reporting to duty. The reality is most F/RAs moonlight with second jobs or careers between fire station duty days. Professional responsibility demands they not compromise their rest/recovery from fire station duty, and arrive for their next duty day rested and alert.
- Training Recovery - We recommend that all F/RAs train between 3-5 times per week in order to build and maintain the necessary physical capabilities. Whenever possible difficult training sessions should be completed during the F/RAs off-duty time and more moderate training should be saved for on-duty time. This would be easily accomplished following the 2-On:1-Off schedule outlined in Figure IV.

(4) Nutrition should focus on F/RA Performance (especially during on-duty days)

- F/RAs should treat proper nutrition as a job requirement. This is especially true during on-duty shifts where the ability to meet physical demands and recovery requirements can be greatly influenced by an F/RA's nutrition.

How?

- We believe that proper nutrition is a vital part of physical performance. We also believe the basics of proper nutrition are mostly intuitive, they are not rocket science. For the most part individuals know when they are eating poorly. Generally, it comes down to discipline.
- Nutrition education and assistance were topics which were regularly brought-up during interviews with F/RAs. While these services would be welcomed by the F/RAs, the key to proper nutrition is not just knowing proper nutrition, it is following it. A certain degree of social pressure will likely influence decisions, however, in the end, proper nutrition is an individual responsibility.

Part III

Fire Department and Survey Demographics

Mountain Tactical Institute - MTI

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Part III: Fire Department and Survey Demographics:

Subjects:

The F/R Department examined in this study was from a midsize, urban/suburban city, located in the Midwestern United States. The population of the city is approximately 205,000. The F/R Department consists of 10 stations and 275 F/R professionals. The average age of the F/R Department is 46 years old.

The many varied services of this F/R Department include: Fire suppression; Emergency medical care and transport; Teaching fire safe behaviors to the public; Inspecting commercial properties; Smoke detector familiarization; Fire cause investigations; School education programs; Health care facilities staff fire extinguisher training; Water rescue and recovery; Hazardous materials response and mitigation; Fire and EMS apparatus maintenance and repair; Fire/EMS facilities maintenance and upkeep; and, Airport fire and EMS services response.

The F/R Department currently requires all on-duty F/RAs to complete and document 30 minutes of physical activity during the 24-hour shift. This is the only fitness requirement the department has in place for current employees. It does offer a voluntary, annual fitness and wellness assessment to members, but it is rarely, if ever used.

Table 3: 2014 Department and Station Call Information*

Number of Stations	10
Divisions Per Station	3 (24-hr On-Duty / 48-hr Off-Duty)
Yearly Emergency Call Volume	22,062
Fire Rescue Calls	6,125 (28% of Total)
Fire Rescue Calls (Hazardous Nature)**	1,341 (6% of Total)
EMS Calls	15,963 (72% of Total)
Yearly Emergency Call Volume (Busiest Station)	4,132 (19% of Total)
Yearly Emergency Call Volume (Slowest Station)	500 (2% of Total)
Monthly Emergency Call Volume (Busiest Month: Aug)	1,964 (9% of Total)
Monthly Emergency Call Volume (Slowest Month: Feb)	1,657 (8% of Total)

*In house fire department statistics

** Includes: *fire, rupture/explosive, hazard without fire*

Notes: Call volume has slowly and steadily increased since 2009. Call volumes are highest 10am until 8pm. The busiest days of the week are Monday and Friday.

Survey Respondents:

The fitness culture survey was created using SurveyMonkey (Palo Alto, CA) and distributed online to F/R Department leadership. F/R Department leadership was then responsible for disseminating the survey to their subordinates.

The fitness culture survey was deployed 2 weeks prior to our scheduled observation period. Table 2 contains basic descriptive information related to the respondents.

Table 4: Survey Respondent Information

Number of Employees	275
Number of Survey Respondents	113 (41% Response Rate)
Male Respondents	103 (91% of Respondents)
Female Respondents	10 (9% of Respondents)
Leadership Response (Fire Chiefs, Fire Captains, etc.)	41 (34% of Respondents)
Height (average)	70.7 inches
Weight (average)	200 pounds
Body Mass Index (BMI) (average)	28.3
Most Common Age Range	36-45 Years of Age
Years in Fire Rescue Profession (average)	16.6 Years
Full-Time Fire Rescue/EMS Position	90 (75%)
Full-Time Fire Rescue Position	24 (20%)

Note: Responses to our on-line survey were utilized to characterize the department. We also accounted for response rate and acquiescence by the department. A higher response rate (90%+) was desired. However, our actual response rate was 41%. This short-coming was accounted for in the scoring system

Part IV

Fitness Culture Assessment

Mountain Tactical Institute - MTI

Jackson, Wyoming

Kristen Oullette, Adam Scott and Rob Shaul

Part IV: Fitness Culture Assessment of a Midsize, Urban, Midwestern Fire Department

Why:

- 1) The Fire/Rescue profession is a physically demanding, high risk occupation. Because of the public service and danger involved, Fire Rescue professionals are “Tactical Athletes.” In fire departments many individual Fire/Rescue Athletes (F/RAs) agree fitness is important, but many F/RAs are simply unfit and many fire departments have notably weak fitness cultures.
- 2) Assessing and improving fitness culture is a key, first step towards improving the overall fitness in a tactical unit.
- 3) Fitness culture combines attitudes and actions of frontline F/RA's and their leadership
 - a) Attitude: A way thinking or feeling about fitness that is reflected in a persons' opinions. For example; This quote regarding fitness assessments, “... we don't need anything that they administration can hold against us.” displays a negative attitude towards an important component of fitness culture, fitness assessments.
 - b) Action: A behavior that displays a clear favor, disfavor, to support or undermine of fitness culture. For example; A fire station division which makes a point to arrive to the duty day an hour early, and train together before duty is a behavior which demonstrates a strong fitness culture.

Goals:

- 1) **Develop a tactical unit fitness culture assessment.** We're on new ground here. Presently, there is no recognized method to evaluate the fitness culture of a tactical unit. We sought to develop an assessment that was reproducible, gave a quantitative score and also yielded qualitative information regarding strengths and deficiencies in fitness culture.
- 2) **Utilize the fitness culture assessment to provide recommendations.** We strive to evaluate fitness cultures along the full spectrum (very weak to very strong). The goal was to develop a system that would be able to appropriately score and offer recommendations for a culture at any level. For this project, we applied our fitness culture evaluation system to a fire department in the Mid-West of the United States. We initiated the project without preconceived notions of the existing fitness culture and developed recommendations unique to the department that was based off of our assessment as well as our experience working with tactical units for nearly a decade.

Challenges:

Many challenges face the fitness culture in Fire Departments.

- 1) **Older “legacy” members resistant to job-based fitness training.** First Responder Units (Fire/Rescue, Law Enforcement) are distinct from military units in that members in their 50s and 60s can still hold front line, operational positions. A higher percentage of legacy members resist physical training and any type of fitness assessment for two general reasons. First, many legacy members have enjoyed long, successful careers without undertaking any job-specific training at all, so why now? Second is age and the natural physical decline which comes with getting older. Some legacy members in their 40’s - 60’s fear fitness training and assessments because age and lifestyle has brought on declining fitness, and they don’t want to be compared to younger members. Many feel experience and tactical proficiency can make up for poor fitness. However, these attitudes often differ with younger members, and creates a disconnect which presents a challenge to developing a unified fitness culture.
- 2) **No training tradition and an anti-training bias.** The quote, “I have been doing this job for years, and I’ve never needed to train. So why now?” would typify an anti-training bias. Day to day operations in a fire station are low intensity work. However, moderate and high intensity events occur about 5% of the time. It only takes one major life threatening event to seriously harm a F/RA, jeopardize their life or the life of a teammate. Therefore, lack of preparation for this event can lead to catastrophic results. If a F/RA is the weakest on a team and cannot be relied on, this will create frustration within the unit and harm the fitness culture and morale and could be dangerous in an “all hands on deck” fire or tactical event.
- 3) **Public union resistance.** Many F/RAs are represented by public unions which historically have been resistant to mandated physical training and high jeopardy fitness assessments.
- 4) **Administrative cost and effort.** Providing time to train on-duty, coaching, training programs and equipment, and tracking will accrue administrative costs and focused effort.
- 5) **Social wellness issues.** Finally, some social issues exist in fire rescue are outdated. These include tolerance of teammates who are unfit for duty, tobacco use, excessive drinking and poor nutrition habits. Fire rescue is a physically demanding job that has many responsibilities (responsibility for one self, teammates and victims). We believe that quiet acceptance of unfit and unhealthy teammates undermines team unity, sends the wrong signal and erodes departmental fitness culture.

