Subject: Amendment to T HR CI 12075 ST
Airspace Developments, v1.0

This technical note is issued by the Asset Standards Authority (ASA) to notify that the guard rails requirements in T HR CI 12075 ST Airspace Developments, version 1.0 are now superseded.

The ASA has published T HR CI 12071 Guard Rails, version 1.0 that covers the requirements for guard rails. In this context, T HR CI 12075 ST is amended as follows:

Delete Section 10.17 to Section 10.20 in their entirety and replace with the following:

10.17 Guard rails

Guard rails shall be provided in accordance with T HR CI 12071 Guard Rails.

Authorisation:

<table>
<thead>
<tr>
<th>Technical content prepared by</th>
<th>Checked and approved by</th>
<th>Interdisciplinary coordination checked by</th>
<th>Authorised for release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Joe Muscat</td>
<td>Richard Hitch</td>
<td>Peter McGregor</td>
</tr>
<tr>
<td>Position</td>
<td>Principal Engineer</td>
<td>Lead Civil Engineer</td>
<td>A/Chief Engineer</td>
</tr>
<tr>
<td></td>
<td>Structures and Bridges</td>
<td></td>
<td>A/Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Network Standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and Services</td>
</tr>
</tbody>
</table>
Technical Note - TN 082: 2016

Issued date: 21 December 2016

Subject: Revised reference to risk criteria

This technical note has been issued by the Asset Standards Authority (ASA) to notify the following.

- The risk criteria to be used by the Authorised Engineering Organisations (AEOs) providing engineering services to TfNSW are contained in T MU MD 20002 ST Risk Criteria for Organisations Providing Engineering Services, version 1.0.

- 30-ST-164 TfNSW Enterprise Risk Management (TERM) Standard provides the risk criteria to be used by TfNSW.

- All references to the TERM standard in this document, where applicable to AEOs, shall read as T MU MD 20002 ST.

Authorisation:

<table>
<thead>
<tr>
<th>Technical content prepared by</th>
<th>Checked and approved by</th>
<th>Interdisciplinary coordination checked by</th>
<th>Authorised for release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Richard Adams</td>
<td>Andy Tankard</td>
<td>Graham Bradshaw</td>
</tr>
<tr>
<td>Position</td>
<td>Manager Safety and Risk Assurance</td>
<td>Principal Manager SQER</td>
<td>Principal Manager SQER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Director Network Standards and Services</td>
</tr>
</tbody>
</table>

For queries regarding this document
standards@transport.nsw.gov.au
www.asa.transport.nsw.gov.au
Important Warning

This document is one of a set of standards developed solely and specifically for use on Transport Assets (as defined in the Asset Standards Authority Charter). It is not suitable for any other purpose.

You must not use or adapt it or rely upon it in any way unless you are authorised in writing to do so by a relevant NSW Government agency. If this document forms part of a contract with, or is a condition of approval by a NSW Government agency, use of the document is subject to the terms of the contract or approval.

This document is uncontrolled when printed or downloaded. Users should exercise their own skill and care in the use of the document.

This document may not be current. Current standards may be accessed from the Asset Standards Authority website at www.asa.transport.nsw.gov.au.

© State of NSW through Transport for NSW
Standard governance

**Owner:** Lead Civil Engineer, Asset Standards Authority

**Authoriser:** Chief Engineer Rail, Asset Standards Authority

**Approver:** Executive Director, Asset Standards Authority on behalf of the ASA Configuration Control Board

Document history

<table>
<thead>
<tr>
<th>Version</th>
<th>Summary of Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>First issue</td>
</tr>
</tbody>
</table>

For queries regarding this document, please email the ASA at standards@transport.nsw.gov.au or visit www.asa.transport.nsw.gov.au

© State of NSW through Transport for NSW
Preface

The Asset Standards Authority (ASA) is an independent unit within Transport for NSW (TfNSW) and is the network design and standards authority for defined NSW transport assets.

The ASA is responsible for developing engineering governance frameworks to support industry delivery in the assurance of design, safety, integrity, construction, and commissioning of transport assets for the whole asset life cycle. In order to achieve this, the ASA effectively discharges obligations as the authority for various technical, process, and planning matters across the asset life cycle.

The ASA collaborates with industry using stakeholder engagement activities to assist in achieving its mission. These activities help align the ASA to broader government expectations of making it clearer, simpler, and more attractive to do business within the NSW transport industry, allowing the supply chain to deliver safe, efficient, and competent transport services.

The ASA develops, maintains, controls, and publishes a suite of standards and other documentation for transport assets of TfNSW. Further, the ASA ensures that these standards are performance-based to create opportunities for innovation and improve access to a broader competitive supply chain.

This standard details the design requirements for airspace developments in the TfNSW heavy rail network and was developed from RailCorp standard ESC 370 *Air Space Developments*, Version 2.2.

This standard supersedes ESC 370.

