

# PHYSICAL DEMANDS ANALYSIS

**EMPLOYER:** City of Richmond  
**JOB TITLE:** FIRE PREVENTION OFFICER  
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## Introduction

The environmental factors and physical demands for this Physical Demands Analysis were documented by Work In Progress Rehabilitation Specialists Inc. The methodology for documentation consisted of an on-site visit and interviews with Fire Prevention Officers Doug Ross and Dave Clou. A detailed record was made of the physical demands of the job in terms of weight, force pounds, frequency, height, and distance using measuring devices such as industrial scale, Chatillon Push/Pull Gauge and measuring tape. The final report was reviewed by Fire Prevention Officers Doug Ross, Dave Clou and John Mitchell.

The Physical Demands Analysis is organized as follows: Job Summary; Job Tasks; Task Description; Environment; Work Hours; Uniform; Equipment; Environmental Factors; Physical Activities; Physical Demands Summary; Appendix – Definitions of Strength Ratings and Frequency.

## Job Summary

The Fire Prevention Officer is responsible for conducting building inspections, fire investigations and fire extinguisher training. There were 219 structure or building fires and 162 vehicle fires in 2003 and all required a fire investigation. The officers work alone 95% of the time, and in pairs 5% of the time.

The Fire Prevention Department is staffed as follows:

- One chief who supervises all operations
- One hall captain who also performs fire investigations and building inspections
- One captain who is a Chief Investigator and who conducts primarily fire investigations but also building inspections
- One captain who primarily performs "Special Protective Services" which requires extensive knowledge of sprinkler systems and other fire protection systems
- Four Fire Prevention Officers who perform all job tasks, including fire investigations and building inspections

## Job Tasks

The main tasks performed by the Fire Prevention Officer are listed below (note that % of shift is expressed in general terms for the whole department as some officers perform strictly or mostly one main task):

<b>Task</b>	<b>% of shift</b>	<b>Frequency / Duration</b>	<b>NOC Strength Rating</b>
1. Building inspections	50%-80%	Performs an average of 8 inspections per day. Depending on building size, a building inspection ranges in duration from 15 min. up to 3 days, for an average of 1 hour.	Primarily LIMITED with rare HEAVY (i.e. climbing vertical ladder)
2. Data entry	25%	Performed for 2-3 hrs. per day on average, up to full 8.75 hour day.	LIMITED
3. Structure fire investigations	10%-30%	Ranges in duration from 1 hour up to 5 day, and 3 hours on average at the scene.	HEAVY
4. Vehicle fire investigations	5%-20%	Averages 1-2 hours at the scene.	HEAVY
5. Driving	20%	A part of each task excluding data entry, for an average of 2 hrs. per day. A trip ranges from a few minutes up to 30 min.	LIMITED
6. Fire extinguisher training	<10%	Performed 3-4 times per year. A training session ranges in duration from 4 - 8 hrs.	HEAVY

## **Task Description**

### **Task #1: Building inspections**

The officer inspects a building to identify fire and life safety hazards, assess compliance to fire code regulations and ensure that fire protection features are well maintained. The officer carries equipment such as clipboard, measuring tape, flashlight, binoculars, and camera, takes notes and pictures, conducts interviews, usually leaves a hand written copy of the inspection report with the building owners or tenants, and creates a computer record of each inspection once back at the office.

### **Task #2: Data entry**

The officer must create a computer record of each inspection and investigation in the record management system.

### **Task #3: Structure fire investigations**

The officer investigates and determines the cause of fires. The officer attends fire incidents mostly at night, and may go into a fire before the firefighters have done the "overhaul" (i.e. taking ceilings and walls down). Conducting fire investigations is by far the most physically demanding task of the job as depending on what burned up (e.g. plastics, chemicals), the officer may have to wear the full turn-out gear (25 lbs.), including the 30 lb. breathing apparatus (SCBA) or a facial respirator. The officer may spend a whole day lifting and moving debris, furniture (e.g. bookshelves, desks, mattresses, sofas), and appliances, and shovelling and sweeping debris. In addition, officers may cut out wall and roof sections with an axe or power saw in their search to identify the cause of the fire. Most of the work is done by a single officer although the officer can call for help (e.g. to move appliances or a vehicle out of a garage). The officer may work in a building that is dark or out of power, and walk over obstacles and debris all over the ground. At times, the officer enters buildings that could contain biological hazards, clandestine drug manufacturing, grow operations and contaminated atmospheres.

