



## JOB DEMANDS ANALYSIS

**Company:** City of Burnaby

**Location:** Paint Shop

**Job Title:** Tradesman - Painter

**Classification:** Regular Duty

### Purpose of Activities

The Tradesman – Painter paints the interior and exterior of City of Burnaby buildings and rental properties; paints cabinets, gates, grates, vehicles, drums, doors, lumber, etc. in the spray booth in the Paint Shop; and performs other non-value added work with City of Burnaby owned parking lots and parkades and bus shelters.

### Tools and Equipment

The Tradesman – Painter will use the following tools and equipment to perform his duties:

- Painting tools and supplies – block sander, pole sander, sand paper, filler, putty knife, 5in1 tool, drop cloth, corrugated plastic drop sheet, paint, brush, paint roller, paint trays, assorted telescoping extension handles (1-4 metres), hand held electro-static paint sprayer (2), assorted step and extension ladders (1-6.7 metres), scaffolding, bucket truck, pressure washer, paint can shaker, wet paint signs, gun wash
- Paint and solvents – latex and oil based paints, automotive paint, lacquer thinner, mineral spirits, aromatic thinners, Toluene
- Protective clothing and equipment – dust mask, fresh air respirator, carbon filter mask, glasses, face shield, hard hat, steel toed boots, leather and/or rubber gloves, disposable coveralls, foam ear plugs, head phones
- Hand tools
- Traffic control – signs, traffic cones,
- Vehicles – two full size vans, one bucket truck, one half ton truck, trailer for pressure washer and 1200 litre water tank and Laser Striper
- Forklift, saw horses, pedestals, four wheeled carts

### Usual Methods

Painting (field –interior/exterior building, parking lot lines, light standards)

1. Gather paint and equipment, load into van or truck.
2. Drive to fieldwork location.\*\*
3. Carry tools and equipment to location of painting (can walk up to 300 metres).\*\*
4. Set out tools and equipment. A ladder, scaffold, bucket truck or Laser Striper may be required depending on the job.
5. Prep the walls/ceilings, doors, parking lot, light standard, etc. for painting by filling holes with all-purpose Ready Filler. Sand with pole or block sander. Lay down a drop cloth



to catch drywall dust in buildings. Use brush to brush drywall dust from light switches, baseboards, wall outlets, etc. A power washer is used to prep outside exterior walls and buildings, parking lots and light standards.

6. Transfer paint from one can to another (smaller quantity).
7. Climb up and down ladder to cut in ceiling and walls. Bend/stoop and crouch to cut in the baseboards and low corners. Repeat until area is cut in. Set out or place “wet paint” signs in areas where public is present.
8. Transfer paint to roller tray or spray machine.
9. Roll paint onto wall. A ladder and/or pole extension may be added to the roller handle. Set the spray nozzle and paint the required area.
10. At the end of the day or the end of the job, the area is cleaned, tools and equipment are carried to the truck and/or the site is secured.
11. Move on to next job or return the next day.

#### Painting (Paint Shop or Spray Booth)

1. Move objects (cabinets, doors, barrels, trailers, wheels, grates, gates, etc.) into Paint Shop or Spray Booth by hand, cart or forklift. One or more people carry some objects.\*\*
2. Set the objects on a cart, saw horse, pedestal or hang them from the ceiling chains.\*\*
3. Prep the objects by filling holes, nicks, etc. sand or rough up the surface.
4. Load the Sprayer, cans or trays with paint.
5. Paint the objects using a Sprayer, brush or roller. Turn the objects if required, repeat step until entire object has been painted.
6. Remove the objects from the Paint Shop or Spray Booth to dry.\*\*
7. Repeat steps 1-6.
8. Clean the brushes, rollers and Sprayer at the end of the day or when finished the job.

#### Other Related Duties (non value added\*\*)

The Tradesman – Painter will also perform other duties that are not directly related to painting. Bus shelters are repaired as required and maintained (pressure washed) up to three times per year. There are approximately 50 bus shelters owned by the City of Burnaby. Each Monday, the Tradesman – Painter will drive to city owned parking lots and parkades and pick up litter. They use a 20-litre pail and a hand picker for this task. The Tradesman – Painter estimates this task takes three hours per week and all four participate in this task.\*\*

The Tradesman – Painter is also required to remove graffiti from city owned property. If the graffiti is determined to be obscene or racially offensive, the Tradesman – Painter will drop whatever task he is working on and drive to the graffiti location. The graffiti is then removed with various chemicals. Typically the chemicals are sprayed (spray bottle) on the graffiti and then wiped off with a rag. On occasion, a power washer is used to wash the chemicals off the object because the chemicals are highly corrosive and will compromise the integrity of the concrete, steel, etc. Non offensive graffiti is removed as the Tradesman – Painter’s schedule allows.\*\*

**The presence of \*\* indicates non-value added tasks. These are tasks that do not contribute to the stated purpose of the work.**



## Administrative Issues

There are four full-time and one auxiliary Tradesman – Painters in the Paint Shop. Standard hours of work are from 0700 to 1530 Monday to Friday with a ten-minute rest period in the morning, a 30-minute lunch break and a ten-minute rest period in the afternoon. On occasion, the Tradesman – Painter will work an alternate shift from 1600 to 2400 or 0400 to 1200. These alternate work hours result when traffic or people in a building will either present a danger to or will impede the work of the Tradesman – Painter.