Methods:**Overview:**

Fitness culture was evaluated using a 4-part method:

- (1) Department wide fitness culture survey
- (2) 3-day observation period
- (3) In-person interviews with leadership and F/RAs
- (4) Analysis of Department and Station historical call data

Information gathered by survey, observation and interview was distilled down to 50 questions that were scored utilizing a point system (0, 1 or 2 points could be earned per question), yielding a fitness culture score ranging from 0 to 100.

1) Fitness Culture Survey

The fitness culture survey was designed to gain information regarding 5 constructs of fitness culture;

- (1) Fitness assessment
- (2) Physical fitness training
- (3) Personal responsibility
- (4) Leadership
- (5) Perceived culture.

Several questions were asked pertaining to the attitudes and actions associated with each construct. For example, we theorize that a strong fitness culture cannot exist without a required fitness assessment. Therefore, several questions were included to gain an understanding of the state of fitness assessment in the department. Men and women were asked if they were required to take a fitness assessment, if there were punitive consequences for failure or rewards for success and also, if they were in favor or opposed to a fitness assessment (space was left to explain why or why not).

The fitness culture survey was created using SurveyMonkey (Palo Alto, CA) and sample questions can be seen in Appendix A. The fitness culture survey was deployed 2 weeks prior to a scheduled observation period.

Vision for the fitness culture survey came from several sources and pilot data was also collected to inform the survey. Personal experience of our coaching organization, discussion with academic colleagues and experts on fire rescue, discussions with incumbent F/RAs and review of the available research on fire rescue and fitness culture all influenced the fitness culture survey. A pilot survey was deployed to the tactical community at large (fire rescue, law enforcement and military) and 247 responses were compiled. Based on the pilot survey results, appropriate changes were made to create an operational, fire rescue-specific fitness culture survey.

Scoring the results of the fitness culture survey was done by analyzing the survey to answer 25 questions dealing with the 5 identified constructs. These questions and constructs can be seen in Appendix A.

The survey, its associated grading scale and qualitative information can be used as a standalone assessment of fitness culture in the event that a department is unable to support observations and interviews.

2) Observation

Observations were carried out by 2 researchers over a 3 day period. Both researchers were Certified Strength and Conditioning Coaches through The National Strength and Conditioning Association. Observations included 3, 24-hour shifts with 3 different stations, where researchers went on all fire and EMS calls and observed each call from a safe distance.

The goal of observations were 2 fold (1) evaluate the stations' fitness culture including; observe fitness training, examine the training areas for comprehensiveness and safety, observe station nutrition and observe "off-call" physical activity (2) complete a job task analysis, which is discussed in Part 2 of this document.

Seven questions were developed to score the observation portion of the analysis. Additional observational data was collected to add context to the qualitative nature of this report and to also inform our recommendations. The observational questions are a direct reflection of the tangible components of fitness culture and can be seen in Appendix B.

3) Interviews

Interviews were carried out with individuals in leadership positions and F/RAs. Leadership interviews were conducted one on one and F/RA interviews were conducted as roundtable discussions to facilitate dialog. Additionally, department wide statistics were analyzed for pertinent injury and call volume data.

Roundtable interviews were conducted at 4 out of 10 fire stations with the division that was on-call (approximately 20 F/RAs were interviewed). One on one interviews were conducted with 3 Fire Chiefs. Interviews were recorded and analyzed later.

Interview questions were constructed ahead of time to gain enough information to answer 15 scored questions. Scored questions based on the interviews can be seen in Appendix B and sample interview questions for leadership and F/RA can be seen in Appendix C.

4) Call Data Analysis

The Department's administration was contacted to answer various questions regarding call volumes and injury reports. Scored call data questions can be seen in Appendix B. Sample questions that were asked of can be seen in Appendix D. Presented below, in Table 5, is the 2014 Emergency call volume for the department.

Table 5: 2014 Emergency Call Volume

Station Number	July Call Volume (2014)	Yearly Call Volume (2014)	Percent of Calls from 2014
1	330	4,132	18.7%
2	45	500	2.3%
3	301	3,425	15.5%
4	82	900	4.1%
5	215	2,593	11.8%
6	120	1,079	4.9%
7	226	2,490	11.3%
8	264	2,845	12.9%
9	202	2,331	10.6%
10	148	1,767	8%
TOTAL	1,907	22,062	100%

Results and Discussion:

The results of our assessment represent a department that has a weak fitness culture. 113 out of 275 individuals responded to the fitness culture survey (41% response rate). The low response rate influenced the overall fitness culture assessment score and subsequently data that was collected from the fitness culture survey is only accounting for 113 individuals. Our criteria for a response rate indicative of a strong fitness culture was 75% or greater.

Fitness Culture Assessment Score

This departments fitness culture assessment score was 47 of a possible 100 points. A score of 100 represents a very strong fitness culture. This value is an indicator of culture strength and is to be used in combination with qualitative data to develop recommendations.

Figure I: Overall Fitness Culture Score and Categories (republished)

Overall Score	47
Score	
0-25	Very Low
26-50	Low
51-75	Moderate
76-100	High

Matrix Analysis

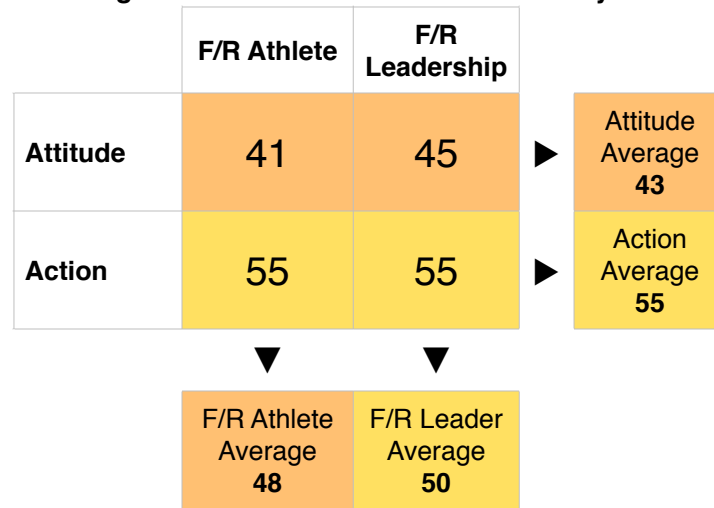
Following the overall analysis we divided results along four major factors:

- (1) Attitude
- (2) Actions
- (3) F/R Athlete
- (4) F/R Leadership

(Figure on following page)

These four factors were isolated and then, using a matrixes, examined to determine imbalances between reported attitudes and observed actions, and between F/R Athletes and F/R Leadership.

Figure V: Fitness Culture Matrixes Analysis



Attitudes vs Actions

- F/R Athlete - the 14 point difference discovered between F/R Athlete Attitudes and Actions reveals a major disconnect between how the F/R Athletes feel about fitness and their actions towards fitness. This can be a sign of “going through the motions” or acting without conviction.
- F/R Leadership - the 10 point difference in F/R Leadership Attitudes and Actions is similar to what we found in F/R Athletes. This can also be a sign of acting without conviction and could be contributing to the integrity issues found in the current system.

