

## **Job Demands Analysis – Sweeper Truck Operator**

### **Purpose**

The sweeper operator is responsible for operating the sweeper or smaller mall sweeper to clean city streets, gutters and mall/downtown sidewalks.

### **Essential Duties**

The sweeper operator has 2 essential duties:

	<b><u>% of shift</u></b>
Duty #1 – Driving/Sweeping	90%
Duty #2 – Labouring	10%

NOTE: The mall sweeper is only operated at night, and only for 50% of the shift (ie: 5 hrs). For the other 50% of the shift the mall sweeper operator performs litter picking which is an entirely different job to operating the sweeper and is not addressed in this report. For the purposes of this report and the percentage breakdowns of duties, the 5 hrs of sweeping is the entire shift of the mall sweeper.

### **Description of Non-essential Tasks**

The operator may be required to perform other work tasks on an occasional basis.

Examples of the tasks that may be performed are:

- Answering questions from the public
- Keeping truck clean

### **Summary of Demands**

	Sedentary	Light	Medium	Heavy	Very Heavy	Comments
<b>Physical (strength)</b>				✓		Lifting demands, hydrant open/close
<b>Physical (endurance)</b>		✓				Stand/walk for up to 10% of shift
<b>Cognitive</b>			✓			Based on driving requirements

**Shift Structure**

Sweepers operate 24/7. Day shift operators work an 8 hour shift (7am – 3:30pm), 5 days/week. Afternoon shift (10am-8pm) and night shifts (9pm-7am) are 10 hrs and operators work 4 days/week. On days there is a 30 minute lunch break and two 10 minute coffee breaks which can be taken at any time. On afternoons and nights there are 3 scheduled 25 minute breaks.

**Frequency Rating Definitions**

The frequency rating definitions used in the Summary Table are from the Dictionary of Occupational Titles (DOT, 1991, 4th edition) published by the US Department of Labor. A similar classification is used for each Essential Duty, but the percentages are changed to reflect % of Duty rather than % of shift.

	<b>Time per Day</b>	<b>Percentage of Shift</b>
<b>Never</b>	0 minutes	0 %
<b>Rare</b>	0 - 5 minutes	0-1 %
<b>Infrequent</b>	6 - 25 minutes	2-5 %
<b>Occasional</b>	26 minutes – 2.5 hours	6-33 %
<b>Frequent</b>	2.6 - 5.25 hours	34-66 %
<b>Constant</b>	5.26 - 8 hours	67-100 %

<b>STRENGTH</b>	
<b>Strength Category</b>	<b>Weight Handled</b>
1. Limited	Up to 5 kg.
2. Light	5 kg. to 10 kg.
3. Medium	10 kg. to 20 kg.
4. Heavy	>20 kg

**Job Demands Analysis – Sweeper Operator - Summary Table**

a. Physical Demands		Frequency During Shift					Weight		Comments	
		Never	Rare	Infrequent	Occasional	Frequent	Constant	Usual (kg)		Max (kg)
Strength	Lifting – Floor to Knuckle		x					2-3	33	D2-Broom segments or boxes of segments, litter, branches
	Lifting – Knuckle to Waist		x					2-3	33	D2-Hose, broom segments or boxes of broom segments, litter
	Lifting – Over Shoulder		x					2-3	5	D2-Put branches or other pieces of debris in hopper side door
	Carrying – with Handles	x								
	Carrying – without Handles		x					2-3	33	D2- wrenches, broom segments, boxes, hose, shovel
	Pushing – Upper Extremity		x					5	45	D2-std.wrench, hydrant wrench
	Pushing – Hips/Legs assist							2-3	25	D2-replace screens, shovelling
	Pulling – Upper Extremity		x					5	45	D2-std. wrench, hydrant wrench, hose
Pulling – Hip/Leg Assist		x					10	91	D2-Open/close hydrants, hoses	
Mobility	Reach - Shoulder or Above			x						D1,2-lift debris into side door of hopper, climbing onto sweeper, remove screens
	Reach - Below Shoulder			x						D1,2-change broom heads, adjust dirt shoe, adjust seat in cab, shovelling
	Handling						x			D1,2-steering wheel, controls, tools
	Fine finger movements	x								
	Neck - Static Flexion					x				D1 - For mall sweeper only
	Neck – Static Neutral				x					D1-when driving and NOT sweeping
	Neck – Static Extension	x								
	Neck – Static Rotation					x				D1-monitoring broom position when sweeping-regular sweeper only
	Throwing	x								
	Sitting						x			D1-driving/sweeping
	Standing		x							D1,2-pre-trip, opening hydrants, filling tank
	Walking		x							D1,2-pre-trip, to hydrant, shovelling
	Running/Jumping	x								
	Climbing		x							D1,2-in/out of truck, onto rear bumper to access screens
	Bending/Stooping			x						D1,2-attach hose to hydrant, change broom heads, adjust dirt shoe, pre-trip checks
	Crouching		x							D1,2-attach hose to hydrant, change broom heads, adjust dirt shoe, pre-trip checks
	Kneeling		x							D2-Change broom heads, adjust dirt shoe
	Crawling	x								
Twisting			x						D1,2-watching mirrors, opening hydrants, pre-trip, changing brooms	
Balancing		x							D1,2-Climb in/out, on bumper for screens	
Travelling						x			D1-driving	