### **Task #4: Vehicle fire investigations**

The officer begins with a perimeter search of the vehicle, then proceeds to the exterior of the vehicle and finishes with an interior inspection of the vehicle, taking notes and pictures. The officer may be required to look under the dash, at the floor, or inside the trunk or engine compartment of the vehicle.

### **Task #4: Driving**

The office drives a pick-up truck to and from sites, driving an average of 2 hours per day.

### **Task #5: Fire extinguisher training**

The officer conducts fire extinguisher training, for periods ranging from 4 to 8 hours per day, 3 to 4 times per year. The officer stands most of the day, aside from brief periods watching videos. The first portion of the training consists of a classroom presentation followed by a demonstration and student participation. The officer, usually alone, will lift a 100 lb. propane cylinder and a 100 lb. fire extinguisher rack in and out of the vehicle, and carry (rack) or tip/roll (cylinder) over distances of up to 50 feet as part of the training sessions.

## Environment

The Fire Prevention Officer works **in the hall** an average of 4 hrs. out of each day to perform general office work (e.g. data entry, paper work, follow-up telephone calls), and an average of 5 hrs. out of each day **in the field**.

## Work Hours

The Fire Prevention Officer works an 8.75 hour day shift, 4 days per week, from 8:00 a.m. to 5:15 p.m., which amounts to a 35 hour week. The officer is "on call" and can be called in at any time of the day or night to perform a fire investigation, with 80% of all fire investigations being performed off-duty hours, usually at night.

## Uniform

Station wear (pants and shirt) and steel-toed footwear on a daily basis. May wear coveralls and a hard hat. During a fire investigation depending on what burned up (e.g. plastics, chemicals), the officer may wear full turn-out gear (25 lbs.) and a 30 lb. SCBA (breathing apparatus) or a facial respirator.

## Equipment

Equipment, materials and tools commonly used are as follows:

- Investigation vehicle (pick-up truck equipped with automatic transmission)
- 35 lb. portable generator and 20 lb. portable lights lifted in and out of pick-up truck and carried up to 300 feet. Used for every fire investigation.
- 100 lb. propane cylinder and 100 lb. fire extinguisher rack lifted in and out of pick-up truck and carried up to 50 feet. Used 3-4 times per year when conducting fire extinguisher training.
- 25 lb. turn-out gear (jacket, pants, boots, helmet with face shield)
- 30 lbs. SCBA - Self Contained Breathing Apparatus consisting of mask and air tank
- Fire extinguishers (5 lbs., 10 lbs., 20 lbs.)
- Facial respirator with and without eye protection
- Tools such as pry bar, axe, shovel, broom, chainsaw
- Desktop computer
- Telephone
- Briefcase, clipboard, pen and paper, flashlight, binoculars, digital camera, books & manuals

## Environmental Factors

The following frequencies are given in terms of an 8-hour shift:

