

Job Demand Analysis - TRADES II - GARDENER

Purpose of the Job

The Trades II - Gardener is responsible for the care and development of horticulture areas as needed during certain times of the year, and will provide supervision to one or more subordinates. The Trades II - Gardener will perform horticultural work at the journeyman level in urban park settings.

Essential Duties

The Trades II - Gardener has 6 essential duties:

- (1) Planting (D1)
- (2) Transplanting (D2)
- (3) Cultivating (D3)
- (4) Pruning (D4)
- (5) Watering (D5)
- (6) Grounds Maintenance (D6)

(These duties are performed at different times of the year)

Summary of Demands

	Sedentary	Light	Medium	Heavy	Very Heavy
Physical				X	
Cognitive			All Duties		

The job is **physically** demanding. The Trades II - Gardener needs to:

- Be able to perform skilled horticultural work
- Carry gardening supplies that weigh up to **22 kg**
- Use gardening tools/equipment that weigh up to **13 kg**
- Work outdoors in variable weather conditions

The workers require **physical endurance** to:

- Continuously stand and walk. (95 % of their shift)
- Maintain posture in a relatively stationary position
- Conduct work from an awkward posture
- Perform repetitive motions

The job is **cognitively** challenging. The Position requires:

- The ability to provide supervision to one or more subordinates
- The ability to select the appropriate type of tools / equipment
- Tactfully deal with a wide variety of park users
- The ability to maintain a variety of records
- Knowledge of turf maintenance practices
- Understanding of irrigation and drainage systems
- Knowledge of landscape construction principles and practices

The job requires certain **qualifications**. The workers must have:

- Successful completion of the BC Landscape Horticultural Apprentice Program and 4 years of diverse and relevant horticulture work experience, OR
- Successful completion of the BC Landscape Horticulture Certificate, 15 credits from a recognized post secondary institute offering a horticulture program and 6 years of diverse and relevant horticultural work experience.
- A valid Pesticide Applicators Certificate for the Province of BC
- A current and valid BC Drivers License

Shift Structure

The Trades II - Gardener work 7:00 am to 3:30 pm. They get a 30 minute meal break and two 10 minute rest breaks.

Job Demands Analysis - Trades II - Gardener: 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		1-13	22	Gardening tools supplies, Power Equipment; All Duties
	Lifting - Knuckle to Waist					X		1-13		
	Lifting - Over Head				X			1-13		
	Carrying - with Handles					X		1-13		
	Carrying - without Handles					X		1-13	22	
	Pushing - Upper Extremity					X				
	Pushing - Hips/Legs assist					X				
	Pulling - Upper Extremity					X				
	Pulling - Hip/Leg Assist					X				
	Reach - Shoulder or Above					X				All Duties
	Reach - Below Shoulder					X				All Duties
	Handling					X				All Duties
	Fine finger movements					X				All Duties
	Mobility	Neck - Static Flexion					X			
Neck - Static Neutral						X				All Duties
Neck - Static Extension						X				All Duties
Neck - Rotation						X				All Duties
Throwing						X				Planting,
Sitting					X					While Travelling
Standing						X				Throughout shift, All Duties
Walking						X				Throughout shift, All Duties
Running/Jumping				X						
Climbing					X					Ladders,
Bending/Stooping						X				All Duties
Crouching						X				All Duties
Kneeling						X				All Duties
Crawling						X				All Duties
Twisting						X				All Duties
Balancing						X				All Duties
Travelling						X			All Duties	

Job Demands Analysis - Trades II - Gardener: Summary Table (continued)

a) Physical Demands (continued)		Frequency During Shift						Comments
		N	R	I	O	F	C	
Sensory / Perception	Hear/Conversations					X		Supervising one or more subordinates
	Hear/Other Sounds					X		Using power equipment
	Vision/Far					X		All Duties
	Vision/Near					X		All Duties
	Vision/Colour					X		Differentiating between plants / weeds,
	Vision/Depth					X		
	Perception/Spatial					X		Planting
	Perception/Form					X		All Duties
	Feeling					X		
	Speech					X		Supervising one or more subordinates
Work Environment	Inside Work		X					Record Keeping
	Outside Work						X	All Duties
	Slippery				X			All Duties
	Congested worksite				X			All Duties, dependent on location
	Chemical Irritants	X						
	Confined Space Entry	X						
	Vapour Fumes	X						
	Noise					X		All Duties
	Proximity to Moving Objects					X		All Duties
	Hazardous Machines					X		Sharp tools and power equipment
	Electrical hazard			X				Electrical equipment
	Sharp Tools					X		Gardening tools
	Radiant/Thermal Energy				X			Power tools
	Hot/Cold					X		Dependent on weather, ALL DUTIES
	Humid					X		Dependent on weather, ALL DUTIES
	Dust					X		All Duties
	Organic Substances					X		Fertilizer
	Medical Waste		X					May encounter used needles
	Blood Products		X					May encounter used needles
	Lighting - Direct					X		All Duties
Lighting - Indirect					X		All Duties	
Vibration - Whole Body				X			Gardening tools, Power tools	
Vibration - Hand/Arm				X			Gardening tools, Power tools	

