



Engineering Standard

Signalling

CRN SD 006

SIGNALLING DESIGN PRINCIPLES – SIGNS

Version 2.0-Issued June 2018

Owner: Principal Signal Engineer

Approved by: David Sweeney

Authorised by: James Zeaiter

Disclaimer. This document was prepared for use on the CRN Network only. John Holland Rail Pty Ltd makes no warranties, express or implied, that compliance with the contents of this document shall be sufficient to ensure safe systems or work or operation. It is the document user's sole responsibility to ensure that the copy of the document it is viewing is the current version of the document as in use by JHR. JHR accepts no liability whatsoever in relation to the use of this document by any party, and JHR excludes any liability which arises in any manner by the use of this document.

Copyright. The information in this document is protected by Copyright and no part of this document may be reproduced, altered, stored or transmitted by any person without the prior consent of JHR.

Document control

Revision	Date of Approval	Summary of change
3.0	May 2003	RIC Standard SC 00 13 01 06 SP Version 3.0 May 2003.
1.0	May 2011	Conversion to CRN Signalling Standard CRN SD 006
1.1	April 2016	Review
1.2	May 2018	Review and add section 6.5 (SPAD alert Boards)
1.2	May 2018	Add section 6.2.9 non-interlocked area sign
2.0	June 2018	Removal of Boards and replace with Signs all of document

Summary of changes from previous version

Section	Summary of change
	No Changes from V1.0
6.5	All new
6.2.9	All new Add section 6.2.9 non-interlocked area sign
6.5	All New Signal Alert Sign and SPAD Alert Sign
All Sections	Replace “notice boards” with “signs

Contents

6	Signs	4
6.1	Types and Provision of Signs: Principle 6.1	4
	6.1.1 Introduction.....	4
	6.1.2 Types of Signs.....	4
	6.1.3 Provision of Signs	4
6.2	Safeworking Signs: Principle 6.2	4
	6.2.1 Introduction.....	4
	6.2.2 Style of Safeworking Signs	4
	6.2.3 Provision of Stop Signs	4
	6.2.4 Provision of Shunting Signs	5
	6.2.5 Provision of Signs at Points	7
	6.2.6 Provision of Derail Signs	8
	6.2.7 Provision of End Signalled Authority Boards	8
	6.2.8 Provision of Signs at or on Signal	8
	6.2.9 Provision of Non-Interlocked Area Signs, Train Order Working	8
6.3	Supplementary Signs: Principle 6.3	10
	6.3.1 Introduction.....	10
	6.3.2 Style of Supplementary Signs	10
	6.3.3 Provision of Tonnage Signal Sign	10
	6.3.4 Provision of Starting Signal Sign.....	10
	6.3.5 Provision of Slip Signs	10
	6.3.6 Provision of Single Light Indication signs.....	10
	6.3.7 Special Situations.....	10
6.4	Principle No. 6.4 - Type and Provision of Clearance Posts.....	12
	6.4.1 Introduction.....	12
	6.4.2 Type of Clearance Posts.....	12
	6.4.3 Provision of Clearance Posts	12
6.5	Signal Ahead and SPAD Alert Signs Principal 6.5	12
	6.5.1 Introduction.....	12
	6.5.2 Type of Signal Ahead Signs.....	12
	6.5.3 Provision of Signal Ahead Signs	13
	6.5.4 Placement of Signal Ahead Signage	13
	6.5.5 Provision of Signal Alert Signs	13
	6.5.6 Removal of Signal Alert Signs.....	14
	6.5.7 Location.....	14

6 Signs

6.1 Types and Provision of Signs: Principle 6.1

6.1.1 Introduction

This Principle addresses the type of and provision of commonly used Notice Signs at strategic locations for safeworking and advisory purposes.

6.1.2 Types of Signs

Notice Signs may be categorised into two types.

6.1.2.1 Category 1 Safeworking

Those which provide mandatory instructions to the driver of a train in lieu of fixed or hand signals to effectively limit or control the movement of a train or locomotive for safeworking purposes.

6.1.2.2 Category 2 Supplementary

Those which provide information to the driver of a train in an advisory or reminder capacity only. These may be located beneath a safeworking signs. Refer to figure 1.

