TRAM ELECTRICAL SAFETY AND OPERATING RULES

TRAM ELECTRICAL SAFETY AND OPERATING RULES

1.0 INTRODUCTION

A copy of these Tram Electrical Safety and Operating Rules shall be issued to all employees engaged to work on the Tram Traction Supply System and High Voltage apparatus feeding that system. They must make themselves familiar with these Rules and perform all work associated with the electrical system in accordance with these Rules.

These Rules also apply to all other employees or persons, including visitors and contractors (whether or not engaged by the Corporation), who may be required to work in the vicinity of the Tram Traction Supply and High Voltage System, herein referred to as Electrical System. It shall be the responsibility of all personnel and their supervisors to ensure that all work on or in the vicinity of Electrical apparatus is performed in accordance with these Rules.

These Rules supplement the Wiring Regulations and other statutory rules and regulations applicable to work on or in the vicinity of electrical equipment. In particular, the Wiring Regulations of Electricity Supply Authorities apply to circuits of domestic and industrial voltage found in tram installations.

2.0 SCOPE

These Rules prescribe the safety practices and procedures which shall apply to all persons when working on or in the vicinity of electrical apparatus forming or capable of forming part of the Tram Traction Supply System and High Voltage apparatus feeding that system.

For the purpose of these Rules the words "... in the vicinity of electrical apparatus ..." means at such distance from the apparatus where there is reasonable concern that the clearances listed herein may be breached. For exposed electrical equipment installed on the Corporation's Tram traction power supply network that clearance is 2000 mm for personnel (including hand-held objects) and 6400 mm for plant defined as cranes, unless otherwise defined in Clause 7.0.

For the purpose of these Rules employees or subcontractors of a company contracting to the Corporation are deemed to be employees of the Corporation. Where the work to be performed by a contracting organisation requires specialised electrical training and authorisation, it is the responsibility of that organisation to ensure that only appropriately trained and authorised personnel are provided to do the work.

These Rules may be elaborated and supplemented by Departmental instructions which may, where considered necessary, impose a stricter application of safety principles.

No relaxation of the provision of these Rules is permitted without the approval of Group Manager, Tram and Bus Infrastructure.

Strict adherence to these safety rules is necessary to ensure:-

(a) Safety of employees and others. This shall be the prime consideration under all circumstances.

(b) Continuity of service.

(c) Welfare of plant.

NOTE: While safety is paramount, continuity of service and welfare of plant may not always be compatible. Which of these is to be given precedence in any instance will depend on the circumstances.

3.0 EXPLANATION OF THE TERMS USED IN THE TRAM ELECTRICAL SAFETY AND OPERATING RULES

The explanation of terms offered in this Clause is not meant as a rigorous definition of electrical or operational terms. The terms listed in this Clause have the following meaning in the context of these Rules.

Apparatus

Any electrical equipment, including overhead lines and underground cables, the conductors of which are live or can be made live.

Approval to Work Adjacent to PTC Tramway Electrical Equipment & Wiring

A document issued by an Authorised Electrical Operator Level A to record details of live apparatus in the vicinity of a work site. See Clause 9.6 and Appendix G for details.

This document may also be used to authorise work in the vicinity of the Corporation's electrical assets by non-Approved Persons.

Authorised Electrical Operator

An Authorised Electrical Operator is a Competent Person who has been authorised in writing by the Manager to carry out switching, isolating, earthing and short circuiting of electrical apparatus and issue and cancellation of access authorities in accordance with these Safety and Operating Rules. See Clauses 5.1 and 5.2 and Appendix A for details.

Conductor

Those parts of apparatus normally alive.

Contractor

Any person or organisation entering into an agreement (oral or written) to provide goods or services to the Corporation. This includes subcontractors and any person who is employed by a contracting person or organisation. For the purpose of these Rules contractors, employees or subcontractors of the contracting organisation engaged to perform work on or in the vicinity of electrical apparatus are deemed to be employees of the Corporation and are bound by the same requirements for training and authorisation as if they were employees of the Corporation.