**Not Required:** Not performed

**Rare:** Not daily

**Occasional:** < 3 hours/day, 0-33% of shift, 1 repetition/30 min.

**Frequent:** 3-5 hours daily, 34-66% of shift, 1 repetition/2 min.

**Constant:** > 5 hours daily, 67-100% of shift, 1 repetition/30 sec.

<b>Environmental Factors</b>	<b>Frequency</b>
<b>Exposure to Weather</b> Exposure to outside atmospheric conditions.	Occasional (works indoors 80% of the time and outdoors 20% of the time).
<b>Extreme Cold</b> Exposure to nonweather-related cold temperatures.	Rare
<b>Extreme Heat</b> Exposure to nonweather-related hot temperatures.	Rare (occurs when driving vehicle during summer - no air conditioning and when wearing breathing apparatus during a fire investigation)
<b>Wet and/or Humid</b> Contact with water or other liquids or exposure to nonweather-related humid conditions.	Rare (during structural fire investigation water is dripping from everywhere causing a damp and humid environment)
<b>Noise</b> Work produces sufficient noise – constant or intermittent – to cause marked distraction or possible loss of hearing.	Rare (when conducting a building inspection at an industrial site or noise of the generators and portable ventilators at a fire scene when conducting a fire investigation)
<b>Vibration</b> Work produced an oscillating or quivering motion of the body or parts of the body.	Rare (when driving or when using an axe or power saw during a fire investigation)
<b>Atmospheric Conditions</b> Exposure to conditions such as fumes, noxious odours, dusts, mists, gases, and poor ventilation, that affect the respiratory system, eyes, or the skin.	Rare. Burned buildings or vehicles are very hazardous environments with respect to fumes, noxious odours and gases. More rarely when performing an industrial building inspection.
<b>Proximity to Moving Mechanical Parts</b> Exposure to possible bodily injury from moving mechanical parts of equipment, tools or machinery.	Rare (occurs when performing industrial building inspections)
<b>Exposure to Electrical Shock</b> Exposure to possible bodily injury from electrical shock.	Rare (for fires where a building has been gutted exposing electrical wiring)
<b>Working In High, Exposed Places</b> Exposure to possible bodily injury from falling.	Rare (climbing onto a roof when conducting an inspection or investigation)
<b>Exposure to Radiation</b> Exposure to bodily injury from radiation.	Not Required
<b>Working with Explosives</b> Exposure to possible injury from explosions.	Rare (may occur during fire investigation where chemicals released could explode)
<b>Exposure to Toxic or Caustic Chemicals</b> Exposure to possible bodily injury from toxic or caustic chemicals.	Rare (may occur during fire investigation as chemicals released from unknown products of combustion can be extremely toxic and during industrial building inspections when checking that chemicals are properly stored)
<b>Other Environmental Conditions</b> (e.g. Demolishes parts of buildings to reach and combat fires and rescue persons endangered by fire and smoke. Is exposed to burns, fumes, smoke, and falling objects. Worker is subjected to bodily injury or death from law violators. Oxygen deprivation. )	Rare (exposure to burns, fumes, smoke, or falling objects, and oxygen deprivation during fire investigations)

## Physical Activities

The following frequencies are given in terms of an 8-hour shift:

**Not Required:** Not performed

**Rare:** Not daily

**Occasional:** < 3 hours/day, 0-33% of shift, 1 repetition/30 min.

**Frequent:** 3-5 hours daily, 34-66% of shift, 1 repetition/2 min.

**Constant:** > 5 hours daily, 67-100% of shift, 1 repetition/30 sec.

ACTIVITY	FREQUENCY	DESCRIPTION
<b>Lifting – Floor to Waist</b>	Rare to Occasional	<p><b>Fire Investigations:</b> Lifting 35 lb. portable generator and 20 lb. portable lights in/out of vehicle; moving debris, furniture and appliances, shovelling debris or cutting out wall and roof sections with an axe or power saw while at times wearing 25 lb. turn out gear with 30 lb. SCBA (breathing apparatus).</p> <p><b>Fire Extinguisher Training:</b> Lifting 100 lb. propane cylinder and 100 lb. fire extinguisher rack in/out of vehicle; lifting fire extinguishers weighing up to 20 lbs. each, two at a time.</p>
<b>Lifting – Waist to Shoulder</b>	Rare	<p><b>Fire Investigations:</b> Lifting debris, furniture and appliances and cutting out wall and roof sections while at times wearing 25 lb. turn out gear with 30 lbs. SCBA (breathing apparatus).</p>
<b>Lifting – Above Shoulder</b>	Rare	<p><b>Fire Investigations:</b> Lifting the 30 lb. SCBA over the head, ripping a ceiling section or upper part of a wall; setting up a 10' ladder weighing 10 lbs.</p> <p><b>Building Inspections:</b> Setting up a 10' ladder weighing 10 lbs.</p>
<b>Carrying</b>	Rare	<p><b>Fire Investigations:</b> Carrying 35 lb. portable generator and 20 lb. portable lights over distances of up to 300 feet.</p> <p><b>Fire Extinguisher Training:</b> Carrying 100 lb. fire extinguisher rack, tipping/rolling 100 lb. propane cylinder over distances averaging 50 feet.</p>
<b>Pushing/Pulling</b>	Rare	<p><b>Fire Investigations:</b> Moving debris, furniture and appliances; shovelling debris; cutting out or ripping wall or roof sections by hand or with tools; opening jammed doors; may push a vehicle out of a garage with co-worker.</p> <p><b>Building Inspections:</b> Opening jammed or "sticky" door.</p>
<b>Sitting</b>	Frequent	2-3 hrs. to perform data entry and general office work; drives vehicle for an average of 2 hrs. a day.
<b>Static Standing</b>	Occasional	May be required for periods of up to 3 hours when conducting fire investigations (e.g. talking to co-workers, interviewing individuals, inspecting structure to find cause of fire) and for periods of up to 1-2 hours when conducting fire extinguisher training. May be required for a few minutes at a time in the hall to fax and print documents, talk with a co-worker, etc.
<b>Walking</b>	Occasional to Frequent	Significant walking occurs primarily when performing building inspections for periods ranging from 15 min. at a time up to a full day depending on size of building.
<b>Climbing</b>	Occasional	Significant stair climbing is required on a daily basis in the hall to climb up/down two flights of stairs. When performing building inspections, officer will climb up to 14 floors (i.e. high-rise buildings) with the typical building having 4 floors and may climb a 6' step ladder to check sprinkler system or other suppression systems or a fixed vertical ladder up to 2 stories high to check the mechanical systems on the roof of commercial buildings. During a fire investigation, officer may climb an aerial ladder, as well as repetitively climb over obstructions within burned building.
<b>Balancing</b>	Occasional	Required during all climbing activities, particularly during fire investigation when walking over uneven and burned floors cluttered with all types of debris.