6.1.3 Provision of Signs

Signs in Category 1 will normally be provided as shown on the signalling arrangements plan and in accordance with the rules and regulations and having regard to the traffic and operational needs at a particular location.

Signs in Category 2 will normally be provided as and when needed or if special or unusual circumstances apply. They may additionally stipulate particular procedures which must be carried out.

Care shall be exercised to ensure that signs are only provided where necessary and that they conform to the laid down standards.

Any special signs requirements shall be specially approved.

6.2 Safeworking Signs: Principle 6.2

6.2.1 Introduction

This Principle addresses the requirements for the provision of various types of mandatory signs for safeworking purposes and in accordance with NWT 318. These are grouped on the basis of their functional application.

6.2.2 Style of Safeworking Signs

These shall be rectangular and show white lettering and numbering against a red background. safeworking signs shall be readable at night.

6.2.3 Provision of Stop Signs

6.2.3.1 Stop - Unqualified

It is necessary to limit the distance over which a slow speed signalled movement can be made without the need to provide further fixed signals then an unqualified STOP sign shall be provided. Refer to figure 1.

6.2.3.2 Stop - Press Button for Level Crossing Lights

If a train movement is to take place at a level crossing on a line for which no level crossing approach initiation controls are provided then a qualified STOP sign shall be provided specifying the method for initiating the level crossing protection. Refer to figure 2.

