



## Railway Infrastructure - Signage



Infrastructure Standard



This Australian Standard® AS 7632 Railway Infrastructure - Signage was prepared by a RISSB Development Group consisting of representatives from the following organisations:

Brookfield Rail  
ARTC  
Queensland Rail

Rio Tinto  
Transport for NSW  
Pacific National

CMT Solutions  
BHP Billiton

The Standard was approved by the Development Group and the Infrastructure Standing Committee in November, 2015. On November 23, 2015 the RISSB Board approved the Standard for release.

This standard was issued for public consultation and was independently validated before being approved.

Development of the standard was undertaken in accordance with RISSB's accredited process. As part of the approval process, the Standing Committee verified that proper process was followed in developing the standard.

RISSB wishes to acknowledge the positive contribution of subject matter experts in the development of this standard. Their efforts ranged from membership of the Development Group through to individuals providing comment on a draft of the standard during the open review.

I commend this standard to the Australasian Rail Industry as it represents industry good practice and has been developed through a rigorous process.



**Paul Daly**  
Chief Executive Officer  
Rail Industry Safety and Standards Board

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# AS 7632:2015

**Railway Infrastructure - Signage**

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## Document Control

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## **1 Introduction**

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### **1.1 Purpose**

This document describes requirements for the whole of life management of railway operational signage.

This documentation may be used to promote a consistent approach to be incorporated into the design, construction, inspection, monitoring, maintenance and decommissioning of railway signage across the Australian rail industry.

### **1.2 Scope**

This Standard covers rail networks as classified in AS 7630 Railway Infrastructure - Track Classification.

This Standard is not specifically intended to cover urban on-street tramway or light rail networks, cane railways, or heritage railways operating on private reservation, but items from this Standard may be applied to such systems as deemed appropriate by the relevant Rail Infrastructure Manager.

This Standard applies to permanent and temporary infrastructure signs that provide information and directions for network users. These include:

- (a) Instruction signs for items such as:
  - i. Permanent speed restrictions
  - ii. Temporary speed restrictions
  - iii. Track possessions for engineering or other works.
- (b) Warning and caution signs for items such as:
  - i. Limit of shunt
  - ii. Limited clearance.
- (c) Information signs for items such as:
  - i. Change of operations system or operational parameters
  - ii. Structure, equipment and location identification signs including station identification and kilometre posts.

This document does not address the requirements for signs:

- (a) on trains
- (b) in public areas outside the operational safety zone, except for those dealing with operational safety
- (c) pertaining to the operation of a station, or customer wayfinding.

This Standard is intended to be used in conjunction with AS 7631 Railway Infrastructure - Sighting.

### **1.3 Compliance**

There are two types of control contained within RISSB Standards:

- (a) mandatory requirements; and
- (b) recommended requirements.

Each of these types of control address hazards that are deemed to require controls on the basis of existing Australian and international Codes of Practice and Standards.

A **mandatory** requirement is a requirement that the standard provides as the only way of treating the hazard.

Mandatory requirements are identified within the text by the term shall.

A **recommended** requirement is one where the standard recognises that there are limitations to the universal application of the requirement and that there may be circumstances where the control cannot be applied or that other controls may be appropriate or satisfactory, subject to agreement with the Rolling Stock Operator, Rail Infrastructure Manager and/or Rail Safety Regulator.

Recommended clauses are mandatory unless the RIM or RSO can demonstrate a better method of controlling the risk.

Recommended requirements are to be considered when compliance with the standards is being assessed.

Recommended requirements are identified within the text by the term **should**.

Hazards addressed by this standard are included in an appendix. Refer to the RISSB website for the latest Hazard Register Guideline: [www.rissb.com.au](http://www.rissb.com.au).

Design, construction and installation of all railway signage shall only be undertaken by persons who have been appropriately authorised by the Rail Infrastructure Manager.

Where conflict arises between a referenced standard and particular clauses of this Standard, this Standard prevails.

Where compliance with the requirements of this Standard is not considered to be reasonably practicable, the Rail Infrastructure Manager shall minimise identified non-compliance risks so far as is reasonably practicable.

#### **1.4 Referenced documents**

The following documents are referred to in this Standard:

- (a) AS 1319 Safety Signs for the occupational environment
- (b) AS/NZS 1906.1/Amdt 1 Retro reflective materials and devices for road traffic control purposes - Retro reflective sheeting
- (c) AS 1744 1975 Standard alphabets for road signs
- (d) AS 7631 Railway Infrastructure Sighting
- (e) AS 1428.1 Design for Access and Mobility
- (f) HB - 59 Ergonomics - The Human Factor. A practical approach to work systems design.
- (g) AS 7531 Lighting and Rolling Stock Visibility
- (h) AS 7630 Railway Infrastructure - Track Classification
- (i) AS IEC 62508: 2011 Guidance on human aspects of dependability

It is suggested that all users satisfy themselves that they are using the most recent version of each standard.



## 1.5 Definitions

**Backplate:** The plate material on which a sign is mounted.

**Human Factors (HF) Guidelines:** ISO and other documents giving relevant advice on how to optimise the interaction between humans and other elements of the system for human well-being and system performance.

**Kinematic Envelope:** A two dimensional cross-section of the shape of a rail vehicle that consists of the static outline plus the maximum permitted allowance for vertical and lateral movements. It also includes any cant and curve affect associated with curved track and dynamic movements in response to track irregularity.

**Limited clearance:** a section where the required distance between the running track and the nearest structure or constraint is less than that would be specified as a minimum safety zone.

**Perception-reaction:** The process taken from the instant a person is cognisant of a stimulus to the instant the required action to safely mitigate any hazards or risks outlined by the stimulus are applied. Perception-reaction is broken down into four components:

- (a) **perception:** (vigilance and detection) the time to detect or discern an object or event
- (b) **recognition:** (recognition, association and reading time) the time to understand the implication of the stimulus presence or event - recognition is sometimes referred to by the alternative term intellection
- (c) **interpretation:** (interpretation and analysis) the time to decide how to react
- (d) **response selection:** the time to initiate any required action – volition.

**Perception-reaction time:** The time taken for a person to undergo the perception-reaction process.

**Reaction time:** The time elapsing between the beginning of the application of a stimulus and the beginning of a person's reaction to it.

