



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline: Engineering (Track & Civil)

Category: Standard

# Infrastructure Requirements for Unit Train Loading and Unloading Facilities for Coal and Mineral Products

## ETD-00-05

### Applicability

New South Wales	✓	CRIA (NSW CRN)	
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### Primary Source

ARTC NSW Standard TDS 15
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### Document Status

Version	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.2	08 Apr 11	Standards	Manager Standards	Exec Manager SS&P 21/06/2010	CEO

### Amendment Record

Version	Date Reviewed	Clause	Description of Amendment
1.0	01 Dec 09		Implementation draft. Supersedes NSW Standard TDS 15 v1.2
1.1	18 Jun 10		Banner added regarding mandatory requirements in other documents and alternative interpretations.
1.2	08 Apr 11		Track classification A and C lines amended to show "Heavy Haul Lines" and "Intrastate Lines".

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**Mandatory requirements also exist in other documents.**

**Where alternative interpretations occur, the Manager Standards shall be informed so the ambiguity can be removed. Pending removal of the ambiguity the interpretation with the safest outcome shall be adopted.**

## 1 Scope

This Standard sets out the Australian Rail Track Corporation's infrastructure requirements for the design of terminals handling unit coal and minerals trains.

## 2 Reason and Nature of Change

Correction of references to standards

## 3 Track Standards

Coal terminals are to be constructed to a minimum of Heavy Haul Line standards as set out in ARTC T&C CoP Section O.

Other product terminals may be constructed to a minimum of Intrastate siding standards as set out in ARTC T&C CoP Section O.

Track under the loading bin is to be constructed to allow easy cleaning and removal of spill product, preferably a concrete slab design with the rail supported on pedestals as shown on ARTC Drawing No. SS-435, or where it is also proposed to load road vehicles, to ARTC Drawing No. SS-432.

Track over unloading bins is to be designed in accordance with Metric Cooper. M270 loading as specified in the ARA Railway Bridge Design Manual.

Earthworks will be constructed to the standards set out in ETM-08-01. Trackwork will be constructed to the standards set out in ETF-05-01.

## 4 Track Layout and Signalling Aspects

### 4.1 Balloon Loops

Figure 1 shows the typical rail siding layout for a balloon loop facility. Where such a facility is to be located on a double mainline track section a facing crossover is required. Signalling control over the junction between the balloon loop siding and mainline is required, including provision of catchpoint protection of mainline, unless otherwise specified by ARTC. This signalling system, to control the entry and departure of trains using the proposed facility, must be approved by ARTC.

In the event that a Branch Line is required to connect between the ARTC mainline and the balloon loop it shall be necessary to install an ARTC approved signalling system to regulate the working of trains.

Balloon loop sidings shall accommodate the largest sized trains to be operated. In particular, consideration should be given to future civil and signalling works required to relocate the balloon loop's mainline junction with ARTC track.

Train movements around the balloon loop are preferably anti-clockwise but where all rail track gradients and other physical factors mitigate otherwise, clockwise operation is acceptable.

The entrance and exit to the balloon loop shall be via a single turnout from the main line.

Where the loading bin is proposed to be located adjacent to an existing main line no portion of the structure and foundations shall be closer than 6200mm to the centre line of the nearest mainline.



The bin facility shall be located on tangent (straight) track so that each wagon being unloaded or loaded is always on this straight. The absolute minimum straight length shall be 26m (see Figure 1).

Where a balloon loop is to be worked under a joint user arrangement (ie. when two parties share the loop) the preferred loading operation is via a single loading bin fed by conveyor from separate stockpiles.

Balloon loop departure and mainline junction signals, including track circuits, shall be of an ARTC approved design.

Loading lights where installed, and loading/unloading approach signal lights are to be of a distinctive appearance to distinguish them from ARTC signals. See copy of Plan No.M01-235 attached.

## 4.2 Runaround Loops

If approved by ARTC the terminal may be designed as a runaround loop. The location of the loop in relation to the bin shall be determined to suit the site and the frequency of trains. General layout for such a facility is shown in Figure 2.