F/R Athlete vs F/R Leadership

- Attitudes - F/R Athlete and F/R Leadership attitudes towards fitness were fairly similar. Unfortunately they were both low.
- Actions - F/R Athlete and F/R Leadership fitness actions were aligned at 55 points. This score represents the highest category for both groups. However, because of the low scores in attitude it is difficult to say how sincere these actions are.
- Overall - the finding that actions and attitudes seem to align between groups shows that there seems to be a decent connection between F/R Athletes and F/R Leadership. However, the low scores show that both groups have plenty of room to improve.

F/R Athlete Attitudes - Score 41- LOW

- Fitness Assessment: There is a split between younger and older F/RAs regarding fitness assessments. 81% of younger and 63% of older F/RAs are in favor of an annual fitness assessments. Younger = < 45 years old, older = >45 years old. The 20 point difference between younger and older F/RAs shows a large difference in support of an assessment. When asked to describe why they support or do not support a fitness test, 10% of younger F/RAs had negative comments, while 33% older F/RAs had negative comments. This large split can be damaging to fitness culture.
- Positive voluntary responses for instituting an annual fitness assessment include; an assessment will ensure fitness, the job is physically demanding, there should be a minimum

standard, all members should be accountable for their individual fitness and it will force those who do not train to change.

- Peer Fitness: 46% of younger and 78% of older F/RAs feel their peers are fit. There is a clear divide between younger and older F/RAs perception of their peers. A department with a strong fitness culture that maintains fitness standards and accountability should all perceive one another as fit.
- 74% feel fitness is at least, somewhat important in their department. In interviews, the majority perceive fitness as important. However, many offered barriers to fitness such as; not enough access to Peer Fitness Trainers, not enough time on-duty, constant interruptions and inconsistent motivation.

Leadership Attitudes - Score 45 - LOW

- Fitness Assessment: 68% of station leadership are in favor of testing. However, administration (non-F/RA) do not support an annual fitness assessment, particularly an assessment that has punitive ramifications.
- Administration had difficulty differentiating between fitness, performance and wellness. All agreed that fitness was important for job performance, but none expressed the crucial nature of fitness or the potential deadly consequences of being unfit or overweight.
- Men and women feel allowed and encouraged by administration to train on duty, however, the imposed mandatory physical training is suboptimal to promote fitness and the current tracking system is fraught with integrity issues.

F/RA Actions - Score 55 - MODERATE

- Low participation in voluntary fitness testing.
- Many are dishonest when reporting their fitness training and there are no repercussions.
- 75% of training that does occur is unplanned/un-programmed.
- 18% use tobacco products.
- Some were observed training, many are motivated to train (particularly for sports/events outside of fire rescue). But, most do not train and/or expressed barriers to fitness training that appeared to be solvable.

Leadership Actions - Score 55 - MODERATE

- Provided all stations with adequate equipment and instituted a Peer Fitness Training Program, although neither the equipment nor fitness programming are optimal.
- There was an understanding that fitness is necessary for job performance and safety, however, leadership opposes mandating yearly fitness assessments.
- Existing Fitness assessment is voluntary and the test battery is not functional for a large volume of F/RAs.
- Mandated physical fitness training guidelines need revision, as the mandate is too general to influence fitness.

What is being done right:

- Mandated on-duty training time
- Equipment is available at all fire stations
- Peer fitness program has been initiated
- Allowed us to come in as an outside researchers

What is contributing to a weak fitness culture:

- No required fitness assessment or fitness standard
- Minimal leadership by example at all levels - station and above
- On-duty mandatory training time is too short and lacks direction
- On-duty training time is often interrupted by calls
- Rampant integrity issues with reporting training time which is eroding the fitness culture
- Too much is being asked of the Peer Fitness Trainers, expecting them to create programs for 200+ F/RAs is a full-time job
- F/RAs can't train at their stations while not on duty

Part V

Job Task Analysis and Physical Requirements

Mountain Tactical Institute - MTI

Jackson, Wyoming

Kristen Oullette, Adam Scott and Rob Shaul

Part V: Job Task Analysis of Firefighters in a Midsize, Urban, Midwestern Fire Department

Why:

Fire/Rescue (F/R) professionals are required to complete multiple, complex, physically demanding tasks as a regular part of their job. The cumulative effect of these tasks, as experienced during a typical 24-hour shift, represents a relatively unmeasured and under appreciated, but extremely vital component of the F/R profession.

This job task analysis and report were undertaken as a means of better identifying, understanding and qualifying the physical requirements of this particular F/R department. The specific job tasks and physical demands of a F/R professional may differ greatly from location to location.

By developing an improved understanding of the distinct conditions under which this department operates we hope to identify department specific F/R fitness requirements and offer explicit recommendations concerning a job-specific fitness assessment and job-specific year-round training program.

Goals:

- 1) Identify the overall fitness demands of a F/RA during a typical 24-hour work periods.
 - a) Determine an estimated and expected value for (1) Total call volume, (2) Total call time, (3) Call types (fire and non-fire) and (3) Time between calls.
 - b) Determining the movement requirements of a F/RA on a typical EMS, service and non-fire related call.
 - c) Determining the physical needs associated with an EMS, service and non-fire related call based on these movements and their observed duration, load, volume and intensity.
 - d) Determining the movement requirements of a F/RA on a typical fire call.
 - e) Determining the physical needs associated with a fire call based on these movements and their observed duration, load, volume and intensity.
 - f) Determining the additional factors, outside of physical activity, which contribute to the fitness demands of a Fire/Rescue and EMS professional.
- 2) Create a F/R Fitness Assessment custom designed for this department based on their specific job task demands, available equipment, usable space and athletes.
- 3) Develop an outline for a department-specific, long-term training program - including macro-, meso-, and micro-cycles.

Methods:**Overview:**

We utilized three separate methods to gather information concerning the general physical demands of a F/RA at this department. On the micro-level we utilized multiple, first-hand, 24-hour observations, conducted by two on-staff researchers. On the macro-level we examined nearly 5 years of historical data provided by the F/R department concerning call volume, work load, service demands and other relevant statistics. To answer any outlying questions, and tie together our observations and historical data we conducted simple formal and informal interviews with F/RAs throughout the department.

Observations:

Three separate 24-hour observation periods were used to provide the researchers with a ground-level view of the F/RA physical demands. Researchers shadowed a station chief and his/her fire crew for their entire 24-hour shift. During our observational shifts we accompanied the F/RA on all emergency calls in order to examine and document the physical requirements that the F/RA experienced.

Research observations were conducted in accordance with the *General Fire Fighter Job Functions - Job Analysis* used by both the International Association of Firefighters (IAFF) and the Federal Emergency Management Agency (FEMA).

To complete our observations, our researchers focused on 22 of the 26 “physical requirements of job task” outlined in the *General Fire Fighter Job Functions - Job Analysis*. These 22 physical requirements were grouped into 8 primary movements and observed for duration (5 classifications) and load (based on weight). Researchers looked at both per-call requirements and cumulative requirements based on multiple calls over at typical 24-hour shift.

The *General Fire Fighter Job Functions - Job Analysis* was used as the main tool to organize, synchronize and objectify the researchers’ subjective observations. Appendix E (at the conclusion of this report) shows how the 22 physical requirements were divided and grouped by the researchers. The eight primary movement groups were:

- (1) Stationary,
- (2) Locomotion,
- (3) Balance, Rotation and Anti-Rotation,
- (4) Squatting,
- (5) Bending
- (6) Pushing,
- (7) Pulling and
- (8) Grasping/Gripping

The researchers examined the 8 movement groups above and created qualified measures using the observed duration and load utilized by the F/RA. Table 5 (below) shows the duration classifications used by the researchers. The classification system was also based on the definitions used by the *General Fire Fighter Job Functions - Job Analysis*.

