Government of South Australia

Department of Planning, Transport and Infrastructure

PUBLIC TRANSPORT SERVICES

ENGINEERING INSTRUCTION

FOR

INSPECTION OF 1 IN 9

TURNOUT AND DIAMOND

TC1-DOC-000391

STOP **and THINK**

Zero Harm

Document Control

DOCUMENT STATUS

Document Owner: Director, Asset Management			
Action	**Name and Position**	**Signature**	**Date**
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Risk Category: High			
Document Review Schedule: This document is due for review on November 2014			

DOCUMENT AMENDMENT RECORD

Rev	Change Description	Date	Prepared	Reviewed	Approved
0	Initial Issue	November 2013	Matthew Reedman	Philip Degenhardt	Brian Green

Contents

1.0 INTRODUCTION AND CONTEXT

1.1 INTRODUCTION

The Department of Planning, Transport and Infrastructure (DPTI) Public Transport Services Division (PTS) owns, operates and maintains the Adelaide Metropolitan Passenger Rail Network (AMPRN). This standard forms part of the engineering management system used to ensure safety and customer service levels are efficiently and effectively supported.

1.2 PURPOSE

The purpose of this document is to provide an engineering instruction for inspection of 1 in 9 R250m turnout and diamond.

1.3 SCOPE

This instruction applies to 1 in 9 R250 turnout and diamond; which include

- 'V' Crossing Area
- 'K' Crossing Area
- 'Switch' Area

1.4 ACRONYMS AND REFERENCED DOCUMENTS

1.4.1 Acronyms

Acronym	Full Name
AMPRN	Adelaide Metropolitan Passenger Rail Network
DPTI	Department of Planning, Transport and Infrastructure
O&M	PTS Operations and Maintenance
PTS	Public Transport Services

1.4.2 Referenced Documents

Document Number or Abbreviation	Title
CP-TS-956	Code of Practice - Volume Two - Train System - Track Geometry
CP-TS-963	Code of Practice - Volume Two - Train System - Points and Crossings

2.0 CONDITION ASSESSMENT AND RESPONSE CRITERIA FOR 1 IN 9 R250

2.1 TURNOUTS - 'V' CROSSING AREA

'V' Crossing area assessment responses for critical dimensions							
Component parameter	**Design dimension (in mm)**	**Range for routine inspection (in mm)**	**Range for increased monitoring (in mm)**	**Range for immediate repair (in mm) or impose speed restriction shown**			
				65 km/h	**40 km/h**	**20 km/h**	**Pilot all trains until repaired**
1. Check Rail Effectiveness and Track Gauge - see figure 5.2 (CP-TS-963)							
Working face of check rail to 'V' crossing nose - see Note 1	1557	1559 to 1555	1554 to 1553	1552 to 1550	1549 to 1545	–	<1545
Track gauge - running rail to 'V' crossing nose - see Note 2	1600	1600 to 1596	1595 to 1592	1591 to 1590	–	–	<1590
2. Worn wing rails and worn or broken 'V' crossing nose - see figures 5.3 to 5.6 (CP-TS-963)							
Vertical wear of wing rail	running rail level	0 to 4	–	5 to 10	–	–	>10
Vertical wear of 'V' crossing nose - see Note 3.	10 below running rail level	5 to 8 below running rail level	9 to 13 below running rail level	–	–	–	>13 below running rail level
Broken crossing nose - thickness of 'V' crossing nose at break (within transfer area) see Note 4.	10 when new (14 theoretical)	–	14 to 20	–	21 to 25	–	>25

Notes:

1. The main effectiveness of the Check Rail is it's ability to protect the 'V' crossing nose. Wheel contact with the crossing nose is therefore a vital observation to be made during inspections. Any sign of damage to the 'V' crossing nose is reason for adjustment or replacement of the checkrail regardless of the check rail wear.

2. For wide gauge in the 'V' crossing critical area, see assessment for plain track in CP-TS-956 (Track Geometry).

3. To provide a smoother transition through the crossing whilst reducing the chance of impact on the nose, the crossing nose is manufactured 10mm below the top plane of the running rails. Measurement for vertical wear should therefore be taken at least 144mm from the working point of the crossing nose.

4. Crossing is designed for a theoretical 14mm width at the working point however the first 150mm from the WP is tapered sideways to allow for additional clearance, providing a 10mm practical nose width.

2.2 DIAMONDS - 'K' CROSSING AREA

'K' Crossing area assessment responses for critical dimensions							
Component parameter	**Design dimension (in mm)**	**Range for routine inspection (in mm)**	**Range for increased monitoring (in mm)**	**Range for immediate repair (in mm) or impose speed restriction shown**			
				65 km/h	**40 km/h**	**20 km/h**	**Pilot all trains until repaired**
1. Check Rail Effectiveness and Track Gauge - see figure 5.2 (CP-TS-963)							
Working face of check rail to 'K' crossing nose - see Note 1	1554	1556 to 1553	1552	1551 to 1550	1549 to 1545	_	<1545
Track gauge - running rail to 'K' crossing nose - see Note 2	1594	1594 to 1593	1592	1591 to 1590	_	_	<1590
2. Worn wing rails and worn or broken 'V' crossing nose - see figures 5.3 to 5.6 (CP-TS-963)							
Vertical wear of wing rail	running rail level	0 to 4	_	5 to 10	_	_	>10
Vertical wear of 'V' crossing nose - see Note 3.	10 below running rail level	5 to 8 below running rail level	9 to 13 below running rail level	_	_	_	>13 below running rail level
Broken crossing nose - thickness of 'K' crossing nose at break (within transfer area) see Note 4.	10 when new (14 theoretical)	_	14 to 20	_	21 to 25	_	>25

Notes:

1. Diamond layout is designed with 'K' Crossings installed 6mm tight to gauge. This allows the wheel flanges to better self level and controls the path of the wheel as they traverse the wheel transfer area. Note Flangeways are designed for 43mm gap on running rail side of nose and 40mm flangeway gap on the checkrail side of the nose. The 6mm tight gauge and 40mm flangeway gap provides a checkrail effectiveness of 1554mm.