Corporation

The Public Transport Corporation of Victoria.

Dead Line Work

Work carried out with the apparatus isolated and earthed in accordance with Clause 9.0. Dead Line Work is covered by issue of Electrical Access Permits.

De-energised

Disconnected from all sources of supply, but not necessarily isolated, earthed or out of commission.

Earth, to earth

In general electrical terminology "to earth" means to connect, through an earth matt, earth spikes or similar, to the general mass of earth. In the 600 volt DC tram traction system used in Melbourne the term "to earth" means to connect to the negative conductor, or rail.

Apparatus is deemed to be earthed if it is isolated and connected to earth, or rail or negative, as appropriate, in such a manner as to ensure and maintain effective dissipation of electrical energy.

Engineer-in-Charge of Apparatus

For the purpose of these Rules the term "Engineer-in-Charge of Apparatus" denotes an officer of the Corporation appointed to the position of manager of a department of the Tram and Bus Infrastructure Group, or his nominee, assigned asset responsibility over the "Apparatus".

Insulated

Adequately separated from adjacent conducting material by an electrically non-conductive substance providing resistance to passage of current and protecting persons from the danger of electric shock or injurious leakage of current.

In Vicinity of Electrical Apparatus

For the purpose of these Rules the words "... in the vicinity of electrical apparatus ..." means at such distance from the apparatus where there is reasonable concern that the clearances listed herein may be breached. For exposed electrical equipment installed on the Corporation's Tram traction power supply network that clearance is 2000 mm for persons (including hand-held objects) and 6400 mm for plant defined as cranes, unless otherwise defined in Clause 7.

Isolated

The state of apparatus when disconnected from all sources of supply by breaks of a length appropriate to the voltage and the insulating medium.

Mobile Plant

Cranes, non-insulated elevating work platforms, tip trucks or similar plant, front end loaders, any equipment fitted with a jib or boom, any device capable of raising or lowering a load and plant or vehicle used for the breaking of the permanent way in the vicinity of trackwork or used in the breaking of the roadway in general. When determining limits of approach, mobile plant can only be considered as a Vehicle when in the normal travelling mode and not in the working mode.

Outside Party

A person, being neither an employee of the Corporation or a contractor to the Corporation who may be involved in work in the vicinity of the Corporation's electrical apparatus, eg. a shop-owner involved in maintenance of a shopfront verandah in the vicinity of tram overhead conductors.

Permit to Work in the Vicinity of Electrical Apparatus

A form of authorisation issued by an Authorised Electrical Operator to an Approved Person which allows work to be carried out in the vicinity of, but not upon, electrical apparatus. In these Rules that permit is also referred to as Permit to Work. Refer Clause 9.5 and Appendix F for details.

Power Control Officer

An Officer of the Corporation on duty at Carlton Electrical Control and responsible for control of all operations on the AC and DC networks of the tram traction system.

Recipient or **Recipient-in-Charge**

A person who by signing on to a Permit, Approval or Authority issued by an Authorised Electrical Operator accepts the conditions of that Permit, Approval or Authority. A Recipient-in-Charge is a person who by virtue of his training, experience or supervising function accepts the conditions of Permit etc., on behalf of the whole work party.

Safety Observer

A suitably instructed and trained person specifically assigned the duty of observing and warning against unsafe approach to electrical apparatus. Refer Clause 6.5

Track Breaking Machine

Plant or vehicle used for the breaking of the permanent way in the vicinity of track work or used in the breaking of the roadway in general.

Traction Voltage

The traction voltage is that potential voltage that normally exists on the tram traction system and is nominally 600 V DC

Vehicle

A truck (not tipping), car, utility or other general purpose vehicle used for the carriage of personnel or goods (see also Mobile Plant).

6.0 WORK IN THE VICINITY OF ELECTRICAL APPARATUS

6.1 Approval

Before any work is performed in the vicinity of electrical apparatus, including overhead line equipment and for work which may involve disturbance and/or damage to underground cables, it shall be the responsibility of the person in charge of the working party to obtain the necessary approval from the Engineer-in-Charge of Apparatus.

