

### Approval

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## 1 Purpose

To define the Requirements for the design and construction of stabling for electric trains of the Melbourne metropolitan railway.

## 2 Scope

This Requirements Document applies to the design and construction of all new stabling sidings to be provided for the metropolitan railway where the movement of trains to and from the siding is integral to the provision of passenger services.

This Requirements Document also applies to the major upgrading of existing stabling sidings.

The Requirements Document applies to works on the Infrastructure Lease and to siding works undertaken on other land which are intended to expand or enhance the provision of passenger services and to form part of the Infrastructure Lease.

The sidings may be designed and constructed as a stand alone facility or as a part of a maintenance depot. In either case, the design and construction shall comply with this Requirements Document.

This Requirements Document does not apply to sidings in workshops and train storage yards. It does not apply to tracks which are fitted with a train wash or under floor wheel lathe. It does not apply to sidings on land outside of the Infrastructure Lease except as stated above where the land is intended to form part of the Infrastructure Lease.

The provisions of this Requirements Document are mandatory.

This Requirements Document takes precedence over other documents relating to the design, construction and operation of train stabling facilities.

## 3 Abbreviations

MTM	Metro Trains Melbourne
POTS	Position of Train Systems
CCTV	Closed Circuit Television
TR	Train Running

## 4 Definitions

Infrastructure Lease	Has the meaning as in the Franchise Agreement
Lux	Light intensity measurement unit

## 5 References & Legislations

The train stabling facilities shall be designed and constructed in accordance with this Requirements Document and relevant MTM Requirements Documents and Australian, Rail Industry.

The design and construction of the stabling facility shall comply with all legislative requirements and codes.

### MTM Standards

Document Number	Title
L1-CHE-STD-002	MTM Requirements Metropolitan Train Maintenance Depot
L1-CHE-STD-004	MTM Requirements Traction Substation & Tie Stations
L1-CHE-STD-006	MTM Requirements Spares for New Assets
L2-INF-SAS-002	Supply & Manufacture Requirements Specification for Railway Ballast

### Rail Industry Standards

Document Number	Title
Drawing No F598 Revision D, 20.12.1996	PTC Standard Drawing 'Track Formation & Ballast for Open Single Track Construction
	PTC Standard 'Heavy Rail Track Construction Standard – Part B', Version 1.3 (1997)
	PTC Train Overhead Design Standards for the Electrification of New Routes, Issue five (1997)
	PTC Train Overhead Design Standards for the Construction of New Railway Overhead Works, Issue Three (1997)
	PTC Train Overhead Design Standards for the Rehabilitation of Existing Routes Issue Three (1997)
VRIOGS 002.1-200X	Guidelines for CCTV Development
VRIOGS 001	Structure Gauge Envelopes
VRIOGS 010.7-2008	Track Bonding, Track Circuit Connections and Traction Interfaces
VRIOGS 012	Series for Signalling

### Australian Standards

Document Number	Title
AS 1657	Fixed Platforms, Walkways, Stairways & Ladders – Design, Construction & Installation
AS 4292	Railway Safety Management
AS 3000	Electrical Installation (Known as the Australian/New Zealand Wiring Rules)

### 6 Responsibilities

The persons nominated in the following table shall be responsible for the specification, design and construction of the train stabling facilities.

Functional Area/Activity	Responsible Person	Responsibilities	Comments
Stabling yard	Operations Manager	Sizing and track layout	Input to the design process
Train Maintenance	Manager Train Maintenance	Sizing of maintenance facility	Input to the design process if required
Wash Plant	Manager Train Maintenance	Specification of throughput	Input to the design process if required
Drivers and Operations management	Operations Manager	Sizing	Input to the design process
Design and Construction	Project Manager	Delivery of stabling facilities to scope, schedule, quality and cost	
Overall Approval	Manager Network Planning and Development	Approval of stabling project as a whole through development to operation	To sign the project scope prior to commitment to construction

### 7 Safety & Environmental

The approach to the operation and maintenance of the stabling facility shall be based on the principle of providing a safe and functional facility in so far as is reasonably practical.

