Oberon Tarana Heritage Railway

OTCS 100

Engineering Standard

Track

CIVIL TECHNICAL MAINTENANCE PLAN

Version 1.0

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Approved by:

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Document control

Revision	Date of Approval	Summary of change
1.0	August, 2018	First Issue. Includes content from the following former RIC standards: TS 001 MP, C 2405, C 2406, C 2407, C 2435, C 2437, C 2438, C 2440, C 2441, C 2442, C 2443, C 2444, C 2445, C 2446, C 2447, C 2448, C 2460, C 2508, C 2512, C 3200, C 3201, CSI 029, AP 5373, AP 5374, RCSI.019, RCSI.022, CTN 03/10, CTN 04/15, TS.4152, TS.4153, RTS.3432 and CRN CS 100 Ver 1.2.

Summary of changes from previous version

Section	Summary of change

Contents

1 Scope and Application

The Technical Maintenance Plan (TMP) specifies maintenance policy for assets within the Track and Structures application. This document is provided for the use of personnel responsible for implementing these policies and programming preventive maintenance work.

The TMP lists items when:

- they are repairable, or
- they have a defined maintenance policy (ie. the item has a scheduled maintenance activity at a defined interval), or
- they require some special maintenance management input and thus will need certain information to be recorded.

The TMP specifies:

- which items are to be maintained;
- what maintenance is carried out;
- when maintenance is required.

The maintenance tasks and minimum frequencies defined in this document are mandatory for all managed civil infrastructure

Any proposed reduction in task scope or frequency (lengthening time between tasks) must be authorised, as appropriate, by OTHR Engineering Manager in a location specific Tailored TMP.

Maintainers shall also review any atypical situations and consider if more stringent requirements are appropriate and ensure appropriate defect management is carried out.

2 References

2.1 Australian and International Standards

Nil

2.2 OTHR Documents

OTCS 200 - Track System

OTCS 210 - Track Geometry & Stability

OTCS 215 - Transit Space

OTCS 220 - Rail and Rail Joints

OTCS 230 - Ties and track support

OTCS 240 - Ballast

OTCS 250 - Turnouts and Special Trackwork

OTCS 302 – Structures Defect Limits

2.3 Other References

CRN CM 203 – Track Inspection Manual

3 Definitions and Abbreviations

The following definitions are used within this standard.

Mainline track:	As defined in Engineering Standard OTCS 200: “Main lines include crossing loops, refuge loops and "sidings" where operating speed in excess of 25km/hr is permitted”.
Passenger Services:	Regularly scheduled passenger trains excluding ad-hoc special services
Seasonal lines	Lines that are non-operational on a seasonal basis due to drought conditions, or when grain is cleared from a line in a short period each year with the line not utilised for the remainder of the year and lines where re-opening is/or may be anticipated.
Non-operational	Lines that are no longer in use. These lines have been disused for many years and there is little likelihood that they will be re-opened. In any event it is recognised that they could not be re-opened without extensive inspection and upgrading.

4 Maintenance concept

4.1 General

The maintenance concept provides for preventive maintenance schedules to minimise or avoid disruption to services, commensurate with BBRC’s safety and reliability objectives. There are two types of maintenance to support the system:

- Preventive maintenance
- Corrective maintenance

4.2 Preventive maintenance

Preventive maintenance is undertaken to keep an item in a specified operating condition through regular maintenance tasks and through systematic examination to detect and prevent potential failures. The former of these includes routine servicing and regular scheduled maintenance based on time or traffic. The latter comprises surveillance examinations, condition monitoring and functional checks. The Technical Maintenance Plan details periods at which preventive maintenance is performed.

4.3 Corrective maintenance

Corrective maintenance is undertaken to restore items to a specified condition by repairing or replacing items. Corrective maintenance is carried out as a result of failures or unsatisfactory conditions detected during preventive maintenance examinations and checks. Corrective maintenance tasks are not detailed in the TMP

5 Safety importance

Not all safety related tasks are of equal importance and hence necessitate differing compliance regimes for cost-effective management. OTHR has divided its assessed safety tasks into two categories, safety critical and safety significant. There are other tasks that are not directly safety related.