**Primary user:** The person or group who would most frequently need to sight the information shown on a sign.

**Readability:** The ease with which the information shown on a sign can be read and understood.

**Sighting:** The ability of a *primary user* to see a sign.

**Sighting Distance:** Sighting distance available from a point is the actual distance over which a person/s from a specified height or position at a particular speed has *visibility* of stationary or moving objects in order to safely perceive/react as necessary to those objects.

**Typeface:** a design for a set of characters, including letters, numbers and marks of punctuation.

**Visibility:** the state of being able to see or to be seen and the distance required to be in this state as determined by light and weather conditions.

### 1.5.1 Abbreviations

**AS:** Australian Standards

**RIM:** Rail Infrastructure Manager

**RSO:** Rolling Stock Operator

**WHS:** Workplace Health and Safety

## 2 Design and Rating

### 2.1 General

Signs are a supplement to, and not a substitute for, the required measures for eliminating or reducing hazards on the railway.

Signs may be temporary or permanent.

This Standard differentiates between the following types of messages conveyed by railway infrastructure signage:

- (a) Danger warnings: these signs are intended to warn users of danger and to inform them of its nature
- (b) Caution warnings: these signs are intended to warn users of potential hazards and alert them to action or provide regulatory information to mitigate any potential dangers
- (c) Regulatory: these signs are intended to inform users of any obligations, restrictions or prohibitions with which they comply
- (d) Informative: these signs are intended to provide users with information.

The assessment of the appropriateness of signs to be used shall carefully consider whether any symbol or symbolic sign used accurately conveys the message, which needs to be conveyed.

Where a sign is required for a purpose that is within the scope of this document but is not included in the appendices, the new design shall satisfy the requirements of this Standard and the *sighting* requirements of AS 7631.

Refer to Appendix A for general flow chart to assist in the assessment and selection of the appropriate sign.

Whenever suitable opportunities arise, for example resignalling or an alteration to an infrastructure layout, if appropriate the replacement or amendment of obsolete signs should be considered.

Sign design should not be changed unless there is evidence to suggest that such changes will improve detection and/or *recognition*.

During the design stage redundant signs should be identified for removal and appropriate preparations for their removal included in the design planning and safety in design process.

In the consideration of design of signs there are two aspects that need to be considered. These are:

- (a) the composition of the elements of the sign to deliver the message (e.g. red octagon with white border and white word "stop" in the centre)
- (b) the specific dimensions of the sign.

The layout should be fixed for delivering the message but the dimensions may change depending on the specific location or usage.

Where there is requirement to change the dimensions, design considerations shall take into account any changes in *readability*, *visibility* or understanding of the layout caused by the changes in dimensions.

## 2.2 Design Considerations

The design of railway signage shall take into account:

- (a) shape, size and thickness of signs
- (b) colours
- (c) use of borders and *backplates*
- (d) lettering and symbols
- (e) *readability*
- (f) reflectivity
- (g) need for unobtrusive positioning of bolt holes and fixings
- (h) earthquake, storm and other relevant environmental factors
- (i) strong winds and cyclones
- (j) whole of life considerations in the selection of materials
- (k) weight and overall dimensions of the sign
- (l) handling, transportation, storage and packaging
- (m) position of signs in relation to optimum *sighting* requirements for the *primary user*
- (n) passage of rail traffic including out of gauge loads
- (o) needs of the *primary user* and other users
- (p) footings and foundations
- (q) the impact of learned *recognition*.

Prior to the design of a new sign the *primary users* shall be identified.

On identification of the *primary users*, their location when viewing the sign and required *perception-reaction time* shall be determined.

Reference shall be made to AS 7631 and factors affecting the *perception-reaction times* when identifying the position of optimum viewing arrangement. If the *primary users* are moving when viewing the sign, the minimum exposure time for sighting the sign shall be considered.

Wherever practical, all signs should be designed to provide the maximum resistance to graffiti.

### 2.2.1 Shape, size and thickness of signs

Signs shall be of suitable size and construction to meet their requirements, taking into account the need for consistency and the avoidance of confusion. For example, a sign intended for rail traffic personnel shall be as large as practical to allow clear *sighting* and *interpretation* by rail traffic crews travelling at normal speed.

Where signs are to be observed at a distance, they shall be of a suitable size and layout for the information to be imparted at that distance.

Where a sign is also required to be read close to and at a distance the design shall allow for legibility in both situations.

### 2.2.1.1 Size

Sign size should take into account the expected distance and place from which the sign will be viewed.

The size of the sign shall be dependent upon the size of lettering required and the length of the message taking into account:

- (a) position of text and/or symbols, which shall be ordered logically and balanced over the face of the sign
- (b) the spacing between lines and text, which shall be such that the sign is legible from a distance
- (c) the spacing between lines for mixed text, which shall ensure that the vertical strokes down below the line shall not interfere with the upward strokes of the text below
- (d) sufficient use of background such that the sign message shall always be clearly distinguishable.

In certain circumstances, for example where there is *limited clearance* from or between tracks, around the exit or entrance to tunnels or in cuttings, the locations for installing signs of a certain size may be constrained by limited space and structural limitations of the sign support structure. In these cases the dimension and shape of the sign may be reduced to suit the constraints.

Where the size of a sign is varied from the standard dimensions the size of the text shall also be varied to ensure it remains in proportion with the size of the sign.

In such circumstances, any reduction in size or change in shape shall be approved by the Rail Infrastructure Manager and an appropriate risk assessment undertaken.

### 2.2.1.2 Thickness

Sign panels with dimensions less than 1,800 mm by 1,200 mm should wherever practical be constructed from a single sheet of material. Where a sign panel is made up from more than one sheet it should be constructed from the minimum number of pieces.

The thickness of a sign is dependent upon the required size, location and material the sign is constructed from.

Design thickness of the sign shall not compromise the required functionality and structural integrity of the sign.

Unless otherwise approved by the Rail Infrastructure Manager, signs constructed out of aluminium plate, stainless steel or non-conductive material, should be at least 1.6mm thick.

## 2.2.2 Colours of signs

When signs are distinguished by unique colour code and/or shape they become useful tools to help protect the health and safety of personnel in the workforce by:

- (a) warning personnel of potential hazards
- (b) providing a deterrent for unauthorised personnel to gain access or perform unauthorised activities in the area
- (c) meeting any legal obligation arising from duty of care to the public and staff
- (d) meeting the requirements of Australian standards.

The use of specific colours such as red, yellow and green can convey specific safety messages at a glance.

Colour and the way it is used for specific applications shall be taken into account.

When proposing new colours and signs the use of common conventions shall be taken into account for consistency and familiarity.