Locomotive run-round facilities shall be clear of the mainlines unless otherwise approved. Many of the requirements for balloon loops also apply to runaround loops.

# 5 Track Design Requirements

## 5.1 Grading and Curvature

The loading of trains is to be generally carried out on a rising grade with the train in motion. The ideal loading grade is a constant rising grade of 1 in 300 for a train length each side of the loading facility but ARTC will evaluate each case individually.

The preliminary design of the facility shall be submitted to ARTC, indicating the horizontal alignment and a longitudinal section to allow approval in principal to be obtained prior to final design being commenced. Ideally this documentation should be accompanied by a computer simulation of the movement of a train through the loader to relate locomotive drawbar force to total individual vehicle resistances induced by their loaded/empty state and their relationship to grades and curves. This simulation will then be used to identify excessive drawbar loads and difficulties in maintaining constant loading speeds.

The minimum curvature of a balloon loop shall be 200m.

## 5.2 Turnout and Catchpoints

All turnouts required for the loading/unloading facilities shall be of a standard type as defined in ETD-03-02.

In the case of balloon loops which are remote from the main line, the junction turnout and intervening track from the main line to the loop shall be capable of sustaining a train speed of 50km/h.

The bifurcation turnout within the loop will have a crossing rate and switch length commensurate with the required train speed which for design purposes will be either 30km/h or 50km/h, and will depend on the crossing rate of the Junction turnout.

Where duplicated mainlines necessitate the siting of a facing crossover in advance of the junction turnout, this crossover will comprise turnouts with the same parameters as the junction turnout.

All catchpoints required for the loading/unloading facilities shall be of a standard type as defined in ETD-03-02

In balloon loops a catchpoint shall be installed between the main line junction and the bifurcation turnout to protect the main line traffic.

A second catchpoint may be required on the departure end of the loop at the clearance point of the loop bifurcation to protect arriving trains. This requirement will be determined by ARTC.

### 5.3 Formation

The formation is to be in accordance with ETM-08-01 and Drawing No. SP521 for sidings.

Wagon and examination areas and walkways are to be provided as specified for the particular location. Walkways should be on the 'inside' of any curves and suitable lighting installed.

Allowance for future electrification shall be provided in formation widths where specified.

## 6 Overhead Loading Structure Design

The loading structure shall not infringe the standard structure gauge as detailed in ETM-07-01, Figure 1. The minimum clear width to be maintained each side of the track centreline is given in ETM-07-01.

All structures on sidings in areas where main line electrification exists, or is to be allowed for, must make provision for electrification of the facility.

In electrified areas where the locomotive is to pass under the loading structure, the minimum height clearance of the supporting structure must be 5650mm. (DC traction) or 5900 (AC traction). Loading chutes in the retracted position only must be a minimum 5300mm above rail.

Provision for skids controlling the pantographs of the electric locomotive and the connection of the electric overhead system to the structure must be to the satisfaction of ARTC.

Where the loading chute is designed to lower into the rail vehicle, the chute in the raised position must be a minimum of 5300mm above the designed rail level, the chute in the lowered position must be suitable for the range of vehicles to be loaded and extend to a minimum of 3500mm to the rail level. The maximum width of the loading chute is to be 1600mm.

The control to the chute must be adequate to ensure that it can be rapidly raised in an emergency.

In areas where the track layout does not provide for a locomotive to pass under the chute, the minimum height of any part of the supporting structure may be 5000mm above rail.

The actual loading chute in the raised position must be a minimum of 5000mm above rail.

## 7 Unloading Bins

The bin shall be constructed to accommodate a loading requirement of Metric Cooper M270 as specified in Australian Bridge Design Code (Railway Supplement).

## 8 Mass Control At Loading Facility

An approved method of controlling the amount of product loaded into each wagon is required to ensure that the rail vehicles are not over loaded in terms of axle load or spillage of material on the track.