**Job Demands Analysis – Sweeper Operator: Summary Table (continued)**

a. Physical Demands (continued)		Frequency During Shift						Comments
		N	R	I	O	F	C	
Sensory / Perception	Hear/Conversations			x				D1,2-With workers at dump site, co-workers on radio/phone
	Hear/Other Sounds						x	D1,2-Vehicles, pedestrians, alarms, workers
	Vision/Far						x	D1,2-Driving, monitor environment
	Vision/Near						x	D1,2-Driving, changing gutter broom, hook to hydrant, shovelling, adjusting dirt shoe
	Vision/Colour						x	D1-Driving demands
	Vision/Depth						x	D1,2-Driving and non-driving tasks
	Perception/Spatial						x	D1- Orienting location when viewing mirrors when driving/sweeping
	Perception/Form		x					D1-Watching for obstacles in poor visibility conditions
	Feeling	x						
	Speech			x				D1,2-With workers at dump site, co-workers on radio/phone
Work Environment	Inside Work						x	D1-Inside vehicle
	Outside Work				x			D1,2-pre-trip, hook up to hydrants, shovelling
	Slippery		x					D1,2-Outside work in wet and slippery road conditions
	Congested worksite				x			D1,2-Depends on traffic, time of day/night, business at transfer stn/dump
	Chemical Irritants	x						
	Confined Space Entry	x						
	Vapour Fumes			x				D1,2- Exhaust if driving with windows down, or when rinsing out back of sweeper
	Noise						x	D1,2-Transfer stn, vehicle and street noise
	Proximity to moving objects					x		D1,2-Vehicles and pedestrians, depending on time of day/night, trucks in transfer stn
Physical Demands	Hazardous Machines		x					D2-broom if it is running
	Electrical hazard	x						
	Sharp Tools	x						
	Radiant/Thermal Energy	x						
	Hot/Cold		x					D2-Extremes are rare and weather dependent
	Humid		x					D2-Extremes are rare and weather dependent
	Environmental Dust		x					D1-if sweeping with windows down
	Organic Substances			x				D2-Shovelling, rinsing out back
	Medical Waste	x						
	Blood Products	x						
	Lighting Issues – Direct		x					D1,2-Dark early mornings in winter
	Lighting Issues – Indirect	x						
	Vibration – Whole Body						x	D1-Driving
	Vibration – Hand/Arm	x						

**Job Demands Analysis – Sweeper Operator: Summary Table (continued)**

b. Cognitive and Psychosocial Demands	Frequency During Shift			Comments
	Never / Rare	Infrequent / Occasional	Frequent / Constant	
Degree of Supervision	x			
Time Pressure		x		D1,2 - if responding to spills or emergencies
Attention to Detail		x		D1,2 - keeping broom aligned with curb, hooking up to hydrant correctly
Memory Requirements		x		D1 - driving routes and directions
Interact with co-workers	x			
Interact with public	x	x		Varies between rare for regular sweeper to occasional for mall sweeper
Work Alone			x	
Reading	x			D1,2-pre/post trip forms, log book
Writing	x			D1,2-pre/post trip forms, log book
Irregular Hours	x			
Operating Equipment			x	

## **Physical Environment**

The work takes place inside sweeper cab, outside on city streets and at the transfer station or Vernon dump.