Refer to AS 1319 for common convention on colours and shapes for a range of Occupational Safety Sign functions.

Unless otherwise approved by the Rail Infrastructure Manager, the following colour principles shall be observed in railway signage.

#### **2.2.2.1 Safety danger**

Red shall indicate STOP and also indicates danger.

Colour R13 Signal Red should be specified;

- (a) Code sRGB 183;61;55
- (b) Hex: #B73D37.

Refer to Appendix B for common examples of existing railway safety danger signs authenticating these principles.

#### **2.2.2.2 Cautionary advisory or cautionary information**

Unless otherwise approved by the Rail Infrastructure Manager, signs providing cautionary information or advice shall have:

- (a) a yellow retroreflective background
- (b) black text or symbol

Colour Y15 Sunflower should be specified.

Refer to Appendix C for common examples of existing railway cautionary information signs authenticating these principles.

#### **2.2.2.3 General advisory: (non-regulatory restriction)**

Unless otherwise approved by the Rail Infrastructure Manager, signs providing general advisory information shall have:

- (a) a white background
- (b) black text or symbol.

Refer to Appendix D for common examples of existing railway general advisory and information signs authenticating these principles.

#### **2.2.2.4 Operational advisory**

Unless otherwise approved by the Rail Infrastructure Manager, signs providing operational advisory information shall have:

- (a) a blue background, colour B23 Bright Blue should be specified
- (b) white text or symbol.

Refer to Appendix E for common examples of existing railway general advisory and information signs authenticating these principles.



### 2.2.2.5 Rear colour

The rear of signs, when visible, shall be black or left unfinished in such a manner that they do not cause confusion to railway staff or the public.

Rear of signs shall not detract from the intent of other signs in the vicinity.

Wherever possible, and where it does not compromise the intent of the sign or other signs, the rear of signs should be consistently coloured.

### 2.2.3 Use of borders, backgrounds and backplates

The definition of borders, backgrounds and *backplates* within this Standard is as detailed in Figure 1 and Figure 2.

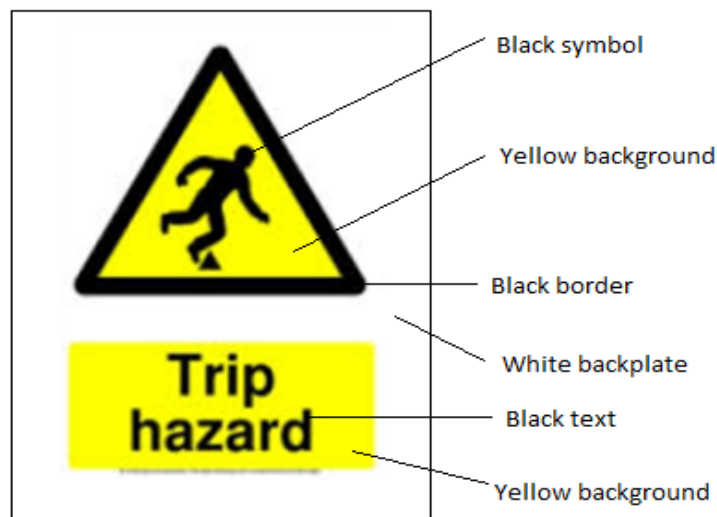


Figure 1

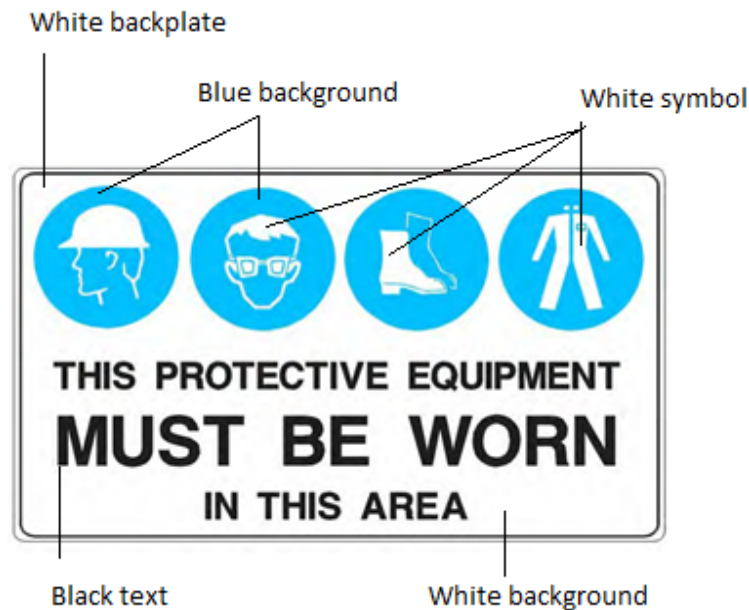


Figure 2

### 2.2.3.1 Borders

Sign *visibility* is enhanced when there is a predominant colour contrast with background colour of immediate surroundings. Use of borders and *backplates* can assist with this contrast.

The inclusion of a border, and the size of that border, shall be based on specific requirements, for example, to assist with distinguishing from the immediate surroundings.

Border colours used on signs shall be appropriate for the situational application.<sup>1</sup>

### 2.2.3.2 Backgrounds

The effect of the background colour of the sign on *visibility* and *readability* of the message, especially when designing new signs should be taken into account.

The background colour should extend sufficiently so as to avoid any merging of colour of the text/symbol onto the *backplate* or border, which may compromise the clarity of the symbol.

### 2.2.3.3 Backplates

*Backplates* may be added to a sign in order to improve the *visibility* of the illuminated face or text/symbol by introducing a controlled-contrast background. The improved *visibility* can then be made more conspicuous by framing the *backplate* with a retro reflective border.

*Backplates* should be consistently coloured and visually distinct and in contrast from the immediate surrounds and infrastructure.

The *backplate* size should allow extension of *backplate* colour beyond the symbol/text sufficiently to allow the text/symbol and background colour to be clearly distinguishable and to allow enough *backplate* colour for the sign to be readily recognised at a distance.

All *backplate* colour and use of retro-reflective material for all signs shall comply with AS 1906.

<sup>1</sup> For example, previous experience suggests that the use of red borders should be avoided in areas such as the Pilbara where a combination of red soil and fading due to extreme sunlight causes a reduction in tonal contrast between the border of the sign and the surrounding environment.

#### 2.2.4 Lettering and symbols

The recommendations provided in AS 1744 should be used for the design of textual and digital instructions.