The preferred method is a batch weighing system that pre-weighs the amount placed into each vehicle. Alternatively, a track weighbridge for weighing the loaded train should be installed.

Other alternative methods of control may be considered, but must be approved by ARTC.

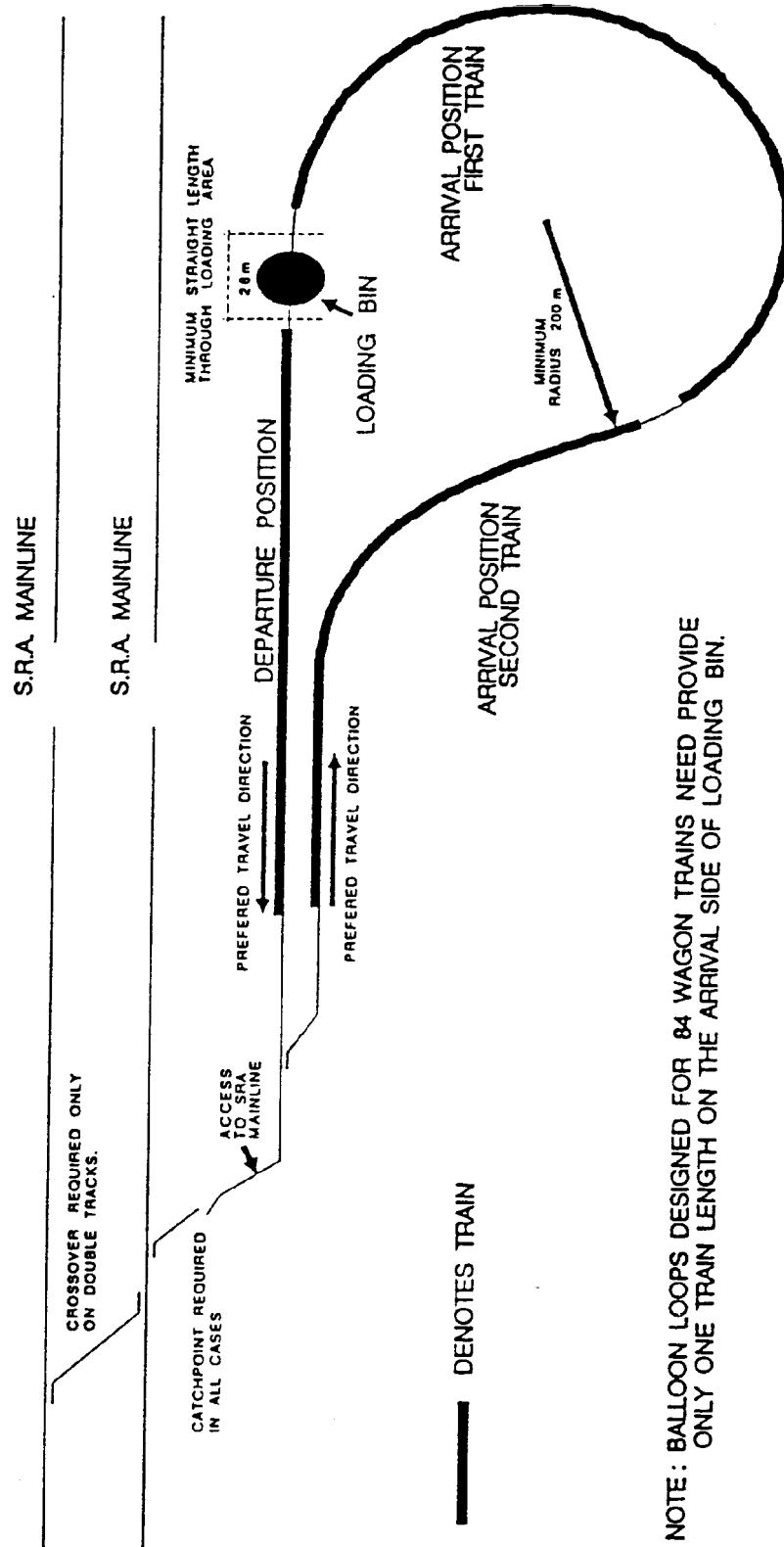
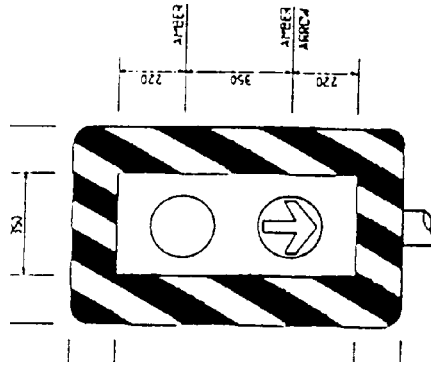
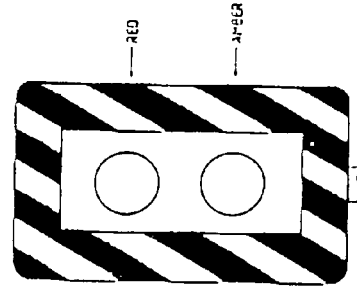


