

SteamRanger Heritage Railway

TRACK & CIVIL CODE OF PRACTICE FINAL INSPECTIONS & TRACK AUDIT

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Track & Infrastructure Services

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AMENDMENTS REGISTER

Issue Date	Summary of Change	Change Authorised By
18/08/2014	New document - complies with DIRN CoP Infrastructure Vol 2&3, to meet requirements under Rail Safety (National) Law Act, 2012 to determine inspection requirements.	TC Barker SHR BoM
22/08/2014	Typing errors corrected	TC Barker
24/10/2014	Added form reference details	TC Barker



1.0 PURPOSE

To detail the requirements of final inspections and track audits that are carried out on SteamRanger Mainline Track following any work activity affecting the Track and Civil Infrastructure.

2.0 SCOPE

This instruction is applicable to all SteamRanger Main Line Track requiring Final Inspections or Annual Track Audit.

3.0 **DEFINITIONS**

4.0 PROCEDURE

4.1 Final Inspections & Annual Track Audit

SteamRanger shall conduct final inspections and assessment of Mainline Track in accordance with the Track & Civil Code of Practice standards. These inspections shall encompass the following elements

- 1. Final Inspections
- 2. Final Assessments
- 3. Temporary Speed Restrictions
- 4. Temporary Operating Restrictions

Completion of work tasks on the Perway Worksheet SHRI-004-WFTC-01 indicate that the above elements have been completed. Any further corrective work shall be noted on this form for entering in the Track Maintenance Corrective Work Register SHRI-004-RETC-01.

SteamRanger shall conduct annual Track Audits of all mainline track. This inspection and audit shall be performed by walking on foot and defects are reported by exception on audit form SHRI-004-WFTC-08. The track and civil elements outlined in this document are items to be assessed under audit. Reference can be made to SteamRanger Track & Civil COP standards to inform the assessment and repair of identified defects.

4.2 Inspections and Assessments

Final inspections and assessments shall be carried out on any work activity affecting the track and civil track infrastructure condition and shall include the following guidelines for each maintenance task.

4.3 At Grade Crossings

- Road/walkway surface cracking or breaking up deterioration of the road surface can allow moisture and contaminants to enter the ballast and penetrate the subgrade.
- Track geometry/alignment laterally and vertically (observe under load), excessive movement under traffic can indicate any of the following;
 - Deterioration of sleepers and fastenings
 - Subgrade deterioration track pumping



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- Requirement for tamping
- Condition of fastenings and sleepers
- Condition of rail
- Flangeways clearance/obstructions
- Under Vehicle Clearance
- Track geometry, including vertical alignment under traffic and approaches to crossings
- Condition of road/walkway surfacing materials
- Condition of signs, including visibility and line of sight
- Condition of fencing including guide fencing and pedestrian mazes
- Concrete stools installation, adequate clearance
- Other defects that could affect the safety of train operations or public access

4.4 Ballast Profile

- Track sections with of inadequate ballast profile
- Track Sections where the ballast profile may interfere with the safe operation of infrastructure (e.g. signals or switches) or rollingstock
- Heaped ballast or gaps between sleepers that indicate longitudinal track movement, sleeper skewing, or lack of crib ballast
- Heaped ballast or gaps at sleeper ends that indicate track movement, or a migration of ballast away from the track
- Other obvious defects that may affect track stability and support

4.5 Ballast Quality

- Mudholes or wetspots which may affect the deterioration rate of the track condition
- Indications of poor sleeper support by ballast (e.g. Cracking of sleepers and bearers, excessive vertical sleeper movement)
- Accelerated loss of track geometry (e.g. Following wet or dry weather) which may indicate poor ballast quality
- Evidence of excessive track vibration (e.g. Following wet or dry weather) which may indicate poor ballast quality
- Areas of fouled ballast which may result in wetspots or mudholes in wet weather
- Areas of poor ballast drainage which may result in wetspots or mudholes in wet weather
- Heaving of soil adjacent to the track which may indicate subgrade failure
- Other obvious defects that may affect track stability and support

4.6 Clearances

- The indication of suspected defects
- The occurrence of an event that may have affected the infrastructure
- When work affecting the location of part of the asset is carried out Measurements shall be made of:

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Clearance from datum plate to specified location

- Distance between track centrelines
- Track Superelevation if specified on Datum plate
- Track Curvature if specified on Datum plate

4.7 Earthworks

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- Any signs of recent movement for example slippage, slumping, settlement or heaving
- Rock or earth, or other debris falling from cuttings
- Scour and/or erosion
- Cracks in formation
- Pumping of sleepers
- Water seepage from embankments and cuttings
- Undercutting of the toe of embankments and cuttings by water or wind
- Damage to embankment or cutting for example by construction or vehicle access
- Conditions likely to cause future slip, scour, slump, settlement (e.g. burning off or clearing of steep banks and cuts)
- Any other occurrences likely to cause a failure of the earthworks