Font and symbol size shall be determined on *perception* factors requirements and recommendations outlined in AS 7631 and the *sighting distance* requirements of the *primary user*.

*Typeface* types should be selected for their ease of *readability* and *visibility* to the *primary user* group, and suitability for the sign purpose.

- (a) Recommended *typeface* for railway signage is AS 1744 Modified Series E.
- (b) Any *typeface* used shall be approved by the Rail Infrastructure Manager prior to use.

Font colour and form should be chosen to maximise contrast and legibility.

The legibility of the sign can be further enhanced by the use of sentence case text.<sup>2</sup>

The layout of text within new sign design may be based upon a grid system.<sup>3</sup>

Text and symbols should be kept away from the edge of the sign to allow differentiation of text/symbol from the border and/or *backplate* colour and immediate surrounds.

#### 2.2.5 Readability

The design of all new signs shall take into account current *human factors* research in terms of maximising *readability* and *visibility*.

Signs shall be designed and positioned to achieve required legibility and *readability*.

Reference shall be made to AS 7631 Railway Infrastructure Sighting in relation to factors to take into account to optimise *perception-reaction* requirements for the *primary user* group.

For signs in public areas reference shall be made to AS 1428.1 Design for Access and Mobility for considerations in relation to *readability*.

#### 2.2.6 Reflectivity

To meet the *readability* requirements, the front of signs shall be retro-reflective or illuminated during the hours of darkness.

Retro-reflective material shall conform to the requirements of AS 1906.

The *readability* shall be judged in accordance with the luminance requirements of rail vehicle headlights under clear night-time conditions.

Where retro-reflective symbol/text is used it should be equal to, or less than, the background brightness to minimise the symbol/text merging with the background.

The standard luminance requirements for train headlights is given in AS 7531, Lighting and Rolling Stock *Visibility*.

<sup>2</sup> Sentence case uses an upper case letter at the beginning of the first word and any proper nouns. All other letters are lower case.

<sup>3</sup> As signs vary in size depending on application, the grid system allows flexibility for elements to be positioned, and the radius of corners to be chosen, in proportion to the size of any individual sign.

Retro-reflective signs intended for the drivers of approaching rail traffic shall be angled such that glare and spectral effects do not arise when the driver is within the reading distance.<sup>45</sup>

### 2.2.7 Environment

When determining *visibility*, any specific environmental conditions such as dust or pollution in the area of the sign, shall be considered in specifying the design and positioning.

When considering wind and cyclone risks, an appropriate probability in exceedance of the design wind speed should be used to produce results that are acceptable to both design life and railway safety.

### 2.2.8 Whole of life considerations

Design considerations shall consider environmental conditions and likelihood of degradation of a sign when in service.

### 2.2.9 Handling, transportation, storage and packing

Consideration of transportation and manual handling issues is particularly important for signs to be erected in locations where vehicular access to the signage location may not be feasible.

### 2.2.10 Footings and foundations

Depth and size of footings shall be designed for the appropriate soil category and taking into account the height, dimensions and position of the sign.

A combination of simple field identification and laboratory test parameters should be undertaken for defining soil category.

Sign supports should be set into concrete footings.

### 2.2.11 Learned recognition

Learned behaviour of the *primary user*, both from their occupational environment and through cultural application of standards such as AS 1319, shall be considered in the design of new railway infrastructure signs.

New signs should not conflict with earlier design precedent which may result in their meaning being confused.<sup>6</sup>

If conflict does arise a risk assessment should be undertaken to determine the most appropriate way forward.

## 3 Fabrication

### 3.1 General

All railway signage shall be fabricated by appropriately authorised persons and approved by the Rail Infrastructure Manager.

<sup>4</sup> In highway applications a retro-reflective sign is often placed facing away from the highway at an angle of 10 degrees from the sight line of approaching traffic. This is to ensure that the drivers of road vehicles are not dazzled as they approach then pass the sign.

<sup>5</sup> For railway applications it is important to ensure that the positioning of any retro-reflective signs does not cause any adverse impacts for the drivers of rail traffic on tracks adjacent to the one to which the sign applies.

<sup>6</sup> For example, when *recognition* of signs is highly automated, such as a road stop sign for road vehicle drivers, unlearning of these signs can take time and the association may never be removed.

The fabrication of signs shall align with safe railway requirements and specifications and provide for:

- (a) safe transport, storage and handling
- (b) safe installation given site conditions and likely or recommended method of work
- (c) resistance to unauthorised removal and sabotage
- (d) all sharp edges to be removed.

Track signage shall be fabricated such that it complies with all relevant drawings, manufacturers' material specifications and specifications of the Rail Infrastructure Manager.

Fixing arrangements shall not degrade the information displayed on the sign e.g. through rust staining, nor compromise the clarity of information shown on the sign.

### 3.2 Integrity of Formation

The fabrication and installation of signs shall consider the safety of the railway including the integrity of the formation.

## 4 Placement and Installation

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### 4.1 General

#### 4.1.1 Installation procedures

All signs shall be placed where they can be clearly seen by *primary* and secondary users.

Installation of signs shall be undertaken in compliance with the Manufacturers requirements and in accordance with railway safety requirements.

Each installation shall be assessed to determine the requirements for:

- (a) positioning, based on *sighting* and other requirements
- (b) proximity of other infrastructure and potential hazards, including electrical hazards
- (c) suitability for the environment, taking into account all reasonably foreseeable conditions
- (d) resistance to vandalism, deliberate defacement, movement and rotation
- (e) method of fixing and removal
- (f) control of vegetation to prevent the sign being obscured
- (g) required maintenance.

Positioning for optimum *sighting* arrangements shall be in line with the *sighting* requirements of AS 7631.

Signs that are not yet in service shall be suitably 'hooded', crossed or otherwise obscured until they are commissioned.

Signs shall be securely positioned to minimise damage or defacement.

Signs shall be constructed and erected so that they do not create an additional hazard.



In deciding where to position signs the following shall be considered:

- (a) proximity of other structures or elements and their potential to detract from the intent of the sign(s)
- (b) possibility of being obscured (including by persons working on or near the line)
- (c) presence of overhead power lines
- (d) presence of buried services for example:
  - i. electricity supply cables
  - ii. telecommunication services
  - iii. fuel pipelines
  - iv. water pipelines;
- (e) any risks that the sign may create if used as a climbing aid.

Before breaking ground for the erection of any signs, enquiries shall be made with the Dial Before You Dig service to ascertain what buried services may be in the locality.