Where new materials or systems are to be introduced with the design and construction of the stabling facilities, the materials and systems shall be subject to type approval for use on the metropolitan train network.

The design, construction and operation of the stabling facility shall comply with the MTM Environmental Management Plan.

Safety and risk assessments shall be undertaken for the stabling project, addressing all areas of specification, design, construction, operation and maintenance.

### 8 Functionality

- 8.1 The sidings shall deliver the functionality described following and in accordance with the details of L4-CHE-FOR-003.
- 8.2 The sidings shall be designed and constructed such that trains may be moved safely to and from the main line and secured in the stabling area. The tracks shall be so arranged that a driver can safely walk around a stabled train to undertake the preparation and stabling activities.

- 8.3 The sidings shall also be designed and constructed such that internal cleaning can be performed on the stabled trains.
- 8.4 The sidings shall further be designed and constructed such that light maintenance can be performed on the stabled trains. Light maintenance includes the replacement of saloon windows and passenger seating.
- 8.5 The maximum speed in the sidings is 15km per hour. The infrastructure shall be designed noting this speed limitation. Main line standards of design and construction shall not apply except as detailed in this Requirements Document.

## **9 Track and Civil Works**

### **9.1 Stabling Siding Layout**

- 9.1.1 The layout of the stabling tracks shall be to the requirements of the Manager Network Planning and Development or the equivalent successor position.
- 9.1.2 With the State's proposal for longer trains of up to 160 metres in length, stabling tracks shall have a free standing length of 169m beyond the Train Running point, 162m from the end of the siding track circuit.

### **9.2 Termination of a Stabling Siding**

- 9.2.1 The standard termination of a siding shall be by baulks consisting of four timbers fixed to the track, two above the rails and two below the rails.
- 9.2.2 The risk assessment undertaken for the stabling project shall determine the level of risk and the appropriate additional or different devices to arrest the moving train.
- 9.2.3 The baulks shall consist of hard timber of a minimum of 270mm by 125mm by 2700mm long. Two timbers are placed above the rails at 600mm spacing and bolted to the two timbers below the rail to securely form the baulk. The timbers above the rail are painted white. Red and white chevrons shall be affixed to the face of the baulk facing the siding.

### **9.3 Track Geometry**

- 9.3.1 New stabling tracks shall be tangent.
- 9.3.2 The minimum track radius permitted within siding tracks is 150m.
- 9.3.3 Siding tracks shall be constructed to a minimum of Class 4 standard.
- 9.3.4 For stabling tracks that terminate at a baulk (or following a risk assessment at additional arresting devices), the vertical grade of the siding shall be 1 in 500 falling towards the baulks.
- 9.3.5 For double ended stabling tracks, the vertical grade of the siding shall be 1 in 500 falling towards the centre of the siding.

### **9.4 Rail and Rail Joint**

- 9.4.1 Any serviceable rail shall be used for the siding track noting that the speed is 15km per hour. Second hand rail in good condition from main line reconstruction is to be used. Rail weights of 47, 50, 53 and 60 kg/m are permissible.
- 9.4.2 The worn running edge of second hand rail shall not be to the gauge side of the siding tracks.
- 9.4.3 Welds within the sidings may be at a distance between welds of not less than 1.5m.

- 9.4.4 Plated or welded track joints are permissible. Where rail plates are used they shall be six hole plates. Defects in the rail are permissible and will not be rectified unless the defect will cause derailment.
- 9.4.5 Single ended sidings shall not have tensioned rail. Double ended sidings shall have tensioned rail.
- 9.4.6 The turnout installed in the main line and the track between the main line turnout and the toe of the first turnout of the sidings shall be designed and constructed to main line standards.

**9.5 Sleepers**

- 9.5.1 Concrete sleepers, classified as seconds and not suitable for main line service shall be used. Low profile concrete seconds are preferred.