4.8 Line of Sight

- Any location where line of sight is deficient, or the view by the train crew of the sign or signal may be obscured
- Temporary or permanent encroachment which may infringe the Line of Sight for example vegetation growth

4.9 Signs

- Sign Characteristics against specification
 - Sign exists
 - Correct sign for purpose
 - Correct information on sign
 - Correct design
 - Sign support is adequate
- Sign installed to specification
 - Facing direction
 - Position along Track
 - Side of track
 - Distance from Track
 - Height relative to track
 - Inclination
- Sign legibility
 - Legible at line of sight distance
 - Damaged
- Other problems
 - Sun glare
 - Background
 - Day/night visibility



4.10 Sleepers and Fastenings

- Damaged, split, broken or missing components
- Indications of sleeper plate movement
- Indications of sleeper movement (e.g. bunching, skewing)
- Indications of incorrect rail cant
- Abnormal deterioration of sleepers and fastenings
- Other obvious defects that may affect the track structure's integrity

4.11 **Points and Crossings**

- Wheel marks which indicate incorrect wheel/rail interaction
- Rail creep which may for example lead to displacement of components and rail alignment problems
- Rail pulling especially at the point and splice rails of Rail Bound Manganese and fabricated crossings
- Damage to any component that does not allow it to perform its intended function

In addition to the requirements of the routine patrol, this inspection shall identify suspected defects in points and crossings and their components, including those components and conditions as outlined below:

- Turnout and Diamond Assemblies
 - Check Layout for missing or broken Components
 - Track geometry
 - Track centre dimension at Fouling Points
 - Rail Condition
 - Rail and weld defects
 - Rail wear
- Points
 - Gauge
 - Track Gauge in Critical Area (other than at point of switch)
 - Throat Gap (Junction of Heads)
 - Switch Toe/Stock Rail Gap Open Throw
 - Switch Toe/Stock Rail Gap Closed (Blade gap)
 - Alignment of Points
 - Heel Spread
 - Switch stop fit to Stock Rail
 - Switch Blade Toe Break
 - Switch Blade and Stock Rail Wear
 - Switch Blade Cripple
 - Metal Flow
 - Switch Support On Chairplates
 - Heel Block Condition
 - Switch Stop Condition
 - Rail Joint Bolts
- Points Operation



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- Hand operated lever operation shall be checked and any identified problems rectified for example obstructions, incorrect clearances of movable components, and poor lubrication, condition and visibility.
 - Spreader bars, Rods, Brackets and Pins/Bolts including:
 Spreader bar condition, straightness, insulation, correct adjustment and clearance under rails;
 Spreader bracket condition, attachment to switches, and pin or bolt connection to bars;
 Connecting rod and bar condition and correct adjustment;
 - Lubrication of all pins and bolts.
- Points Lubrication
- Crossings
 - Gauge at Critical Areas
 - Check Rail Effectiveness
 - Vertical Wear on Crossing Nose
 - Flangeway Clearance
 - Flangeway Depth
 - Wing rail Wear
 - Rail alignment
 - Running edge wear
 - Metal flow
 - Crossing Nose Condition
 - Crossing Cracks
 - Broken or Cracked Crossing Spacer Blocks
 - Check Rail Spacers
 - Check Rail and Crossing Bolts
 - Check Rails
 - Fastenings
 - Damaged fastenings (e.g. from incorrect installation, derailment, vandalism)
 - Missing, ineffective (e.g. corrosion, wear, loose), incorrect type of fastenings (clips, insulation spacers, metal spacers, pads and special components including gaskets and abrasion plates)
 - Baseplates and chairs
 - Bearers
 - Bearer Condition
 - Ballast

4.12 Rail and Rail Welds

- Broken Rails and Rail Welds
- Rail and Rail Weld deformation
- Wheel Burns
- Contamination of the rail surface (e.g. pests, spills)
- Excess differential Rail wear on curves
- Excess Wear Rates
- Gauge corner shelling
- Unusual Patterns of Gauge Face Contact



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- Unusual vehicle tracking patterns
- Rail corrugation
- Rail crippling

4.13 Insulated Joints

- Broken Bolts
- Broken Plates
- Metal Flow across joint
- Excessive vertical deformation
- Excessive Rail End Batter
- Insulation Breakdown
- Other obvious defects or missing components

4.14 Mechanical Joints

- Frozen Joints
- Broken or loose Bolts
- Bent Bolts
- Cracked and Broken Plates
- Bent Fishplates
- Worn Fishplates
- Elongated Bolt Holes
- Excessive Rail End Batter
- Excessive vertical deformation
- Flogging Joints
- Track Circuit Bond Wire Damage
- Other obvious defects or missing components