The difference in importance between safety critical tasks and safety significant tasks is the failure characteristic of the condition being assessed by the examination task.

The failure characteristics of safety critical tasks are generally rapidly developing and adverse following the breach of defined conditional criteria. There is a significant increase in risk associated with safety critical tasks being extended beyond the specified task period without defined and approved risk mitigation measures in place.

The failure characteristics of safety significant tasks are slower to manifest themselves and less likely to be adverse following the breach of defined conditional criteria

6 Competency

All maintenance inspection, assessment, monitoring and review functions must only be carried out by authorised persons with relevant competencies.

7 Management and reporting

The Engineering Manager shall establish and maintain systems to ensure that the following requirements for the completion of Safety related tasks are met:

1. Safety Critical Tasks shall be completed within the defined planning latitude. An Engineering Waiver shall be sought for those tasks exceeding the planning latitude.
2. Safety Significant Tasks should be completed within the defined planning latitude.
   - The Engineering Manager shall review the compliance of Safety Significant, and other, tasks at the end of each month.
   - Safety Critical need to be specially managed. Monthly review is insufficient. The Engineering Manager shall arrange for notification by inspection staff in the event that any such inspections become overdue.
   - If any task became overdue beyond its planning latitude during the month, but has been completed before the end of the month, it should be reviewed to establish if management action is required to ensure that future inspections will comply with scheduled task requirements.
   - If any Safety Significant task is overdue beyond its planning latitude at the end of the month, an Engineering Waiver shall be established within 7 days.
   - **WARNING**

     Failure to secure the Engineering Waiver will require IMMEDIATE (same day) action to bring the risk back to acceptable levels. This action may include seeking an Engineering Waiver for an extension, removal of the asset from service or placement of service restrictions on the particular asset.
3. A documented risk mitigation process designed to manage the increase in risk of extending the task period shall accompany an application for a waiver.

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8 Technical Maintenance Plan User Information

The TMP table has the following elements:

- Asset group description
- Brief description of the preventive maintenance/service to be performed
- Applicability of the Service to specified asset configurations or operating environments
- Minimum task frequencies or periods (including latitudes)
- Explanatory comments

8.1 Asset

This element details relevant groups of assets within the Civil application that share similar maintenance requirements e.g. Track System, Rail, Ties/Support.

8.2 Service Description

This column provides a brief description of preventive maintenance tasks or sets of tasks

8.3 Safety Importance

Some scheduled examination tasks have been categorised as Safety Critical (C) or Safety Significant (S). Tasks that are unscheduled (ON EVENT tasks) or have no safety implications are shown as NA.

8.4 Applicability

This column provides information about how preventive maintenance tasks are to be applied across various asset configurations and/or within specific operating environments. For example, the frequency of Track Patrols varies according the asset type and traffic pattern.

8.5 Service Schedule Reference

Not used by OTHR.

8.6 Period

The “Period” column defines the minimum frequency at which relevant maintenance should be carried out for each asset and configuration. Period references include:

ON EVENT:	Maintenance or examination is to be carried out when the relevant event occurs.
ATI	Maintenance or examination is to be carried out At the Time of Installation

Any reduction in the minimum recommended frequencies (lengthening time between tasks) must be authorised, as appropriate, by the General Manager.

Where criteria overlap the most stringent is to apply. For example if a section of track carries passengers services and freight traffic less than 1MGT per annum, two different track patrol frequencies might be seen to apply (two patrols per week and every 14 days). In this case the more stringent (two patrols per week) will apply.

8.7 Latitude

This column specifies any latitude that may be allowed for scheduling purposes. Inspection schedules shall be based on planned inspection dates, not “last performed” date.