**9.6 Track Formation and Ballast**

- 9.6.1 The formation and track design shall be in accordance with PTC Drawing No. F598 with the following exceptions.
  - a. The earthworks shall be as detailed below
  - b. The ballast under the sleepers shall be 150mm
  - c. Second quality concrete sleepers shall be used
  - d. The rail shall be any serviceable rail for 15 km per hour of 47, 50, 53 (or exceptionally) 60kg/m.

**9.7 Turnout**

- 9.7.1 The turnout from the main line forming the siding entrance track shall be of a minimum angle of 1:9 and constructed to main line standards on concrete sleepers.
- 9.7.2 Turnouts within the sidings are to be generally 1:7.52 turnouts constructed on concrete bearers. Other turnouts may be used but the 1:7.52 turnout is preferred.
- 9.7.3 Rail of the same weight as the turnout shall be installed adjacent to the turnout with rail junctions at least 13m from the turnout. Rail junctions may be welded junction rails or plated junctions.

**9.8 Earthworks and Drainage**

- 9.8.1 The design and construction of the earthworks and drainage shall be minimal and consistent with being fit for purpose. Earthworks shall be constructed to support the trains at tare at a speed of 15km per hour.
- 9.8.2 The drainage shall be consistent in its flood design with the main line adjacent to and served by the stabling. The design and construction of the drainage system shall ensure that the sidings are not flooded unless the main line is flooded. Flood design shall protect the track assets from the 1 in 100 year event.
- 9.8.3 Pit covers shall be to VicRoads standards applicable for pits in public roadways.

**9.9 Pathways**

- 9.9.1 Pathways shall be provided along both sides of the stabling tracks and across the stabling tracks at the ends of stabled trains. The pathways shall be formed from asphalt on a sub-base and a minimum of 1200mm wide. The edges of the pathways shall be painted yellow designating a walking path 1m wide.



- 9.9.2 In locations where maintenance personnel will use a battery truck, the pathways on one side of the stabling tracks shall be constructed to support the loaded vehicle and have a minimum width of 1750mm. The 1750mm pathways shall be arranged such that the battery truck has access to one side of all trains stabled in the siding and for the truck to be moved to a secure location when not in use.
- 9.9.3 The provisions for Walkways and Pathways are presented in the MTM Walkways and Pathways Requirements Document.

**9.10 Roadways**

- 9.10.1 Access roads to the sidings and within the sidings shall be designed and constructed to support the access of heavy vehicles such as refuge removal trucks. The roads shall also provide for the intermittent access of emergency vehicles such as fire trucks. The roads shall provide for access to at least one end of all sidings.
- 9.10.2 Where the sidings are integral to a Train Maintenance Depot, the access roads shall be as required to service the depot and sidings.

**10 Signalling Works**

**10.1 Signals**

- 10.1.1 The movement of trains between the main line and the sidings and between sidings shall be controlled by fixed signals.
- 10.1.2 Signalling equipment shall be designed and installed in accordance with the current signalling Standards.
- 10.1.3 Dwarf signals shall be provided for the management of trains within the sidings.
- 10.1.4 The Signalling arrangement for the stabling shall be approved by the Manager, Network Planning and Development or the successor equivalent position.

**10.2 Track Circuits**

- 10.2.1 Track circuits shall be designed and installed to the main line and sidings as necessary for the safe working of trains.
- 10.2.2 For the purpose of proving that a train in the siding is prepared and in position to enter revenue service, each siding shall be fitted with a track circuit which shall be installed to be clear of the stabled train but which operates when the train presents to the departure signal. The track circuit shall be of a minimum length which shall permit the driver to present the train onto the track circuit but also provide a clear view of the signal. A Train Running marker shall be placed on the footpath adjacent to the siding 7 metres on the departure side of the end of the track circuit to indicate to the driver the correct location for the train at the Train Running (TR) point.
- 10.2.3 The "TR" marker consists of the letters TR in a rectangle of dimensions 1000mm by 300mm painted in white on the pathway asphalt.
- 10.2.4 Sidings shall be fitted with track circuits of 73m length to provide indication of the presence of three car and six car trains. For sidings holding two or more six car trains, the track circuits shall be arranged to be capable of detecting each three car train.
- 10.2.5 POTS tags shall be fitted to the sleepers at all siding entrances.

