

## **CITY OF SAINT PAUL**

### **PREPARATION FOR THE PHYSICAL PERFORMANCE TEST**

#### **INTRODUCTION**

Employment with the Saint Paul Fire Department has many rewards. Foremost is a great sense of satisfaction in serving the community and creating, by your actions, an environment where life and property are safe and secure. Additional benefits include an excellent salary, paid vacations, a contributory health insurance program, an on-duty health and fitness program and a work schedule which allows you to pursue other interests as well.

While firefighting is an exciting and rewarding career, it is one of the most physically demanding jobs in existence. Firefighters must respond to the demands of the situation. This means that physical fitness is an important component of job performance.

The duties of a firefighter are many and varied. The work environment can be hot, smoky and extremely hazardous. Protective equipment worn by firefighters is heavy (approximately 59 pounds) but essential and severely limits performance. On the job, firefighters carry heavy objects, including a variety of equipment.

Saint Paul firefighters also serve as Emergency Medical Technicians (EMT's), providing the major ambulance service in the City. This often requires them to carry (with another firefighter) stretchers holding patients that could weigh well over 200 pounds. Being in top physical condition is a prerequisite for employment and the best possible protection against on-the-job injuries.

Much of what firefighters do in emergency situations requires muscular strength and endurance as well as aerobic fitness. A commitment to life-long fitness is an essential part of being a firefighter. Said another way, while it is important to have a high level of fitness to compete for a job in the Saint Paul Fire Department, it is even more important to maintain fitness once on the job.

The Saint Paul Fire Department welcomes applicants to try out for the position of firefighter. In order to better prepare for a position in this demanding occupation, we have provided you with guidelines for setting up a training program.

There is no such thing as a "typical" fire. Each fire is different in its physical demands and length of time required to put it out. The test is designed to provide the City with a list of prospective employees who exhibit the highest probability of success as a firefighter in these situations.

One purpose of this information is to provide an overview of the physical demands of a firefighter to better help you prepare for a challenging career in the fire service. Research has been conducted to measure the necessary levels of fitness to safely perform the duties of a firefighter. High levels of muscular strength and aerobic (endurance) fitness have been consistently identified as one of the most important determinates of job performance.

## **GENERAL DESCRIPTION OF JOB DUTIES**

Since any job-related test must reflect actual job tasks, this information will provide a general description of typical job duties which require physical performance by individual firefighters (activities performed singularly, not in teams).

These tasks are generally performed continuously (one right after the other) for a duration of 15 minutes or more, depending on the severity of the incident. Additionally, each task is performed while wearing the protective clothing mentioned earlier. This turnout gear, weighing approximately 59 pounds, is distributed over the entire body and significantly increases the physical demands of the job tasks.

### **1. Climbing stairs under a load**

Fighting fires as well as responding to emergency medical calls may require climbing stairs while carrying equipment. Two to three flights is very common, and fire fighting in a high-rise building will require climbing many more. Equipment weighing from 25 – 60 pounds is commonly carried by one person over the shoulder (hose bundles) or in the hands (fans, medical kits, tools) while ascending and descending stairs.

Therefore, upper body (arms, back, shoulders and neck), lower body (back, buttocks and legs) and abdominal (stomach and waist) strength and endurance, aerobic endurance and grip strength are all necessary for this common task.

### **2. Carrying equipment on the ground**

Although walking on level ground is less taxing than climbing stairs, firefighters often make numerous trips from the fire truck or engine to the fire scene, carrying equipment, hose bundles, ladders, etc. Even after the fire is put out, firefighters must overhaul or complete the fire suppression task by removing furniture and debris from the burned structure.

The weight of this equipment varies, so upper body, lower body and abdominal strength, as well as aerobic endurance and grip strength are required for this task also.

### **3. Chopping with an axe, cutting with a chain saw, and using a pike pole**

Part of the fire suppression tasks involve ventilation of smoke and heat by chopping through roofs, floors, and doors of a burning house or building. Because some roofs may have two to three layers of shingles, a firefighter may be required to start and use a chain saw while balanced on a roof ladder. Inside a house or building, the firefighter may have to pull down ceilings by using a pike pole. This tool has a sharp spike and hook and is used to punch through and remove parts of a ceiling.