Before giving such approval the Engineer-in-Charge of Apparatus shall arrange for adequate safety precautions to be taken having regard to:

- The nature of the work to be performed.
- The location of the adjacent live electrical apparatus.
- Whether or not the applicant working party is accustomed to working in vicinity of electrical apparatus.

6.2 Limit of Approach to Exposed Live Electrical Apparatus

No person shall allow any part of their body, or any object in contact with any part of their body, to come within 2000 mm of any exposed live electrical apparatus with exceptions as set out in Clause 7.0.10. To maintain these minimum distances from overhead conductors, appropriate allowance shall be made for sag and sway under a variety of conditions.

Persons are required to avoid movements that could result in these distances being infringed.

Please note that the clearance of 2000 mm applies only to high voltage apparatus of 22 kV or lesser voltages. Clearances for electrical equipment of higher voltage belonging to other Supply Authorities shall be in accordance with Clause 6.3.

FAILURE TO COMPLY MAY CAUSE SERIOUS INJURY OR DEATH

6.3 Limit of Approach to Exposed Live Electrical Apparatus of another Electricity Supply Authority

No person shall allow any part of their body or any object in contact with any part of their body to approach live, exposed electrical apparatus of another Electricity Supply Authority within limits of approach nominated by that Authority. For apparatus up to 22 kV (nominal) where such limit has not been explicitly specified, the limit of approach shall be two metres. In the case of higher voltages the Authority must be asked to nominate a safe limit of approach.

6.4 Precautions to be taken when working in the vicinity of Live Electrical Apparatus

Where there is no reasonable possibility of persons or any object in contact with their body coming closer to exposed live electrical apparatus than the limit of approach specified in Clause 7.0.10, it shall be regarded as safe for the work to be performed, provided that the Engineer-in-Charge may take all or any of the following precautions:

- Explain and point out if applicable the position of adjacent live electrical apparatus and permitted limits of approach.
- Erect "Danger" notices to identify and define live electrical apparatus.
- Erect barriers to guard against mistaken or inadvertent contact with live electrical apparatus.
- Appoint a suitable person as a Safety Observer whose sole duty shall be to warn people should the approach to live apparatus become hazardous.
- De-energise adjacent electrical apparatus.

6.5 Safety Observer

A Safety Observer's sole duty shall be to warn people should the approach to live apparatus become hazardous or limits of approach are likely to be infringed.

Depending on circumstances, a Safety Observer may be needed when erecting overhead support structures.

The Safety Observer shall be positioned such that the whole work site, including cranes and vehicles, can be adequately observed and clear communication maintained with all staff, including crane and vehicle drivers.

For special approach work the Safety Observer shall have an approved means of checking the height of traction voltage apparatus.

Safety Observers shall be specifically instructed in their duties on each occasion they are posted.

APPENDIX B

– Application for Permission to Work On or In the Vicinity of Electrical Apparatus

PUBLIC TRANSPORT CORPORATION

TRAM AND BUS INFRASTRUCTURE

APPLICATION FOR PERMISSION TO WORK ON OR IN THE VICINITY OF ELECTRICAL APPARATUS No: _____

TO OPERATIONS SUPERINTENDENT – CARLTON ELECTRICAL CONTROL FAX: 9347 6828
214 QUEENSBERRY STREET, CARLTON 3058 PH : 9610 3391

This Application must be endorsed on receipt by the Carlton Electrical Control receiving officer's initials, date and time _____ ___/___/___ _____hrs.

APPLICATION FOR:

- ☐ ACCESS PERMIT ☐ PERMIT TO WORK ☐ O–O–C DECLARATION
- ☐ TESTING PERMIT ☐ APPROVAL TO WORK
- ☐ Other, please specify –

LOCATION: _____
(Street, Pole No., Substation, Extent of Works, Pole No. to Pole No.)

APPARATUS: _____

PROPOSED SCOPE OF WORKS (If track occupation applied for, please attach details)

_____

_____

_____

_____

_____

_____

_____

PROPOSED ISOLATIONS, EARTHING AND OTHER PRECAUTIONS:

_____

_____

_____

Earthing Required (Y / N) ?