This standard is a first issue.
Foreword

This standard is intended to be used by competent personnel engaged in the provision of services relating to rail infrastructure. Compliance with the requirements in this standard will not, by itself, be sufficient to ensure that satisfactory outcomes will be produced. Personnel providing services based on the standard need to bring appropriate expertise to the matters under consideration.

In addition to the requirements of this standard, asset decisions shall take into account the life cycle cost considerations specified in T MU AM 01001 ST Life Cycle Costing.

If, when using this standard, it is considered that the intent of stated requirements is not clear, a clarification needs to be sought from the ASA.
Table of contents

1. Introduction ........................................................................................................................................ 7
2. Purpose .............................................................................................................................................. 7
   2.1. Scope ........................................................................................................................................... 7
   2.2. Application ................................................................................................................................. 7
3. Reference documents .............................................................................................................................. 7
4. Terms and definitions .......................................................................................................................... 9
5. Safety requirements ................................................................................................................................ 10
6. Fire and life safety requirements ............................................................................................................. 10
7. Environmental and heritage requirements .............................................................................................. 11
8. Construction ......................................................................................................................................... 12
   8.1. General ......................................................................................................................................... 12
   8.2. Dilapidation surveys ....................................................................................................................... 13
   8.3. Risk assessment ............................................................................................................................ 13
   8.4. Crane and other aerial operations .................................................................................................. 14
   8.5. Track possessions and power outages ............................................................................................ 14
   8.6. Documentation to be submitted prior to construction .................................................................. 14
9. Maintenance and operation ..................................................................................................................... 15
10. Design criteria .................................................................................................................................... 15
   10.1. Fire rating .................................................................................................................................... 16
   10.2. Drawing standards ....................................................................................................................... 17
   10.3. Geotechnical .............................................................................................................................. 17
   10.4. Electrical ..................................................................................................................................... 18
   10.5. Drainage ...................................................................................................................................... 18
   10.6. Noise and vibration ..................................................................................................................... 18
   10.7. Survey ......................................................................................................................................... 19
   10.8. Services ....................................................................................................................................... 19
   10.9. Access ......................................................................................................................................... 19
   10.10. Aesthetics ................................................................................................................................. 20
   10.11. Clearances to railway tracks ....................................................................................................... 20
   10.12. Seismic loading .......................................................................................................................... 20
   10.13. Approved materials .................................................................................................................... 20
   10.14. Protection of TfNSW property .................................................................................................... 21
   10.15. Collision protection – new airspace developments .................................................................... 21
   10.16. Collision protection – existing airspace developments .............................................................. 21
   10.17. Derailment containment device – general ................................................................................. 22
   10.18. Derailment containment device – configuration ....................................................................... 23
   10.19. Derailment containment device – signalling interface ............................................................... 24
   10.20. Derailment containment device – joints in guard rails ............................................................... 25
   10.21. Information to be supplied at the design stage ......................................................................... 25
10.22. Lighting and ventilation .................................................................................................................... 26

11. Decommissioning or disposal ............................................................................................................. 27

Appendix A    Freight lines ................................................................................................................. 28
1. **Introduction**

An airspace development is a structure or structures built over the rail track or tracks to support offices, shops, accommodation and the like. An airspace development may exist at a station.

Work on an airspace development across the full lifecycle is typically constrained by the presence of a live and operational rail network below.

Work on an airspace development across the full lifecycle shall not interrupt rail operations except as agreed with Transport for NSW (TfNSW).

Airspace developments may be proposed, designed, constructed, maintained and decommissioned by private industry organisations or government bodies.

2. **Purpose**

The purpose of this document is to provide technical requirements to facilitate the design, construction, maintenance and decommissioning of civil components of airspace developments so as to manage the effect upon the TfNSW facilities and trains across the full life cycle. The intention of the standard is to minimise effect upon the track and network user disruption across the full life cycle of the airspace development.

2.1. **Scope**

This document specifies the design requirements for airspace developments within the TfNSW heavy rail network.

This document covers the construction of new airspace developments and the refurbishment of existing airspace developments where they do not meet current requirements as stipulated in legislation, Australian Standards and ASA’s engineering standards.

Where a conflict is found to exist between an Australian Standard and this standard, the requirements of this standard shall take precedence.

This document does not cover station concourses.

2.2. **Application**

The requirements of this document apply to airspace developments on the TfNSW heavy rail network.

3. **Reference documents**

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.
**Australian standards**

AS 1085.1 Railway track material – Part 1: steel rails

AS/NZS 1170 Structural design actions

AS 1668 The use of ventilation and airconditioning in buildings

AS 1726 Geotechnical site investigations

AS 4825 Tunnel Fire Safety

AS 5100 Bridge design

AS/RISSB 7513 Railway Rolling Stock Interior Environment

**Transport for NSW standards**

EP 08 00 00 01 SP Overhead Wiring Standards for the Electrification of New Routes

