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To: Art Darnbrough, Director, Construction  
From: Rob Dickinson, Worksite Analyst, Construction  
Date: September 25, 1992  
Subject: **WORKSITE ANALYSIS REPORT: Claim #00000002-4 -- MR. ELECTRICIAN**

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**EMPLOYER:**

**CONTACT:**

**DATE OF ON SITE VISIT:**

**POSITION ANALYZED:** Electrician, construction

**DATE OF ACCIDENT:**  
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**PURPOSE**

To describe the duties involved in the construction electrician trade.

**CONCLUSION**

It is concluded that the duties of a construction electrician are varied as has been contained in this report. The discussion section has comments that may direct vocational rehabilitation.



## JOB DESCRIPTION

### Job Objective:

To lay out, assemble, install, repair, maintain, connect or test electrical fixtures, apparatus, control equipment and wiring for systems of alarm, communication, light, heat or power in building or other structures.

### Duties:

#### Essential

##### 1) install underground supply lines:

- to do this, a heavy equipment operator digs a trench which can be up to 50 meters long
- the electrician has to do occasionally pick and shovel work in order to lay cable in this underground trench
- following the laying of the cable, the heavy equipment operator would cover over the pipes or wires with the dirt

##### 2) material handling:

- various supplies and devices brought to the site have to be unloaded
- this includes panels, transformers, conduits and spools of wire which may be transported using wire carriers if available

##### 3) install boxes and conduits during wall construction:

- this is essentially working 1 step ahead of bricklayers installing metal boxes prior to them being bricked in by the bricklayers
- may involve working on top of scaffolds or working on ladders

##### 4) install main home runs:

- laying of conduits from panel to terminal boards
- may also involve installing conduits used for telephone and television systems
- majority of this work is performed overhead
- bending of conduits is generally relatively easy up to 1 inch in diameter and more difficult above this, performed using a hickey

##### 5) rough-in suites:

- this involves using a chisel to cut holes using a hammer, drill holes in walls in order to pass wires through them
- this is a job usually done by apprentices
- also done for the main house runs as mentioned above in duty #4
- particular to this duty, it is done in suites, which is a highly repetitive aspect of the job

##### 6) wire pulling/cable laying:

- this involves feeding wires thru conduits
- sometimes involves using fish lines in order to feed wires thru
- involves a lot of whole body movement and tugging on wires in order to have them pass thru conduits and other channels and to overcome the resistance of wire being pulled from spools



7) distribution systems:

- once the main power feed comes into a building, it has to be distributed through the system
- this involves going from multiple transformers and then through distribution panels
- installation of these devices may involve a lot of whole body pushing and pulling in order to fine tune placement of such equipment
- generally performed by 2 men working in pairs, sometimes with the assistance of a portable crank
- bending of tek cables can be rather difficult for wire diameter which can approx. 3 inches in the case of major apartment buildings and commercial structures

8) mount panels:

- various panels in electrical rooms weighing approx. 25-35 kg, approx. 16" x 60" in height
- the electrician would initially lay out the holes and then drill them using a hammer and drill
- he would fit plugs into the holes and then with the assistance of another worker, he would position the panel over the pilot holes
- use screw gun to attach panel to the wall
- this may be repeated several times depending upon the distribution system being used

9) fire alarm systems:

- this involves laying of conduit and distribution of wires
- wires have to be tested for conductivity
- install devices on sprinkler systems as well as tamper switches
- various types of devices including auditory speakers, bells, whistles, lights, heat and smoke detectors
- involves handling various types of small wires
- most of this work occurs at chest height
- the connection of such systems to their panel
- the testing of such systems as well

10) terminating (punching down)

- once cables have been fed into a panel, the electrician makes the appropriate connections to a central junction box or panel
- the electrician strips the insulation from the wire and then fits it into the appropriate terminal
- uses screw driver to fasten at the appropriate location
- repeat the above steps until the panel has been completely terminated
- this can be a very repetitive job in which an electrician can spend all day performing just this duty

11) install pot lights:

- these are the round circular lights installed into overhead ceiling panels
- the electrician would cut a round hole in the ceiling tile
- he would unpackage the pot light
- fit pot light into the tile
- he would make a connection to the junction box using Bx wire



- he would repeat this many times until all pot lights were connected
- he would then connect the system to the central distribution box
- repeat the above steps until assigned alternative duties

12) florescent fixtures:

- unpack florescent fixtures from boxes
- there may be some sub-assembly required which would occur at ground level
- make series/parallel connections between various fixtures
- fixtures are installed into a fixture assembly
- install the fixture into suspension grid of ceiling
- make appropriate connection to terminal box or to adjacent fixture
- this requires an extensive amount of ladder work for the electrician making these connections and doing the actual installation
- occasionally fixtures are suspended from chains where the hanger is pre-installed by another electrician

13) office wall distribution systems:

- often there are temporary type walls installed in offices
- these are currently constructed out of pre-fabricated metal studs
- prior to the drywall going up, electrical wires would be run inbetween these studs involving drilling holes thru the studs
- attach boxes to the studs
- run lines of Bx cable between these boxes
- install various switch plates
- involve the use of a screw gun and a light drill
- generally a 2-man job
- strip and make connections to various terminals

14) under floor duct:

- under floor duct in large office buildings
- there is an under floor duct which runs around the periphery of the central core
- at regular intervals, there are approx. 2" to 3" diameter holes through which cable is distributed around the central power source or communication centre of the floor
- these cylindrical concrete holes are broken into using a hammer and chisel to take out the turret plug
- fish wire is used to feed through the turret hole and make connection to end of wire
- wire is pulled through to the turret and a connection is made to go off in a different direction
- once connection is made, install turret plugs
- continue down channel to termination of wire feed
- fish wire up through the next turret hole
- make connection to floor receptacle or other terminal device
- this is very repetitive low level work



15) install receptacles:

- after drywall has been installed
- make connection to boxes and terminal receptacles
- this can be at various heights but generally between ground and chest level
- this can be repetitive work as well

16) communication systems:

- in the electrical room of a large building, there are panels where the telephone system is distributed from
- this is dealing with very small coded wire
- some wire has to be stripped and a connection is made with a small punch similar to a hammer & chisel type of action
- again, this can be a very repetitive type of work and could take up to an entire day for an electrician

17) pre-fab assembly:

- this is for pre-fab fixtures which are generally installed in garages which involves assembling a housing in order to protect the light against accidental electrocution
- generally with every large job there is a small pre-fab shop
- there is unpackaging and assembling of fixtures done at bench level work
- the job is relatively light in nature and easy to accommodate

18) installing conduits:

- this mostly involves 1/2", 3/4" and 1" conduit
- it could involve handling bundles of up to 10 at a time
- conduit is cut using a hacksaw and shaped using a hickey (long-handled bending tool)
- used for the distribution circuits
- drill hole into concrete
- install plastic anchor
- install clip and screw to hold conduit
- often performed while standing on a baker's scaffold (small scaffold: 4'-5' height)

19) install cable runs, pans:

- often coming out of the major transformer rooms
- large number of runs of conduits of approx. 3" diameter may be emanating from the room
- multiple hangers have to be installed from the concrete ceiling
- hammer drill punches hole into concrete
- hangers are suspended from the ceiling
- sometimes pre-fab racks are pre-assembled in the assembly shop installed at site

20) install tek cables:

- these are the very large main power leads into buildings
- often 1" to 3" in diameter
- they are very heavy and require a lot of slugging
- generally they are pulled with a tugger which is an electrical device
- often a 4-man job



- these spools may be placed upon a carrier if available or spool jack
- these are the main lines or feed which energize the entire building
- this cable has to be stripped and cut these wire using a hacksaw
- sometimes they are placed in the ground
- sometimes they are fed through conduits set-up on actual mounts

21) process work:

- more occurring in the industrial sectors
- such things as making connections for devices such as conveyor belts
- installing such things as trip switches, photo cells, etc.

22) repair/replacements:

- changing fixtures and bulbs to make systems more energy efficient
- normal repair caused by wear and tear on systems

23) reading blueprints and drawings:

- work is assigned to an electrician to follow a certain type of schematic or drawing
- interpret drawings and retrieve materials from available stock
- perform installation
- test installation to ensure that it is operational and safe

Non-Essential:

- there are no non-essential duties as have been described in this particular report
- they will vary from job to job

Relevant Activity Demands:

Standing:

- for up to 60 minutes at a time
- may be in conjunction with standing on ladders or walking
- total accumulation in an 8-hour shift approx. 8 hours
- rarely does a whole day involve 8 hours of static standing
- standing can be accommodated in various ways

Sitting:

- not a regularly occurring job demand except during pre-fab assembly when sitting is possible
- low level sitting may occur on small benches or stools when working for prolonged periods at low level

Crouching/Squatting/Kneeling:

- a regular job demand occurring while installing terminal receptacles
- also occurs regularly when working on floor ducts and at various other times throughout this job
- for approx. 10 minutes at a time
- variable frequency and duration
- total accumulation may exceed 4 hours per shift



Walking:

- for the majority of time it is over smooth concrete surfaces
- occasionally it could be on rough ground around construction sites, especially when required to install underground supply lines
- total accumulation in an 8-hour shift approx. 6 km

Bending/Twisting:

- this would occur at various times throughout all duties in this job
- variable intensity and duration
- by attention to good body mechanics, it is hopefully possible to limit the extent of this activity

Climbing:

- climbing up and down ladders and scaffolds
- a frequent job demand throughout this duty
- approx. 100 times up and down per shift
- baker's scaffold approx. 5 vertical steps in height

Lifting:

- bundles of conduit, 10/bundle
- 1/2", 20 lbs
- 3/4", 25 lbs
- 1", 40 lbs
- lifting heavy panels and generators up to 150 lbs for a 2-man shared load
- spool jacks, 2 per set, 80 lbs a piece
- tool belt weighing approximately 13 kg
- note: that sometimes there is mechanical assistance available of assistance in the form of a helper to share the load
- variable intensity and duration

Pushing/Pulling:

- pulling on heavy cable while passing cable through conduit and other enclosures
- pushing & pulling on hickey (pipe bender) utilizing long-handled tools
- repeated approximately 100 times/shift
- variable intensity and duration

Shoulder Positions:

- there is frequent work at above shoulder level
- variable intensity and duration, approximately 5 minutes at a time



## **JOB ANALYSIS**

I toured work site at the invitation of Gord Barton of Ainsworth Electric. We reviewed the job descriptions of electricians that have been injured workers to compile this job description. In general, the body parts most frequently injured with electricians are primarily their knees, followed by back injuries, followed by various electrical burns, etc. to hands and face. When considering modified work for electricians, basically what is required is to address the remaining physical capacity in light of the demands of the actual duties available on any particular work site. The initial choices essentially are pre-fab assembly, termination of wires involved in all systems, except the heaviest of which involving the tek cables.

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