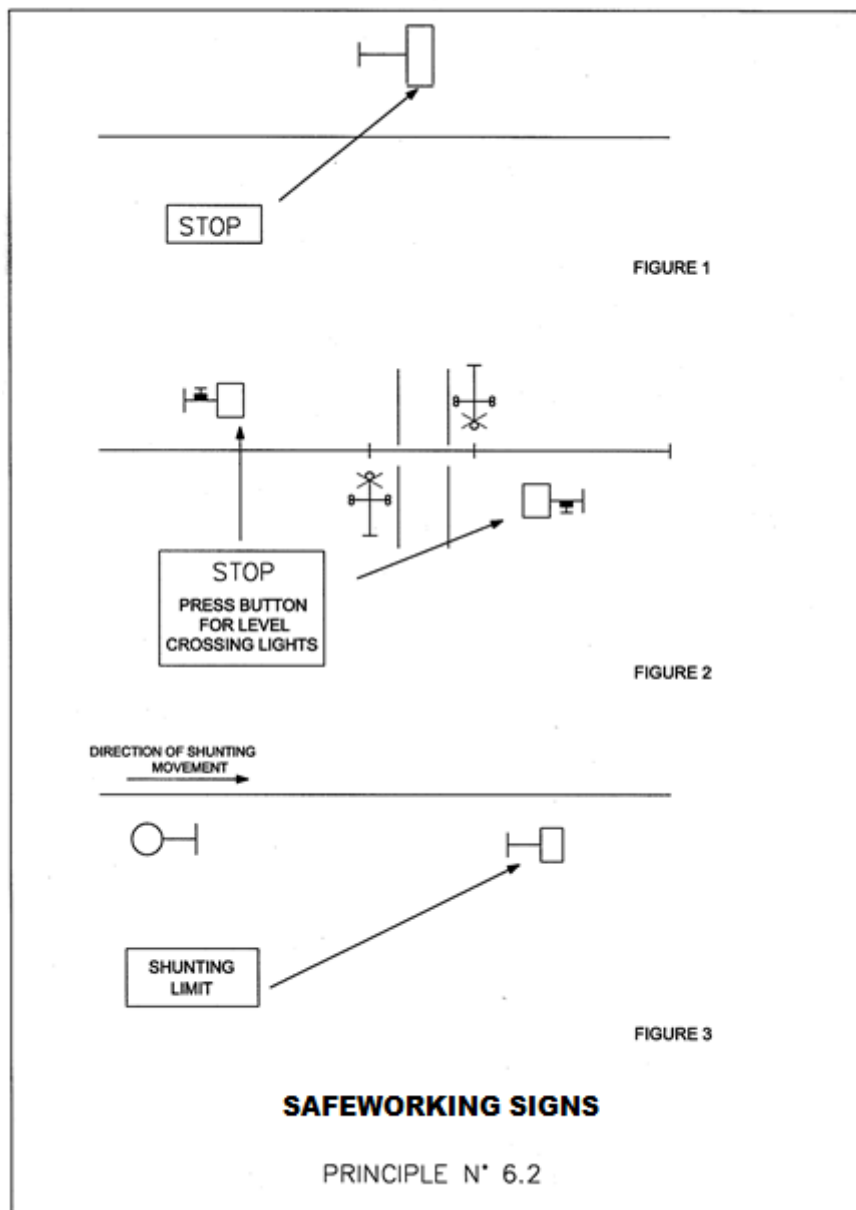
6.2.4 Provision of Shunting Signs

6.2.4.1 Shunting Limit - Unqualified

If wrong direction shunting movements are authorised on a line but are not limited by a fixed signal and there is no doubt as to which line a shunting sign would apply at the point where shunting movements must cease, then an unqualified SHUNTING LIMIT sign shall be provided. Refer to figure 3.

6.2.4.2 Shunting Limit - Qualified

If wrong direction shunting movements are authorised on a line but are not limited by a fixed signal and there may be doubt as to which line a shunting sign would apply at the point where shunting movements must cease, then a qualified SHUNTING LIMIT sign shall be provided specifying the line to which it applies. Refer to figure 4.



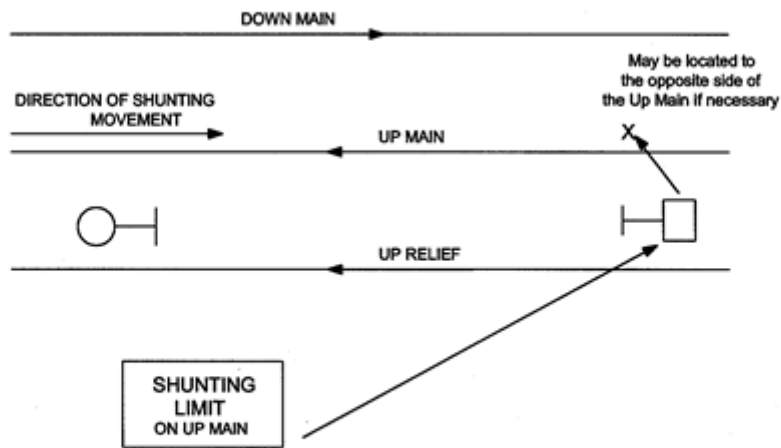


FIGURE 4

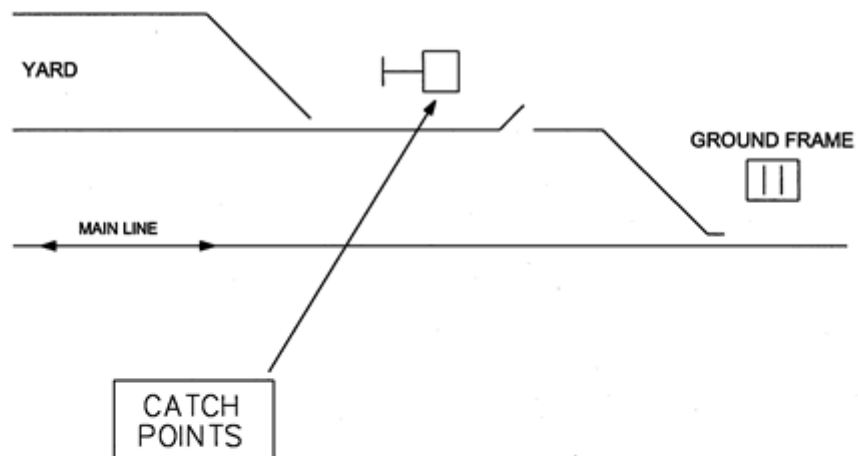


FIGURE 5

SAFeworking SIGNS

PRINCIPLE N° 6.2

6.2.5 Provision of Signs at Points

6.2.5.1 Catch Points

A CATCH POINTS sign shall be provided to protect a set of catch points which is not protected by a fixed signal, where regular train movements are made towards the catch points.

The form of the notice board shall be as shown in Figure 5A. The board shall be white on red background, and the board shall be located immediately in front of the catchpoints.