Job Demands Analysis - Trades II - Gardener: Summary Table (continued)

b) Cognitive and Psychosocial Demands	Frequency During Shift			Comments
	Never / Rare	Infrequent / Occasional	Frequent / Constant	
Degree of Supervision		X		Usually supervising other workers, All Duties
Time Pressure			X	Seasonally dependent work. All Duties
Attention to Detail			X	All Duties
Memory			X	All Duties
Interact with co-workers			X	All Duties
Interact with public		X		Wide variety of park users, All Duties
Work Alone		X		All Duties
Reading		X		Read procedures and instructions, All Duties
Writing		X		Record Keeping
Irregular Hours	X			
Operating Equipment			X	Power Tools / Equipment

Frequency rating definitions

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

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

Physical Environment

The work takes place at the Vancouver East District parks, community centre grounds, service yards, and other park-like locations such as the medians on the City's roadways. The Trades II - Gardener is required to travel to various parks and community centres in the Vancouver East district to perform several gardening duties.

The Trades II - Gardener works outdoors (99% of the time) in hot, cold, dry, wet, humid and inclement weather conditions.

Staffing Levels

The Trades II - Gardener will either work alone for some of their shift, or provide supervision to one or more subordinates. The number of subordinates supervised depends on the size and scope of the work being performed.

Tools and Equipment

The Trades II - Gardener uses a variety of supplies and tools while working. The list includes

- Planting materials and supplies
- Ground maintenance tools
- Power tools
- Personal Protective Equipment
- Transportation Equipment

Planting Materials and Supplies

Planting materials and supplies used by the Trades II - Gardener include: plant bulbs, seeds, shrubs, trees, fertilizer, plastic pots, plastic crates and buckets (with/without handles).

Ground Maintenance Tools

Maintenance tools used by the Trades II - Gardener include: rakes (stiff and flexible), shovels (flat and round point) digging forks, garden hoe, clippers,

shears, pole saws, hand saws, loppers, stakes, water hose, push brooms, lifts, Sledge hammers, spreader, and pylons. (Figures 1-3)



Figure 1: Shovels (Round Point & Flat) and a Flexible Rake



Figure 2: Various Shears



Figure 3: Spreader

Power Tools

Power tools used by the Trades II - Gardener include: hedge trimmers, chain saws, backpack blower (Figures 4-6), and rototillers.



Figure 4: Hedge Trimmer



Figure 5: Rototiller



Figure 6: Chainsaw

Personal Protective Equipment

Personal protective equipment used by the Trades II - Gardener include: gloves, rain gear, hard hat with face shields and ear protection, safety goggles, steel-toed boots, Kevlar-lined pants, and respirators. (Figure 7-8)



Figure 7: (Below): Hard hat with face shield and hearing protection



Figure 8 (Left): Rain gear

Transportation Equipment

Transportation equipment used by the Trades II - Gardener include: wheel barrels, lifts, trucks, and the gator utility vehicles. (Figure 9-10)



Figure 9: Gator Utility Vehicle



Figure 10: Wheel Barrel

Description of Essential Duties

Planting (Essential Duty 1)

The tasks that make up Essential Duty 1 (Planting) are: apply fertilizer (Task 1), till the soil (Task 2), and plant (Task 3) (a) bulbs, annuals, and shrubs (b) seeds. Planting occurs more frequently during the spring (March - July) and the fall (October - November).