## 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.

- Stand or walk on concrete, tile floors, asphalt, grass or other surfaces that may be stable or unstable.
- Climb up and down ladders (1-6.7 metre), scaffolding, in and out of the bucket truck and van or truck.
- Paint and/or pressure wash from a ladder, scaffold or bucket truck.
- Bend/stoop, crouch, kneel to paint
- Operate electro-static paint sprayer, pressure washer, Laser Stripper and other related equipment
- Reach shoulder and above to shoulder and below to prepare and paint interior, exterior buildings, components in the spray booth and other labouring duties.
- Lift, carry and place objects in the Paint Shop or Spray Booth by hand, cart or forklift.
- Wear a mask or respirator to perform some work with dangerous chemicals or toxic substances

## 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.

1. Body positioning technique during preparation and painting in the field and spray booth.
2. Lifting and carrying techniques ask for help, use a forklift.
3. Task organization

## Accommodative Considerations

1. People with injuries to the spine, in any region, may have difficulty with the static and dynamic movements required to prep and paint.
2. People with shoulder injuries such as rotator cuff tendonitis, bursitis and instability may have difficulty with dynamic and static loading and reaching when prepping and painting.
3. People with forearm and elbow injuries such as tennis elbow may have difficulty with the repeated static grip forces required to prep and paint, specifically with the brushes, sprayers, extension handles, etc..
4. People with nerve compression injuries in the upper extremities may have difficulty with the repeated and prolonged shoulder flexion activities required to prep and paint.



5. People with lower extremity injuries may have difficulty with the constant change of position from standing, bending, stooping, crouching, kneeling and climbing up and down ladders, scaffolding and in and out of the bucket on the bucket truck.
6. Post-whiplash and other neck problems may have difficulty with this position.
7. Individuals who do not cope under deadline pressure or in open low-autonomy work environments would have difficulty with this position.
8. Tradesman - Painter must hold a Trades Ticket, which is valid in the Province of British Columbia.

Prepared By: Jeffrey J. McGinn, Kinesiologist

February 25, 1999



## Summary of Stresses

### Metabolic Stresses

The aerobic energy systems will supply the major source of energy while performing the duties and responsibilities of the Tradesman - Painter. This energy system will be required to maintain the low to moderate energy requirement necessary for this work. Occasionally, high-energy demand, for prolonged periods of activity will be supplied by the anaerobic energy system. Performing tasks and duties using poor posture or technique will decrease the metabolic demand required throughout the shift but these postures and techniques will increase the structural stress to the spine and upper and lower extremities.

### Structural Stresses

**Spine** –Significant loading of the spinal structures are likely in this position. Prolonged loaded and unloaded forward flexion, extension, lateral flexion and rotation of the spine are all movements required by the Tradesman Painter. Forward flexed postures require no activity from the torso musculature, but increase asymmetrical disc compression and passive stretch on the posterior spinal ligaments and disc fibres. This can contribute to disc integrity problems as well as contributing to deconditioning of the torso support musculature. Lateral flexion and/or rotation with or without forward flexion (loaded or unloaded) will significantly increase the shear forces encountered by the discs, fibres and spinal ligaments.

**Neck, Shoulders and Upper Extremity**– Prepping and painting require prolonged and repeated static and dynamic movements from below to above shoulder height. The static and dynamic movements through the shoulder and upper extremity often require the rotator cuff muscle groups, upper trapezius and scalene muscles of the neck to maintain a constant and significant load. Prepping and painting tool use (predominately dominant hand) will increase the static and dynamic loading of the forearm flexors, extensors, supinator, pronator teres and the pronator quadratus. Paint sprayer use will also increase the vibration and compressive forces from the grip to the elbow and shoulder that may lead to over use tendon or nerve injuries. Impingement and inflammatory injuries to the shoulders are likely due to the prolonged static arm position (flexed and abducted shoulder and elbow) required during prepping and painting.

Almost all of the Tradesman – Painters work is carried out in front of his body with some type of tool or implement. This [position will weaken the shoulder girdle support structure and increase the risk of injury to this area. Rotator cuff and biceps tendon tendonitis are likely as the muscle of the upper back and shoulder weaken through prolonged use. As this happens, thoracic spine kyphosis will increase and the cervical spine will be pulled forward out of its neutral position.