4.15 Rail Lubrication

- Excessive Lubrication
- Lack of Lubrication
- Lubrication Effectiveness
- Contamination of the rail surface (e.g. Pests, spills)
- Rail Lubricator Inspection
 - * Level of contents of main container
 - * Damage
 - * Blade height & condition
 - * Plunger settings & operations
 - * Grease leakage
 - * Lubricator not delivering grease to rail head
 - * Filler valve condition
 - * Loose mounting fasteners
 - * Loose hose clips
- Other obvious defects or missing components



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4.16 Temporary Joints

- Broken Bolts
- Loose Clamps
- Cracked or Broken Plates
- Excessive vertical deformation
- Excessive Rail End Batter
- Track Circuit Bond Failure
- Other obvious defects or missing components

4.17 Guard Rails

- Lack of uniform distance between the guard rail and the running rail
- Lack of uniform height difference between guard rail and the running rail
- Loose or missing fastenings
- Component damage caused by a derailment, collision, dragging equipment on rollingstock or vandalism etc
- Other obvious defects that may affect the structure's functional integrity

4.18 Trackside Buildings and Structures

- Changes in the integrity of the structure
- Changes in the alignment of the structure
- Damage caused by a derailment, collision, dragging equipment on rollingstock or vandalism etc
- Undermining of Structures Foundations
- Crushing of components
- Defects requiring monitoring
- Other obvious defects that may affect the structure's functional integrity and security

4.19 Structures under and over the Track

- Changes in the integrity of the structure
- Changes in the alignment of the structure
- Component damage caused by a derailment, collision, dragging equipment on rollingstock or vandalism etc
- Undermining of Structures Foundations
- Unusual dis-colouration
- Unusual seepage of water
- Crushing of components
- Defects requiring monitoring
- Other obvious defects that may affect the integrity of the structure



4.20 Fire Controls, Vegetation, Access Roads/Paths and General Right of Way

- Treated or controlled areas (including the ballast, cesses and established fire breaks) not substantially free from vegetation growth.
- Off target damage to vegetation growth outside treated or controlled areas.
- High risk fire locations including presence of combustible rubbish and vegetation.
- Infringement on firebreaks by combustible materials.
- Hazardous tree limbs or trees which may affect train operations.
- Presence of noxious weeds as defined by the relevant local authorities (e.g. proclaimed plants as defined by the South Australian Animal and Plant Control Act 1986 and Regulations).
- Hazards effecting the safe use of access roads and walkway Paths.
- Unauthorised encroachment into the Right of Way be third parties including the building of structures, new excavations, tipping of materials, road construction, erection of hoardings or fences, the laying of drains, pipes or cables.
- Damaged or defective third party crossings of the Right of Way (pipelines, services, cables etc.)

4.21 Vandalism

• Visual Inspection for damage caused by vandalism shall be carried out at all worksites

4.22 Track Geometry

- Track geometry defects including those that may indicate problems with the underlying track and civil structure
- Locations where the deterioration in track geometry is abnormal since last inspected
- Indications of track geometry and alignment defects including:
 - evidence of recent or current movement
 - unusual wear patterns on the rail
 - locations where the geometry is inconsistent with the track either side (e.g. a sudden change in curve radius)
 - Variations in track alignment (i.e. that is from design) that may for example affect clearances or track stability
 - Other obvious defects that may affect track stability and support



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4.23 Track Stability

- Lateral misalignment, "kick", sharp or flat curvature
- Track movement
- Rail stress problems

The inspection should also determine the condition of the general track structure in terms of its contribution to the confirmed defect including for example:

- Poor track geometry
- Poor or deficient ballast profile
- Wet and contaminated ballast/formation conditions
- Generally poor ballast quality (rounded, degraded, broken down)
- Pumping sleepers or other signs of poor track support
- Poor sleeper/fastening condition
- Presence of fixed points
- Recent track maintenance activity
- Light track structure for alignment and traffic conditions

4.24 Track Drains and Cesses

- Scour
- Blockage or partial blockage of the track drain or cess due to debris, rubbish or silt
- Damage to waterways by construction or vehicle access
- Erosion or damage to levee banks or channels
- Any other blockage or the waterway

4.25 Waterways

- Scour or signs of overtopping of structure
- Scour around culvert walls, ends and barrells
- Scouring or damage to or around foundations, abutments, wingwalls, or temporary support
- Blockage or partial blockage of the waterway due to debris, rubbish or silt
- Damage to culvert and drains by construction or vehicle access
- Drain barrel damage or collapse
- Erosion or damage to levee banks or channels
- Condition of sumps
- Any other blockage of the waterway

5.0 REFERENCE DOCUMENTATION

SteamRanger Heritage Railway Track & Civil Code of Practice standards as applicable.

Code of Practice for the Defined Interstate Network Volume 4 Track, Civil and Electrical Infrastructure Parts 1, 2 & 3: June 2002.