**10.3 Rollout and Errant Train Protection**

- 10.3.1 Rollout and errant train protection shall be provided in the following situations:
- 10.3.2 To prevent a train from a siding fouling the main line, and
- 10.3.3 To prevent a train from a siding being presented to a track outside of the sidings, unless the route for the movement of the train is set.
- 10.3.4 Only one rollout protective device is required for a group of sidings that have a common entry track.

**10.4 Points**

- 10.4.1 All points shall be motorised and controlled from the signal box nominated in L4-CHE-FOR-003.

**10.5 Train Access Gate**

- 10.5.1 The siding area shall be secure with a gate across the entry track to the sidings. The gate shall be remotely controlled and integrated with the signalling system for the safe passage of trains.
- 10.5.2 The position of the gate shall be displayed in the signal box as an object within the signalling system.

**10.6 Signal Post Telephones**

- 10.6.1 Telephones providing direct connection to the controlling signal box shall be provided at the entry to the sidings. The telephones shall be placed such that a driver does not have to cross more than three siding tracks to access a phone from any siding.
- 10.6.2 Placement of a telephone which requires a person to cross a main line from the siding is not permitted.
- 10.6.3 A system in the signal box shall indicate to the signaller the numbers of the signals from which a call is initiated or made to.

**11 Communications**

**11.1 Communications room**

- 11.1.1 A secure communications room shall be provided in the staff amenities area. The room shall be sized to accommodate the communications and data equipment for the stabling area.

**11.2 Telephones**

- 11.2.1 Telephones shall be provided to all office and amenities areas in the management/supervisory and staff amenities building.

**11.3 Train Radio**

- 11.3.1 Train radio coverage is required to all trains on the stabling tracks. The adequacy of coverage shall be determined during the design phase of the stabling project.
- 11.3.2 Should the radio coverage not be to standard, the required scope change, including any additional equipment, shall be incorporated into the project.

**11.4 Computer terminals**

11.4.1 Computers shall be provided at each work station and one computer shall be provided in each amenity area.

**11.5 Clocks**

11.5.1 Digital clocks, synchronised to Eastern Standard Time or Eastern Standard Daylight Saving Time shall be installed in the amenities and meal areas of offices and amenities buildings.

**12 Electrical**

**12.1 Traction Power & Isolation of Structures & Equipment**

12.1.1 The sidings shall generally be wired for the operation of electric trains. Where specified in L4-CHE-FOR-003, one siding may be provided for track maintenance machines without traction wiring.

12.1.2 The traction supply wiring shall be supported on portal or cantilever structures spanning a number of sidings. The structures shall also carry the lighting fittings for the illumination of the siding area.

12.1.3 Anchor structures shall be offset at the ends of sidings such that an errant train does not strike the structure and disarrange the overhead wiring for the sidings.

12.1.4 Each structure shall be bonded to a power rail through a spark gap.

12.1.5 The sidings shall be supplied by an independent circuit breaker providing an independent supply to that supplying the main lines.

12.1.6 The number of trains to be supplied from a single circuit breaker shall be 3. Each group of 3 trains or part thereof, if the number of trains is not a multiple of 3, shall be sectionalised with a section insulator and provided with a switch which shall enable the traction supply to the sidings to be isolated and bonded to rail. Isolation and bonding to rail is required for inspection and access to the traction wiring and the siding lighting fittings.

12.1.7 The switch shall be located remotely to the structures supporting the catenaries (where installed) and contact wires and the fittings and wiring over the sidings such that in the isolated and bonded to rail position, clear access is provided to the structures and the wiring. Where there are multiple groups of sidings holding 3 trains, the switches shall be arranged such that each switch is readily identified with its appropriate sidings.

12.1.8 Clear access means that a person accessing the siding structures, fittings and wiring is not required to come within 3 metres of the switch and the wiring remaining alive from the traction supply system.