All three tasks require primarily upper body strength and endurance. Back, arm, shoulder, abdominal and neck muscles as well as grip strength must be adequately developed to perform these tasks.

### **4. Dragging weighted objects**

In addition to carrying various equipment, firefighters also have to drag a charged hose line; this means the hose is filled with water from a fire engine or hydrant at great pressure. The weight of this charged hose line

varies based on the diameter of the hose but can weigh in excess of 80 pounds. Firefighters are required to drag this hose on the ground, sometimes across great distances (as with field fires) and up stairs through houses and buildings.

For this task, firefighters must possess upper and lower body and abdominal strength as well as grip strength and overall endurance because of the distances and force it takes to drag and manipulate the charged hose.

5. Rescue operations, carrying and/or dragging a victim

One of a firefighter's main duties is protecting and saving lives. This may require carrying and/or dragging a victim from an accident scene or burning building. The victim may even in some cases be an injured firefighter. There is no way to predict the weight of a victim; if it is another firefighter, s/he will be wearing 59 pounds of gear in addition to his/her body weight. It is therefore realistic to assume that firefighters must be able to carry and/or drag 200+ pounds by himself or herself if called upon to do so.

This task requires all of the attributes already mentioned: upper and lower body strength, abdominal and grip strength and overall endurance.

### **PREPARATION FOR THE SAINT PAUL FIRE PHYSICAL PERFORMANCE TEST (PPT):**

Now that you have read a general description of the types of tasks required of Saint Paul Firefighters, the next step is to understand the components of the exam and to prepare yourself to successfully complete the physical performance test.

#### **\*\*\*NOTE OF CAUTION\*\*\***

**The City of Saint Paul does not assume any responsibility for any medical consequences that may arise from participating in this training to prepare for the Firefighter Physical Performance Test.**

1. Prior to beginning any training program, it is advisable to check with your personal physician should you have any questions regarding your current health status.
2. Orientation Session. An orientation session consisting of a video tape of the test, and the test equipment will be available for inspection. This will give you a better understanding of the test and how to prepare for it.
3. Practice Sessions. The test site with the test equipment, and instructors will be available for hands on practice sessions.
4. Training Suggestions. The following training suggestions are intended to help people prepare for the PPT. Because of the differences in strength and conditioning among the candidates, and lack of research on training for the PPT, a more specific program cannot be given.

- a. Specificity of training. You need to train as specifically as possible for the five tasks in the test by simulating the PPT as closely as possible. Make use of the practice sessions at the test site.
- b. Pace or Intensity. This is a timed test – the faster you go the better your score. Therefore, you need to practice the PPT as it will be performed in the actual test.
- c. Duration of event. This is a relatively short duration, high intensity event lasting from about 2.5 to 7.0 minutes depending upon a person's physical ability.
- d. Frequency of training. The number of times per week which one needs to train is an individual decision.
- e. Progression. If you are unable to perform each task of the PPT as described, begin with less weight and increase the weight as you improve.
- f. Practice each event. Practice each task in the PPT separately, then once or twice a week practice them in the sequence together, as will be done in the PPT.
- g. PPT Description and Simulation Suggestions.

Clothing:

Fire Turn Out Coat	= approx. 8 lbs.
Weighted Vest	= 20 lbs.
Empty SCBA air tank	= 18.25 lbs.
Fire Helmet	= 2.5 lbs.
Fire gloves	= insulated finger gloves

Simulate the turn out coat with a heavy winter jacket. The weight vest can be purchased at sporting goods stores or simulated by adding sand bags to a hunting type vest or other coat. Another option is to weight a backpack with 20 lbs. for the vest and an additional 18.5 lbs for the air tank. Wear insulated work gloves to simulate the fire gloves. Wear a safety hard hat or other hat weighted to 2.5 lbs. to simulate the fire helmet.

5. The following five (5) tasks are included in the Physical Performance Test:

- a. Climbing Stairs under Load:

Candidate shoulders (from a table 5'1" high) a standard high-rise pack of 100' of 1.75" hose weighing 58 lbs. The candidate then carries the bundle up to the fifth floor inside the Drill Tower (64 steps with 6.5"rise/step). Upon reaching the fifth floor landing, candidate drops bundle of hose in designated area, and returns to the bottom of the tower without the bundle. Candidate must touch each step on the way down. Candidate walks 75' to next task.