Apply the fertilizer (Duty 1, Task 1)

The Trades II - Gardener transfer the mushroom manure from the back of the truck to the wheel barrel. This involves the Gardener II scooping the mushroom manure using a flat shovel and loading it onto the wheel barrel. Once there is enough mushroom manure on the wheel barrel they then push it to the soil bed and use the flat shovel to spread the fertilizer in the area. (Figure 11)



Figure 11: Gardener II applying fertilizer to soil bed

Till the soil (Duty 1, Task 2)

After the fertilizer has been applied, the Trades II - Gardener either manually or mechanically tills the soil, depending on the size of the soil bed and the availability of the Rototiller machine. Manually tilling the area involves the Gardener II using a garden hoe or a spading fork to mix the fertilizer with the soil. Mechanically tilling the soil involves the Gardener II unloading the

Rototiller from the back of the pick up truck (Figure 12) and pushing it to the area to be tilled. The Rototiller is pushed over the area in order to mix the fertilizer with the soil bed. (Figure 13)

Figure 12: Unloading the Rototiller



Figure 13: Tilling the soil with the Rototiller

Planting Bulbs, Annuals, and Shrubs (Duty 1, Task 3a)

Once the soil bed has been tilled, the Trades II - Gardener plants the bulbs. They bring a plastic crate or a bucket (with a handle) full of bulbs to the area to be planted. The Gardener II “throws” bulbs out onto the soil bed according to the pattern that they wish to use. To avoid wrecking the soil bed, the Gardener II will lay some plywood down on the soil. The Gardener II crouches and/or kneels on the boards to plant the bulbs (Figure 14). For areas not big enough to lay down plywood, the Gardener II is often in an awkward position when planting since they stretch to reach the soil bed. In order to plant the bulbs the Gardener II digs a hole with a hand shovel, place the bulb in it, and then cover it up with some soil (Figure 15)



Figure 14: Gardener II crouching on plywood to plant bulbs



Figure 15: Gardener II crouching and reaching to plant bulbs

To plant annuals and shrubs, the Trades II - Gardener uses similar planting procedures as when planting the bulbs. The Gardener II will dig the appropriate sized hole and place the annuals / shrubs inside, and fill the hole in with soil.

Planting Seeds (Duty 1, Task 3b)

After opening the bag of seeds, the Trades II - Gardener picks it up and pours the contents $\frac{3}{4}$ full into a bucket with a handle. Once the seeds have been transferred into the bucket, the Gardener II brings the bucket to the area to be seeded. When spreading the seeds, the Gardener II carries the bucket in one hand and uses the other hand to grab a hand full of seeds and throw it on the area (Figure 16). (A spreader which is pushed is used to spread seeds over larger areas). Once the seeds are spread, the Trades II - Gardener gently rakes the soil with a flex rake to make the sure the seeds firmly contact the soil. Once finished, the Trades II - Gardener puts some temporary plastic fencing up using a sledge hammer to keep the public out of the newly seeded area as necessary. This involves hammering metal stakes into the ground, roll out some plastic fencing, and hooking it onto the stakes.



Figure 16: Planting Seeds

Physical, Cognitive, and Psychosocial Demands (Planting)

While performing Duty 1 (Planting), the Trades II - Gardener will be exposed to heavy physical demands, cognitive and moderate psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting and carrying various tools, equipment, and supplies, pushing / pulling tools and equipment, reaching, gripping various tools and fine finger movements. The job involves bending / stooping, crouching, kneeling, twisting and balancing when planting bulb and/or shrubs. The job also involves standing, walking and climbing.

The cognitive demands include working alone or providing supervision to one or more subordinates, the knowledge and ability to follow proper planting procedures, the ability to select the appropriate type of tools / equipment for the work, and the knowledge of using and operating the tools / equipment.

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

Essential Duty 2: Transplanting

The tasks that make up Essential Duty 2 (Transplanting) are: transplanting (Task 1) (a) to a public location (b) from a public location.

Transplanting (Duty 2, Task 1) (a) To a Public Location

Transplanting an item to a location requires the same preparation work as described in Essential Duty 1 (Planting) which involves applying the fertilizer (Duty 1, Task 1) and tilling the soil (Duty 1, Task 2).

Once the preparation work has been completed, the Trades II - Gardener will dig the appropriate sized hole in the ground depending on the size of the item being transplanted. Once the hole has been dug, the Trades II - Gardener will transplant the item. For larger items such as trees or shrubs, a mechanical lift is used to assist the Gardener II to place it in the ground. Once in the ground, the Gardener II will use shovels to fill it in with soil.

Transplanting (Duty 2, Task 2) (b) From a Public Location

Transplanting items from a location involves the Trades II - Gardener digging up the plant to be removed and replacing it with another item or filling the hole with soil. If the item being removed is a small plant, the plant will be placed into plastic pots with hand shovels and then transported. For larger items such as shrubs and trees, the Gardener II will, ball the root into a burlap sac, and then transport it (Figure 17).



Figure 17:
Hedges being transported
on the back of a truck

Physical, Cognitive, and Psychosocial Demands

While performing Essential Duty 2 (Transplanting), the Trades II - Gardener will be exposed to physical, cognitive, and psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting, carrying various tools, equipment, and supplies, pushing / pulling tools and equipment, reaching, gripping various tools, fine finger movements, standing, walking, climbing, bending / stooping, crouching, kneeling, twisting, and balancing.