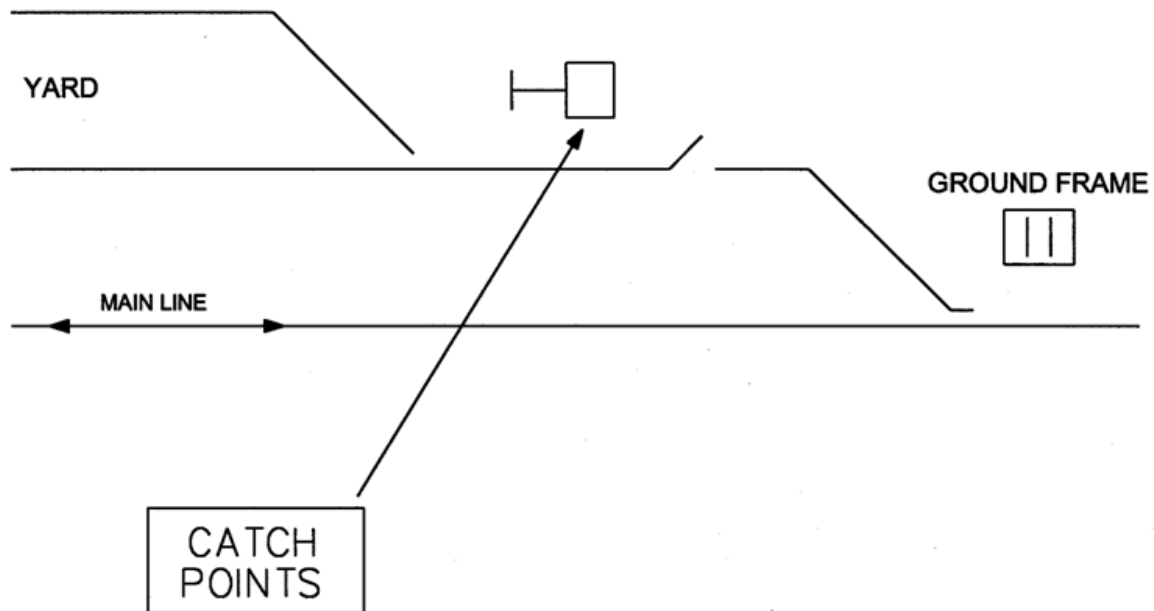


Figure: 5A Catch Points Sign

A CATCH POINTS AHEAD Sign shall be provided in the following circumstances:

- Where a signal protecting a set of catch points has been involved in multiple SPAD incidents, and where no SPAD risk mitigation measures have been installed
- Where a signal protects a set of catch points which have been identified as presenting a high risk to a derailing train.

The form of the sign shall be as shown in Figure 5B and shall be white on black background. The notice board shall be located 25 to 50 metres on the approach side of the signal protecting the catch points.

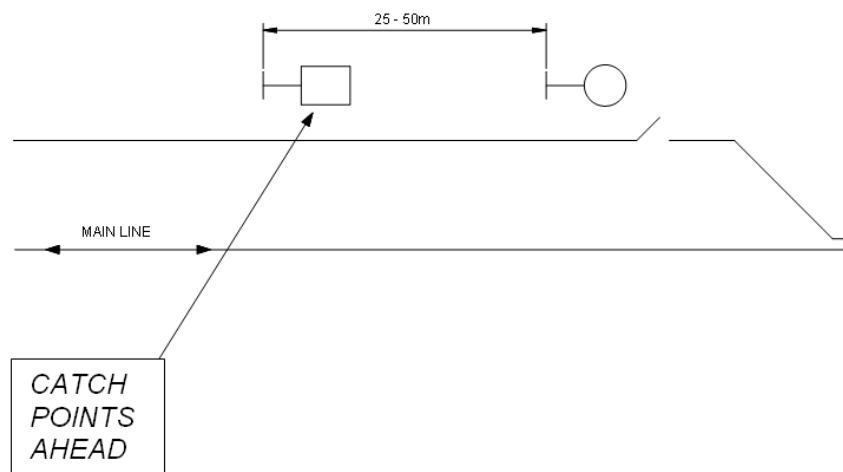


Figure: 5B – Catch Points Sign

6.2.6 Provision of Derail Signs

If a derailer is provided which is not protected by a fixed signal and regular movements are made towards the derailer, then it shall be protected with a DERAIL sign. Refer to figure 6.