However, because we examined both individual and cumulative call demands we elected to focus primarily on the percentage definitions provided in the *General Fire Fighter Job Functions - Job Analysis*. This allowed us to qualify physical demands “per hour” (used to approximate per call demands) and “per 8-hours” of physical activity (used to approximate per shift demands). This 8-hour physical activity “shift” is based on the 24-hour total shift assumption used in the *The General Fire Fighter Job Functions - Job Analysis*.

Table 6: Physical Activity Duration Classifications

Category	Definitions	Per Hour	Per 8 Hours
Intermittent	"On and off again" basis		
Rarely	Less than 1% of the time	Less than 40 sec.	Less than 1.5 min.
Occasionally	1-33% of the time	40 sec. to 20 min.	4.8 min. to 2.6 hr.
Frequently	34-66% of the time	20 min. to 40 min.	2.7 hr. to 5.3 hr.
Constantly	67-100%	40 min. to 1 hour	5.4 hr. to 8.0 hr.

Finally, to estimated loads we used information provided by the F/R department, research observations and estimations found in the *General Fire Fighter Job Functions - Job Analysis*. Based on these three sources of information we divided loads into 7 weighted categories. These categories and a basic list of tools can be found in Table 6 (below). This was also similar to the system used in the *General Fire Fighter Job Functions - Job Analysis*.

Table 7: Load Classification and Basic Tools List

	Load	Tools and Equipment
(1)	1-10 lbs.	Radio/flashlight (5 lbs.), Sledge (10 lbs.)
(2)	11-20 lbs.	Oxygen Kit (14 lbs.), First Aid Kit (14 lbs.)
(3)	21-30 lbs.	Protective Gear - boots, pants, coat, helmet (28 lbs.), Self Contained Breathing Apparatus SCBA (25 lbs.), Saws (20-30 lbs.), Defibrillator Pack (26 lbs.), Wet-Vacuum (30 lbs.), Hydraulic Cutters (30 lbs.)
(4)	31-50 lbs.	Carbon Dioxide Extinguisher (40 lbs.), Hydraulic Jaws (48 lbs.), Hydraulic Ram (36 lbs.)
(5)	51-75 lbs.	20-24' Ladder (56-67 lbs.)
(6)	76-100 lbs.	Fan (78 lbs.)
(7)	Over 100 lbs.	35' Ladder (135 lbs.), 50' Bangor (245 lbs.), Gas Generator (115 lbs.), Charged Hoses (Up to and over 200 lbs.)

Historical Data Review:

Two historical reports were examined to verify our observations. These reports also provided context and archival details which helped add depth to our results.

The first report we reviewed was conducted by Public Safety Solutions Inc (PSSi). It included approximately 5 years of historical data collected from 2009 through 2014. The report examined fire station placement and expansion possibilities, but also contained a detailed analysis of over 40 F/R specific areas of interest. Our review focused predominately on the following factors:

- (1) Fire Department Historical Service Demand,
- (2) Historical Workload by Call Type,
- (3) Workload by Month of Year,
- (4) Fire Workload by Day of Week,
- (5) Workload by Hour of Day,
- (6) Fire Service Demand,

(7) Structure Fire Incidents in the City and
(8) Coverage Statistics

The second report we reviewed was a detailed analysis of emergency service call data from 2014. Data was collected, compiled and provided directly by the F/R department. The report contained a comprehensive break-down of the 22,062 service calls answered by the department. Calls were tracked by station and month, and also classified into 10 categories and 121 sub-categories.

In addition to call data, the second report also provided detailed injury data from the F/R department for all of 2014. This data was broken-down by call type: EMS and fire (fire suppression), and then sub-divided into 39 sub-categories. Data was also reported concerning the symptom and body parts which corresponded to the injury.

Interviews:

During our 24-hour observation periods we conducted multiple formal and informal interviews with F/RAs from nearly every station and at all levels of the organization. These interviews were used to help answer additional questions and fill-in details missed during our observations.

Analysis:

Each 24-hour observation yielded a job task analysis for each call answered. These were then combined to show the cumulative physical demands an F/RA experiences during their 24-hour shift. These physical demands were calculated by identifying the utilized movement group, assessing the load and, finally, documenting the duration of the physical requirement. An example is provided below in Figure I:

Figure VI: Example: Observation Analysis Table

	1-10 lbs	11-20 lbs	21-30 lbs	31-50 lbs	51-75 lbs	76-100 lbs	100+ lbs
Squatting	Frequent	Frequent	Occasional	Occasional	Occasional	Rarely	Intermittent

Figure VI Notes:

- (1) Movement is identified in the far left column.
 - (2) Load is identified in the top row (based on classifications in Table 2).
 - (3) Duration (based on classifications in Table 1) is assigned to the load and movement in the body of the table.
- These three variables: (1) Movement, (2) Load, and (3) Duration were used to assess all 8 movement groups during the 24-hour period.

After data collection was complete we then compared our observations to the two historical reports and the information gathered during our interviews. Combined, the *Fire Station Placement Review and Recommendations for Expansion* (report provided by PSSi) and the internal call volume report (provided by the F/R Department) accounted for over 18,000 separate 24-hr periods. The F/RAs we interviewed had as many as 30+ years of experience. Incorporating the reports and our interview data allowed us to compare our observations against years of experience and a large set of historically reported data.

Results and Discussion:

Results Part I: Over-all Call Volume and Call Time:

During our three 24-hour observations our F/RAs experienced an average of 8.3 emergency service calls. This was slightly higher than the overall average of 6.0 emergency calls reported by the department in 2014. During our observations we also experienced two fire calls - one vehicle and one structural. Two fire calls during three 24-hour observations is significantly higher than the department average. However, according to historical data, station-to-station call volume varies greatly throughout the department. The highest volume station averaged 11.3 call responses per day in 2014, while the lowest volume station responded to just 1.3 calls per day during the same year. Thus, we felt that our observations represented an authentic example of call demand experienced by the department.

Table 8: Emergency Call Averages Per Station Per 24-Hours

	Observation	2014 Averages
Total Calls	8.3	6.0
EMS & Service Call	7.7	5.8
Fire Call	0.6	0.2

During our 24-hour observation periods the F/RAs we observed spent between 5.5 hours and 9.5 hours of their 24-hour shift responding to emergency calls. Although there was no historical data for us to compare against, based on conversations and interviews with the F/RAs, these findings seems to align with typical 24-hour shift expectations and was on-part with the 8 hour assumptions used in the *General Fire Fighter Job Functions - Job Analysis*.

Based on this information, we estimated that a typical 24-hour shift should include between 18.5 hours and 14.5 hours of off-call time. However, this should not be considered “down-time” as F/RAs still have to accomplish duties around the station, complete mandatory training, carry out administrative requirements, cook meals, and complete equipment maintenance during this time.

The final overall observation we noted was a measure of time between calls. During our 24-hour observation periods the recovery time between emergency calls varied from as little as 0 minutes to as long as 4.5 hours. These periods were completely random. However, based on our observations and historical reports typically call volume is highest between 1100 and 2000.

Results Part II: Physical Requirements of an EMS, Service and Non-Fire Calls

During our 24-hour observation periods we attended 25 EMS, service and non-fire related calls. These calls typically lasted between 15 and 60 minutes, and were very light on physical requirements.

Table 4 (below) shows a qualitative break-down of EMS, service and non-fire calls as classified by our researchers. Of the eight observed movement groups, the primary movement requirements for a typical EMS, service or non-fire call are: (1) Squatting and (2) Bending. These movements are commonly seen when addressing a victim, providing aide or moving a victim. Of secondary importance are (3) Pushing, (4) Pulling and (5) Gripping/Grasping. Examples of these include moving stretchers, carrying medical tools, moving furniture/debris or assisting victims. Of least importance are typically (6) Stationary, (7) Locomotion, (8) Balance, Rotation and Anti-Rotation. These include standing, sitting, walking on uneven surfaces, and getting into awkward positions.