The cognitive demands include providing supervision to one or more subordinates, the knowledge and ability to follow proper transplanting procedures, and the ability to select the appropriate type of tools and equipment.

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

Essential Duty 3: Cultivating

The task that make up Essential Duty 3 (Cultivating) are: cultivating the flower bed (Task 1)

Cultivating the flower bed (Duty 3, Task 1)

The Trades II - Gardener is required to disturb the first few inches of the soil around the plants to provide good air and water exchange and discourage weed germination. This is done after the plants have been planted, therefore the Gardener II will not be able to use any power equipment to cultivate the soil as they may risk damaging the plants. The Trades II - Gardener will use various gardening tools such as rakes, gardening hoes, trowels, and cultivators to stir the soil around the plants.

Physical, Cognitive, and Psychosocial Demands

While performing Essential Duty 3 (Cultivating), the Trades II - Gardener will be exposed to physical, cognitive, and psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting and carrying various tools and equipment, pushing / pulling tools and equipment, reaching, gripping various tools, fine finger movements, standing, walking, climbing, bending, crouching / stooping, kneeling, twisting and balancing.

The cognitive demands include working alone or providing supervision to one or more subordinates, and the knowledge of cultivating principles and practices.

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

Essential Duty 4: Pruning

The tasks that make up Essential Duty 4 (Pruning) are: pruning (Task 1) (a) within arms reach, (b) out of arms reach, and gathering and disposing the trimmings (Task 2)

Essential Duty 5 (Pruning) is more frequently done during the winter months (December - March).

Pruning (Duty 5, Task 1) (a) within arms reach

For pruning items within arms reach, the Trades II - Gardener will use tools appropriate for the job, such as spring loaded hand clippers, sheers, loppers, gas powered hedge trimmers, and hand saws. This involves the gardener II performing a lot of repetitive pruning motions with the arms and hands and working from awkward positions to reach different areas.

Pruning (Duty 5, Task 1) (b) out of arms reach

For pruning things further than an arms reach away, the Trades II - Gardener will use tools appropriate for the job such as pole saws, gas powered extended hedge trimmers, or an extended pruning saws. This involves carrying and using equipment that is up to 8kgs / 17.5lbs above their shoulders. The Trades II - Gardener must be careful of falling branches and trimmings while pruning things high above the ground.

Gathering and disposing the trimmings (Duty 5, Task 2)

Once the pruning has been completed, the Trades II - Gardener must collect all the branches from the trees, bushes, and hedges that have been pruned and have dropped to the ground. Once everything has been gathered, the gardener II will do one of two things depending on the location they are pruning at. Some locations (such as some community centres) have designated areas where all branches and trimmings are dumped and will be picked up by other workers on a regular basis. If the gardener II is pruning at a location like this, they will take the trimmings they have gathered and bring it to the designated area. If

they are pruning at a location that does not have a designated dumping area, they will load the trimmings onto the back of their trucks and transport it to a service yard and the gardener II will unload it there.

Physical, Cognitive, and Psychosocial Demands

While performing Essential Duty 4 (Pruning), the Trades II - Gardener will be exposed to physical, cognitive, and psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting and carrying various tools, equipment, and supplies above the shoulder, pushing / pulling tools and equipment above the shoulder, reaching, gripping, fine finger movements, standing, walking, climbing on ladders, bending, crouching / stooping, and kneeling, twisting and balancing.

The cognitive demands include working alone or providing supervision to one or more subordinates, and the understanding of pruning principles and practices.

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

Essential Duty 5: Watering

The tasks that make up Essential Duty 5 (Watering) are: preparing the water hoses (Task 1), watering (Task 2) (a) manually, (b) using sprinklers, and putting the equipment away (Task 3).

Essential Duty 4 (Watering) occurs more frequently during the hotter months of the year (July - September). During these times, the Trades II - Gardener will water up to three times a week.

Preparing the water hoses (Duty 4, Task 1)

The Trades II - Gardener will carry the water hose to the nearest hose bib to the area which they will be watering. The standard length of the hose is 15m / 50ft and is either ½” or ¾” thick, depending on what is required. (½” hose is 1.8kgs / 4lbs). They will unroll and attach the water hose to the hose bib.

Watering (Duty 4, Task 2) (a) Manually

For smaller areas, the Trades II - Gardener will water the area by hand. They will select and attach the appropriate hose end nozzle required to water the area. They will use one arm to squeeze the nozzle to let water flow through the hose and sway it side to side until the area has been watered adequately. For even smaller areas and for potted plant, the Trades II - Gardener will use a plastic watering can to water the plants (Figure 18).