Training: Climb stairs in an apartment or business building or use outside stairs. Simulate the hose bundle with a duffle bag filled with sand, a tube of sand, or a log or telephone pole. Practice climbing the stairs as fast as possible (taking more than one step at a time going up is permitted, and use the handrail). Practice descending the stairs as fast as possible touching each step on the way down. Exercising on a stair climbing machine would also be another way to simulate this task.

b. Dragging a Charged Hose Line:

Candidate picks up the nozzle of a 100' section of 1.75" hose line charged with water from the hydrant, places it over the shoulder, and drags it a distance of 75'. Candidate drops hose once the distance is reached. The nozzle and coupling must cross the line indicated on the ground. Candidate walks 27' to next task.

Training: This can be simulated by attaching a rope to a log, piece of telephone pole, railroad tie or sandbags and dragging it for a distance of 75'. If unable to perform the task, start with a lighter weight and increase weight as you progress with training.

c. Victim Rescue:

Candidate lifts (from under the arms and from behind) a 175 lb. rescue mannequin, and drags it 100' while walking backwards. Once the feet of the mannequin pass designated mark, candidate releases mannequin and proceeds to next station. Candidate walks 35' to next station.

Training: This task can be simulated by filling a duffle bag with sand or other heavy material. Or use a live body. The simulated victim should be picked up by squatting down, reaching around it with both arms in a "bear hug" and lifting it off the ground. Make sure to use your legs to lift rather than your back to avoid possible injury. Once you have a good grip on the "victim", walk backwards, and drag it for 100 feet. If unable to perform as described, start with a lighter weight which you can handle without straining and/or shorter distance, and gradually increase the weight of the dummy and the distance dragged as you progress with training.

d. Equipment Carry:

Candidate picks up a 12" steel exhaust fan (approximately 47.5 lbs.) with one or both hands, and carries it while walking a distance of 150'. Candidate places fan in marked box on ground. Candidate walks 17' to next station.

Training: This task can be simulated by using a plastic milk carton carrying case. Add weight by filling gallon milk containers with sand or water. If you are unable to carry 47.5 lbs, start with less and add more as you progress.

e. Forcible Entry Simulator (Keiser Force Machine):

Candidate straddles a steel I-beam girder mounted on teflon glides. Using an overhead chopping motion with an 8-lb. shotmallet (similar to a sledgehammer), the candidate drives the girder a distance of 5' along a stainless steel track. Time stops when girder passes over end of track.

Training: Simulate this task by using a sledgehammer and 3 railroad ties. Using the two outside ties as rails for your feet, drive the middle tie along the ground by striking the end of it. Or chop with an ax on a log. Most people can do this task in 15-60 strokes, so train for chopping up to a minute without stopping.

## **GUIDELINES FOR STARTING A TRAINING PROGRAM**

The general conditioning program contained in this document is designed to provide guidelines to improve your aerobic or cardiovascular endurance, muscular strength, muscular endurance, to increase muscle mass and decrease body fat, and to increase flexibility. These guidelines are based on recommendation by the American College of Sports Medicine (1995).

Before starting this program, your personal physician should give you a physical examination advising you of any physical limitations or precaution of which you need to be aware.

Training principles that should be followed:

1. **Overload principle:** Increased use causes increased work capacity. For example, for muscular strength to increase, the muscle needs to be challenged above those resistance levels normally experience.
2. **Training is specific:** If a person wants to improve stair climbing, then stair climbing or an exercise similar to this needs to be done. Jogging or biking is probably not specific enough.

## **AEROBIC (CARDIORESPIRATORY) FITNESS**

1. **Frequency of Training (How Often):** Three to five days per week is optimal. Training two or less days per week usually does not cause an increase in aerobic fitness. Training more than 5 days per week results in only a small increase in aerobic capacity when compared to 3-5 days per week.
2. **Intensity of Training (How Hard):** The heart rate is usually a good indicator of how hard a person is working. The minimum training intensity threshold for improvement in aerobic endurance is about 60% of the maximum heart rate. Target heart rate can be calculated by taking  $220 - \text{your age} = \text{your maximum heart rate}$ , then multiply by desired percentage(%). Example:  $220 - 20\text{yrs old} = 200 \text{ beats per min max HR}$ .  $200 \text{ beats/min} \times 60\% = 120 \text{ beats/min}$ .