SCHEDULED START AND FINISH OF WORK:

START: Date / / Time am/pm FINISH: Date / / Time am/pm

Proposed on–site contact: (Name) _____ (Phone, mobile,etc) _____

Applicants Name: _____ Grade: _____ Dept: _____

Contact Address: _____

I understand that: (i) APPROVAL OF THIS APPLICATION ALONE IS NOT AN AUTHORITY TO PERFORM THE PROPOSED WORKS

(ii) ISOLATIONS, EARTHING AND OTHER PRECAUTIONS WILL BE AS DETAILED ON THE ISSUED PERMIT / CERTIFICATE, NOT NECESSARILY AS ON THIS APPLICATION

Phone: _____ Fax: _____ Signature _____ Date / /

Sections below for OFFICE USE ONLY

APPLICATION APPROVED / NOT APPROVED {Cross where not applicable}

Operation Superintendent _____ Date / /

Copy of Approval returned to Applicant [ ] Date / /

Copy of Approval forwarded to Engineer–in–Charge of Apparatus [ ] Date / /

PERMIT / AUTHORITY / STATEMENT

Type: _____ No.: _____ Issued: Date / / Time ____ am/pm

Cancelled: Date / / Time am/pm

9.5 Permit to Work in the Vicinity of Electrical Apparatus (Refer to Appendix F for form of Permit)

When it is necessary for an Approved Person to work in the vicinity of, but not in contact with, electrical apparatus, other than equipment installed in substations or switch-yards, the Engineer-in-Charge of the Apparatus shall determine whether the work may be safely undertaken with the apparatus live.

If in the opinion of the Engineer-in-Charge of Apparatus the work cannot be carried out with the apparatus live, the Power Control Officer shall be advised and arrangements made for the apparatus to be isolated, earthed and short-circuited and a Permit to Work in the Vicinity of Electrical Apparatus issued by an Authorised Electrical Operator.

All details of the limitation to be applied shall be recorded on the Permit to Work form and shall be in accordance with the following:

- Approved Persons receiving a Permit to Work shall be permitted to work closer than the limits of approach defined in Clause 7.0.10 of these Rules but not allowed contact with nor to perform any work on the apparatus.

- If circumstances warrant, the Authorised Electrical Operator may impose additional restrictions on the recipients of the Permit to Work whereby they shall not infringe the imposed limit of approach.

Permit to Work in the Vicinity of Electrical Apparatus may only be issued to, and received by, employees of the Corporation and contractors who have been trained, tested and authorised to do so.

Arrangements for the issue of a Permit to Work shall only be made with adequate notice to the Engineer-in-Charge of Apparatus.

After the Permit to Work has been relinquished and cancelled the Power Control Officer may arrange to place the apparatus in service.

When it is necessary for a Corporation employee or contractor to work in the vicinity of, but not in contact with, apparatus controlled by another organisation, the Engineer-in-Charge of Apparatus shall seek approval from the responsible organisation via the Power Control Officer.

When it is necessary for a Corporation employee or contractor to work in the vicinity of, but not in contact with, apparatus controlled by another organisation, the

APPENDIX F

– Permit to Work in the Vicinity of Electrical Apparatus

10

PUBLIC TRANSPORT CORPORATION

TRAM AND BUS INFRASTRUCTURE

PERMIT TO WORK IN THE VICINITY OF ELECTRICAL APPARATUS No.: _____

This Permit allows for work in the vicinity of, but not in contact with, isolated and earthed conductors

Carlton Electrical Control Operations Superintendent ph: 9610 3391 Power Control Operators ph: 9610 3394