Figure 18:
Hose and watering can

Figure 19:
Plastic & Metal Oscillating Sprinklers



Watering (Duty 4, Task 2) (b) Using Sprinklers

For larger areas that need watering, an oscillating sprinkler will be used (see Figure 19). The Trades II - Gardener will connect the sprinkler attachment onto the end of the water hose and set it up in the appropriate location. They will change the location of the oscillating sprinkler as necessary.

Putting the equipment away (Duty 4, Task 3)

Once the watering has been completed, the Trades II - Gardener must put away the equipment such as the water hoses, the plastic watering cans, and the oscillating sprinklers. This requires rolling up the hose, and carrying and putting all equipment away in the appropriate places.

Physical, Cognitive, and Psychosocial Demands

While performing Essential Duty 5 (Watering), the Trades II - Gardener will be exposed to physical, cognitive, and psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting and carrying various equipment, pushing and pulling equipment, reaching, gripping the hose end nozzle, fine finger movements, standing, walking, bending, crouching / stooping, kneeling, twisting and balancing.

The cognitive demands include working alone or providing supervision to one or more subordinates, and the understanding of irrigation principles and practices

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

Essential Duty 6: Grounds Maintenance

The tasks that make up Essential Duty 6 (Grounds Maintenance) are: weeding (Task 1), and gathering and disposing the leaves (Task 2).

Weeding (Duty 7, Task 1)

The Trades II - Gardener must remove weeds from wherever they grow. This involves using a hand shovel to dig out the weeds or pulling it out by hand. A lot of repetitive motions are involved in weeding and requires the gardener II to work in awkward positions. Once the weeds have been removed from the soil bed, the gardener II will collect them all and transport them to the designated dumping location.

Gathering and Disposing the Leaves (Duty 7, Task 2)

Depending on the size of the area the Trades II - Gardener covers, they will either gather all the leave manually or mechanically. If the area they must clean is not large, they will manually collect the leave using a rake and create piles of leave so that they may be easily removed later in batches (see Figure 20).



Figure 20: Piles of leaves

If the Trades II - Gardener must cover a large area, they will use a gas powered leaf blower to gather the leaves. They will strap the leaf blower onto their

back (13kgs / 28.5lbs) (see Figure 21) and direct the hose as required to blow all the leaves to one area.



Figure 21: Backpack Blower

Once the leaves have been collected in piles, the Trades II - Gardener will collect them and load it into the back of their trucks. All leave are then transported to Everett Crowley Park and dump at a designated area there.

Physical, Cognitive, and Psychosocial Demands

While performing Essential Duty 6 (Grounds Maintenance), the Trades II - Gardener will be exposed to physical, cognitive, and psychosocial demands.

The physical demands include working outdoors in variable weather conditions, lifting and carrying various tools, equipment and supplies, pushing / pulling tools and equipment, reaching, gripping various tools, fine finger movements, standing, walking, climbing, bending, crouching / stooping, kneeling, twisting, and balancing.

The cognitive demands include working along or providing supervision to one or more subordinates, and the ability to identify weeds and other undesirable pests in the flower beds.

The psychosocial demands include interacting with coworkers and the ability to tactfully deal with a wide variety of park users.

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Description of Non-Essential Tasks

The Trades II - Gardener may be required to perform other non-essential work tasks on an occasional basis. Examples of the tasks that may be occasionally performed are: record keeping, cleaning and maintenance of tools / equipment, and cleaning their trucks.

Recommendations

The Trades II - Gardener position involves many labour intensive duties and therefore has a high potential for various musculo-skeletal injuries to occur. Some recommendations to minimize the risk of musculo-skeletal injuries from occurring are:

- Stretching program to warm up the muscles before any labour intensive activities
- Various lengths of gardening tool that are appropriate to the workers' height
- Take adequate breaks from duties involving repetitive motion
- Make necessary power equipment available to assist in performing labour intensive activities

Data Collection

The JDA observations took place between October 25th, 2005 and November 3rd, 2005. The Trades II - Gardener was observed working at various locations including Champlain Heights Community Centre, Kensington Community Centre, Killarney Community Centre and at Sunset Service Yard. Supplementary data was gathered by interviews with the Vancouver East District - Sunset Service Yard Trades Foreman, Jeff Whitehead.

This Job Demands Analysis report is limited to the Trades II - Gardener who perform majority of their work outdoors in the Vancouver East District of the Vancouver Parks Board. Frequency of duties and tools / equipment available may vary by district.