6.2.7 Provision of End Signalled Authority Boards

Instead of a STOP sign at the end of a signalled area, an “END SIGNALLED AUTHORITY” sign may be installed at the end of a shunt signal route exiting an interlocked area into a non-interlocked area where it will not be necessary for the train to come to stand at the board if the driver can be otherwise authorised to proceed, it being safe to do so. The END SIGNALLED AUTHORITY sign is inscribed “End Signalled Authority – do not proceed unless authorised”. Refer to figure 7.

6.2.8 Provision of Signs at or on Signal

Where accept or outer signals protect a wrong direction shunting movement or other risk, then a “THIS SIGNAL MUST NOT BE PASSED AT STOP WITHOUT THE AUTHORITY OF THE SIGNALLER” sign shall be provided on the signal post.

6.2.9 Provision of Non-Interlocked Area Signs, Train Order Working

NON-INTERLOCKED AREA Signs are located at locations where the points are operated by non-interlocked points for example when Thornley levers are used to operate the points within a yard or the points lever is not released by an operator’s key.

Generally, the boards are to be positioned on the departure side of the “END TRAIN ORDER WORKING and STOP boards”. Refer to figure 8.

The board will have “NON INTRELOCKED AREA” printed in black on a white retroflective background see figure 9



Figure 9

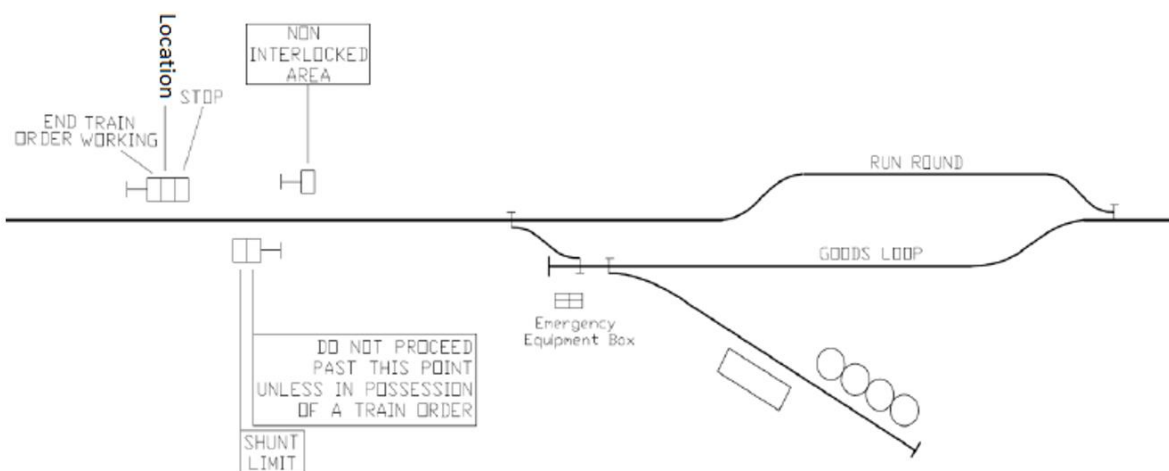


Figure 8

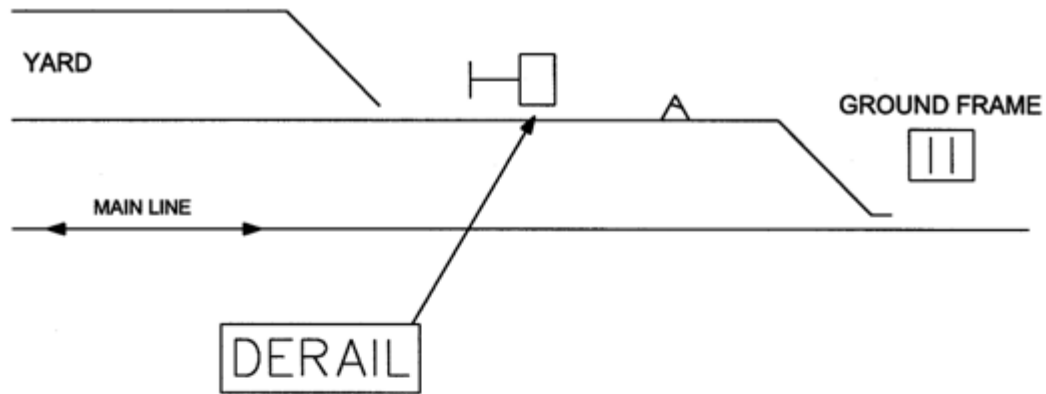
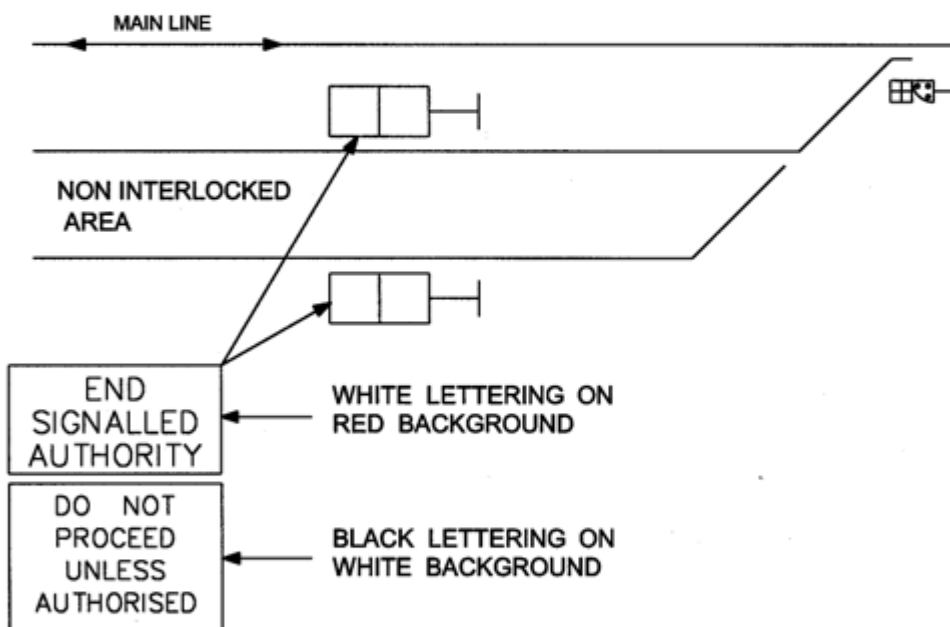


FIGURE 6



N.B. SIGNALLED MOVEMENTS INTO THE NON_INTERLOCKED AREA ARE SUBJECT TO YARDMASTER OR SHUNTER AUTHORISATION.

FIGURE 7

SAFeworking SIGNS
 PRINCIPLE N° 6.2

6.3 Supplementary Signs: Principle 6.3

6.3.1 Introduction

This Principle addresses the requirements for the provision of various types of supplementary signs for advisory purposes. These are grouped on the basis of their functional application.

6.3.2 Style of Supplementary Signs

These shall be rectangular and show white lettering and numbering against a black background except where indicated otherwise.

It shall be possible to read the notice board at night.

6.3.3 Provision of Tonnage Signal Sign

At certain locations where trains over a particular weight may have difficulty in restarting if brought to a stand at a signal ahead a TONNAGE SIGNAL sign shall be provided on a signal in rear advising the driver to wait for a full clear indication before proceeding. Refer to figure 1.

6.3.4 Provision of Starting Signal Sign

Starting signal sign shall give authority to pass a starting signal at stop on instruction from the signaller.

