



## JOB DEMANDS ANALYSIS

**Company:** City of Vancouver

**Location:** #4 Patrol District

**Job Title:** Police Officer

**Classification:** Regular Duty

### Purpose of Activities

The purpose of the Police Officer position is to respond to the emergency and routine requirements of the citizens of Vancouver through the enforcement of the laws and bylaws.

### Tools and Equipment

The Police Officer will use the following tools and equipment to perform their duties:

- High performance police cruiser.
- Computer keyboard/monitor in car.
- Cellular telephone.
- Pepper Spray.
- Shotgun.
- Handgun.
- Baton.
- Flashlight.
- Notepad.
- Radio.
- Sirens/Lights.
- Kevlar Vest.
- Handcuffs.
- Utility Belt.

### Usual Methods

Most of the work is patrol oriented. One or (more normally) two officers will patrol a certain section of a district in the City of Vancouver for the majority of their shift. They respond to calls as they are dispatched. These calls can range from interviewing someone who has come home to find that their house has been burglarized to serious car accidents through to subduing a violent and possibly armed offender.

Much of the work on the scene involves interview, note-taking and checking records via the radio or through the computer in the car. Between calls, a considerable amount of time is spent driving. An average shift will create an opportunity for several hours of driving activities.



Most patrol units in Vancouver do not transport individuals to the lock-up for processing. There are special vans that are called to the scene for the purpose of transporting offenders.

A confrontation is a regular part of the job and these confrontations can take on any number of possibilities. Often they are verbal and the officer is aiming to get compliance from an individual. Sometimes the officer will have to use some level of manual force to restrain and handcuff an individual and occasionally the confrontation can include weapons. It is always possible that an officer's life may be in danger during a confrontation.

Other elements of a shift will include relationship building in the community by visiting certain establishments in the district to exchange information with business owners and to have a visible presence. These visits can also include check-ups on individuals thought to be connected to criminal activity.

### Administrative Issues

The officers work a variety of shifts that rotate forward every week. These are worked four on and four off. The shifts are as follows:

A	0500 – 1600
B	0700 – 1800
C	1400 – 0100
D	1600 – 0300
E	1900 – 0600

The officers also have four training days each year and two “call back” days. The city is divided into four patrol districts (West end, Eastside, Southeast, Westside). Each area has its own peculiarities, but Eastside has the heaviest call volume.

There can be a significant level of psychological strain in this job. Violent confrontation is always possible and regular power plays between the officers and members of the public (subjects of investigation and others).

### Activity Demand Variables

These variables are tasks that must be carried out by the employee and are implicitly or explicitly required as objectives of the job.

- Enter data into a computer using a keyboard.
- Work from a seated position for extended periods.
- Manage and deal with emergency situations.
- Use radio system.
- Work in an open environment.
- Respond with escalating levels of force as situation requires.
- Deal with people in a wide variety of stressful and non-stressful environments

### Worker Decision Variables

These variables are the sub-routines and cognitive/physical decisions made by the worker in carrying out the objectives of the job.

- Technique for dealing with individuals and situations in the field.



- Limited decision over which calls to respond to and when.
- Timing of breaks.
- Some control over timing and extent of conversation with others.

### **Accommodative Considerations**

1. People with injuries to the spine in any region may have difficulty with the static and largely seated postures.
2. The sitting required for this position would aggravate individuals with hemorrhoids or suffering from vascular insufficiency in the legs
3. Only extremely fit and thoroughly trained individuals should be employed in this position.

Prepared By: Greg Hart, Kinesiologist

August 4, 1999



## **Summary of Stresses**

### **Metabolic Stresses**

The aerobic energy system supplies most of the energy for the sedentary duties of police work as the energy requirements are very low amounting to about 800 kcal per shift. The aerobic energy pathway is also used to facilitate recovery from the periodic bursts of maximal effort. The anaerobic energy system will be taxed occasionally when running in pursuit or to a situation, in climbing stairs, in confrontations and in restraining or arresting individuals. Because of the variability of the demands on the energy systems and the sudden need for high levels of anaerobic energy in emergency situations the need for high levels of anaerobic conditioning is vital. Aerobic conditioning is helpful in recovery and in controlling body composition and lifestyle disease risk. Anaerobic conditioning (both power and capacity) is required to increase the amount of anaerobic energy available for use (both in sudden bursts of energy such as striking, jumping or reacting in defense as well as prolonged high intensity activities such as a prolonged struggle or a chase).