Based on our observations the typical load used during these calls is between 10-39 lbs. This included carrying a defibrillator pack (~26 lbs.), oxygen kit (~14 lbs.) or first aid kit (~14 lbs.). Most

loaded movements include lifting from the ground to the waist or chest, plus carrying objects to/from the truck and victim.

During these calls, the heaviest load a F/R will face is typically determined by the patient. Based on our limited observations, patient weight varied from light (approximately 100 lbs.) to very heavy (well over 250 lbs.) - obviously even heavier patients are likely to be encountered. Most calls did require the movement of a patient - with, or sometimes without, a stretcher. The stretcher used by this particular F/R department was approximately 80 lbs. unloaded, but provided hydraulic assistance to raise and lower the patient. In cases where the stretcher was not usable, multiple F/RAs would contribute to lifting and lowering a patient - this distributed the heaviest load between multiple individuals.

Table 4 (below) shows a basic break-down of the typical physical demands experienced during a typical non-fire call. Movement is identified in the far left column. Load is identified in the top row (based on classifications in Table 2). Duration (based on classifications in Table 1) is in the body of the table.

**Table 9: Physical Requirements of EMS, service or Non-Fire Calls
(Based on per hour classifications)**

	1-10 lbs	11-20 lbs	21-30 lbs	31-50 lbs	51-75 lbs	76-100 lbs	100+ lbs
Stationary	Frequent	Frequent	Occasional	Intermittent	Intermittent	Intermittent	Intermittent
Locomotion	Frequent	Frequent	Occasional	Intermittent	Intermittent	Intermittent	Intermittent
Balance / Rotation, Anti-	Frequent	Occasional	Occasional	Intermittent	Intermittent	Intermittent	Intermittent
Squatting	Occasional	Occasional	Rarely	Rarely	Rarely	Rarely	Rarely
Bending	Occasional	Occasional	Rarely	Rarely	Rarely	Rarely	Rarely
Pushing	Occasional	Occasional	Rarely	Rarely	Intermittent	Intermittent	Intermittent
Pulling	Occasional	Occasional	Rarely	Rarely	Intermittent	Intermittent	Intermittent
Grip / Grasp	Frequent	Frequent	Frequent	Occasional	Intermittent	Intermittent	Intermittent

Category	Definitions	Per Hour
Intermittent	"On and off again" basis	
Rarely	Less than 1% of the time	Less than 40 sec.
Occasionally	1-33% of the time	40 sec. to 20 min.
Frequently	34-66% of the time	20 min. to 40 min.
Constantly	67-100%	40 min. to 1 hour

Results Part III: Physical Requirements of a Fire Call

Fire calls vary greatly in duration and can require moderate to very high levels of physical activity. Although these calls represent a small minority of all emergency calls (less than 5%) their physical demands far out-weight those of almost any other call.

During our observations we were able to witness two types of fire calls - vehicle and structure. Each fire call was unique and presented a very particular set of physical demands. The two fires observed by our researchers differed vastly in duration, intensity and physical activity. Table 5 (below) shows a basic outline of the duration of the fire divided into stages, as observed by our researchers. It also contains a basic categorization of the physical activity demands of each stage based on the same definitions in Table 1.

Table 10: Basic Break-down of Two Observed Fire Calls

Action/Stage	Vehicle Fire	Structure Fire	Physical Activity
Travel to Scene	10 min	10 min	Rarely
Stage Gear/Tools	5 min	10 min	Constantly
Fire Attack	12 min	25 min	Constantly
Overhaul/Investigate	10 min	40 min	Frequently
Clean-Up	8 min	30 min	Occasionally
Return to Fire House	10 min	15 min	Intermittent
Total	55 min	2 hr 10 min	

During the entirety of these calls the F/RA donned over 50 lbs. of protective gear - including boots, pants, coat, helmet (~28 lbs.), SCBA (~25 lbs.) and radio/flashlight (~5 lbs.).

In addition to personal protective gear we observed F/RAs using the following equipment: Ax and trumpet tool (~20 lbs.), various ladders from 10-foot to 35-foot (up to ~1135 lbs.), dry and charged hoses (up to and over 200 lbs.), fan (~78 lbs.), gasoline generator (~115 lbs.), 16" blade saw (~20 lbs.).

Of the eight observed movement groups, the primary movement requirements during a typical fire call are: (1) Stationary, (2) Locomotion, (3) Balance, Rotation, Anti-Rotation, (4) Squatting and (5) Bending. These movements dominate during all phases of the emergency call - especially during fire suppression and overhauling/investigating. Since the F/RA is in under load (~50 lbs.) during the entire event this creates an immediate strength demand. In addition to their gear we observed F/RAs operating under loads in excess of 75 additional pounds.

After the four movements listed above the second most demanded movement was: (6) Gripping/ Grasping. This can be seen during the usage of tools and hoses; climbing ladders and carrying objects, victims and materials. Of lesser, but still significant importance are (7) Pushing and (8) Pulling. This includes handling hoses, breaching doors, swinging axes and sledges, venting, plus many other tasks. The loads on these movements can easily exceed 50-100 additional pounds.

Table 6 (below) shows a basic break-down of the general physical demands experienced during a typical fire call. Movement is identified in the far left column. Load is identified in the top row (based on classifications in Table 2). Duration (based on classifications in Table 1) is in the body of the table.

**Table 11: Physical Requirements Fire Calls
(Based on per hour definitions/assumptions)**

	1-10 lbs	11-20 lbs	21-30 lbs	31-50 lbs	51-75 lbs	76-100 lbs	100+ lbs
Stationary	Constantly	Constantly	Constantly	Constantly	Constantly	Occasional	Occasional
Locomotion	Constantly	Constantly	Constantly	Constantly	Constantly	Frequent	Frequent
Balance / Rotation, Anti-	Constantly	Constantly	Constantly	Constantly	Constantly	Occasional	Occasional
Squatting	Constantly	Constantly	Constantly	Constantly	Constantly	Occasional	Occasional
Bending	Constantly	Constantly	Constantly	Constantly	Constantly	Occasional	Occasional
Pushing	Frequent	Frequent	Frequent	Frequent	Occasional	Occasional	Occasional
Pulling	Frequent	Frequent	Frequent	Frequent	Occasional	Occasional	Occasional
Grip / Grasp	Constantly	Constantly	Frequent	Frequent	Occasional	Occasional	Occasional

Category	Definitions	Per Hour
Intermittent	“On and off again” basis	
Rarely	Less than 1% of the time	Less than 40 sec.
Occasionally	1-33% of the time	40 sec. to 20 min.
Frequently	34-66% of the time	20 min. to 40 min.
Constantly	67-100%	40 min. to 1 hour

Discussion:**Discussion Part I: EMS, Service and Non-Fire calls:**

Based on our observations, the historical data we examined and the interviews we conducted we estimate that most 24-hour periods will contain an average of 6-8 emergency calls per station. Obviously this number will vary depending on the station - typically from as few as 1 call to as many as 14 calls. Regardless of the variety across the department, calls are predominately non-fire related - generally 95% or more.

General Characteristics:

- Predominantly short duration (20-35 minutes).
- Consist of low physical activity (Rare or Occasional activity - less than 1/3 of total time)
- Most common physical requirements experienced during these situations are: (1) Squatting and (2) Bending.
- Most movements are unweight and weighted movements use light to moderate loads (15-45 lbs).

Discussion Part II: Fire Calls:

Fire related calls, although they represent the vast minority of events, account for the most demanding physical requirements faced by F/RA. Based on our observations, interviews and historical data a typical fire call for this department can last from as short as 40 minutes to well over two hours. Physical activity demands during these events will vary greatly, but are often extremely high.

