

# CITY OF VICTORIA

## PHYSICAL DEMANDS ANALYSIS

Effective Date: Dec. 4, 2007

<b>Job Title:</b>	Fitters Assistant	<b>Date of Job Site Visit:</b>	Nov. 1, 2007
<b>Department:</b>	Waterworks Operations	<b>On-Site Contact Person:</b>	Antonio Pacheco (Manager)
<b>Location:</b>	Various Waterworks Job Sites / Public Works Yard	<b>Classification:</b>	Regular Duty

### **POSITION FUNCTION**

The Fitters Assistant is responsible for offering assistance in the installation and repair of water-mains, water valves, fire hydrants, PRV stations, and water services (i.e. assisting various other positions within Waterworks Operations, such as Fitter, Fitter Mechanic, Leadhand, etc.).

### **TOOLS & EQUIPMENT**

The Fitters Assistant uses the following tools / equipment in the performance of their essential duties:

- Power Tools – jackhammer, ‘jumping jack’-style tamper, compressor, circular pipe saw, guillotine saw, concrete saw, hydraulic pump, snap cutter
- Hand Tools – long / short handled shovel, pick, straight pry-bar, chains / strapping, rake, push broom, sledgehammer, dolly, ladder, socket sets for couplers / clamps, hydrant wrench, pressure gauge, wheelbarrow, tapping machine, service key (i.e. for valve shut-offs)
- Equipment / Components – water-main pipe (varying length / diameter), large water-main valves, smaller service line shut-off valves, pipe elbows / T’s, rubber gaskets, couplings, clamps, pipe lubricant
- Traffic Control Items – traffic cones, traffic signs (‘lane closure’, ‘workers / equipment at work’)
- Safety Equipment – rubber / leather gloves, long pants, hard hat, face shield / safety glasses, ear protection (as needed), dust mask (as needed), reflective vest, steel toe boots, first aid kit

### **USUAL METHODS**

Employees working within this ‘target position’ utilize the following methods in the performance of their primary essential duties:

- a) Gather tools, materials, and equipment for the workday and load them onto the truck.
- b) Crew drives to the worksite and sets up traffic cones / signs.
- c) Tools / equipment are carried from the truck to a spot near where the asphalt will be broken and the ditch will be dug.
- d) Prior to excavation, a worker will hand-locate and mark underground utility lines so that backhoe operator is aware of cautionary digging zones.
- e) Backhoe / Excavator removes the asphalt road-top and digs a ditch to expose water-main pipe.

- f) As needed, workers (inc. Fitters Assistant) use jackhammer / straight-bar / pick to remove protruding areas of asphalt / concrete, making the edges of the road-cut (or sidewalk-cut) follow a clean line.
- g) Workers (inc. Fitters Assistant) use push-brooms / flat shovels to keep edges of ditch clear of dirt / rocks that may interfere with subsequent work.
- h) At certain points a Fitters Assistant will remain at road-level in order to prepare the pipe and components before they are lowered into the ditch (e.g. greasing pipe, applying rubber gaskets, etc.). He/she will also arrange all the necessary couplings / connections / clamps for that particular jobsite, and will lower them as needed into the ditch either by hand or by use of a rope.
- i) Fitters Assistant enters ditch via ladder, or by stepping into it (i.e. if it is a shallow ditch).
- j) At certain points a Fitters Assistant will remain in the ditch, and he/she works with the Fitter, Fitter Mechanic, Leadhand to complete the repair of a broken water-main, or to install the new pipe / valve / components in the ditch. This initially requires use of a shovel to remove dirt / rock away from the pipe / connection.
- k) As required (i.e. depending on the job task) the Fitter Mechanic or Fitters Assistant in the ditch will make a cut in the existing water-main using a power saw to tie-in the new connection. As needed, he/she will receive the coupling / connection / clamps that are lowered into the ditch, put them in place, and will tighten the couplings / clamps with a socket wrench.
- l) Grease lubricant is placed in the bell of the pipe / connection, in preparation for receiving the end of a length of water-main pipe. The Fitters Assistant (or Fitter / Fitter Mechanic / Leadhand) will guide a section of water-main pipe (max length = 6 metres) as it is lowered into the ditch by the backhoe. Once this length of pipe is properly positioned and its end is loosely fit into the bell opening, the Fitters Assistant (or Fitter / Fitter Mechanic / Leadhand) may use a long pry bar to lever the pipe-end into the bell. These steps are repeated until pipe is laid the length of the ditch.
- m) If a fire hydrant is being installed, the backhoe will excavate an area for the hydrant, and will lift / lower the hydrant components into position. The Fitters Assistant (or Fitter / Fitter Mechanic / Leadhand) will install and tie-in the hydrant (and associated valve / components) with the existing water-main using the steps as described above.
- n) If residential / business water services are being replaced or newly laid, the Fitters Assistant may hand-dig a ditch for the new water service (and to reveal the existing service). Copper line is rolled out within the ditch, and the Fitters Assistant (or Fitter / Fitter Mechanic / Leadhand) taps a hole in the existing water-main and completes the tie-in procedure (i.e. installing shut-off valve, etc.).
- o) Once all tasks are complete related to the laying of (or repair of) water-main and/or individual water services, the ditch is refilled via Backhoe / Excavator, and the dirt is compacted via a 'hoe-pack' (backhoe attachment), or via the Fitters Assistant manually using a 'jumping jack'-style tamper.
- p) Once dirt is fully compacted, workers (inc. Fitters Assistant) clean up the site by gathering any remaining broken-out pieces of asphalt / concrete, and sweeping up or shovelling loose debris / dirt / gravel as required.
- q) Traffic control signs / cones (if utilized) are gathered and are returned to the truck.
- r) Crew drives to next work site, and repeats steps (a) - (q)