Latitudes are generally expressed in days. That is, a task with a period of 4 months and scheduling latitude of 12 days should be completed within a period of 120 + or - 12 days.

9 Tailored Technical Maintenance Plans

The information includes:-

- Document Reference
- Location
- Asset Class to which the Tailored TMP applies
- Task to which the Tailored TMP applies (and a summary of its application)

10 Technical Maintenance Plan

Technical Maintenance Plan						
Service Description	**Safety Importance**	**Applicability**		**Period**	**Latitude**	**Comments**
10.1 Track System						
Track patrol	C	Lines with passenger services		7 days	N/A	Maximum of 6 calendar days between days of examination.
Wet Weather Patrol	NA	All track		On event	N/A	Event trigger: heavy rain, (dependent on infrastructure susceptibility)
Heat Patrol	NA	Welded track		On event	N/A	Event trigger: During WOLO conditions and at times of high rail temperature or when there is concern for the stability of welded track To be carried out once only during the hottest part of the day. Not applicable as the tracks are not continuously welded.
Front of train examination	S	All Lines where speed > 50kph		1 month	10 days	Not applicable as maximum speed permitted in the yard is 25kph.
Detailed walking examination	S	Lines with passenger services		3 months	9 days	
Siding examination	NA	All sidings		12 months	36 days	
Post Irregularity examination	NA	All track		On event	N/A	Event trigger: Any event that may potentially cause track system damage e.g. derailment, collision, flood or fire, earthquake, high wind, (dependent on infrastructure susceptibility) or a "call out" based on reports from train drivers or the public

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
Welded Track Stability Analysis	S	Welded track (Main Lines and Main line Crossing Loops)	12 months	N/A	Primary WTSA Analysis to be completed by end of September each year. The locations of any previous misalignments from the last 3 years must be examined in detail prior to the end of September. All secondary analysis, repair works and subsequent re-measurement and analysis are to be completed by 30 November each year. Where seasonal factors prevent completion of examination/analysis a preliminary assessment must be made of any outstanding track. Not applicable as tracks are not continuously welded.
Track recording examination	S	All main lines	12 months	2 months	
Track clearances examination	S/C	Passenger lines	1 year	36 days	
	S	Sidings	2 years	72 days	
	NA	All track	On event	N/A	Event trigger: Suspected change in track geometry which could affect track clearances
Track Centres Examination	S/C	Passenger lines with adjacent tracks (main line, loop or siding)	12 months	36 days	Optional where the design track centres exceed 4300mm
	NA	Sidings	On event	N/A	Event trigger: Suspected change in track geometry which could affect design clearance requirements

Technical Maintenance Plan						
Service Description	**Safety Importance**	**Applicability**		**Period**	**Latitude**	**Comments**
10.2 Rail						
Ultrasonic rail examination	S	Passenger lines		4 years	144 days	
Visual Examination of VSH Rail Defects	NA	All Vertical Split Head defects		On Event	Varies	
	S	Small Vertical Split Head defects		14 days	NIL	To commence at end of 5 week period after detection
Rail wear and condition examination	S	All main lines and crossing loops on Class 1 and Class 2 lines		4 years	144 days	Not applicable as there are no class 1 and class 2 lines
Rail corrosion examination	S	Rail in Tunnels and other wet locations		1 year	36 days	Other locations where corrosion is an actual or potential problem (including electrolytic corrosion).
Test Weld	S	All new aluminothermic field welds		14 days	NIL	to be tested after installation Test ATI where possible.
		All new wirefeed welds		14 days	NIL	to be tested after installation Test ATI where possible
Cleaning Rail head	NA	All rails in track circuited areas		On Event		Event Trigger: Clean or grind at time of installation
Grind Rail	NA	All new rail installed on Class 1 and 2 mainline tracks as part of re-railing (and not as closures for replacement of defects) Existing rail on Class 1 and 2 mainline tracks when concrete sleepers are installed or when substantial back canting is corrected Cascading or transposing of rail on Class 1 and 2 mainline tracks		ATI	N/A	to be ground within 5 MGT of installation (or 20% of the grinding cycle for preventive grinding (whichever is the larger) following the re-railing
Insulated joint examination	S	All		1 year	36 days	Includes redundant Insulated Joints
Mechanical Joints Examination	S	Welded track		1 year	36 days	Visual as part of the Welded Track Stability Examinations.
		Loose Rail		1 year	36 days	Visual as part of the Detailed Walking Examination or Track Patrol
Rail lubricator examination	NA	All lubricators		6 months	18 days	
Rail lubricator service	NA	All lubricators		As required	N/A	Event trigger: to be re-filled and serviced at an appropriate interval to ensure service is carried out prior to lubricator running empty
Rail lubricator check of rail head	NA	All lubricators		On Event	N/A	Event trigger: Review lubrication prior to ultrasonic rail testing.