6.3.5 Provision of Slip Signs

In areas that are prone to land slippage a SLIP SITE sign shall be provided on the controlled running signals leading into the area. Refer to figure 2

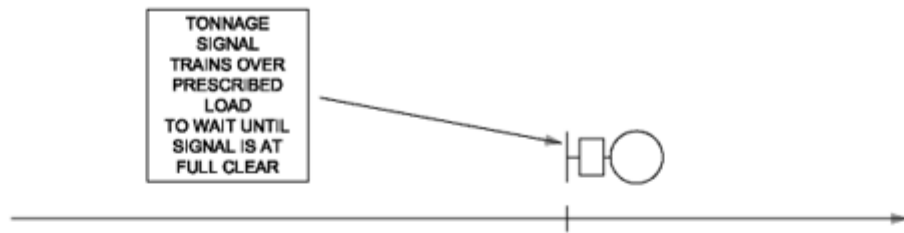
6.3.6 Provision of Single Light Indication signs

If the type of signalling on a running line changes to or from single light, then signs advising drivers of the change shall be provided at the first single light signal reading into the single light indication territory and at the last single light signal reading out of it.

Refer to figure 3.

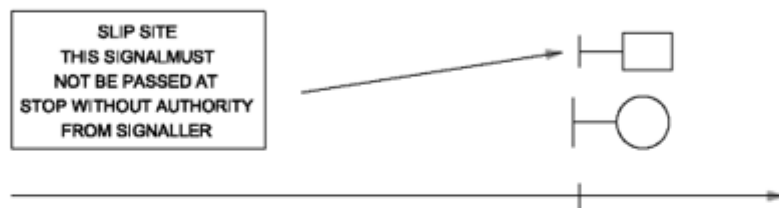
6.3.7 Special Situations

In these circumstances the arrangement of and wording to be shown on the sign shall be specially approved.



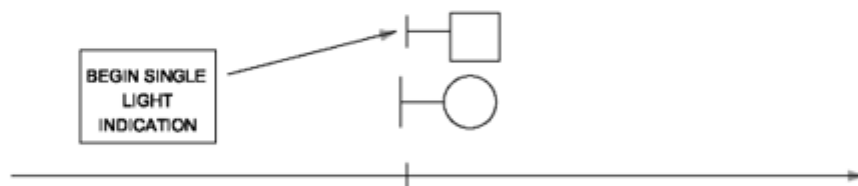
TONNAGE
SIGNAL
TRAINS OVER
PRESCRIBED
LOAD
TO WAIT UNTIL
SIGNAL IS AT
FULL CLEAR

FIGURE 1

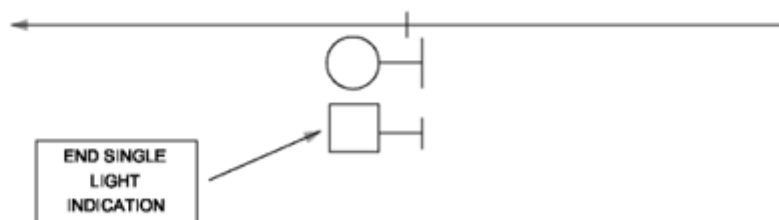


SLIP SITE
THIS SIGNAL MUST
NOT BE PASSED AT
STOP WITHOUT AUTHORITY
FROM SIGNALLER

FIGURE 2



BEGIN SINGLE
LIGHT
INDICATION



END SINGLE
LIGHT
INDICATION

FIGURE 3

SAFEWORKING SIGNS

PRINCIPLE N° 6.3

6.4 Principle No. 6.4 - Type and Provision of Clearance Posts

6.4.1 Introduction

This Principle addresses the type of and provision of clearance posts at locations where trains must be brought to a stand clear of other movements.

6.4.2 Type of Clearance Posts

Clearance posts shall be white and stand 200mm above top of rail level. They shall be illuminated during darkness by a white light as necessary. Alternatively, in certain locations, white reflectorised vertical clearance boards 600mm high are provided.

6.4.3 Provision of Clearance Posts

Clearance posts shall be provided at crossing loops and at converging junctions in the absence of fixed signals to indicate to a driver the point at which a train may be safely brought to rest clear of any other movement at the convergence of the tracks.

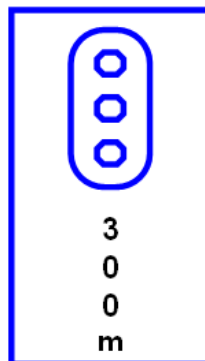
6.5 Signal Ahead and SPAD Alert Signs Principal 6.5

6.5.1 Introduction

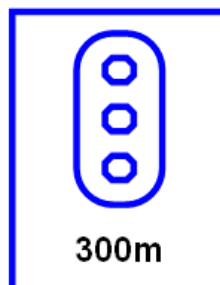
This Principle addresses the type of and provision of signal ahead signs and signal alert boards provided to inform drivers they are approaching a signal.