### **Structural Stresses**

Structural stresses to the zone constable on patrol are as varied as the types of situations that they are involved in. The leg musculature is involved in stabilization during confrontations, episodes of power in sudden reactions, climbing and jumping over obstacles. The shoulders are used extensively but more occasionally than the legs. While driving or in the van the shoulders are used in flexion, abduction and external rotation to operate the computer and reach for the radio, phone or siren. This can comprise a significant portion of the day. More forcefully the shoulders are used in confrontation and restraining offenders. All of the musculature of the shoulders may be taxed maximally in all ranges of motion, concentrically (when directing a force), statically (when stabilizing or restraining) or eccentrically (when resisting a force). The same can be said of the musculature around the elbow, wrist and hand areas. The wrist, hands and elbows are also used much more in writing notes and tickets, searching individuals and in restraining offenders. The back is another area of stress to the officers. This is mostly so in a passive sense as the prolonged periods of sitting in the very poorly designed seating of the cruiser places high compressive load and passive ligament strain on the spine. It also allows for the shortening and weakening of the several key muscular structures (i.e. hip flexors, hamstrings, adductors). The back is certainly affected by confrontations. It must be utilized in support and stabilization and perhaps actively in lifting (concentrically) or in resisting (eccentrically). These movements may be through full ranges of motion. The confrontational stresses on the back and the other joints of the body are fairly infrequent but may occur at any time so the officer must be prepared. It is also important to note that most of the confrontational stresses are fairly sudden and do not allow much preparation, they are often reactionary. The sudden change from passive to dynamic movement places the spinal structures in a severely compromised position and at high risk for injury.

The majority of the shift of the officer is spent sitting in the vehicle while driving from location to location, maintaining communication via the radio or the CAD (small computer), writing notes, receiving statements or phoning in reports. The quality of the car raises a number of concerns. The seating is very soft and offers no support of the natural spinal curve. The seat pan angles back to the junction with the seat back. This position reduces the opportunity for sliding out from under the seatbelt in a crash, but it also disables normal



postural control of the spine, loads the lumbar discs (especially when driving over rough road or terrain) and interferes with optimal function of the circulatory system as well as a number of vital organs located in the abdominal cavity. It is also an inefficient position for breathing.

The seating is built quite low to the ground. Getting in and out of the car is difficult as well, especially for tall officers, as there is a rise to step over as they enter and exit the vehicle. These factors make it difficult to get in and out of the vehicle quickly, necessitating awkward body positions to do so. A final problem exists in reaching over the seat to the briefcase in the back seat to retrieve paperwork. The position necessary to do this causes significant rotational stress to the spine while stressing the shoulder joint in the reach and lift. It is not uncommon to see the Patrol Constable spending 70 - 90 % of their shift sitting in the vehicle and being subjected to these continuous stresses.

In the vehicles, the officers must maintain communication with dispatch. This is done with the radio, the cellular phone and the CAD. The CAD, although it significantly improves communication and information available, poses a few physical stresses to the officer operating it. The CAD is positioned between the driver and passenger seats, connected to the dash. It swivels side to side to allow both officers to view it. In the cars there is not much arm room to type on the CAD and in both types of vehicles the shoulder must be in abduction and external rotation to type. Dominant hand use may not always be possible depending on whether the officer is the driver or the passenger. They must be able to use both hands to operate the CAD or rotate the spine into undesirable postures. The wrist also ends up in static extension and either ulnar or radial deviation depending on who is using it.

### **Special Stresses**

A factor that complicates the structural and metabolic demands is the presence of the equipment belt worn by the officers. It affects physical strain through its position as well as through its mass. The belt typically weighs approximately 10 kg with the weight distributed unevenly due to the focus of mass in the gun, radio and in the two extra clips of ammunition (15 bullets per clip). Handcuffs, pepper spray and small or large flashlight as well as a ticket book and baton in some cases is also loaded on this leather belt. The added load impacts energy requirements in most activities, but the bulk of the equipment forces the constables to unload a portion of the equipment when entering the Caprice. The seats in the vehicle are poorly designed for this requirement.

### **INTERVENTIONS**

Recommendations that could be implemented to lessen the risk of injury are listed below:

1. Encourage ongoing physical conditioning of the officers, specifically in the areas of anaerobic power and capacity, total body strength (including joint stability) and power. Aerobic conditioning is already focused on and should also be included. Physical conditioning is certainly the most influential controllable factor in this occupation.
2. Revisit the yearly physical assessment requirements to ensure that the above noted areas are assessed in addition to the functional assessments.