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
10.3 Ties/support					
Detailed tie examination	S	Lines with fully concrete sleepers/slabs or fully steel sleepers	2 years	72 days	
		Lines with timber sleepers	1 year	36 days	
		Sidings with fully concrete sleepers/slabs or fully steel sleepers	5 years	180 days	
		Sidings with timber sleepers	2 years	72 days	
10.4 Ballast					
Ballast Examination	S	Welded Track	1 year	36 days	As part of Welded Track Stability Examination
10.5 Drainage					
Surface drain examination	S	All operational lines	1 year	36 days	Prior to period of greatest rainfall includes functioning of drainage structures such as trash racks, sedimentation basins and flow control structures
	NA	All sidings	1 year	36 days	Prior to period of greatest rainfall includes functioning of drainage structures such as trash racks, sedimentation basins and flow control structures
Sub-surface drain examination	S	All lines	1 year	36 days	Prior to period of greatest rainfall
	NA	All sidings	1 year	36 days	Prior to period of greatest rainfall
Wet weather - special examination	NA	All operational lines	On event	N/A	Event trigger: at times of heavy rain or potential flooding (includes functioning of special drainage structures such as trash racks, sedimentation basins and flow control structures)
10.6 Turnouts					
Turnout examination (including, catchpoints, diamonds and slips)	S	Lines with passenger services Lines carrying > 10mgt per annum	1 year	36 days	
		Other lines and all Sidings	2 years	72 days	
Special Turnout examination	S	Similar flexure turnouts on lines with passenger services and lines carrying > 10mgt per annum	6 months	18 days	Particular attention is drawn to any similar flexure turnouts (ie where the outside rail nominally the 'high rail' is the stockrail) which are subject to curve wear. For such cases, the fit of the switch against the stockrail, the condition of the switch, the stockrail and the switch tip height, width and angle should be assessed
		Similar flexure turnouts on other lines and all Sidings	NIL		
Special Switch Timber Examination	NA	Interlocked points on timber bearers (locations with a history of points failures)	On Event	N/A	Event trigger: Prior to periods of extreme temperature such as Summer or Winter
Inspection of Crossing condition	NA	Lines carrying > 15MGT per annum	6 months	18 days	After installation: Each 2 weeks till first grind then each 2 months for 12 months After repair (building up): each 1 month until first grind