## **Staffing Levels**

The sweeper operator works alone.

## **Tools and Equipment Used**

Truck, socket wrenches, hydrant wrench, shovel, hose at wash rack

## **Other Equipment**

The sweeper operator must wear steel toed boots, a safety vest and gloves for non-driving work.

## **Data Collection**

Mandy Gallant, an ergonomic consultant from ErgoRisk Management Group conducted the JDA assessment on January 9<sup>th</sup>, 2009. Data was collected using a tape measure, industrial scale, Chatillon push/pull force gauge, digital camera and through observation and discussion with selected employees and the superintendent.

## **Contact for the on-site assessment**

Dennis Cole, Sub-Foreman of Street Cleaning was the contact for the on-site assessment.

## **Description of Essential Duties**

This section describes the work tasks that comprise the 2 essential duties of the job. Essential Duty Tables 2 and 3 (located at the end of this report) provide the physical, cognitive and psychosocial demands for performing each of the essential duties.

### **Essential Duty 1: Driving (Regular Sweeper)**

The sweeper operator is required to drive a sweeper on city streets to sweep debris from road surfaces and gutters. At nights or on days during the leaf program they drive according to a pre-assigned route. At other times the operator may be called to specials and may be following a flusher truck to clean a road, or may be sweeping at a construction site. At times the operator may have to negotiate the sweeper truck into tight spaces or around obstacles such as parked cars, containers, etc.

When sweeping the operator needs to keep the gutter broom close to the curb, but without touching it, this requires static neck rotation to monitor the broom position in side mirrors (Fig. 1). The operator also has to watch the road in front at the same time he is monitoring the mirrors, in case there is a parked car or obstacle ahead. The truck has both left and right-sided driving controls depending on which side of the street is being swept. In most cases the operator uses right-hand drive, but when sweeping the left side of a one-way street he may use the left-side controls. The sweeper controls are located on a center panel between the 2 sets of driving controls and consist of a series of buttons and switches.

Prior to leaving the yard in the morning the operator performs a pre-trip inspection of the sweeper, checking tires, lights, fluid levels, brakes, windshield wipers and sweeper controls (Fig. 2 & 3). If necessary the operator will fill the sweeper with gas either at the beginning or end of the shift. Operators tend to keep the same sweeper each day unless a sweeper has to be turned in for maintenance. At the end of the shift a post-trip inspection is performed and a pre/post trip inspection form is completed.



Fig. 1: Neck rotation to view gutter broom in mirror while operating controls.



Fig. 2: Checking fluids on pre-trip inspection.



Fig. 3: Operator climbing onto the sweeper during pre-trip inspection.



Fig. 4: File photo of the mall sweeper.

### **Essential Duty 1: Driving (Mall Sweeper)**

The mall sweeper is operated out of the National Yard on night shift only (Fig. 4). The operator typically performs litter picking (not addressed in this report) for the first ½ of the shift then sweeps for the second half when there is less activity on the mall and sidewalks. The mall sweeper is used in a specific area of downtown sweeping the



Granville mall and adjacent sidewalks. The mall sweeper operator looks down through the glass floor to monitor broom position, rather than looking sideways into mirrors like the regular sweeper. Other driving demands are similar.

### **Essential Duty 2: Labouring**

The sweeper operator is responsible for basic maintenance of some of the sweeper equipment. The gutter broom is typically changed once a week and consists of removing 10 bolts holding 5 segments of broom head in place (Fig. 5). The operator then replaces those segments with new ones. The operator may carry individual segments to the side of the sweeper when replacing the gutter broom or may carry a box with a complete set of segments inside (Fig.6). Gutter brooms are changed inside the garage. At times the dirt shoe may also need adjusting, which the operator also does with a socket wrench. In the case of the mall sweeper the broom heads are smaller and lighter and are changed as a complete unit by removing 4 screws.