**Hips and Lower Extremities** – Standing and walking on concrete and asphalt for the entire shift increase the compressive forces through the ankles, knee, hips and spine. Climbing up and down ladders, scaffolding and in and out of the bucket truck will tax the knee, hip and ankle flexors and extensors.



## **INTERVENTIONS**

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

1. Teach postural awareness sessions that will focus on the importance of proper body posture and how it relates to their ultimate physical comfort and fatigue level.
2. Encourage the Tradesman - Painter to maintain an increased level of fitness away from work that will focus on cardiovascular endurance, muscular strength, muscular endurance and flexibility. Particular attention should be paid to strengthen the shoulder complex and upper back.
3. Eliminate non-value added tasks from the duties of the Tradesman – Painter (bus shelters, graffiti and parking lot litter pick up)
4. Provide knee pads to the Tradesman – Painter when kneeling to cut in low wall edges.
5. Improve the ventilation and air flow in the spray booth.
6. Improve the lighting in the spray booth and Paint Shop.

PJDC-Tradesman - Painter

Referral: Lana Ho		Organization: City of Burnaby							Title: Tradesman Painter	
Dept.: Engineering & Traffic		Division: Paint Shop							Contact:	
PHYSICAL DEMANDS		R E Q U I R E 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	D			X		45	<1-10	paint, wood, parts for painting, drums
	Lifting - Knuckle to Waist	X	D			X		45	<1-10	paint cans, doors, wood, metal parts
	Lifting - Waist to Shoulder	X	D			X		30	<1-10	paint cans, drums, wood, metal parts
	Lifting - Over Head	X	D		X			30	<1-10	hangs parts to spray in booth
	Carrying - With Handles	X	D			X		45	<1-10	paint cans, sprayer, pressure washer
	Carrying - Without Handles	X	D				X	45	<1-10	pole sander, roller extension, parts
	Pushing - Upper Extremity	X	D				X	25	<1-10	pole sanding, rolling, brushing paint
	Pushing - Hip/Leg Assist	X	D		X			45	<1-10	carts, bins, laser striper
	Pulling - Upper Extremity	X	D				X	25	<1-10	pole sanding, rolling, brushing paint
	Pulling - Hip/Leg Assist	X	D		X			45	<1-10	carts, bins, laser striper
	Reach - Shoulder or Above	X	D			X		30	<1-10	pole sanding, roll, brush, spray paint
	Reach - Sho. or Above extnd	X	D			X		15	<1-10	pole sanding, rolling, brushing paint
	Reach - Below Shoulder	X	D				X	45	<1-10	sand,roll,brush,spraypaint,power wash
	Reach - Bel. Shoulder extnd	X	D					45	<1-10	lift, carry, pole sand, roll paint
Handling	X	D				X	45	<1-10	paint tools/equip., pressure wash	
Gripping	X	D				X	50	<1-10	prep/paint tools, paint cans, parts	
Fine Finger Movements	X	D			X		max.	low	sprayer adjustments, tools use	
E N R G Y	Aerobic (percent)	X					95			light to moderate activity to prep, paint and labour
	Anaerobic (percent)				5					some heavy lifting of parts to paint
	High Energy Expenditure				X					some heavy lifting of parts to paint
	Low Energy Expenditure	X					X			light to moderate activity to prep, paint and labour
P O S T U R E +	Neck - Static Flexion	X				X				prep, paint and labour below shoulders
	Neck - Static Neutral	X					X			stand, walk, paint with, brush, roller, sprayer
	Neck - Static Extension	X				X				prep, paint and labour above shoulders on walls/ceiling
	Neck - Rotation	X	E			X				shoulder check, paint from ladder, spray/pressure wash
	Throwing									
	Sitting	X			X					drive to paint in field, parking lot, bus shelters
	Standing	X					X			concrete floor in shop, buildings, tile floor, grass, asphalt
	Walking	X					X			in shop, spray booth, at work site
	Running/Jumping				X					down from ladder, scaffolding, back of truck, van
	Climbing - Arms and Legs	X			X					up/down ladder to prep/paint, scaffold, truck, van
	Climbing - Legs Only	X			X					stairs in buildings, on trailer, truck
	Bending/Stooping	X					X			to prep, paint, labour at work site
	Crouching	X				X				to prep, paint, labour at work site
	Kneeling	X			X					to prep, paint, labour at work site
Crawling										
T W O G E N E R A L	Twisting	X	E							prep, paint, labour at work site
	Balancing	X			X					on ladder, scaffold while prepping, painting, power wash
	Traveling	X			X					to work site in the City of Burnaby
	Work Alone	X			X					on some jobs in shop or at work site
	Interact with Public	X			X					drive in traffic, at work site, on street
	Operate Equip/Machinery	X				X				truck, van, forklift, sprayer, pressure washer, shaker
	Irregular/Extended Hours	X			X					on occasion 4pm-12am, 4am-12 pm

\* 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.