<b>Neck Movements</b>	Occasional to Frequent	Sustained neck flexion is required for periods of 2-3 hours daily to perform data entry and general desk work (i.e. keyboarding, reading). Neck extension is required repeatedly and for periods of up to 5 min. at a time during building inspections to inspect ceiling, attics, sprinkler and other suppressions systems. Neck movements in all directions are required continuously during a fire investigation.
<b>Stooping/Twisting</b>	Rare to Occasional	Required primarily during fire investigations, for example, when digging and shovelling debris, and when on hands and knees to look at floor, carpeting, under furniture/bed and pull flooring apart. During a vehicle fire investigation, may be required to get inside the car under the dash.
<b>Squatting</b>	Rare to Occasional	Same as above.
<b>Kneeling</b>	Rare	May be required for a short duration during a fire investigation.
<b>Forward Reaching</b>	Rare to Occasional	Required repetitively during the course of a fire investigation (e.g. moving debris, furniture and appliances, shovelling debris or cutting out wall and roof sections). Extended the arms forward may be required on occasions but for brief durations during the course of a building inspection.
<b>Above Shoulder Reaching</b>	Rare	Required primarily during a fire investigation (e.g. cutting out or ripping a ceiling section or upper part of a wall; setting up a 10' ladder weighing 10 lbs.). May be required on occasions for brief durations during a building inspection (e.g. setting up a 10' ladder weighing 10 lbs., inspecting fire alarms, sprinklers, and other suppression systems).
<b>Handling/Gripping</b>	Occasional to Frequent	Handling of generally light objects is required on a daily basis to perform activities such as office work/data entry (e.g. handling paperwork, books and manuals, using a mouse), driving a vehicle to and from sites, and taking notes, using camera and flashlight during building inspections. When investigating significant fire incidents, significant handling with moderate to high grip strength is required (e.g. moving debris, furniture and appliances; shovelling debris, using tools such as axe and power saw to cut out wall and roof sections).
<b>Fingering</b>	Occasional	Required on a daily basis, primarily to keyboard as well as fill out forms and write notes.
<b>Feeling</b>	Not Required	
<b>Operating Hand Controls</b>	Occasional	Required on a daily basis to drive vehicle, for an average of 2 hours per day with trips ranging in duration up to 30 min.
<b>Operating Foot Controls</b>	Occasional	Required on a daily basis to drive vehicle, for an average of 2 hours per day with trips ranging in duration up to 30 min.
<b>Talking</b>	Frequent to Constant	Required throughout the day to communicate with co-workers, tenants, occupants, owners, victims, witnesses, public, etc. The ability to speak clearly is particularly crucial due to the high percentage of ESL residents.
<b>Hearing</b>	Frequent to Constant	Same as above. Excellent hearing ability is crucial at a fire scene when conducting a fire investigation to hear the communications on the fire ground and evacuation alerts.
<b>Tasting</b>	Not Required	
<b>Smelling</b>	Rare	Good sense of smell is important during a fire investigation to detect potential safety hazards (e.g. propane leak).
<b>Near Acuity</b>	Occasional	To read the computer screen, documents, books, and manuals.
<b>Far Acuity</b>	Occasional	To drive vehicle for an average of 2 hrs. per day, particularly at night. During a building inspection to look at sprinkler heads, fire alarms, etc.
<b>Depth Perception</b>	Occasional	To drive vehicle for an average of 2 hrs. per day, particularly at night.
<b>Accommodation</b>	Occasional	To drive vehicle for an average of 2 hrs. per day, particularly at night.
<b>Color Vision</b>	Occasional	To drive vehicle for an average of 2 hrs. per day, particularly at night.
<b>Field of Vision</b>	Occasional	To drive vehicle for an average of 2 hrs. per day, particularly at night.