1. References: Application for Permission to Work No.:_____ Carlton Control Log No:._____
   Other:._____
2. Location – _____
   (Street, Route, Pole No., Pole No.–to–Pole No.)
3. Apparatus – _____
4. This Permit to Work in the Vicinity of Electrical Apparatus is issued to Approved Person _____
   (Name) _____ (Grade) _____ (ApP. No.) _____
   as a Recipient–in–Charge of a work party and authorises work as detailed below:
5. The following isolations, earthing and other precautions were taken prior to issue of this Permit.
   The Recipient was instructed not to interfere with any isolators, earths and any other precautions taken in the course of issue of this Permit.
6. The Recipient was instructed to take the following additional precautions: _____

7. I, _____ Grade _____ Level ___ AEO. No._____
   certify that the conditions of isolation, earthing and other precautions are as detailed above and issue this Permit.
   (signed) _____ Date ___/___/___ Time _____ am/pm

8. I hereby acknowledge receipt of this PERMIT TO WORK IN THE VICINITY OF ELECTRICAL APPARATUS and agree to the conditions as stated above.
   RECIPIENT IN CHARGE: Name _____ ApP. No. _____ Ph: _____
   (signed) Date ___/___/___ Time _____ am/pm

9. Signature of members of work party

   We, the undersigned, understand and accept the instruction not to interfere with the isolation, earthing and other precautions detailed above.

		ApP. No.
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

10. I hereby relinquish this PERMIT TO WORK.
    All persons under my charge have been withdrawn and warned that approach to the apparatus is no longer safe to approach.
    Date ___/___/___ Time ____ am/pm
    RECIPIENT IN CHARGE –
    (signature) _____

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

11. I have advised Carlton Control Centre and with its approval I cancel this Permit to Work _____
    (Name) _____ Level _____ AEO No. _____ (Date) ___/___/___ (Time) _____ am/pm

9.3.5 On receipt of an Electrical Access Permit, the Recipient-in-Charge must ensure that all persons, who require access to the apparatus, sign the Permit form before commencing work.

9.3.6 An Electrical Access Permit shall not be relinquished and cancelled until all persons who have signed on the Permit have signed off.

9.3.7 If due to exceptional circumstances, it is impossible for a member of the work party to sign off the Permit, the following procedure must be adopted:-

- The Recipient-in-charge shall ensure that adequate precautions are taken to advise and prevent such a person from approaching the apparatus.

- The Recipient-in-Charge shall advise the Power Control Officer that a member of the work party is unable to sign off the Permit and that adequate precautions have been taken to prevent such a person from approaching the apparatus.

- The Power Control Officer shall record in the log book that attempts have been made to locate the missing member of the work party and only then may the Recipient-in-Charge sign off instead of the missing person.

9.6 Approval to Work Adjacent to PTC Tramways Electrical Equipment & Wiring (Refer to Appendix G for form of the Approval)

Where the nature of the work and the degree of hazard involved requires the details of live apparatus and the precautions to be recorded, an Approval to Work Adjacent to PTC Tramways Electrical Equipment & Wiring shall be issued.

The Approval to Work must only be used when no other Authority, Permit or Certificate described in these Rules is, or may be, applicable to the work situation and it is safe to do so.

An Approval to Work may be issued to persons irrespective of their Electrical Safety and Operating Rules level of training and authorisation, and including non-approved Corporation employees and contractors or outside parties and shall be issued only by an Authorised Electrical Operator Level A. The Electrical Operator shall only issue an Approval to Work with the approval of Power Control Officer on duty at Carlton Electrical Control and only when satisfied about the Recipient's understanding of the instructions on the Approval and confidence that these will be observed by the Recipient.

Typical work situations where an Approval to Work Adjacent to PTC Tramways Electrical Equipment & Wiring may be considered would cover provision of isolation, precautions and instructions to a shopkeeper painting or repairing downpipes on their property in the vicinity of tram overhead wires and fittings.