Fig. 5: Operator replacing gutter broom.



Fig. 6: Operator lifting new broom segments to replace gutter broom.

The sweeper needs to be filled with water once or twice daily. In the case of the mall sweeper this is done at the yard by filling the tank with a hose. For the regular sweeper this involves driving to a hydrant and hooking up the hose to the hydrant (Fig. 7). The

operator then opens the hydrant with a special hydrant wrench (Fig. 8) and closes it once the sweeper tank is full. This task requires significant force. When sweeping the operator may at times encounter a pile of debris at the curb which the sweeper is not able to sweep up. The operator then gets out and spreads out the pile with a shovel so that the sweeper can sweep it up. The operator may also get out to pick up branches or other large objects that the sweeper cannot sweep up. He/she puts this debris directly into the hopper through the side door.

At the end of the day the operator drives the regular sweeper to the transfer station or Vernon dump to dump his load. He/she then drives to the wash rack and rinses out the rear of the truck (Fig. 9). Special screens at the top rear of the hopper must be pulled down and rinsed and then put back in place. To reach the screens the operator may have to climb up on the rear bumper of the truck (Fig. 10). Replacing the screens requires some force, particularly if they are very dirty or stuck. In the case of the mall sweeper it is dumped into a container at National Yard and the rear of the sweeper is also rinsed out with a hose at the wash rack.



Fig. 7: Hooking up to a hydrant to fill the sweeper.



Fig. 8: File photo of a city worker opening a hydrant using a hydrant wrench.

Job: Sweeper Operator  
Employer: City of Vancouver  
Reports to: Superintendent of Street Cleaning

Department: Engineering – Street Cleaning  
Location: Varies

Union: CUPE 1004



Fig. 9: Rinsing out back of sweeper at wash rack.



Fig. 10: Opening screens in rear of sweeper to rinse them.

**Essential Duty 1: Sweeper Operator - Driving**

a. Physical Demands		Frequency During Duty					Weight		Comments
		Never	Rare	Infrequent	Occasional	Frequent	Constant	Usual (kg)	
<b>Strength</b>	Lifting – Floor to Knuckle	x							
	Lifting – Knuckle to Waist	x							
	Lifting – Over Shoulder	x							
	Carrying – with Handles	x							
	Carrying – without Handles	x							
	Pushing – Upper Extremity	x							
	Pushing – Hips/Legs assist	x							
	Pulling – Upper Extremity	x							
	Pulling – Hip/Leg Assist	x							
<b>Mobility</b>	Reach - Shoulder or Above		x						Checking fluids, climbing in/out of regular sweeper
	Reach - Below Shoulder		x						Adjust seat controls, checking tires during pre-trip inspection
	Handling						x		Steering wheel, oil dipstick, turn indicator and other sweeper controls
	Fine finger movements	x							
	Neck – Static Flexion					x			Mall sweeper only, looking down at brooms
	Neck – Static Neutral					x			Looking ahead when driving
	Neck – Static Extension	x							
	Neck – Static Rotation					x			Regular sweeper only, looking in mirrors to monitor broom position
	Throwing	x							
	Sitting						x		
	Standing		x						Pre-trip inspection only
	Walking		x						Pre-trip inspection only
	Running/Jumping	x							
	Climbing	x							
	Bending/Stooping		x						Pre-trip inspection only
	Crouching	x							
	Kneeling	x							
	Crawling	x							
	Twisting				x				Shoulder check, getting in/out of sweeper, reaching to controls
	Balancing		x						When climbing in/out of sweeper
Travelling						x			

**Frequency Rating Definition for % of Duty**

The definitions for frequency ratings are contained at the end of the Table (page 14).