12.1.9 The catenary and contact wiring from the main line to the sidings shall be designed and constructed to main line standard. The contact wire shall be tensioned in all cases and the catenary tensioned when the length of the catenary is greater than one-half of a standard main line tension length.

12.1.10 The contact wire shall be designed and constructed as trolley wire in the sidings. The contact wire shall be weight tensioned. The contact wire shall be designed and installed to be no lower than a height of 5000mm above top of rail under the worst case conditions of ambient temperature and system loading.

### 12.2 Lighting

- 12.2.1 Lighting shall be provided to the siding area to illuminate all access points, pathways and stabled trains. The lighting shall also illuminate the perimeter of the stabling area for the CCTV system. The design illumination level shall be sufficient to ensure that with 10% of the light fittings inoperative, the area is safe for pedestrians and for drivers to undertake the preparation and stabling of trains.
- 12.2.2 High pressure sodium lamps are required.
- 12.2.3 The illumination across the site shall be 15 lux with a uniformity of not less than 0.3 for all pathways and train preparation areas.
- 12.2.4 The illumination level to the perimeter fencing shall be 10 lux minimum and 15 lux maximum.
- 12.2.5 The design and installation of the lighting shall not permit glare or light spill to be outside of the Infrastructure Lease.
- 12.2.6 Light fittings shall be installed on the structures supporting the traction wiring. The fittings and associated cabling shall be insulated from the structures to an insulation level of 2kV to protect the lighting installation in the event of a traction supply fault energising the structure. Insulation shall be provided by porcelain or similar insulation with proven design and external use.
- 12.2.7 As the design requires, additional structures or poles shall be provided for the mounting of the lighting fittings.
- 12.2.8 To facilitate the maintenance of the lighting and the traction wiring, the circuitry supplying the lights shall be designed and installed such that all the light fittings within a group of 3 sidings shall be capable of isolation as a unit.
- 12.2.9 The lighting shall be controlled automatically to be operative at night. Control shall usually be via a photo electric detector. A test switch shall be provided for the maintenance personnel to test and maintain the lights.

Location	Luminance	Comments
Access pathways between stabled trains, stabling facilities and rail access paths to and from stabling sidings	<u>Horizontal luminance (<math>E_h</math>)</u> 15 lux average maintained level Measured at ground level Uniformity not less than 0.3 Point luminance ( $E_{ph}$ ) 4 lux <u>Vertical luminance (<math>E_v</math>)</u> 9 lux average maintained level Measured 1m above ground level Uniformity not less than 0.3 Point luminance ( $E_{pv}$ ) 3 lux	The levels are based on trains being stabled in all sidings.
Access pathways outside of stabling fence	8 lux average maintained level	

Location	Luminance	Comments
Along the stabling site fence	Minimum 10 lux Maximum to be not greater than that applying to the access pathways within the siding site	Minimum requirement for CCTV surveillance is 10 lux.
Staff car park	30 lux average maintained level Measured 1m above ground level Uniformity not less than 0.3	
Offices and amenities building	To comply with Australian Standards	

### 13 Security

#### 13.1 Security Fence

- 13.1.1 The siding area shall be fenced. The fence and the structures within the stabling area, including the buildings, poles and overhead wiring structures shall be so located as to minimise vandalism and intruder entry.
- 13.1.2 The fence shall be weld wire mesh topped with 3 strands of barb wire and positioned such that it is not readily climbed. The fence shall have a bottom rail that is in contact with the ground and prevents persons entering the siding area below the fence.