Technical Maintenance Plan						
Service Description	**Safety Importance**	**Applicability**		**Period**	**Latitude**	**Comments**
Inspection of Crossing condition (cont'd)	NA	Lines carrying ≤15MGT per annum		On Event	N/A	Event trigger: After installation: Each month till first grind then each 3 months for 6 months After repair (building up): each 2 months until first grind In service: as part of Turnout Examination
		All manganese and vanadium crossings		3 months	9 days	Additional examination due to ultrasonic examination being of limited effectiveness
Ultrasonic Examination of Turnouts	S	All main lines		4 years	144 days	Testing of crossing and turnout rails including, catchpoints, diamonds and slips.
Ultrasonic Examination of Expansion Switches	S	All Expansion switches		6 months	18 days	
Grind turnout rails	NA	Any new turnouts on Class 1 or heavily used Class 2 tracks (>5MGT)		ATI	NA	to be ground within 8 MGT for Standard Carbon rails and 10 MGT for Head Hardened rails (or 20% of the grinding cycle for preventive grinding (whichever is the larger) following installation.
10.7 Earthworks						
Earthworks examination	S	All operational lines		1 year	36 days	In conjunction with drainage examination
		All operational sidings		1 year	36 days	
Detailed Examination Geotechnical risk sites	S	All risk category 1 sites without EWS		Continuous on Event	None	Event trigger: Prior to and during passage of trains in dry weather
		All risk category 1 sites with EWS		1 day	None	
		All risk category 2 sites without EWS in wet weather		1 day	None	During periods of heavy rain or prolonged wet weather
		All risk category 2 sites without EWS		Twice weekly	None	In dry periods
		All risk category 2 sites with EWS in wet weather		Twice weekly	None	During periods of heavy rain or prolonged wet weather
		All risk category 2 sites with EWS		1 month	6 days	In dry periods
		All risk category 3.1 sites without EWS in wet weather		Twice weekly	None	During periods of heavy rain or prolonged wet weather
		All risk category 3.1 sites without EWS		1 month	6 days	In dry periods
		All risk category 3.1 sites with EWS		1 month	6 days	
		All risk category 3.2 & 3.3 sites without EWS		1 month	6 days	
		All risk category 4 & 5 sites without EWS		various		In conjunction with Detailed Walking Examination

Technical Maintenance Plan						
Service Description	**Safety Importance**	**Applicability**		**Period**	**Latitude**	**Comments**
Geotechnical risk site review	S	All risk category 1 sites without EWS		1 month	6 days	
		All risk category 1 sites with EWS		2 months	6 days	
		All risk category 2 sites without EWS in wet weather		2 months	6 days	During periods of heavy rain or prolonged wet weather
		All risk category 2 sites without EWS		6 months	18 days	In dry periods
		All risk category 2 sites with EWS		6 months	18 days	
		All risk category 3.1 sites		6 months	18 days	
		All risk category 3.2 & 3.3 sites without EWS		6 months	18 days	
		All risk category 3.2, 3.3 sites with EWS		12 months	36 days	
		All risk category 4 & 5 sites without EWS		12 months	36 days	
10.8 Level crossings						
Level crossing examination	S	Level crossings and track vehicle take offs on lines with passenger traffic.		1 year	36 days	Note – includes all signs and road markings
Sight distance Assessment	NA	All level crossings on operational lines		On Event	N/A	Event Trigger: Changes to sight distance standards, notification of changes in road or rail traffic patterns (volume, speed, vehicle type)
Steel Sleeper Examination	S	All steel level crossings with steel sleepers		6 years	216 days	Removal of steel LX panels for steel sleeper corrosion assessment
10.9 Track on Non Operational Lines						
Not Applicable						

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
10.10 Structures					
Detailed Structures Examination	S/C	All timber underbridges on operational lines Safety critical only if on a shortened cycle due to bridge condition otherwise a statistically managed class of bridges.	2 years	72 days	Including steel and concrete components of timber bridges and timber components of steel or concrete bridges
	S/C	All steel or concrete underbridges, on all operational lines Safety critical only if on a shortened cycle due to bridge condition otherwise a statistically managed class of bridges.	4 years	145 days	
	S	All timber overbridges on operational lines	2 years	72 days	including steel and concrete components of timber bridges and timber components of steel or concrete bridges
		All steel or concrete overbridges on operational lines	4 years	145 days	Concrete includes reinforced and prestressed concrete, brick, and stone bridges. and overbridges of compressed fibro, PVC, or similar
		All timber footbridges and stepways on operational lines	2 years	72 days	including steel and concrete components of timber bridges and timber components of steel or concrete bridges
		All steel or concrete footbridges and stepways on operational lines	4 years	145 days	
		All signal bridges	4 years	145 days	
		All Tunnels	4 years	145 days	