2. Gauge through the 'K' Crossing area has been tightened by 6mm to 1594mm (see Note 1.) Wide gauge in the 'K' crossing critical area is not permitted. For validation of track gauge through 1 in 9 Diamond Crossover refers to Vossloh on-site Inspection sheet and diagram A4B16162. For wide gauge in other non-critical areas see assessment for plain track in CP-TS-956 (Track Geometry).

3. To provide a smoother transition through the crossing whilst reducing the chance of impact on the nose, the crossing nose is manufactured 10mm below the top plane of the running rails. Measurement for vertical wear should therefore be taken at least 144mm from the working point of the crossing nose

4. Crossing is designed for a theoretical 14mm width at the working point however the first 150mm from the WP is tapered sideways to allow for additional clearance, providing a 10mm practical nose width. Flangeway gaps of 43mm for running rail flangeways and 40mm for checkrail side of nose flangeways.

2.3 TURNOUTS - SWITCH AREA

Switch area assessment responses for critical dimensions

Component parameter	Design dimension (in mm)	Range for routine inspection (in mm)	Range for increased monitoring (in mm)	Range for immediate repair (in mm) or impose speed restriction shown			
				65 km/h	40 km/h	20 km/h	Pilot all trains until repaired
1. Switch flangeway refer figure 4.1 (CP-TS-963)							
Minimum switch blade throat opening - back of switch blade to stock rail - refer to figure 4.1	55	40 to 55	_	_	39 to 35	_	<35
Minimum switch opening - refer to figure 4.1	127	95 to 127	85 to 94	_	_	80 to 84	<80
2. Track gauge at toe of switch - refer to figure 4.1 and Note 1. (CP-TS-963)							
For Tangential switches	1600	1600 to 1595	_	1594 to 1592	_	1591 to 1590	<1590

Notes:

1. For wide gauge in the switch critical area, the assessment for plain track in CP-TS-956 (Track geometry) shall apply.

3.0 ON SITE INSPECTION SHEET FOR 1 IN 9 DIAMOND CROSSING

ON-SITE INSPECTION SHEET FOR 1 in 9 DIAMOND CROSSING — Sample only

Hand	Turnout angle	Rail type	Drawing No.	Special details	Assembly type
	1:9	AS 60kg HH			Complete / Partial

Track Guage + 2 / -0mm**

Ref.	Design	Actual	Ref.	Design	Actual
g1	1600		g8	1600	
g2	1600		g9	1600	
g3	1594		g10	1600	
g4	1594		g11	1594	
g5	1594		g12	1594	
g6	1594		g13	1600	
g7	1600		g14	1600	

Crossing End Opening ± 2 mm

Ref.	Design	Actual	Ref.	Design	Actual
V1a	304.8		K1	382	
V1b	332.8		K1	382	
V2a	304.8		K2	382	
V2b	332.8		K2	382	

Crossing Checkrail Flangeway Widths ± 2 mm

Ref.	Design	Actual	Ref.	Design	Act.	Des.	Act.
V1	44		K1	43		40	
V2	44		K2	43		40	

Checkrail Flangeway Widths 43+2/-1 mm

Ref.	C1-G1	C2-G2	C3-G3	C4-G4
Actual				

Checkrail Effectiveness Gauge 1557 +3/-1 mm

Ref.	gg1	gg2	gg3	gg4
Actual				

Notes:

V-Crossing Nose to Nose

Ref.	Design	Actual
v v	29182	

V-Crossings Nose To K-Crossings Center

Ref.	Design	Actual
v1 k1	14613	
v1 k2	14613	
v2 k1	14613	
v2 k2	14613	

Closure Rail Lengths ± 3 mm

Ref.	Design	Actual
CL1	7395	
CL2	7395	
CL3	7395	
CL4	7395	
CL5	7387	
CL6	7387	
CL7	7387	
CL8	7387	

Crossing Lengths ± 3 mm Along Running Edges

Ref.	Design	Actual
V1	7029	
V2	7029	
K1	8169	
K2	8169	

Check Rail Lengths 4600 ± 5 mm

Ref.	G1	G2	G3	G4
Actual				

Check Carrier Rail Lengths7024 ± 5 mm

Ref.	C1	C2	C3	C4
Actual				

Other critical points

	Pass	Fail
Bearer Spacing		
Bearer Quality		
Rails Undamaged		
Clips Applied		
Bolts Tightened		
Huck Bolts in Tolerance		
Screw Spikes Tightened		

Component identification

K-Crossings:

V-Crossings:

Check Rails:

Check Carrier Rails:

Closure Rails:

Broad Guage Network Inspection

Name:

Date:

Signature:

** Dimensions are taken perpendicular to running edge.

Comments:

Note

The on-site inspection sheet for 1 in 9 diamond crossing can be access via PTS Engineering Maintenance webpage for Control Register Forms.

4.0 DIAMOND CROSSOVER - DIAGRAM

Angle 1:9		Rail Type: AS 60 kg HH	
C	Check Carrier Rail	K	1 in 9 K-Crossing
G	4.6m Check Rail	cc	Centre Closure Rails
CL	Closure Rail	g	Track Gauge
V	1 in 9 V- Crossing	gg	Check Rail Effectiveness Gauge