Where a sign is to be installed on a bridge, any restriction for working on the structure shall be complied with.

Where a sign is to be installed in a vulnerable location such as a vehicle turning area, appropriate protection measures for the sign shall be considered.

#### 4.1.2 Visibility and position along the track

Signs shall be placed and orientated perpendicular to the normal line of sight, subject to compliance of the requirements in AS 7631.

Signs shall be positioned so that they are visible and attract the appropriate attention from the *primary user* and any secondary users as appropriate.

Signs shall be located in such a manner that the sign is not obscured by other equipment within the *sighting distance* for the *primary user*, so that the following readability requirements are addressed:

- (a) potential for the signs to be obscured by staff or by passengers on a platform
- (b) the location chosen shall not compromise or prejudice the intent of the sign.

Signs shall not be positioned where they may obscure other information or distract from other safety signs and/or signals.

When positioning signs, the impact of each sign and the manner in which it will be read, understood and acted upon by all *primary* and secondary users of the sign should be taken into account.

*Sighting distances* should, as far as is reasonably practicable, be in alignment with *perception-reaction* requirements of AS 7631.

An assessment shall be undertaken to optimise the installation of signs to be placed within required *perception-reaction time*.

Ongoing assessments should ensure that the sighting of the signs continues to meet the requirements of AS 7631 and relevant current human factors and visibility requirements and guidelines.

Where a sign is intended for the drivers of rail traffic, relevant specific *sighting* issues, such as traffic speed, effects of glare from adjacent road traffic and the like shall be taken into account.

Where a sign is not intended for the drivers of rail traffic, the sign shall be positioned such that it is not a distraction for rail traffic drivers, and considers any hazards that may arise.

Trackside signage should be located so that it cannot be damaged by the normal action of plant such as ballast regulators, side drain cleaning plant, ballast shoulder cleaners, or the normal operation of service traffic.

#### 4.1.3 Rail traffic driver ergonomics

The arrangement of signs along the trackside for the control of the movement of trains shall take into consideration any activities that a driver may be required to undertake on the approach to the signs.

The sequence of information shall be arranged so that the effect on the workload of the driver is acceptable and in line with National Rail safe working and *human factors guidelines* and practices.

#### 4.1.4 Clearances

All signs should be positioned and maintained so that:

- (a) they do not foul the kinetic envelope
- (b) minimum safety clearances for personnel are provided
- (c) minimum electrical clearances are provided
- (d) walkways are not obstructed.

#### 4.1.5 Vertical position

The vertical position of signs shall be determined:

- (a) to comply with the sighting requirements in AS 7631
- (b) to comply with clearance requirements
- (c) according to the potential effect of other signs, signals and infrastructure in the vicinity.

In calculating the vertical position to optimise *sighting* requirements, the activities and position of the *primary users* shall be taken into account.

#### 4.1.6 Lateral position

In addition to meeting minimum *sighting* requirements, the lateral positioning of all signs shall be compliant with any relevant Australian Standards and clear of the *kinetic envelope* outline for the safe passage of rail traffic. The *kinetic envelope* used shall include static and rolling stock outline plus the safety margin as approved by the Rail Infrastructure Manager.

Where appropriate, the lateral positioning of signs should cater for the safe passage of out-of-gauge loads.

#### 4.1.7 Effect of the sun

The movement of the sun and its potential impact on the *readability* and reflectivity of signs shall be taken into account when choosing the orientation and location of those signs.

When considering the positioning of retro-reflective signs the effect of the shade from the sun on the *readability* and appearance of the sign shall be assessed.

#### 4.1.8 Ambient lighting

Locations at which signs are to be installed shall be assessed to determine hazards arising from the effects of ambient lighting and other light sources, for example street or traffic lights, in the vicinity of the sign.

Ambient lighting which is not under the Rail Infrastructure Manager's control shall not be used to obtain the required *visibility* and *readability* of railway signs.

## 4.2 Temporary signs

Temporary signs, by their nature, will not form part of the normal route knowledge gained by the drivers of rail traffic, and may appear in the corridor without prior notification.

The information conveyed by temporary signs will often be of a safety critical nature.

All temporary signs shall meet the requirements of this standard.

### 4.2.1 Method of fixing temporary signs

The method of fixing of temporary signs should provide for:

- (a) safe portability and ease of use
- (b) resistance to unauthorised removal
- (c) stability, especially on ballast or other uneven surfaces and in the presence of passing trains or high wind.

The fixing of retro-reflective material shall be in alignment with requirements of AS 1906.

### 4.2.2 Power supply for illumination of temporary signs

Where temporary signs are illuminated, the power supply shall meet at least the following operational requirements:

- (a) shall not allow unauthorised operation
- (b) shall provide a means of checking the condition of the power supply for the illumination.

Any power indicators shall not emit a light in a direction which allows observation by a driver of rail traffic.

## 5 Maintenance

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### 5.1 General

All railway signs shall be:

- (a) maintained in such a manner as to enable them to continue to be fit for the intended purpose
- (b) subject to a planned general inspection, regular patrol inspection and scheduled monitoring regime
- (c) subject to a regular maintenance program that includes *visibility*, graffiti removal and replacement as soon as it becomes necessary.

No sign shall be declared redundant before the arrangements for its decommissioning are complete and approved by the Rail Infrastructure Manager.

An asset register providing information on all permanent operational signs shall be established and maintained. All monitoring and maintenance activities shall be carried out with reference to this register.

Signs should be repaired when necessary and as specified and approved by the Rail Infrastructure Manager.

Information recorded in the asset register should include:

- (a) type and identify of sign
- (b) position and the reasons for the choice of position
- (c) the need addressed by the sign
- (d) maintenance arrangements
- (e) maintenance history.

Any changes in environment or surrounds which may impact the function and purpose of the sign shall be noted and a reassessment undertaken to ensure the sign continues to be able to be used for its intended purpose.

## **5.2 Inspection and assessment**

### **5.2.1 Scheduled patrol inspections**

The interval between patrol inspections of permanent and temporary operating signs should not exceed 7 days or as otherwise specified by the Rail Infrastructure Manager in an approved maintenance program. Particular attention should be given to temporary signs.

Patrol inspections shall keep a lookout for defects and conditions (i.e. indicators of a defect) that may cause signs to not be performing the function intended including:

- (a) damaged, missing or unreadable signs
- (b) temporary signs
- (c) locations where sight distances are deficient, or the view by the train crew of the sign may be obscured
- (d) fallen trees or new vegetation growth.