## **ADMINISTRATIVE ISSUES**

Each 'Waterworks' crew consists of multiple workers with designated roles. The typical shift for 'Waterworks' workers (inc. Fitters Assistant) extends from 07:00 am to 15:30 pm, or 8:00 am to 16:30 pm. Shifts are scheduled Monday to Friday, and the workers receive two 15-minute rest periods, and one 30-minute lunch break during each shift. Shifts are scheduled Monday to Friday, although workers can be called out 24 hours per day, seven days per week in an emergency (e.g. broken water-main). Overtime is a position requirement, but does not occur on a regular basis. Overtime can involve an extended workday, or being called-in during off hours.

Any repairs or mechanical maintenance that vehicles or power equipment require is completed within the Public Works mechanical shop.

## **WORK ENVIRONMENT**

### **Physical Effort:**

Lift and move moderate to heavy equipment and materials (occasional to frequent basis)

### **Mental Effort:**

Within normal limits

### **Visual / Auditory Effort:**

Within normal limits

### **Work Environment:**

- \*Work outside (continuous, aside from riding in truck to worksites)
- Work in close proximity to moving traffic (frequent)
- Exposure to equipment noise (occasional to frequent, e.g. saws, jackhammers, tampers, backhoes / excavators, etc.)
- Exposure to equipment vibration (occasional to frequent, e.g. saws, jackhammers, tampers, etc.)
- Exposure to exhaust fumes and airborne particulates – airborne dirt / dust or saw-cutting particulates (occasional)

\*Note: the environmental conditions can considerably alter the degree of challenge of this job. It is possible to be exposed to widely varying conditions, including:

- extremely hot conditions (i.e. with implications for dehydration, sunburn, heat stroke)
- extremely wet conditions (i.e. with implications for less reliable footing, less stability of trenches, increased heaviness when shovelling wet dirt / mud / clay, and a need for higher grip forces due to slipperiness of tools / pipe components, etc.)
- extremely cold conditions (i.e. with implications for less reliable footing due to snow / ice, less stability of trenches due to slushy wetness, increased heaviness when shovelling wet dirt / mud / clay, and a need for higher grip forces due to slipperiness of tools / pipe components, etc.)

## **KEY SKILLS AND ABILITIES**

- Understand and discuss job-related matters.
- Operate a variety of light to heavy industrial equipment and vehicles.
- Operate hand tools and light power equipment.
- Establish and maintain effective working relationships.
- Deal with the public in a courteous and tactful manner.
- Work safely on widely varying job sites (i.e. on various streets throughout residential and commercial neighbourhoods).

## INDEPENDENCE

- Workers within these positions are under direct supervision at all times.
- Work quality is reviewed by leadhand / supervisor on a regular basis.
- Work is assigned according to a weekly schedule (set by supervisor), while also acknowledging that this schedule will need be adjusted as necessary to accommodate 'emergency' call-outs (e.g. water-main repairs).
- Problems (e.g., an inability to complete certain tasks for various reasons, malfunctioning tools / power equipment, etc.) or complaints from the general public are referred to supervisor / manager.

## QUALIFICATIONS

### **Formal Education, Training and Occupational Certification:**

- Grade 10 education minimum, and
- Current and valid Class 5 B.C. Driver's Licence.

### **Experience:**

- 1 year of related experience ... or ...
- an equivalent combination of education and experience.