The level of fitness at the beginning of this program is important because a beginner can make improvements in aerobic fitness at a relatively low intensity. Those who already possess a high level of fitness may need to train at a higher heart rate intensity.

3. **Duration of Training (How Long):** Twenty to sixty (20-60) minutes of continuous aerobic activity is recommended. As one adapts to the exercise the length of time or the intensity may be increased.
4. **Mode of Activity (What Type):** Activities that use large muscle groups, can be maintained continuously, and are rhythmical and aerobic in nature are recommended. Some examples of this would be walking, hiking, jogging, running, bicycling, stationary cycling, stair climbing, and swimming.
5. **Warm Up and Cool Down:** Aerobic exercise sessions should have a 5-10 minute warm-up consisting of light exercises which elevate the heart rate. Following the aerobic training, a 5-10 minute cool down session should be included which allows the body and heart rate to return to normal. The cool down may also prevent dizziness, fainting or nausea.

## **RESISTANCE (STRENGTH) TRAINING**

What is it?

Muscular strength and muscular endurance are developed or maintained by increasing more than normal resistance to movement (overload principle). Muscular strength is best developed by using heavy weights requiring maximal or near maximal effort and less than 6 repetitions. Muscular endurance is best developed using lighter weights with greater than 20 repetitions. Firefighting requires both muscular strength and endurance, so 8-12 repetitions are recommended for this training.

A repetition is moving the weight through the range of motion of a joint. For example, in the arm curl, the weight is held with the arm straight. The weight is lifted upward by bending the arm at the elbow. The weight is then slowly lowered to the starting position.

Perform the movement through the full range of motion for that muscle group. For example, on the bicep curl start with the arms extended and lift the weight up until the arm is fully flexed.

Form is important so adhere as closely as possible to the techniques for performing the movement.

Both raising and lowering the weight helps build strength and should be done in a controlled manner.

Avoid holding your breath during the lifting because it can induce excessive increases in blood pressure. It is generally recommended to exhale while the muscle is working the hardest. For example, in the bench press, exhale while pushing up, and inhale while lowering the weight.

A set is the number of repetitions done without resting between lifts. For example, doing 10 repetitions of the arm curl would be one set. A minimum of at least one set with 8-12 repetitions to volitional fatigue should be completed for each muscle group. Two to five sets are recommended. The last repetition in each set should be difficult to complete, indicating that the lift is requiring a near maximal effort. All the major muscle groups of the body should be trained. The groups include the abdomen, thighs, chest, back, shoulders, triceps, and biceps. For each push movement, there should be a pull movement to keep a balance in the strength levels between muscle groups. For example, if you do biceps curls, you should do triceps extensions.

Where? Strength training can be done in a gym or club that has resistance training equipment. Often, there is an instructor to help you set up a program and get started. Strength training can also be done at home using purchased equipment or making your own. Weights can be made by filling a variety of different size containers with water, sand or concrete.

With Whom? It is recommended that you train with a partner for both safety and motivational reasons. The partner can assist you with using the proper lifts and be available to help you as a spotter if you have problems lifting the weights. The training partner can also help motivate you to keep working hard and provide encouragement.

How to Start? It is recommended that you do a minimum of 8-10 exercises involving the major muscle groups. Women tend to possess less upper body strength than do men, and therefore women may need to concentrate more on upper body strength exercises.

The first few strength training sessions should be used to determine how much weight to lift for each muscle group. As a general rule-of-thumb, use as much weight as can be lifted 10-12 times. The last repetition should be fairly difficult to lift.

Strength training should be done at least two days per week. There should be a day of rest between strength training sessions in order for the muscle group to recover. You might alternate your aerobic workouts with the strength workouts.

How to Progress? Keep a record of your strength training sessions. You should note the date, how many pounds lifted, the number of repetitions, and the number of sets performed. This serves as a motivator because you can see your progress. It also helps you decide when to increase the weight in order to progress upward in strength.