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
Detailed Structures Examination (cont'd)		All cattle stops, ash/sand traps, traffic barriers, bridge balustrades, sedimentation basins storm water flow controls and similar structures)	4 years	145 days	
		All Lighting Towers, Service Crossings, Platforms, Loading Banks, and Stages, Turntables, Cranes, and Weighbridges, Retaining Walls	4 years	145 days	
		All fixed buffer stops and lower order protection devices	4 years	145 days	
		All energy absorbing buffer stops	1 year	36 days	Includes friction and combination hydraulic/friction buffer stops
Transom Examination	S	All timber transoms on steel or concrete transom top underbridges	4 years	145 days	To be undertaken midway between 4 year Detailed Structures Examination
Temporary Supports Examination	S	Temporary supports on all underbridges on operational lines	3 months	9 days	
Detailed bridge examination below ground	S	All timber piles	6 years	216 days	
	NA	All timber piles	On event		Event Trigger:, cross-sectional area of a pile is degraded to 50% of its original cross sectional area, must then have 2 yearly cyclic examinations carried out
		All spliced timber piles	On event		Event Trigger: splice shows signs of vertical or sideways movement,
Deflection Test	NA	All timber spans longer than 4m on operational lines	On event		Event Trigger: Detailed or Visual Structures examination indicates potential excessive deflection, or as requested
Underwater examination	S	All underbridges with pier/column bases permanently underwater	6 years	216 days	Depending on deterioration shown at the previous examination, or if major scouring is suspected
Special examination	NA	All structures	On event		Event Trigger: during periods of heavy rain, of flooding, or following damage by road or rail vehicles,

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
Visual Structures Examination	S	All timber underbridges on operational lines	2 years	72 days	At least once in the period between Detailed Structures examinations.
		All steel or concrete underbridges, on all operational lines	4 years	145 days	At least once in the period between Detailed Structures examinations. Concrete includes reinforced and prestressed concrete, brick, and stone bridges and underbridges of compressed fibro, PVC, or similar Underbridges includes culverts and undertrack pipes greater than 300mm opening
		All steel or concrete overbridges on operational lines	4 years	145 days	
		All steel or concrete footbridges and stepways on operational lines	4 years	145 days	
Fatigue assessment	NA	Underbridges and overbridges with wrought iron or steel superstructures on operational lines	On event	N/A	Event Trigger: the extent of cracks indicates the bridge may be approaching its fatigue limit.
Structure damage assessment	NA	All	On event	N/A	Event trigger: Any irregular event potentially affecting the integrity of the structure. e.g. Rail or road vehicle impact, flood, land slide/slip etc.
10.11 Structures on Non Operational Lines					
Not Applicable					

Technical Maintenance Plan					
Service Description	**Safety Importance**	**Applicability**	**Period**	**Latitude**	**Comments**
10.12 Right of Way					
Right of Way examination	S	All operational lines	Variable	N/A	As part of Detailed Walking Examination (includes fencing , vegetation, access roads, firebreaks, vermin control, cattle grids, site litter control)
		All sidings	Variable	N/A	As part of Siding Examination (includes fencing , vegetation, access roads, firebreaks, vermin control, cattle grids, site litter control)
Railway sign examination	S	All lines	Variable	N/A	As part of Detailed Walking Examination Includes Speed boards and Safety Signs
		All sidings	Variable	N/A	As part of Siding Examination Includes Speed boards and Safety Signs
Permanent Speed sign examination	S	All lines	1 year	36 days	As part of Detailed Walking Examination - correctness of signs (for position, speed shown , track indicated etc)
10.13 Right of Way on Non Operational Lines					
Not Applicable					