## **WATERWORKS “FITTERS ASSISTANT” SUMMARY TABLE**

JOB TASK	TASK DETAILS	
<b>Lifting</b>  Floor to Waist	<b>Max</b> = 78 lbs (rare, when 2 workers lift 156 lb 'Bomag' tamper in / out of van)  <i>Note: lifting of tamper does not cover full range between floor and waist level, as it is usually lifted up each step of the 'Grumman' work van (tallest step-up requires a 14-inch vertical lifting displacement)</i>  <b>Avg</b> = 10 - 50 lbs (occasional)	
	e.g. Lifting of various items, including (but not limited to) the following: <ul style="list-style-type: none"><li>• 2 workers lifting a 156 lb 'Bomag' tamper (78 lbs per person) in / out of van 2 - 4 times per shift (tallest step-up requires 14 inch vertical displacement),</li><li>• 2 workers lifting a 98 lb 4-inch valve (49 lbs per person ... <i>but can be lifted via crane &amp; sling</i>),</li></ul>	<ul style="list-style-type: none"><li>• 2 workers lifting a 72 lb 'Stanley' jackhammer (36 lbs per person), in / out of van 2 - 4 times per shift (tallest step-up requires 14 inch vertical displacement),</li><li>• sledgehammers (e.g. 8 lbs, 14 lb).</li></ul>

<b>Lifting</b>  Waist to Shoulder / Head	<b>Not</b> a significant job demand.	
<b>Lifting</b>  Floor to Shoulder / Head	<b>Max</b> = 49 lbs (rare, lifting of 10-inch coupling out of ditch)  <b>Avg</b> = 10 - 20 lbs (occasional)	
<b>Carrying</b>  Two-Handed	<b>Max</b> = 49 lbs (rare, carrying of 10-inch coupling over a distance of 10 feet)  <b>Avg</b> = 10 - 20 lbs (occasional)	
<b>Carrying</b>  One-Handed	<b>Max</b> = 55 lbs (rare, when carrying roll of 1-inch diameter copper water-service line over a distance of 20 - 50 ft.)  <i>Note: roll of copper may also be carried in an over-the-shoulder style.</i>  <b>Avg</b> = 10 - 40 lbs (occasional)	
	e.g. Unilateral Carrying of various items, including (but not limited to) the following: <ul style="list-style-type: none"> <li>roll of 1-inch diameter copper water-service line (55 lbs),</li> <li>roll of ¾ -inch diameter copper water-service line (43 lbs),</li> <li>roll of ½ -inch diameter copper water-service line (23 lbs),</li> <li>sledgehammer (8 lbs or 14 lbs),</li> <li>bag / bucket of sawdust (approx. 10 lbs) to insulate meter pit.</li> </ul>	
<b>Pushing</b>	<b>Max</b> = 29 lbs of pushing <u>force</u> (rare, when using dolly to move 6-inch 'detector check & valve' weighing 250+ lbs)  <b>Avg</b> = 10 - 20 lbs of <u>force</u> (occasional)	
	e.g. Pushing associated with varied tasks, including (but not limited to) the following: <ul style="list-style-type: none"> <li>using dolly to move 6-inch 'detector check &amp; valve' weighing 250+ lbs (29 lbs push <u>force</u>),</li> <li>using pry-bar to push end of water-main pipe into 'bell' opening of another pipe section,</li> <li>brief but high pushing force when using socket wrench to tighten pipe couplings,</li> </ul>	<ul style="list-style-type: none"> <li>wheelbarrow usage (carrying load of dirt / gravel over a 50 - 100 foot distance when running water service line into residences),</li> <li>varied but moderate pushing force (if proper technique is utilized) for operation of jackhammer and "jumping-jack" style tamper.</li> </ul>

<b>Pulling</b>	<b>Max</b> = 92 lbs of pulling <u>force</u> (occasional, when dragging 156 lb 'Bomag' tamper over a 20-foot distance)  <b>Avg</b> = 10 - 20 lbs of <u>force</u> (occasional)	
	e.g. Pulling associated with varied tasks, including (but not limited to) the following: <ul style="list-style-type: none"> <li>dragging 156 lb 'Bomag' tamper (92 lbs <u>force</u> when dragged on flat asphalt) over a distance of 20 feet,</li> <li>dragging of jackhammer (62 lbs <u>force</u> when dragged on flat asphalt) over a distance of 10 - 25 feet,</li> </ul>	<ul style="list-style-type: none"> <li>brief but high pulling force when using socket wrench to loosen pipe couplings,</li> </ul>
<b>Reaching</b> Above Shoulder	<b>Max Duration</b> = 5 seconds (rare, when passing tools or equipment in / out of ditch)	
	e.g. Overhead reaching during a few tasks, including (but not limited to) the following: <ul style="list-style-type: none"> <li>reaching overhead to pass tools or equipment in / out of ditch (5 seconds duration),</li> <li>placing tools into back of van / truck bed (&lt; 5 seconds duration).</li> </ul>	
<b>Reaching</b> Below Shoulder	<b>Frequency</b> = Frequent to Constant	
	e.g. Reaching to low levels during the vast majority of job tasks.	
<b>Neck Motion</b> - Flexion (look down) - Extension (look up) - Rotation (side turn)	Flexion: Max Duration = 1 - 3 minutes (looking down at water-main pipe when in ditch, or looking down into ditch from road-level)  Extension: Max Duration = 1 minute (looking upward out of ditch)  Rotation Max: Duration = 5 sec (turning head to side)	
<b>Sitting</b>	<b>Max Portion of Shift</b> = combined total of 5 - 10% of shift (predominately while travelling in trucks between job sites, for 5 - 20 minutes per trip).  <b>Max Sustained Duration</b> = 20 minutes	
<b>Standing / Walking</b>	<b>Max Portion of Shift</b> = combined total of 90 - 95% of shift  <b>Max Sustained Duration</b> = 2.5 hours (i.e. remaining on one's feet until break periods, when sitting is an option if preferred)	