#### 13.2 Access Gates

- 13.2.1 The siding area shall be fitted with gates for the movement of trains to and from the sidings, pedestrian access and the parking of motor vehicles. All gates shall be normally locked.
- 13.2.2 The area below the train gate shall be built up with asphalt to the top of rail level to prevent persons crawling beneath the gate to enter the siding area. The pedestrian and motor vehicle access gates shall be constructed close to the ground to prevent unauthorised entry.
- 13.2.3 The pedestrian gate shall be 1.5m in width and opened by a key. The gate shall also be fitted with an electrical release system controlled from the supervising facility and a contactless access card system. The status of the gate shall be indicated in the supervising facility.
- 13.2.4 The pedestrian gate shall be self closing and locking.
- 13.2.5 The road vehicle access gate shall be 3.6m in width and opened externally to the stabling area by a key. The gate shall also be fitted with an electrical release system and a contactless access card system for external access.
- 13.2.6 The gate shall be fitted with a system which detects the presence of a road vehicle within the stabling area presenting to exit the area and which automatically opens the gate. The gate shall close and lock automatically after the passage of the vehicle.
- 13.2.7 The gate shall be capable of being controlled from the supervising facility. The status of the gate shall be indicated in the facility.
- 13.2.8 Intercom system shall be provided between each gateway and the supervising facility nominated in L4-CHE-FOR-003.

**13.3 Closed Circuit Television (CCTV)**

- 13.3.1 The sidings shall be fitted with a CCTV system which incorporates automatic motion and intruder detection across the entire site. The system shall be effective in all conditions day and night and give a visual and audible alarm to the supervising facility nominated in L4-CHE-FOR-003. The system shall operate continuously and record all cameras. Image storage shall be maintained for 30 days after which the earlier data may be over written.
- 13.3.2 The system shall incorporate a means to enable the supervising person to acknowledge the presence of authorised persons on the site.

**13.4 Facility Security**

- 13.4.1 The management/supervisory and staff amenities building shall be fitted with an intruder alarm. The alarm shall give a visual and audible alarm in the supervising facility.

**14 Facilities**

**14.1 Office & Amenities Building**

- 14.1.1 An office and amenities building shall be provided for the accommodation of managers/supervisors, train drivers and other staff for the number of personnel specified in L4-CHE-FOR-003. The building shall be of commercial/industrial standard designed and constructed to be fit for purpose.
- 14.1.2 Where specified in L4-CHE-FOR-003, facilities for rolling stock maintainers and cleaners shall be provided.
- 14.1.3 The building shall comprise meal rooms, locker rooms, toilets, showers and such offices as specified. It shall also include a secure communications room and a room for train cleaner's equipment.
- 14.1.4 Separate sign-on and standby rooms and a meal room shall be provided for drivers.
- 14.1.5 The meal rooms shall be fitted with boiling and cold water units, an ice machine and an oven for heating food.
- 14.1.6 The locker rooms, toilets and showers shall be specified for the number of male and female persons to be accommodated at the facility. In the case that no females are proposed to be at the stabling facility, the building shall incorporate facilities for at least 5 female personnel.

**14.2 Stabling yard facilities**

- 14.2.1 The stabling area shall be fitted with fire hydrants generally located adjacent to the fence and the access road for emergency vehicles. For large siding sites additional hydrants may be required. For all stabling sites, hydrants shall be arranged such that no point within the stabling facility is more than 150 metres from a hydrant.
- 14.2.2 Any emergency assembly area or multiple areas shall be provided outside of the stabling area for the use of personnel in case of emergency. Crossing main line tracks to access the emergency assembly areas is not permitted.
- 14.2.3 Taps providing domestic water for cleaners shall be provided along side every third siding. The taps shall be placed clear of pathways and adjacent to overhead structures, poles and the fence to prevent them becoming a trip hazard. The taps and the associated piping shall not be affixed to the overhead structures, poles or fence but shall be independently supported. The taps shall be 450mm above the ground

- 14.2.4 Drainage points shall be provided below the taps to receive discarded water and prevent puddles.
- 14.2.5 A commercial rubbish receptacle shall be provided with an appropriate hard stand for the rubbish removed from the trains. An access road shall be provided for trucks to access and empty the rubbish receptacle.
- 14.2.6 Car parking shall be provided for the employees at the facility in accordance with the number given in L4-CHE-FOR-003.

## 15 Related Documents

L4-CHE-FOR-003 MTM Technical Requirements Metropolitan Train Stabling Facilities Form