Figure 1 – Typical Balloon Loop Rail Siding Layout



WEIGHBRIDGE SIGNAL



SPOT LOADING SIGNAL

ALL DIMENSIONS AS FOR THE CORRESPONDING SIGNAL

**LOADING OR UNLOADING SIGNALS**

- INDICATIONS
  - OPAL WHITE ..... LOADING OR UNLOADING COMPLETED
  - RED ..... STOP
  - AMBER LIGHT WITH AMBER ARROW ..... INCREASE SPEED
  - AMBER LIGHT WITH AMBER ARROW ..... DECREASE SPEED
  - AMBER LIGHT WITH AMBER ARROW ..... MAINTAIN SPEED
  - FLASHING AMBER ..... RETIRED SIGNAL TO BE CANCELLED
- LOADING COMPLETED ASPECT FITTED ONLY TO LAST ONE TO THREE VEHICLES OR AS OTHERWISE REQUIRED DEPENDING ON EXPECTED TRAIN LENGTHS
- INDICATIONS ARE TO BE SPACED SO THAT AMBER INDICATIONS ARE CLEARLY VISIBLE TO DRIVERS UNDER ALL WEATHER AND TRACK LAYOUT CONDITIONS. MAXIMUM SPACING IS 100m

**WEIGHBRIDGE SIGNALS**

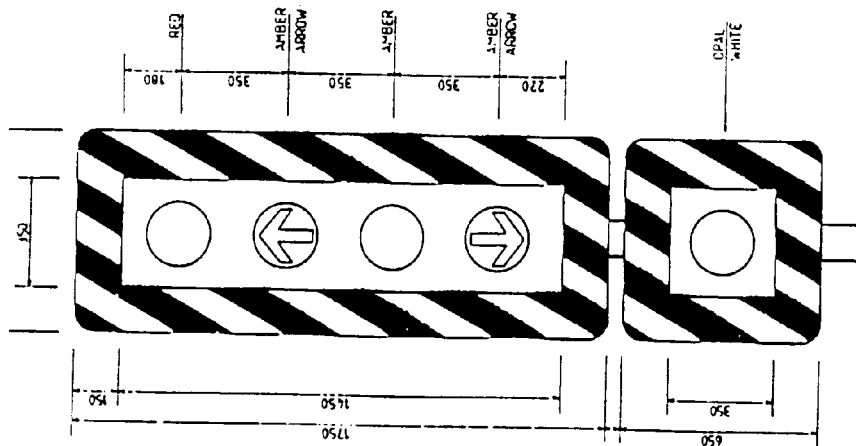
- AMBER LIGHT ..... MAINTAIN SPEED
- AMBER LIGHT WITH AMBER ARROW ..... DECREASE SPEED
- LIGHTS OFF ..... WEIGHING COMPLETE