The speed at which the inspection is carried out should be consistent with the local conditions and the full scope of the inspection being carried out (e.g. the type and number of other infrastructure elements being inspected).

### **5.2.2 General inspections**

General inspections shall be undertaken by visual means for all permanent and temporary operating signs to ensure they are:

- (a) to standard
- (b) visible and conspicuous
- (c) performing the function intended.

The inspection shall include the tasks of the patrol inspection in addition to the identification of defects and conditions and note any new distractions or changes in the environment which may impact the intended use of the sign.

Inspection of line of sight and *readability* shall be carried out in respect to the requirements and position of the *primary user* of the sign.

For all signs to be sighted by drivers of rail traffic, inspection shall include an on-rail assessment at the specified distance as near as practicable to the driver's normal operating position.

For all signs the inspection shall include an assessment of whether the sign has moved from its original position or orientation, or whether the intent of the sign has changed.

General inspections should be carried out at intervals not exceeding 3 years or as otherwise specified by the Rail Infrastructure Manager, e.g. in an approved maintenance program.

General inspections should be carried out when suspected defects are identified from conditions determined from patrol inspections.

The creation and use of a standard checklist will ensure that inspections are undertaken thoroughly and to a consistent standard.

Completed checklists shall be filed appropriately and retained for all general inspections.

General inspections and associated checklist outcomes shall be recorded in a suitable register.

### 5.2.3 Assessment

All signs shall be assessed to ensure compliance with the required legislative requirements and standards for material condition, installation and structural integrity.

Where the sign does not comply, appropriate action shall be taken to ensure the immediate safety of operations.

Follow up action shall then be taken to ensure that the sight line is restored.

### 5.2.4 Assessment of sightline

Assessment of sighting and readability shall be undertaken from the sightline of the primary user of the sign and in accordance with current safety regulations and *human factors* guidelines (such as HB 59 and AS IEC 62508) and AS 7631.

Where it is assessed that the sight line is obstructed appropriate action shall be taken to ensure the immediate safety of operations.

Follow up action shall then be taken to ensure that the sight line is restored without delay to ensure compliance with legislative requirements and standards.

Where the sightline is permanently obstructed for the maximum operating speed then either:

- (a) the sign shall be relocated
- (b) advance warning to drivers of trains shall be provided, or
- (c) operational restrictions shall be imposed.

The appropriate risk profile and hierarchy of hazard controls to minimise or eliminate any exposure to hazards caused by any obstructions to the sign sightline shall be taken account.



## **6 Decommissioning and Disposal**

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### **6.1 General**

Any signs that have been decommissioned and are not in service shall be obscured.

Any signs that have been decommissioned and are not in service should be removed as soon as possible.

### **6.2 Decommissioning**

The following shall be taken into account prior to the decommissioning, dismantling and disposing of signs:

- (a) that the work can be carried out without risks to health and safety so far as is reasonably practicable
- (b) that all possible hazards inherent in the process of decommissioning and dismantling the signs (e.g. poles falling over the railway etc.) are identified and appropriate mitigation processes put in place.

Signs should be dismantled in accordance with designers and manufacturers instructions, where they exist.

Appropriate notification processes, as approved by the Rail Infrastructure Manager shall be followed before any signs are removed.

### **6.3 Disposal**

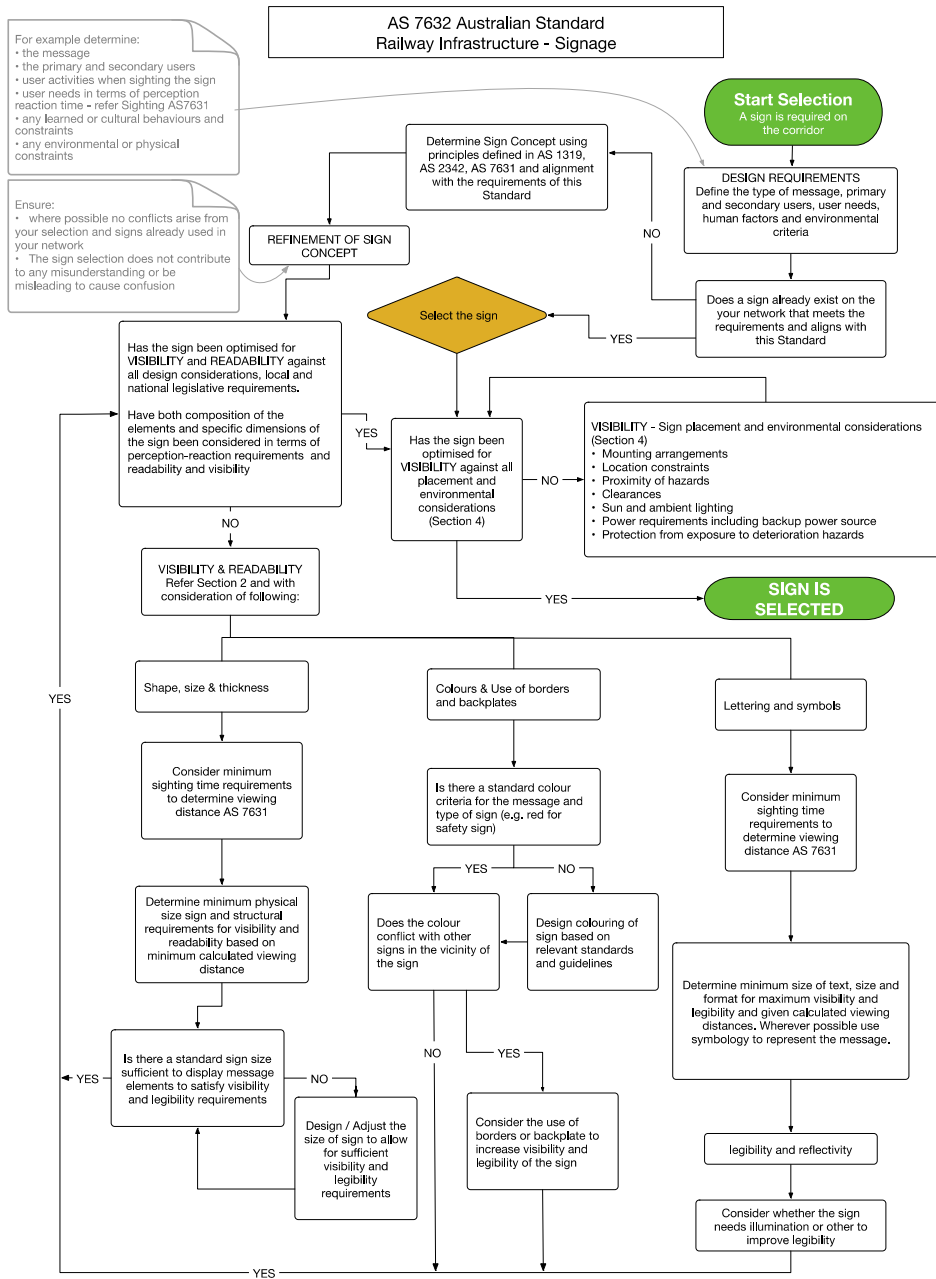
Signs may have been made of or coated with hazardous materials such as asbestos or lead based paints, or have accumulated such materials from passing rail traffic or infrastructure maintenance activities.