APPENDIX G

– Approval to Work Adjacent to PTC Tramways Electrical Equipment and Wiring

PUBLIC TRANSPORT CORPORATION

TRAM AND BUS INFRASTRUCTURE

APPROVAL TO WORK ADJACENT TO PTC TRAMWAYS No. _____
ELECTRICAL EQUIPMENT & WIRING

Carlton Electrical Control Operations Superintendent ph: 9610 3391 Power Control Operators ph: 9610 3394

References: Application for Permission to Work No.:_____ Carlton Control Log No:._____

Other:._____

Issued to (Name of Person–in–Charge of Working Party) _____

of _____ Date / / Time am/pm

You are hereby approved to carry out the following work: _____

_____

_____

_____

_____

at _____

_____

FROM Time am/pm Date / / TO Time am/pm Date / /

THE RECIPIENT OF THIS APPROVAL TO WORK IS WARNED THAT THE STEPS TAKEN BY THE CORPORATION TO ENSURE SAFE ACCESS TO WORK MAY NOT BE IN PLACE AFTER THE LATTER OF THE TIMES ABOVE

The following precautions have been taken: _____

_____

_____

_____

The following instructions shall be observed by the Working party:_____

_____

_____

_____

_____

_____

_____

(Name) _____(signature)_____ Level___AEO No. _____

I understand the conditions of equipment and wiring as detailed above and by accepting this Approval to Work I undertake to be bound by its restrictions. I will seek advice of Carlton Electrical Control (Ph: 9610–3394) whenever the conditions of this Approval require clarification and/or change.

(Name) _____(signature)_____ (Phone) _____

(recipient) Date___/___/___ Time_____am/pm

I hereby relinquish this Approval to Work and state that I fully understand that the condition of the equipment and wiring detailed above may be changed without further reference to me.

(Name) _____(signature)_____Date___/___/___ Time_____am/pm

(recipient)

I have advised Carlton Electrical Control and with its approval I hereby cancel this Approval for Work

(Name) _____AEO (signature)_____Date___/___/___Time_____am/pm

SECTION BELOW FOR OFFICE USE ONLY

RECORD OF ACCESS PERMITS ISSUED DURING THE CURRENCY OF THIS APPROVAL TO WORK

Access Permit No.	ISSUED	Date / /	Time	am/pm
	CANCELLED	Date / /	Time	am/pm
Access Permit No.	ISSUED	Date / /	Time	am/pm
	CANCELLED	Date / /	Time	am/pm

13.2 Operation of Mobile Plant

Please note that by definitions of these Rules "mobile plant" is not insulated.

13.2.1 Because of potential hazards associated with work using uninsulated mobile plant adjacent to live conductors and/or apparatus, special consideration shall be given to its use during planning of the work.

The person in charge of the work party, crane driver, dogman and crane chaser shall, through all employees and contractors engaged in the work, ensure that the mobile plant, its gear and load shall not approach within 6400 mm of an exposed conductor or apparatus unless -

- the conductor is isolated and earthed;
  or
- the conductor is suitably insulated and/or shielded;
  or
- movement of the plant and load is observed by a safety observer whose sole task shall be to signal the plant operator to stop when it appears that the plant, gear or load would infringe the following limits of approach to the conductor, allowing for sag or sway -

traction voltage (600 volt DC)	2000 mm
low voltage (not exceeding 1000 volt AC or 1500 volt DC)	2000 mm
high voltage (exceeding 1000 volt AC or 1500 volt DC)	6400 mm

13.2.2 During operation of the mobile plant, only those persons at ground level actually involved in the work associated with the mobile plant shall be in the vicinity of the plant; all other persons shall remain clear.

13.2.3 A sticker reading **"Danger - Watch Out for Overhead Power Lines"** shall be maintained in a prominent position to the view of the driver/operator in the cabin of all mobile plant which has a jib or extendable portion which could reach overhead conductors.

13.2.4 The removal or installation of poles or structures in the vicinity of live overhead conductors and traction voltage apparatus shall only be undertaken with the apparatus or conductors shielded and/or insulated by approved methods and under the protection of approved procedures. The respective roles for crane operator, dogman and crane chaser under the Crane Regulations, 1989 shall still apply.

13.2.5 Uninsulated Elevating Work Platforms and Telescopic Boom Buckets are defined in these Rules as mobile plant and must, likewise, maintain a minimum clearance of 6400 mm to live, exposed electrical conductors and apparatus.