General Characteristics:

- Vary from moderate to long duration (45 minutes - over 2 hours)
- Due to restrictions imposed by the self-contained breathing apparatus (SCBA) and the physical exertion required by the F/RA is broken into 10-15 minute segments. These segments are often extremely high activity and can be repeated multiple times with very small breaks.
- A combination of strength, endurance, work capacity and stamina are required from the F/RA. High levels of muscular strength and muscular endurance were most often required when completing the most common job tasks associated with fire emergencies.
- F/RA can expect to carry a load of at least 60 lbs. at all times during the event (possibly over 2 hours). This load will be present during all of the common movements: (1) Stationary, (2) Locomotion, (3) Balance, Rotation, Anti-Rotation, (4) Squatting and (5) Bending.
- In addition to moving under load, the F/RA responding to a fire emergency is almost guaranteed to lift, carry, swing, push and pull objects of at least 30 pounds, and often times well over 75 pounds.

Discussion Part III: 24-Hour Cumulative Demand:

One of the most important factors to note concerning the physical demands of a F/RA is the cumulative effect multiple calls can create. As previously stated call volume at a single station can vary from as little as 1 call to over 15 calls. Each call will also vary greatly depending on type and size. These are vital factors to consider, and ones which make it extremely difficult to quantify a true 24-hour physical demand.

The truth is that no discussion of F/RA physical demands is complete without addressing this very important factor: **uncertainty**.

Our observations, interviews and even historical data represent approximations and estimations. No matter how accurate these are, the only certainty is that each 24-hour shift will have an uncertain and varying amount of physical demands.

General Characteristics (Approximations):

- F/RA physical activity can vary from 2 hours to well over 12 hours. Variations exist in over-all length (based on total call volume and duration) and intensity (based on call type).
- 8 hours is a commonly used approximations when estimating F/R physical fitness demands during a 24-hour shift. Our observations and interviews tend to support this as a sufficient “average.”
- Applying the 8 hour assumption to our observations, interviews and historical data this estimates:
 - 7 hours and 36 minutes of low intensity activity (EMS, service and non-fire type demands) - 95%
 - 24 minutes of high to extremely high activity (fire type demands) - 5%
 - The 8 total hours will likely be divided into 6-8 emergency call segments with an approximated gap of between 0 minutes and 2 hours between calls.
- However, the amount of uncertainty in these approximation means F/RAs can never be sure of the demands they face. Thus they need to over prepare for an “average” shift.

Discussion Part IV: Other Factors Contributing to Physical Demands:

Lastly, we noticed three very important factors which, although not directly associated with physical activity have a profound effect on the over-all physical demands experienced by a F/RA.

- Sleep: The first is sleep pattern disruption and deprivation. Very rarely is the on-duty fire fighter able to get the recommended sleep 7-9 hours of continuous sleep. This can become a major contributing factor to overall F/RA fatigue.
- Recovery: Secondly, many F/RA use their 48-hour recovery time (time between 24-hour shifts) to work second and third jobs. This can create situations in-which a F/R professional goes for 40 hours or more without sleep and may report to duty already fatigued.
- Nutrition: The last factor, which can be effective F/RA physical requirements is nutrition. During our observations and interviews nutrition was a topic which continually received our attention. A general lack of education and consideration for nutrition and the nutritional needs of the F/RA were readily apparent during meal time observations and discussions. Most F/RA expressed nutrition as a major concern to their over-all wellness. Some caution here, however. Eating well takes 99% discipline, 1% education. Avoiding sweets, empty carbs, sugary drinks and alcohol is 95% of the battle. The place to start is station meals and snacks. Off duty, F/RAs must exercise personal nutritional accountability.

Appendices: A-I

Mountain Tactical Institute - MTI

Jackson, Wyoming

Kristen Oullette, Adam Scott and Rob Shaul

Appendix A

Sample questions from the fitness culture survey:

- How many years have you been in the fire rescue profession?
- Are you in a leadership role?
- Does your unit have a required fitness test?
- Should there be an established fitness test?
- Why or why not (describe).
- Does your unit employ mandatory physical fitness training?
- How do you typically train? (Alone or with your unit?)
- Is your physical training effective at keeping you fit for duty?
- Does work provide you with a facility to train at?
- Describe your training facility.
- Are you allowed to train on-duty?
- Are you encouraged to train on-duty?
- Do you train on-duty?
- What percentage of your department do you believe is fit for duty?
- Do you feel fit for duty?
- Do you smoke?
- Do you use other tobacco products?
- How many drinks to you typically consume per week?

Appendix B

The fitness culture assessment is broken into 4 parts

1. Fitness Culture Survey Analysis Questions (1-25): points awarded based on the fitness culture survey.
2. Observation Questions (26-32): points awarded based on on-site observations.
3. Interview Questions (33-57): points awarded based on leadership and F/RA interviews.
4. Technical Support Questions (58-60): points awarded based on technical support inquiry.

Point values

Y = Yes (2 pts.),

S = Somewhat (1 pt.)

N = No (0 pts.).

Total Possible Points = 100

Survey Analysis Questions

Response Rate

1. Y/N 75%+ of the community responded to the survey

Fitness Assessment

2. Y/N Existing assessment test (yearly, not including hiring process)
3. Y/N 75%+ voluntary participation and/or mandated fitness assessment
4. Y/N 75%+ believe there should be a fitness assessment
5. Y/N Incentives and/or punishment for FT pass/fail

Fitness Training

6. Y/N 75% voluntary participation and/or mandated physical fitness training
7. Y/N Allowed to train on duty
8. Y/N All F/RAs have a place to train at work
9. Y/N Subsidized/discounted membership at an off-site location to train off-duty

Personal Responsibility

10. Y/N 90%+ feel fit for duty
11. Y/N The average BMI is < 25
12. Y/N 90%+ feel that their training is effective at keeping fit for duty
13. Y/N 10% or less use tobacco products
14. Y/N 10% or less have >7 drinks/week regularly
15. Y/N 10% or less report that they are overweight

Leadership

16. Y/N 90%+ feel encouraged to train on duty
17. Y/N 90%+ report that they train on duty
18. Y/N Programming is supplied for F/RAs
19. Y/N 25%+ voluntarily expressed barriers to their fitness
20. Y/N No opposition to leadership present in voluntary answers

Culture

21. Y/N All feel that 75-100% of their teammates are fit for duty
22. Y/N All feel that their culture of fitness is somewhat important or above
23. Y/N 10% or more say they do not eat healthy
24. Y/N No Culture split: older and younger align on want/need for mandated fitness assessment, <10 point difference (<45, >46)

25. Y/N No Culture split: culture is perceived similarly between younger and older, <10 point difference (<45, >46)

Observation Questions

- 26. Y/N All stations have dedicated on-site training
- 27. Y/S/N On-site equipment is in good repair (safe, clean, unbroken/maintained)
- 28. Y/N On-site training areas allow for cardio (enough machines to accommodate 25% of crew at once)
- 29. Y/N On-site training areas have adequate free weights for lifting (squat rack, 6-45lb plates, bench press, barbells, dumbbells to 80lb, pull up rack minimally)
- 30. Y/S/N Observed individuals training on duty (S = low percentage)
- 31. Y/S/N Has a functioning Peer Fitness Training Program, or other method to assist with training (Minimal duties include; creation or distribution of fitness training programs, maintenance of fitness training equipment and acting as a liaison between administration and fire stations [equipment needs etc.], Somewhat = fulfilling some duties)
- 32. Y/S/N Has a method to track training attendance (S = method is ineffective)

Interview Questions

Leadership Interviews

- 33. Y/N Was able to meet with at least 1 Fire Chief

Administration has given support for training in the form of:

- 34. Y/N Selected appropriate fitness testing (validated test or supported by a professional organization)
- 35. Y/N Give F/RAs access to programmed training (trained peer or professional)
- 36. Y/S/N Genuine encouragement (expressed in interview how they motivate/make training possible) (Y = clear commitment to F/RAs and they also train themselves, S = unclear commitment towards encouragement and their own training)
- 37. Y/N Understanding of the physical needs for F/RAs (expressed the need for strength, aerobic endurance and work capacity)
- 38. Y/S/N Leadership by example (they also train, have trained recently; S = they train, but very minimally)
- 39. Y/S/N Budget (has monies set aside for training equipment and/or programming and education that is utilized based on needs/requests from stations. If money is not spent, the budget accumulates towards the next fiscal year; S = the budget is low and/or does not carry over)

F/R Interviews

- 40. Y/N Was able to meet with at least 10% of the F/R population

FF and EMS general consensus

- 41. Y/N Fitness is important to job performance
- 42. Y/S/N Men and women feel supported in their fitness needs (time/space/equip)
- 43. Y/S/N Men and women feel supported by admin (leadership push for fitness is felt)
- 44. Y/S/N Men and women either are receptive to instituting or agree with the FT
- 45. Y/S/N Men and women agree with the presentation of fitness training (mandatory, voluntary either way, they like it)
- 46. Y/N Men and women sense that the culture is positive (department wide, >50% uphold personal fitness and feel that their co-workers do as well)
- 47. Y/S/N Men and women are allowed to take naps (Y = permission from admin, S = it is not not allowed)

Technical Support Questions

- 48. Y/N Acceptable injury/call volume ratio by location and population density (at or below the regional average by population size)
- 49. Y/N Able to access previous full years pertinent data (yearly call volume, call volume by station and call volume by type EMS/Fire)
- 50. Y/N Able to access previous full years pertinent injury data (volume and type of EMS and Fire injuries)

Appendix C

Sample interview questions for leadership and F/RAs.

Interview Questions: Leadership

- When was the last time you trained?
- What did you do?
- Describe your mandated training and how you decided upon this framework.
- What is the goal of the mandated training? (if it's 30 min of PA, the goal is maintain low level CV likely)
- Describe your peer fitness program.
- How do you feel about mandatory fitness testing?
- If money wasn't an option, how would you handle the fitness needs for your men and women?
- Describe the unique mental/physical demands that your men and women experience that aren't like any other job.
- How important is fitness for a firefighter?
- How important is fitness compared to technical expertise and experience?
- Do you train personally? If so, how and how often?
- Did you consistently train when you worked in the fire house?
- What is the biggest challenge to implementing consistent fitness training?
- Is there union resistance?
- Is there resistance from legacy firefighters (older guys)?
- Why don't you have a mandatory fitness assessment?

Interview Questions: EMS and Firefighters

- Do you consider yourself an athlete?
- What is your athletic background?
- What does fit for duty mean to you?
- What type of fitness do you need to do your job well?
- How is the fitness requirement for EMS different than fire?
- What is the most physically demanding part of your job?
- What are some of the barriers to your fitness?
- What motivates you the most to maintain your fitness?
- What did you do before becoming a firefighter (jobs and athletic background to help understand who is applying for this job)?
- How do you feel about mandated fitness testing and training?
- Would you work harder if there was a test to pass?
- Do you train more here or when you are off-duty? Why?
- What do you do when off duty?

Appendix D

Technical support inquiry questions.

Yearly call volume:

- Total department volume
- Calls broken down by type (EMS, fire etc.)

Descriptive statistics regarding EMS calls and fire calls:

- EMS responses by type (car wrecks, violent crimes, injuries at homes, animal incidents etc..)
- Firefighter responses by type (fires, false alarms, carbon monoxide etc.)

Volume of calls by station

- Total volume by station
- Volume by type per station

Number of reported on the job injuries

- Yearly district volume
- Yearly volume by station

Descriptive statistics of on the job injuries

- EMS type of injuries
- Fire types of injuries
- Training/work related of injuries (injuries incurred while not on a call)

Appendix E: Movement Groups, Physical Requirements and Descriptions

Movement Group Utilized by Researchers	Physical Requirements From <i>General Fire Fighter Job Functions - Job Analysis</i>	Description of Physical Req. From <i>General Fire Fighter Job Functions - Job Analysis</i>
(1) Stationary	(1) Sitting	Riding in truck or engine to and from fire scene
	(2) Standing	Dynamic standing, raising ladders, operating hoses, inspecting equipment
	(3) Driving	If assigned to drive equipment to and from fire scene
(2) Locomotion	(4) Crawling/Kneeling	On the floor or through wreckage, access victim, holding hoses, administer first aid
	(5) Walking	From and to truck or engine multiple times at fire or accident scene
	(6) Running	From truck or engine to fire or accident scene; carry tools/hose, up or down stairs
	(7) Climbing Stairs or Ladders	Deploying or climbing a ground or aerial ladder; climbing stairs to reach scenes
	(8) Carrying	Protective gear, ladders, equipment, victims,
(3) Balance, Rotation/ Anti-Rotation	(9) Balance	When climbing ladders or stairs, working on rooftops, carrying victims
	(10) Working at Heights	Working on rooftops, climbing/standing on ladder, tall buildings and equipment
	(11) Walking on Rough Ground or Uneven Surfaces	Working at scene without pavement, strewn with debris
	(12) Twist or Turn	Removing and replacing gear, deploying ladders, moving/removing obstacles
	(13) Awkward Positions	Reaching over/under wreckage, removing victim, remove debris/obstacles
(4) Squatting	(14) Crouch/Squat	Unwinding/pulling/coupling hoses, administering first aid
	*(15) Lifting (floor to waist)	Protective gear, ladders, equipment, victims,
(5) Bending	(16) Bend/Stoop	Unwinding/pulling/coupling hoses, administering first aid
	(17) Extension/Flexion	Pushing/pulling ladders, shoving debris, retrieving hoses, grasping below waist

	*(15) Lift (floor to waist)	Protective gear, ladders, equipment, victims,
(6) Push	(18) Push	Moving objects away: debris, doors, walls, beams, ladders, victims
	* (19) Reaching (Shoulder to Overhead, Shoulder to Ground)	Hoisting ground ladders, swinging axe/sledgehammer, pulling-up
	*(15) Lift (Shoulder to Overhead)	Protective gear, ladders, equipment, victims,
(7) Pull	(20) Pull	Draw towards oneself: hoses, ladders, debris, victims, ropes
	*(19) Reaching (Overhead to Shoulder)	Hoisting ground ladders, swinging axe/sledgehammer, pulling-up
	(15) *Lift (Ground to Shoulder)	Protective gear, ladders, equipment, victims,
(8) Grasp/Grip	(21) Handling/grasping	Using tools, hoses, first aid, ladders, PPE, backboards, victims
	(22) Power grasping	Moving/pulling/operating charged hose, breaching wall hanging on ladder
NOT ASSESSED	(23) <i>Finger/Feel</i>	
	(24) <i>Speak/Hear Requirements</i>	
	(25) <i>Vision Requirements</i>	
	(26) <i>Operating Foot Control</i>	

* Physical Requirements From *General Fire Fighter Job Functions - Job Analysis* which apply to more than one movement group.