Activities and processes associated with decommissioning and dismantling should include inspections to ensure, so far as is reasonably practical, that any risks of exposure to hazardous substances and/or materials are identified and appropriate mitigation measures put in place prior to disposal.

In disposing of hazardous material, consultation shall be undertaken with local waste disposal authorities or organisations to ensure safe handling, transportation and disposal of all such materials.

## Appendix A Assessment of Sign Selection

Flowchart for the assessment of the appropriateness of selection of signs: Refer to Section 3.



Flowchart for the assessment of the appropriateness of the selection of signs. Refer clause 2.1.5(a)

## Appendix B Safety Danger - Examples of existing railway signs demonstrating the colour principals to be applied in railway signage

Red is used as a background colour for STOP and DANGER signs

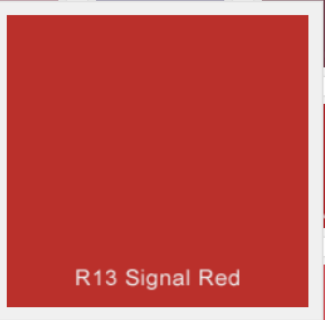



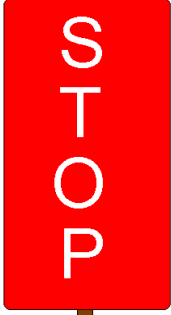
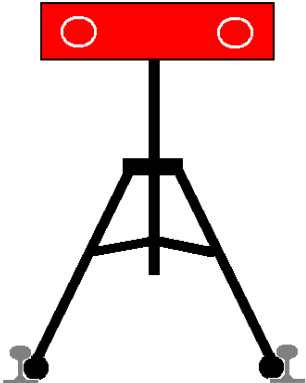

Figure Reference	Sign	Description
B.1	Colour swatch 	Signal Red (AS 2700 name) R13
B.2		Message: Warning to stop.
B.2.1		Warning to stop
B.2.2		Used in a Local Possession Authority to provided protection between separated worksite.

Figure Reference	Sign	Description
B.3		<p>Placed 500 meters before an obstruction (work area) and used in conjunction with 3 Railway Track signals to provide in-field protection.</p> <p>The rail traffic is to Stop before reaching the Stop sign.</p>
B.4		<p>Placed on the departure side of a Controlled Absolute Signal or as required before an obstruction (work area) to provide in-field protection.</p>
B.5		<p>Placed in front of private access road entering railway properties.</p>

## Appendix C Cautionary advisory - Examples of existing railway signs demonstrating the colour principals to be applied in railway signage

Cautionary advisory guide you to operate and work safely

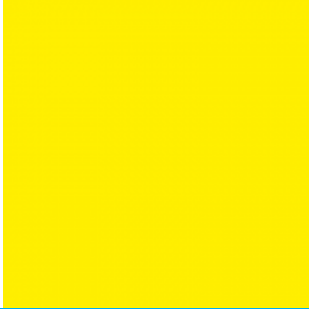
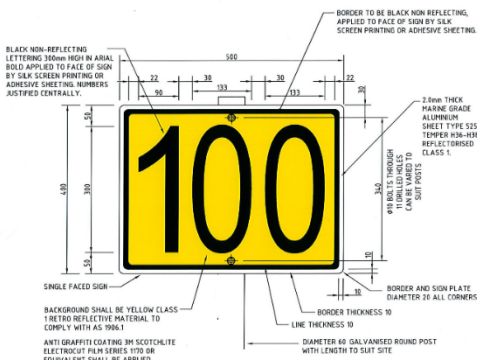


Figure Reference	Sign	Description
C.1		<p>Sunflower (AS 2700 name) Y15</p>
C.2		<p>Permanent Speed Signs. Travel at speed indicated.</p>
C.3		<p>Permanent Speed Signs (applicable only to divergence).</p>
C.4		<p>The speed denoted on the board indicates the maximum allowable speed for traffic taking the diverging road (arrow).</p>


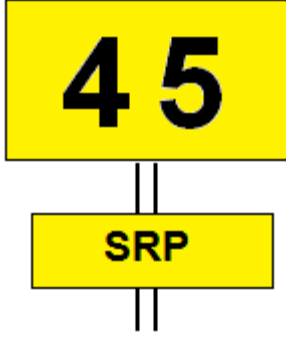
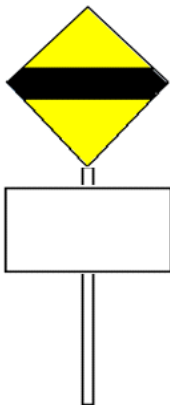
Figure Reference	Sign	Description
C.5		<p>Level Crossing Speed Restriction Sign.</p> <p>Placed on the approach to Level Crossing to indicate the approach.</p> <p>Only used on level crossing with restricted road user view to approaching rail traffic.</p> <p>Proceed at the speed shown on the speed restriction sign until the rail traffic has reached the level crossing.</p>
C.6		<p>Self-restoring Points Speed Restriction Sign.</p> <p>Placed on the approach to self-restoring points in Train Order Territory to indicate the approach speed.</p> <p>Proceed at the speed shown on the speed restriction sign until the rail traffic has reached the points track.</p>
C.7		<p>Temporary Speed Restriction Ahead.</p>