## Physical Demands Summary

Enclosed are the results of the Essential Physical Demands that were obtained for the position of **Fire Prevention Officer**. Please note the specific maximum weight and frequency requirements as follows:

### City Of Richmond

#### *Physical Demands Analysis Summary*

#### **Fire Prevention Officer**

**N.O.C. Strength Classification: HEAVY**

<i><b>Physical Activities</b></i>	<i><b>Maximum Requirements</b></i>
<i><b>Lifting -Floor to Waist</b></i>	Rare to Occasional (up to 100 lbs.)
<i><b>Lifting -Waist to Shoulder</b></i>	Rare (up to 50 lbs.)
<i><b>Lifting –Above Shoulder</b></i>	Rare (up to 30 lbs.)
<i><b>Carrying</b></i>	Rare (up to 100 lbs.)
<i><b>Pushing</b></i>	Rare (up to 100 lbs.)
<i><b>Pulling</b></i>	Rare (up to 100 lbs.)
<i><b>Sitting</b></i>	Frequent
<i><b>Standing (static)</b></i>	Occasional
<i><b>Walking</b></i>	Occasional to Frequent
<i><b>Stair Climbing</b></i>	Occasional
<i><b>Ladder Climbing</b></i>	Rare
<i><b>Balancing</b></i>	Occasional
<i><b>Neck Movements</b></i>	Occasional to Frequent
<i><b>Stooping/Twisting</b></i>	Rare to Occasional
<i><b>Squatting</b></i>	Rare to Occasional
<i><b>Kneeling</b></i>	Rare
<i><b>Forward Reaching</b></i>	Rare to Occasional
<i><b>Above Shoulder Reaching</b></i>	Rare
<i><b>Handling/Gripping</b></i>	Occasional to Frequent
<i><b>Fingering</b></i>	Occasional
<i><b>Feeling</b></i>	Not Required
<i><b>Operating Hand Controls</b></i>	Occasional
<i><b>Operating Foot Controls</b></i>	Occasional
<i><b>Talking</b></i>	Frequent to Constant
<i><b>Hearing</b></i>	Frequent to Constant
<i><b>Tasting</b></i>	Not Required
<i><b>Smelling</b></i>	Rare
<i><b>Near Acuity</b></i>	Occasional
<i><b>Far Acuity</b></i>	Occasional
<i><b>Depth Perception</b></i>	Occasional
<i><b>Accommodation</b></i>	Occasional
<i><b>Color Vision</b></i>	Occasional
<i><b>Field of Vision</b></i>	Occasional

## APPENDIX – DEFINITIONS OF STRENGTH RATINGS AND FREQUENCY

<b>Strength ratings as defined by the National Occupational Classification (N.O.C.)</b>	
<b>STRENGTH RATING</b>	<b>WEIGHT</b>
Limited	0-5 kg (0-11 lbs.)
Light	5-10 kg (11-22 lbs.)
Medium	10-20 kg (22-44 lbs.)
Heavy	>20 kg (> 44 lbs.)

<b>Frequency</b>	
Not Required	Not performed
Rare	Not daily
Occasional	< 3 hours/day, 0-33% of shift, 1 repetition/30 min.
Frequent	3-5 hours daily, 34-66% of shift, 1 repetition/2 min.
Constant	> 5 hours daily, 67-100% of shift, 1 repetition/30 sec.