**Essential Duty 1: Sweeper Operator – Driving (continued)**

a. Physical Demands (continued)		Frequency During Duty						Comments
		N	R	I	O	F	C	
Sensory / Perception	Hear/Conversations		x					With co-workers or supervisor at beginning and end of shift or on cell/radio during shift.
	Hear/Other Sounds						x	Traffic noise, sirens, etc
	Vision/Far						x	Driving demands
	Vision/Near						x	Driving demands
	Vision/Colour						x	Driving demands
	Vision/Depth						x	Driving demands
	Perception/Spatial				x	x		Checking mirrors (freq for regular sweeper, occasional for mall sweeper)
	Perception/Form		x	x				Poor visibility conditions (varies between rare in day & infreq on rainy/foggy nights)
	Feeling	x						
	Speech		x					With co-workers or supervisor at beginning and end of shift or on cell/radio during shift.
Work Environment	Inside Work						x	Inside cab of sweeper
	Outside Work		x					Pre-trip only
	Slippery			x				Depends on road conditions and weather
	Congested worksite				x			Depends on traffic conditions and time of day/night and location in the city.
	Chemical Irritants	x						
	Confined Space Entry	x						
	Vapour Fumes			x				Exhaust fumes if windows down when driving
	Noise						x	
	Proximity to moving objects						x	Other vehicles, pedestrians
	Hazardous Machines	x						
	Electrical hazard	x						
	Sharp Tools	x						
	Radiant/Thermal Energy	x						
	Hot/Cold	x						
	Humid	x						
	Environmental Dust		x					If windows down and driving past construction site.
	Organic Substances	x						
	Medical Waste	x						
	Blood Products	x						
	Lighting Issues – Direct		x					Dark mornings in winter, poor weather at night
Lighting Issues – Indirect	x							
Vibration – Whole Body						x		
Vibration – Hand/Arm	x							

**Essential Duty 1: Sweeper Operator – Driving (continued)**

b. Cognitive and Psychosocial Demands	Frequency During Duty			Comments
	Never / Rare	Infrequent / Occasional	Frequent / Constant	
Degree of Supervision	x			
Time Pressure		x		If responding to spills or emergencies
Attention to Detail		x		Keeping broom aligned with curb, or sidewalk for mall sweeper
Memory Requirements		x		driving routes and directions
Interact with co-workers	x			
Interact with public	x	x		Varies between rare for regular sweeper to occasional for mall sweeper
Work Alone			x	
Reading	x			pre/post trip forms, log book
Writing	x			pre/post trip forms, log book
Irregular Hours	x			
Operating Equipment			x	sweeper

**Frequency Rating Definitions for % of Duty**

The frequency rating definitions are from the Dictionary of Occupational Titles (DOT, 1991, 4th edition) published by the US Department of Labor.

	Percentage of Duty
<b>Never</b>	0 %
<b>Rare</b>	0-1 %
<b>Infrequent</b>	2-5 %
<b>Occasional</b>	6-33 %
<b>Frequent</b>	34-66 %
<b>Constant</b>	67-100 %

STRENGTH	
Strength Category	Weight Handled
5. Limited	Up to 5 kg.
6. Light	5 kg. to 10 kg.
7. Medium	10 kg. to 20 kg.
8. Heavy	>20 kg