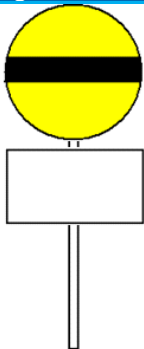
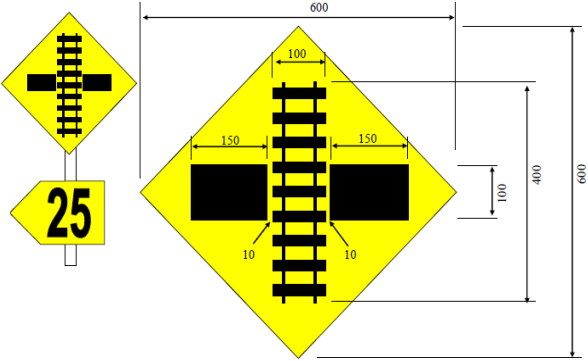

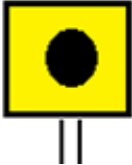
Figure Reference	Sign	Description
C.8		Temporary Speed Restriction Start.
C.9		Level crossing with speed sign.
C.10		Level crossing approach and speed sign.
C.11		<p>Approach to a controlled location.</p> <p>Placed 1600 metres from the first Controlled Absolute signal of a Controlled location where an Approach signal is not provided.</p>



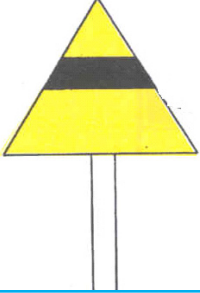



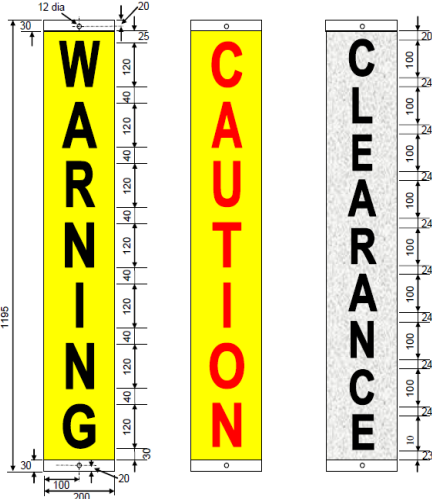
Figure Reference	Sign	Description
C.12		<p>Placed 2,500 metres before an obstruction (work area) and used in conjunction with 2 Railway Track signals to provide in-field protection.</p> <p>The rail traffic is to proceed and be prepared to Stop at the Stop sign.</p>
C.13		<p>Commencement of Train Order Territory.</p> <p>Placed at a point where Train Order working takes effect.</p> <p>All workers are to work and operate under the Rules applicable to the Train Order System.</p>
C.14		<p>Train Order Crossing Station Indicator Sign.</p> <p>Indicates that rail traffic is approaching a crossing station in Train Order Territory.</p>
C.15		<p>Train Order Non Crossing Station Indicator Sign.</p> <p>Indicates that rail traffic is approaching a non-crossing station in Train Order Territory.</p>
C.16		<p>Switch Machine Hand Operation Caution.</p>

Figure Reference	Sign	Description
C.17		<p>Predictor Sign.</p> <p>Rail traffic crews shall ensure that they do not increase speed above the speed they were doing at the time that they passed the predictor sign until the leading vehicle has passed over the level crossing.</p> <p>Usage: Brookfield Rail.</p>
C.18		<p>Temporary Speed Signs.</p> <p>When these are used the speed information is attached to the bottom or the top of the sign as appropriate.</p>

## Appendix D General advisory - Examples of existing railway signs demonstrating the colour principals to be applied in railway signage

Used for general information and advice

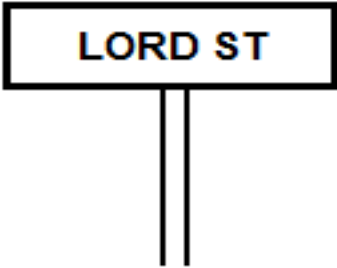

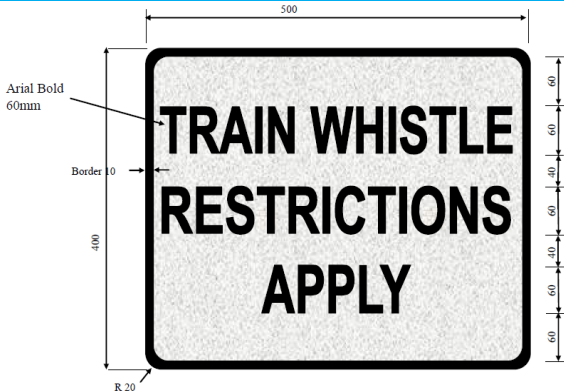
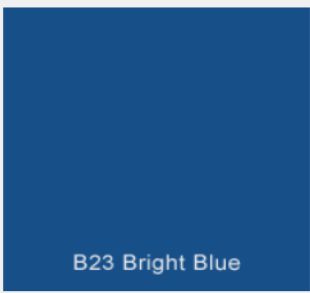


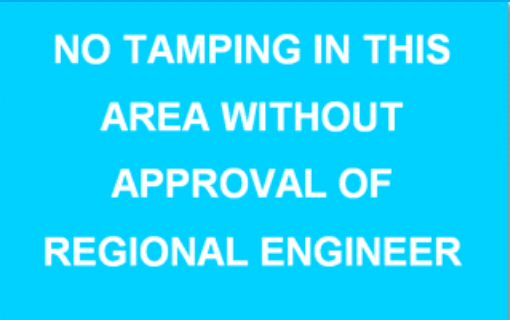
Figure Reference	Sign	Description
D.1		<p>Level Crossing and Bridge Indicator Signs.</p> <p>Displays the name of the level crossing or bridge the rail traffic is approaching.</p>
D.2		Whistle Sign.
D.3		Whistle Restriction Sign.

Figure Reference	Sign	Description
D.4		Whistle sign for trains leaving a specific destination.
D.5		Level Crossing Incident Reporting Sign - Passive and Active Control Crossings.
D.6		Walkway information signage.
D.7		Location sign.

Figure Reference	Sign	Description
D.8		Kilometre posts



## Appendix E Operational advisory - Examples of existing railway signs demonstrating the colour principals to be applied in railway signage

Figure Reference	Sign	Description
E.1	<p>Colour swatch</p> 	Bright Blue (AS 2700 name) B23
E.2		Speed Ramp Sign. Increase to the speed shown on the sign until the rail traffic has reached the termination sign.
E.3		Safety equipment advisory - refer to Workplace Health and Safety.
E.4		Trackside Information advisory.

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