<b>Climbing</b> Steps	<b>Max</b> = 3 steps into 'Grumman' van (first step is 14" above ground-level, second step is 8", third step into van is 9")	
<b>Climbing</b> Ladders	<b>Max</b> = 15 ladder rungs (rare, when climbing in / out of a deep ditch) <b>Avg</b> = 6 - 10 ladder rungs (rare to occasional)	
<b>Sledge Hammering</b>	<b>Frequency</b> = Rare to occasional	
	e.g. Sledge hammer use is associated with varied tasks, including (but not limited to) the following: <ul style="list-style-type: none"> <li>• breaking water-main apart after saw cuts are made,</li> <li>• 'driving home' section of pipe (i.e. sledge hammering against piece of wood place against pipe, to drive the pipe into 'bell' opening of another pipe section.</li> </ul>	
<b>Bending</b>	<b>Max Portion of Shift</b> = 5 - 10% of shift (occasional)  <b>Max Sustained Duration</b> = *10 minutes sustained bending (rare, when applying a tapping sleeve or service clamp)  <b>Bending Depth</b> = bending to a depth 1 foot above ground-level (Note: workers can bend knees if preferred)  <i>*Note: squatting / kneeling / sitting in ditch are acceptable postural substitutions for bending in these job tasks.</i>	
<b>Ground Level Postures</b>  (i.e. Kneeling and/or Squatting)	<b>Max Portion of Shift</b> = 5 - 10% of shift (occasional)  <b>Max Sustained Duration</b> = *10 minutes sustained squatting / kneeling (rare, when applying a tapping sleeve or service clamp)  <i>Note: bending is an acceptable postural substitution for kneeling / squatting in these job tasks.</i>	
	e.g. Kneeling / Squatting during various tasks, including (but not limited to) the following: <ul style="list-style-type: none"> <li>• preparing pipe sections in ditch (3 - 5 minute sustained squat / kneel),</li> <li>• preparing pipe / components before they are lowered into the ditch, involving tasks such as greasing pipe, etc. (2 - 3 minute sustained squat / kneel),</li> </ul>	<ul style="list-style-type: none"> <li>• arranging couplings / connections in preparation for lowering them into the ditch (1 - 2 minute sustained squat / kneel),</li> <li>• picking up lightweight items off of ground (e.g. tools and small equipment components).</li> </ul>

<b>Crawling</b>	<b>Max Distance</b> = 10 feet of crawling on hands and knees (rare, when preparing pipe sections in ditch)
<b>Sweeping</b>	<p><b>Max Duration</b> = 5 - 10 minutes of sustained sweeping using push-broom (rare to occasional, sweeping to keep edges of road-cut clear of dirt / rocks after excavator / backhoe initially digs ditch, and sweeping to clear dirt / debris from road upon completion of job)</p> <p><b>Avg Duration</b> = 2 - 5 minutes (occasional)</p>
<b>Raking</b>	<p><b>Max Duration</b> = 5 - 10 minutes sustained raking (rare to occasional, when using a rake to level the surface of gravel)</p> <p><b>Avg Duration</b> = 2 - 5 minutes (occasional)</p>
<b>Shovelling</b>	<p><b>Max Duration</b> = 20 minutes sustained (occasional, hand-digging to expose gas / hydro lines when Backhoe / Excavator is approaching these underground utilities as identified in the initial hand-locate)</p> <p><b>Avg Duration</b> = 5 - 10 minutes (rare to occasional, when hand-digging service lines into residences, prior to rolling out new copper line)</p> <p>e.g. Shovelling of the following substances:</p> <ul style="list-style-type: none"> <li>• mud / clay in ditch,</li> <li>• gravel,</li> <li>• top soil on residential lawns.</li> </ul>