6.5.2 Type of Signal Ahead Signs

The Signal Ahead Sign come in two styles:



Vertical style (sign is Blue on Silver/White background)



Horizontal style (sign is Blue on Silver/White background)

6.5.3 Provision of Signal Ahead Signs

Signal Ahead signage shall only be provided in tunnels where drivers may have difficulty in establishing their position due to all the surroundings being similar throughout the tunnel.

Signal Ahead signage shall not be provided generally but may be installed where the following criteria apply:

- a) Where signals are spaced a further distance apart than the general spacing of other signals on the line, or
 - i. Where the signal spacing exceeds 600m, and
 - ii. Signal sighting is less than 300m.
- b) The sign shall be installed on a suitable post, or bracket at approximately drivers eye level (about 2.5m above rail level) on the left side of the track to approaching trains, except where the signals are located on the right hand side, in which case the sign location should be consistent with the signal locations (such as for wrong direction running on bi-directional lines).
- c) A minimum of 50m sighting shall be provided for Signal Ahead signage.
- d) The sign shall be located 300m before the signal

6.5.4 Placement of Signal Ahead Signage

Where necessary, they can be located on both sides of the track if necessary to improve sighting (providing they cannot be misread from an adjacent road).

The sign is to be installed as a control for difficult sighting situations an example may be the curvature of the line that makes sighting difficult. It would be preferable to install an additional sign, then attempt to improve sighting.

6.5.5 Provision of Signal Alert Signs

Signal Alert Signs are provided at locations where multiple SPADS have occurred, and a request is received for a Signal Alert Sign.

The sign form shall be blue on silver/white background and include the words ALERT at the top of the sign and signal number above the facsimile of a signal and the distance to the signal in meters below the facsimile.

- a) The sign shall be installed on a suitable post, or bracket at approximately drivers eye level (about 2.5m above rail level) on the left side of the track to approaching trains, except where the signals are located on the right hand side, in which case the sign location should be consistent with the signal locations (such as for wrong direction running on bi-directional lines).
- b) A minimum of 50m sighting shall be provided for Signal Ahead signage.

The sign shall be located at a distance on the approach to the SPAD signal to allow train operators to manage the train and be able to stop before the signal.



An intermediate Signal Alert board may be placed between the approach board and the signal if the distance between the approach Signal Alert board and the signal is significant and will require recommendation of the Signal Sighting Committee



6.5.6 Removal of Signal Alert Signs

When there is a proposed configuration change of the asset (e.g. Incandescent to LED, resignalling etc) or an operational change of the asset (e.g. new timetable working etc) or a request to remove the Signal Alert Sign, then a Signal Sighting Committee shall be formed to review the sighting of the signal and also identify any risks associated with the removal of the Signal Alert Board as follows:

- a) Review the location of the SPADed signal/ SPAD Alert Sign – is the board effectively acting as a repeater signal for the SPADed signal? If so, then it is possible that by removing the board you are also removing a critical driver prompt for the approaching signal. Consideration may be given to keeping the SPAD Alert board.
- b) Review whether other mitigations have been implemented at the signal (e.g. upgrade to LED lamps) – Have any other mitigations been implemented? If so, can these mitigations be relied on to remove the need for the Signal Alert Board.
- c) Review the date of the last SPAD – was it between 6 – 12 months ago? If it was over 12 months ago it is probable that it is ok to remove the SPAD Alert Board.
- d) What is the risk of a SPAD at the location? Is there a high risk immediately past the signal (e.g. catchpoints without a speed check approach), does the signal immediately protect a level crossing (high risk) etc.? More consideration should be given to removing SPAD Alert Boards for high risk signals. To quantify the impact of its removal and allow drivers to adjust, a signal alert board shall be bagged and remain in place for a transition period of 3 months prior to its physical removal.

6.5.7 Location

Signal Alert and Signal Ahead signage locations are subject to agreement through a Signal Sighting Committee.