As your strength increases it is necessary to increase the resistance in order to overload the muscles. This is called progressive resistance exercise. For example, if you can lift 100 lbs. on the bench press 12 repetitions, then it is time to increase the weight.

## **BODY COMPOSITION**

It is advantageous to have a large muscle mass and a relatively low percent body fat. Muscle mass can be increased through the resistance training program recommended in the previous section. Fat weight generally can be reduced with aerobic endurance training program. Exercise programs that are performed at least three days per week for at least 20 minutes per day and that expend at least 300 calories per session are the minimum for fat loss. Greater fat loss can be achieved through weight loss programs using diets. However, there is usually a loss in muscle mass as well as fat weight with diets. Body fat percentage can be a much better marker when monitoring your progress, when compared to your weight on a scale.

## **FLEXIBILITY**

Flexibility is defined as the capacity to move a joint through its full range of motion. It is important to maintain a reasonable amount of flexibility for efficient movement. For example, if muscles in the back of the thigh (hamstrings) are tight, you may not be able to take a full stride while walking or jogging. Flexibility may also be important in decreasing the chances of injuring muscles and in preventing low back pain.

Assessment of flexibility is difficult because it may be different in each joint. Stretching should be done during both the warm-up and the cool down portion of your workout. After a brief warm-up it is important to use dynamic stretching. This form of stretching prepares the body for physical exertion and sports performance. In the past it was the practice to undertake static stretching before exercise. Dynamic stretching increases range of movement, blood and oxygen flow to soft tissues prior to exertion. Increasingly coaches and sports trainers are aware of the role in dynamic stretching in improving performance and reducing the risk of injury.

After the completion of your workout is when you should use static stretching; this means slowly lengthening the muscles to a point of slight discomfort. Hold this position 10-20 seconds. Repeat 3-5 times for each exercise. DO NOT bounce because this may injure the muscle. Also, avoid toe touches and traditional leg lifts, because they increase pressure on the disks in the low back.



## **NUTRITION**

The keys to good nutrition are **VARIETY, BALANCE, AND MODERATION**. There are no 'good foods' and 'bad foods'. Try to eat all foods in moderation; too much of anything isn't a good idea.

Here are some definitions for the major nutrient groups:

**PROTEIN** is found in both plant and animal foods. Protein is a key building block for every cell in your body. The typical American eats at least 50% more protein than is needed to meet daily needs. Eating extra protein in food or supplement form does **NOT** increase muscle mass alone; the addition of exercise can increase muscle mass.

**CARBOHYDRATES** help provide quick energy. Foods including grains, rice, pasta, fruits, and vegetables are good sources of carbohydrates. Try to include lots of whole grain products, because they have the added bonus of fiber and higher concentrations of certain vitamins and minerals. Avoid processed carbohydrates when possible.

Most people have the wrong impression that all **FAT** is bad. Fats provide most of the energy for the body's work and serve as a storage form of energy from other foods. While some fat is essential, too much can increase your risk for heart disease and certain kinds of cancer. Current recommendations are to limit fat intake to no more than 30% of your total calories. To figure that out, divide the number of calories you eat by 30. The answer is your maximum limit in fat grams per day.

**VITAMINS AND MINERALS** are required in very small amounts. Taking supplements will not make a bad diet any better. Scientists are learning that it is sometimes special components of foods that have beneficial effects we once attributed to vitamins. Taking too many supplements over time can actually cause harmful side effects.

Perhaps the most important nutrient is one frequently forgotten: **WATER**. Be sure to drink plenty of fluids, especially when you workout. Water is the best choice for fluid replacement. Fruit juice and sports drinks are more slowly absorbed and not as effective. Aim for a minimum of 6-8 glasses of non-caffeine containing fluids a day to meet you body's water needs; add more if you exercise or if the weather is warm.

The Saint Paul Fire Department and the Office of Human Resources hope this information will be helpful to you if you decide to pursue a career as a firefighter. You can keep updated on the status of the Firefighter application and hiring process by checking our website at [www.stpaul.gov/firefighter](http://www.stpaul.gov/firefighter).