**SPOT LOADING SIGNALS**

- RED LIGHT ..... STOP
- AMBER LIGHT ..... PROCEED

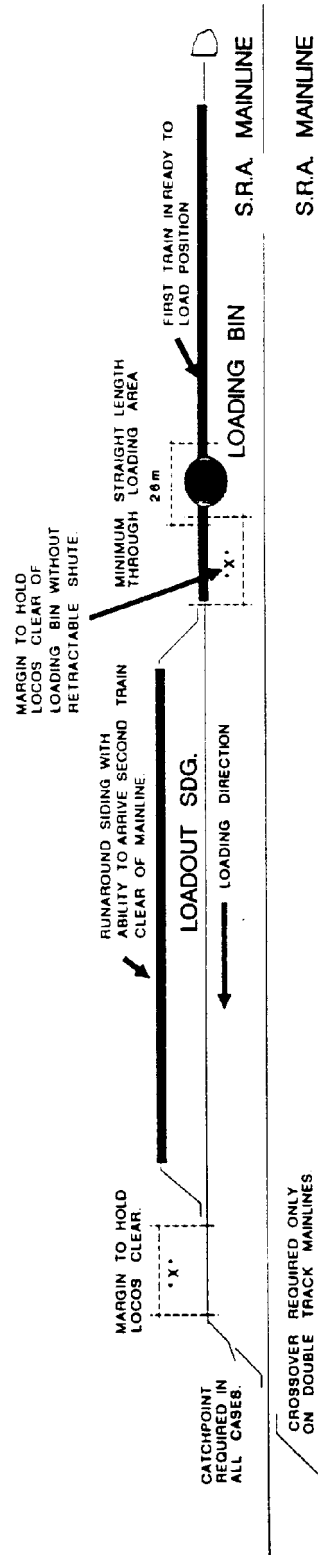
**GENERAL NOTES**

- LAMP UNITS 175mm Dia
- ALL LAMPS TO BE HOODED MINIMUM HOOD LENGTH 225mm
- LOWEST INDICATION TO BE NOT LESS THAN 1700mm ABOVE RAIL LEVEL
- RECOMMENDED SIGNAL LOCATION 2.7m FROM TRACK CENTRELINE
- ALL LAMPS ARE TO BE 170+50+55
- ALL TARGET SIGNALS TO HAVE EQUAL WIDTH YELLOW LIGHTS. ALL SIGNALS TO BE CLASS 1 SIGNALLING RETRO REFLECTIVE



LOADING OR UNLOADING SIGNAL

FIGURE 2. RUNAROUND SIDING GENERAL ARRANGEMENT.



OUTLINE OF GENERAL OPERATING PROCEDURE

TRAIN ARRIVES INTO LOADOUT SIDING. LOCOS DETACH AND PROCEED VIA RUNAROUND SIDING TO OPPOSITE END. LOCOS PROPELL EMPTY TRAIN INTO POSITION TO COMMENCE LOADING. TRAIN LOADS IN DIRECTION OF ARROW ABOVE. IN EVENT SECOND TRAIN ARRIVES DURING THE LOADING OF THE FIRST TRAIN UPON THAT TRAIN'S DEPARTURE THE SECOND TRAIN'S LOCOS RUNAROUND VIA THE NOW UNOCCUPIED LOADOUT SIDING. TRAIN IS THEN PROPELLED INTO IT'S LOADING POSITION PROVIDING EITHER THE BIN'S LOADING SHUTE IS RETRACTABLE TO ALLOW LOCOS TO PASS UNDERNEATH OR SUFFICIENT DISTANCE IS PROVIDED AS SHOWN ABOVE TO HOLD ALL LOCOS BETWEEN THE LOADING BIN AND THE NEAREST SET OF POINTS TO AVOID LOCOS PASSING UNDER THE BIN. THE SECOND TRAIN THEN PROCEEDS TO LOAD VIA THE LOADOUT ROAD.