**Essential Duty 2: Sweeper Operator – Labouring**

a. Physical Demands		Frequency During Duty					Weight		Comments		
		Never	Rare	Infrequent	Occasional	Frequent	Constant	Usual (kg)		Max (kg)	
<b>Strength</b>	Lifting – Floor to Knuckle					x		2-3	33	Broom segments or boxes of segments, litter, branches	
	Lifting – Knuckle to Waist					x		2-3	33	Hose, broom segments or boxes of broom segments, litter	
	Lifting – Over Shoulder				x			2-3	5	Put branches or other pieces of debris in hopper side door	
	Carrying – with Handles	x									
	Carrying – without Handles				x			2-3	33	Wrenches, broom segments, boxes, hose, shovel	
	Pushing – Upper Extremity				x			5	45	Std. wrench, hydrant wrench	
	Pushing – Hips/Legs assist				x			2-3	25	Replace screens, shovelling	
	Pulling – Upper Extremity				x			5	45	Pull out screens, use std. wrench, hydrant wrench, hose	
	Pulling – Hip/Leg Assist				x			10	91	Open/close hydrants, drag hose	
<b>Mobility</b>	Reach - Shoulder or Above				x					Lift debris into side door of hopper, climbing onto sweeper, remove/replace screens	
	Reach - Below Shoulder					x				Change broom heads, adjust dirt shoe, shovelling, pick up debris/litter	
	Handling						x			Wrenches, hoses, litter, debris, brooms	
	Fine finger movements	x									
	Neck - Static Flexion	x									
	Neck – Static Neutral	x									
	Neck – Static Extension	x									
	Neck – Static Rotation	x									
	Throwing	x									
	Sitting	x									
	Standing					x					Opening hydrants, filling tank
	Walking					x					Truck to hydrant, shovelling, in garage, carrying debris
	Running/Jumping	x									
	Climbing			x							Onto rear bumper to access screens (regular sweeper only)
	Bending/Stooping					x					Attach hose to hydrant, change broom heads, adjust dirt shoe, pick up debris
	Crouching			x							Attach hose to hydrant, change broom heads, adjust dirt shoe
	Kneeling				x						Change broom heads, adjust dirt shoe
Crawling	x										
Twisting					x					All labouring tasks	
Balancing			x							On bumper for screens -regular sweeper only	
Travelling	x										

**Frequency Rating Definition for % of Duty**

The definitions for frequency ratings are contained at the end of the Table (page 17).

**Essential Duty 2: Sweeper Operator - Labouring (cont)**

a. Physical Demands (continued)		Frequency During Duty						Comments
		N	R	I	O	F	C	
Sensory / Perception	Hear/Conversations			x				With workers at dump sites, co-workers on radio/phone
	Hear/Other Sounds						x	Vehicles, pedestrians, alarms, workers
	Vision/Far						x	Monitoring environment for safety
	Vision/Near						x	All labouring tasks
	Vision/Colour	x						
	Vision/Depth						x	All labouring tasks
	Perception/Spatial	x						
	Perception/Form		x					Watching for obstacles in poor visibility conditions
	Feeling	x						
	Speech			x				With workers at dump sites, co-workers on radio/phone
Work Environment	Inside Work			x				Working inside garage changing broom heads
	Outside Work						x	Fill tank, hook up to hydrants, shovelling
	Slippery		x					Outside work in slipper, wet weather
	Congested worksite				x			Depends on traffic, time of day/night, business at transfer stn/dump
	Chemical Irritants	x						
	Confined Space Entry	x						
	Vapour Fumes					x		Vehicle exhaust, when rinsing out back of sweeper
	Noise						x	Transfer stn, vehicle and street noise
	Proximity to moving objects					x		Vehicles and pedestrians, depending on time of day/night, trucks in yard or transfer stn
	Hazardous Machines		x					Broom if it is running
	Electrical hazard	x						
	Hazardous/Sharp Tools	x						
	Radiant/Thermal Energy	x						
	Hot/Cold		x					Extremes are rare and weather dependent
	Humid		x					Extremes are rare and weather dependent
	Environmental Dust		x					Depends on work location
	Organic Substances					x		Shovelling, rinsing out back, adjust brooms
	Medical Waste	x						
	Blood Products	x						
	Lighting – Direct		x					Dark early mornings in winter, or poor weather at night
Lighting – Indirect	x							
Vibration – Whole Body	x							
Vibration – Hand/Arm	x							



**Essential Duty 2: Sweeper Operator - Labouring (cont)**

b. Cognitive and Psychosocial Demands	Frequency During Duty			Comments
	Never / Rare	Infrequent / Occasional	Frequent / Constant	
Degree of Supervision	x			
Time Pressure		x		If responding to spills or emergencies
Attention to Detail		x		Hooking up to hydrant correctly, correctly installing brooms and adjusting dirt shoe
Memory Requirements	x			
Interact with co-workers	x			
Interact with public	x	x		Varies between rare for regular sweeper to occasional for mall sweeper
Work Alone			x	
Reading	x			
Writing	x			
Irregular Hours	x			
Operating Equipment		x		

**Frequency Rating Definitions for % of Duty**

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