3. Ensure that adequate footwear is being utilized. Three key factors are ankle stability, heel stability and the appropriate absorption of compressive forces through the sole. Another consideration is to keep the weight of the footwear as low as possible without compromising the foregoing factors. The weight of footwear has been demonstrated to have an effect on energy expenditure over several hours. The current footwear does not accommodate the normal heel to toe energy transfer in running or even walking very efficiently. This is a severe restriction in sprint situations. This could be demonstrated in a simple study with a few volunteers.
4. Where possible, significant changes should be made to the patrol vehicle. The current layout of the radio, CAD, sirens and storage is very poor and contributes to injury and to inefficiency and safety problems. The seats are also inadequate, especially considering the amount of time spent sitting in them and the difficulty getting in and out of them. Change to the Recarro is an excellent idea. Any changes to the cabin of the cruiser should be made in a team approach including the vehicle manufacturer and several officers. The current design undoubtedly contributes to back injury and will certainly impair recovery.
5. A task force should be created to examine different ways to handle shift arrangements, especially in conjunction with court and training duty opportunities. The current shiftwork scenario can be physiologically very challenging and difficult to adjust to.

Referral: Debbie Craig		Organization: City of Vancouver							Police Constable		
Dept.: Police		Division:							Contact:		
									Date: August 4, 1999		
PHYSICAL DEMANDS		R E Q D	S I D E	FREQUENCY*				Max. Weight (kg)	Usual Weight (kg)	COMMENTS	
				Sel 1	Low 2	Mod 3	High 4				
S T R E N G T H	Lifting - Floor to Knuckle	X	B		X				100	75	Conscious or unconscious persons
	Lifting - Knuckle to Waist	X	B		X				100	50	Assisting conscious persons, briefcase
	Lifting - Waist to Shoulder	X	D	X					100	2 - 50	Gun to firing position, baton in fights
	Lifting - Over Head	X	B	X					100	50	Possible in physical confrontation
	Carrying - With Handles	X	E		X				20	15	One arm - briefcase for short distances
	Carrying - Without Handles	X	E	X					100	5	Shotgun, confiscated material, person
	Pushing - Upper Extremity	X	B	X					80	50	Offender in confrontation, into vehicle
	Pushing - Hip/Leg Assist	X	B		X				80	50	Restraining offender, fight situation
	Pulling - Upper Extremity	X	B		X				80	0 - 40	Steering vehicle, restraining offender
	Pulling - Hip/Leg Assist	X	B		X				100	70	Restraining offender, unconscious body
	Reach - Shoulder or Above	X	D		X				80	3% BW	Control person, check ledge or window
	Reach - Sho. or Above extnd	X	D	X					80	3% BW	Restraining persons
	Reach - Below Shoulder	X	D		X				min.	min.	Apply handcuffs, search suspect, radio mic.
	Reach - Bel. Shoulder extnd	X	R		X				80	3% BW	Searching suspects, shake hands, sirens
	Handling	X	B			X			max.	min.	People, weapons, materials
Gripping	X	B			X			max.	min.	Variety of different sizes and surfaces	
Fine Finger Movements	X	R			X			min.	min.	Write notes/reports, radio controls, CAD	
E N R G	Aerobic (percent)	X					85				Walking, sitting, standing, driving
	Anaerobic (percent)	X			15						Confrontations, lifts, climbing stairs, sprint pursuit
	High Energy Expenditure	X			X						Psycho-emotional stress reactions, altercations, climbing, etc.
	Low Energy Expenditure	X					X				Sitting, walking, interviews, eating, filling out reports
P O S T U R E + M O B I L I T Y	Neck - Static Flexion	X					X				While writing notes, tickets, running the CAD
	Neck - Static Neutral	X					X				Most activities including driving
	Neck - Static Extension	X			X						Brief, to survey an area, climbing stairs
	Neck - Rotation	X	R				X				Survey while driving, run CAD
	Throwing	X	E	X							In the sense of martial arts techniques in confrontations
	Sitting	X					X				Driving, dictating reports, CAD operation, eating
	Standing	X				X					Talking to individuals, waiting at scene
	Walking	X					X				Short distances to investigate (<50 m), to homes
	Running/Jumping	X		X							Pursuing or responding on foot over obstacles (<250 m)
	Climbing - Arms and Legs	X		X							Ladder, fence
	Climbing - Legs Only	X			X						Stairs in buildings, in/out of vehicle
	Bending/Stooping	X			X						Picking up person, speaking/prodding person on ground
	Crouching	X			X						Assisting or dealing with person lying on the ground
	Kneeling	X		X							Extended periods of assistance at ground level
	Crawling										
Twisting	X	E			X					Restraining or confronting offenders, reach for sirens	
Balancing	X			X						Physical confrontations	
G E N E R A L	Traveling	X					X				Extensively in zone, also throughout the district and city
	Work Alone	X		X							Normally in pairs, occasionally alone if partner off duty
	Interact with Public	X				X					Interviews, questioning, gen. inquiries, image interaction
	Operate Equip/Machinery	X					X				Computer, radio, vehicle, weapons, cuffs, cell phone
	Irregular/Extended Hours	X					X				Ten hour shifts, often irregular counterclockwise rotation