Appendix F: Example of F/R Fitness Assessment Specifically Designed for the Department

Department F/R Fitness Assessment Scoring Chart				
Points	Pull-Ups	5:00 Step-Ups w/ 50#	Push-Ups w/ 50#	Event w/ 50#
25	25	220	30	8:30
24	24	215	28	8:45
23	23	210	26	9:00
22	22	205	24	9:15
21	21	200	22	9:30
20	20	195	20	9:45
19	19	190	19	10:00
18	18	185	18	10:15
17	17	180	17	10:30
16	16	175	16	10:45
15	15	170	15	11:00
14	14	165	14	11:15
13	13	160	13	11:30
12	12	155	12	11:45
11	11	150	11	12:00
10	10	145	10	12:15
9	9	140	9	12:30
8	8	135	8	12:45
7	7	130	7	13:00
6	6	125	6	14:15
5	5	120	5	14:30
4	4	115	4	14:45
3	3	110	3	15:00
2	2	105	2	15:15
1	1	100	1	15:30
FAIL	0	95	0	>15:30

Note: An athlete must receive at least 1 point in Every Category in order to Pass

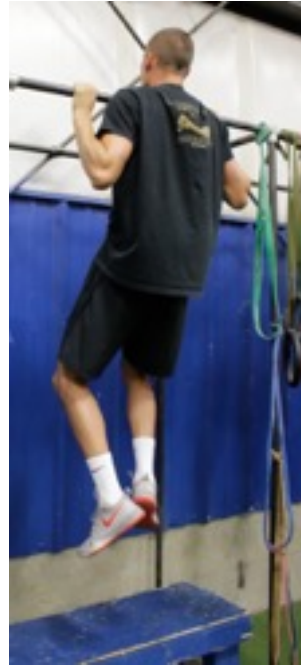
Appendix G: Example of Possible Scoring Standards for F/R Fitness Assessment

F/R Fitness Assessment Scores by Age and Gender (Out of 100 Points)			
Age	Category	Female	Male
17-21	Outstanding	60	75
	Good	54	68
	Satisfactory	46	57
	Pass	34	43
22-26	Outstanding	62	79
	Good	56	71
	Satisfactory	47	60
	Pass	35	45
27-31	Outstanding	63	83
	Good	57	74
	Satisfactory	48	63
	Pass	36	51
32-36	Outstanding	62	79
	Good	56	71
	Satisfactory	48	60
	Pass	36	45
37-41	Outstanding	62	77
	Good	56	69
	Satisfactory	48	59
	Pass	36	47
42-46	Outstanding	61	75
	Good	55	67
	Satisfactory	47	57
	Pass	35	43

F/R Fitness Assessment Scores by Age and Gender (Out of 100 Points)			
Age	Category	Female	Male
47-51	Outstanding	59	69
	Good	53	62
	Satisfactory	45	53
	Pass	34	42
52-56	Outstanding	58	69
	Good	52	62
	Satisfactory	44	53
	Pass	33	39
57-61	Outstanding	58	67
	Good	52	60
	Satisfactory	44	51
	Pass	33	41
62+	Outstanding	57	64
	Good	51	57
	Satisfactory	44	49
	Pass	33	36

Appendix H: F/RA Fitness Assessment Photos**Part 1: Pull-Ups**

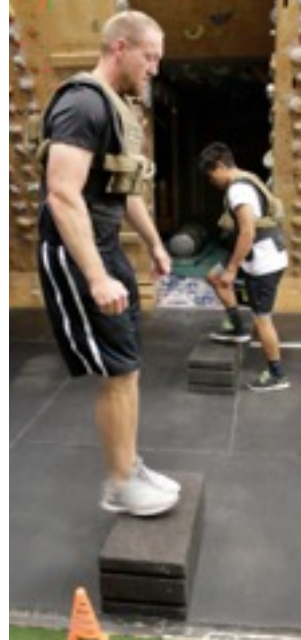
- (a) The correct starting position begins when arms are fully extended beneath the bar, feet are free from touching the ground or any bar mounting assist and the body is motionless.
- (b) Legs may be positioned in a straight or bent position, but knees may not be raised above the waist.
- (c) One repetition consists of raising the body with the arms until the chin is above the bar and then lowering the body until the arms are fully extended



- (d) The intent is to execute a vertical “dead hang” pull-up. A certain amount of inherent body movement will occur as the pull-up is executed.
- (e) However, the intent is to avoid a pendulum-like motion that enhances the ability to execute the pull-up. Whipping, kicking or kipping of the body or legs, or any leg movement used to assist in the vertical progression of the pull-up is not authorized. If observed, the repetition does not count for score.

Part 2: Step-Ups

- (a) The 5 min step-up test is to be completed with 50# of additional weight. The weight should be worn across the shoulders and on the athlete's back and/or chest.
- (b) Athletes will start with both feet on the ground approximately 2-6 inches from a 9 inch step
- (c) On the command to begin the athlete will step one leg and then the other onto the step



- (d) A repetition is counted each time an athlete placing both feet onto the step.
- (e) After completing a repetition the athlete must return to the starting position with both feet on the ground.
- (f) This is a timed event so the athlete should be reminded of their time remaining at frequent intervals so they may adjust their pace.
- (g) Due to the high number of repetitions we recommend the counter use a mechanical devise or tally system.

Part 3: Hand Release Push-Ups

- (a) The 1-min Hand Release Push-Up test is to be completed with 50# of additional weight. The weight should be worn across the shoulders and on the athlete's back and/or chest.
- (b) The athlete will start in the down position - with their chest resting on the ground. Hand position can be determined by the athlete but should not be wider than 4 inches past shoulder width.
- (c) On the command to begin the athlete will press their bodies off the ground, extending their arms until they reach a fully locked-out position.



- (d) Upon completing the movement the athlete will, in a controlled manner, lower themselves back to the ground so that their chests are resting on the floor. This completes one full repetition.
- (e) Before beginning the next repetition the athlete must completely lift their hands off the ground (i.e. Hand Release). After this is complete the athlete may begin their next repetition.
- (f) The athlete should maintain strict body alignment throughout the event. Feet must remain in contact with the floor and should be no wider than 12 inches apart.

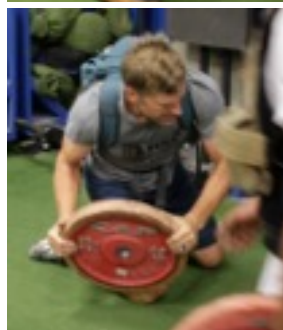


Part 4: F/R Obstacle Event - 4 Rounds with 50# (Women use 25# Plate, Men use 45# Plate)**(a) 100m Shuttle
(4x25m)**

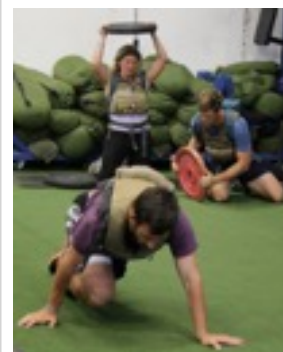
- (a) Athlete can hold the plate any way they wish as long as it is kept in the front or side of the body (no resting the plate on their backs)
- (b) Athlete may run or walk as they are able.

**(b) 10x Ground to
Chest Plate Pull**

- (a) Start with the plate on the ground and grip the plate with both hands.
- (b) Using whatever method the athlete prefers they must lift/pull the plate until their elbows are past their shoulders.

**(c) 10x Kneeling Half
Moons**

- (a) On both knees the athlete will touch the plate to the ground outside of their knees
- (b) Then lift the plate overhead with arms near full extension. Touching the plate to the other side completes a rep.

**(d) 25m All-Fours
Crawl (2x12.5m)**

- (a) The athlete may crawl on their hands and knees or "bear crawl" as they see fit.
- (b) The athlete will do down 12.5m meets make an 180 degree turn and return to their starting point.

Appendix I: Observation PhotosF/RAs completing overhaul after battling a car fire.



Photo 1: F/RAs complete overhaul following a car fire.



Photo 2: F/RA complete mandatory training between emergency calls during their 24-hour shift.



Photo 3: F/RA Tools and Gear used to fight structure fire. The saw in the foreground weighs approximately 30#.



Photo 4: F/RAs after approximately 40 minutes of fire suppression activity.



Photo 5: Example of dumbbell sets available for training at most stations.



Photo 6: Example of training facilities at fire station.



Photo 7: F/RAs participating in more mandatory training between emergency calls.



Photo 8: F/RA training on-duty at her station



Photo 9: F/RAs participating in more mandatory training between emergency calls.



Photo 10: F/RAs responding to a vehicle accident call.



Photo 11: F/RAs removing the stretcher from the EMS vehicle during an EMS call.

References

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