\* Frequency Legend      1 = Seldom; Not Daily    2 = Low Daily Activity; < 1hr  
3 = Moderate Demand; Repetition 1 - 3 hrs daily      4 = High Frequency Demand; Repetition > 3 hrs daily

The following shading denotes a      HIGH RISK TASK:      Modifications should be considered

**REQD** is marked with an X if the particular demand or category is relevant to the purpose of the job.

**SIDE** refers to the side or limb required to execute a task. If it is marked **E**, it indicates either side, the most common choice is listed first. **D** refers to dominant and **B** to both sides.

Referral:		Organization:						Title: see 1st page header	
Dept.:		Division:						Contact:	
PHYSICAL DEMANDS		R E Q D	S I D E	FREQUENCY*				Date:	
				Sel. 1	Low 2	Mod. 3	High 4		COMMENTS
P E R C E P T I O N	Hearing - Conversations	X	B				X	Radio used regularly/phone, interviews, 3rd person talk	
	Hearing - Other Sounds	X	B				X	Radio talk, traffic sounds, ambient noise in area	
	Vision - Far	X					X	Most activities	
	Vision - Near	X					X	Writing tickets, notes and regular CAD interaction	
	Vision - Colour	X					X	Suspect description	
	Vision - Depth	X					X	Driving, judge position of objects in alleys, parks, in crowds	
	Perception - Spatial	X	B				X	Driving, requir'd to move through/around crowds + obstacles	
	Perception - Form	X	B		X			Identify/differentiate objects very quickly in poor light	
	Feeling (Tactile)	X	B			X		Control radio, access weapons or accessories	
	Reading	X					X	Files, reports, handwritten notes, violation book, CAD	
W O R K	Writing	X				X		Notes, tickets	
	Speech	X					X	In person, to people in differ. states of awareness, radio	
W O R K	Inside Work	X					X	In vehicle, district office, court, inside businesses, homes	
	Outside Work	X				X		Vehicle to building, traffic stops, investigate - all weather	
	Hot Conditions >25 deg. C	X		X				Occasionally in summer months	
	Cold Conditions <10 deg.C	X		X				Very occasionally in the winter	
	Humid	X		X				During the summer and rainy conditions	
	Dust	X		X				Normally present outdoors, worse on windy days	
	Vapor Fumes	X			X			Traffic, sewer manholes, cig./bar smoke, pepper spray	
	Hazardous Machines	X					X	Vehicles from within police vehicle	
	Proximity to Moving Object	X					X	People, vehicle traffic and doors	
	Noise	X					X	Street and indoor including exceeding 100 dB at times	
E N V I R O N M E N T	Electrical Hazard	X		X				Possible in accident scenarios	
	Sharp Tools	X		X				Can be exposed to knife weapons, needles	
	Radiant/Thermal Energy	X				X		Amplified heat through windows of vehicle	
	Slippery Conditions	X		X				Wet and icy conditions throughout the year	
	Vibration and Related	X					X	Jarring spine in vehicle driving, recoil from shot/handgun	
	Chemical Irritants	X		X				Exposure to pepper spray, mace	
	Organic Substances	X		X				Garbage, vomit, saliva, feces, urine	
	Medical Waste	X		X				Hypodermic needles	
	Blood Products	X		X				Potential for contact with human blood very high	
	Congested Worksite	X		X				Occasional confined space activities	
T	Lighting - Direct	X					X	Daylight, overhead street lights, office lights, moonlight	
	Lighting - Indirect	X				X		Reflected sunlight, reflected effects lighting in bars	
	Lighting - Adjustable	X			X			Portable penlights and full size flashlights	
	Lighting - Fluorescent	X			X			District offices, stores, arrest processing	
	Lighting - Incandescent	X			X			Streetlights, building stairways	
	Lighting - Shadows etc.	X			X			Possible in streets, alleys, entrances, into vehicles, in bars	

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For detailed descriptions of each of the different categories, please refer to the reference guide or inquire with Human Effort at 1-888-4EFFORT