EP 12 10 00 20 SP Low Voltage Distribution Earthing

EP 12 10 00 21 SP Low Voltage Installations Earthing

EP 12 20 00 01 SP Bonding of Overhead Wiring Structures to Rail

ESC 100 Civil technical maintenance plan

ESC 215 Transit space

ESC 220 Rail and rail joints

ESC 302 Structures Defect limits

ESC 330 Overhead Wiring Structures and Signal Gantries

ESC 340 Tunnels

ESC 350 Platforms and retaining walls

ESG 100.17 Signal design principles – Track circuits

SPC 301 Structures construction

T HR CI 12110 ST Earthworks and Formation

T HR CI 12130 ST Track Drainage

T HR CI 12190 ST Service Installations within the Rail Corridor

T HR EL 08001 ST Safety Screens and Barriers for 1500 V OHW Equipment

T HR EL 10001 ST HV Aerial Line Standards for Design and Construction

T HR EL 12002 GU Electrolysis from Stray DC Current

T MU AM 01001 ST Life Cycle Costing

T MU AM 01003 ST Development of Technical Maintenance Plans
4. Terms and definitions

The following terms and definitions apply in this document:

**AEO** Authorised Engineering Organisation; means a legal entity (which may include a Transport Agency as applicable) to whom the ASA has issued an ASA Authorisation

**Airspace development** a structure or structures built over the rail track to accommodate overhead offices, shops, accommodation and the like

**ASA** Asset Standards Authority

**Derailment containment device** an approved configuration installed to prevent a high consequence event arising from a train derailment. Such events include a train impacting structure or structural elements and a train falling off a bridge. In the case of an airspace development, guard rails provide a level of protection to an adjacent support.

**Developer** the person or party proposing the airspace development. The developer may be a private industry or government organisation

**Operator and maintainer** is the entity accredited by the rail regulator to act as rail infrastructure manager for the operation and maintenance of rail infrastructure
Rail corridor comprises the volume, both above and below ground, between the outer face of opposing boundary fences. If no boundary fences are present, the extent of the rail corridor shall be taken as 15 m from the centreline of the outermost rail in each direction. The rail corridor also includes easements across other land that accommodates rail infrastructure.

Services utility assets used to transfer, transmit or transport data, electricity, liquids, solids, gases and the like. Services are installed above ground and below ground within and outside rail corridors.

SFAIRP so far as is reasonably practical

TERM TfNSW Enterprise Risk Management Standard

TfNSW Transport for New South Wales

TfNSW facilities comprises all railway track, railway stations, civil works, associated track structures, over track structures, signalling systems, train control systems, communication systems, equipment, nodes, conduits, ducting, cable, cable support structures and other plant, equipment, buildings or facilities owned, leased or used by TfNSW on, or in any way comprising, the railway corridor.

White rail Category 1 recycled rail in accordance with ESC 220 Rail and rail joints

5. Safety requirements

The Authorised Engineering Organisation (AEO) shall establish and implement a design process system that manages safety assurance across the full life cycle of the airspace development. The design process system shall be developed with reference to TS 20001 System Safety Standard for New or Altered Assets.

6. Fire and life safety requirements

Where an airspace development over TfNSW property is proposed, it shall adequately consider and respond to the fire and life safety risks which exist; are created by the proposal; or, may exist as a result of foreseeable future development in the rail corridor.

A risk assessment shall be carried out in accordance with TfNSW’s safety management system, in particular the TfNSW Enterprise Risk Management standard. This risk assessment shall consider, but not be limited to, possible fire sources from within the rail corridor such as passenger and freight train fires.

If a new airspace development results in the creation of a tunnel as defined in ESC 340 Tunnels, the developer shall be responsible for the design and installation of all necessary fire and life safety arrangements in accordance with ESC 340 Tunnels and AS 4825 Tunnel Fire Safety.
If a new airspace development results in the creation of an underground or enclosed station condition, the developer shall be responsible for the design and installation of fire and life safety requirements subject to a fire and life safety risk assessment. An airspace development shall be considered to create an underground or enclosed station condition if the platform and the permanent way to which it is adjacent are covered by any part of the airspace development for more than 80 m.

Any lease boundaries created shall be considered to be property boundaries and therefore ‘fire source features’ both to TfNSW and the airspace development.

Extensive network user disruption including train line and station closure is a consequence of an airspace development damaged by a fire incident. This risk shall be considered in all risk assessments produced.

Risks created each side of the new boundaries shall be, where possible eliminated, and where not possible, mitigated against to the level of so far as is reasonably practical (SFAIRP).

7. Environmental and heritage requirements

The design of airspace developments shall consider environmental impacts and sustainability opportunities during investigation, planning, construction, operational and decommissioning activities.

The design shall consider sustainability over the life cycle of the asset. Considerations include the following:

- optimisation of energy or water use
- natural ventilation and lighting
- low energy lighting and power
- protection or enhancement of biodiversity
- stormwater management
- noise and vibration
- visual impact and amenity
- ability and ease to maintain and ‘retro-fit’ improvements over time

Environment and heritage management is governed by the Environmental Planning and Assessment Act 1979 (NSW) and the Heritage Act 1977 (NSW). The Environmental Planning and Assessment Act requires that environmental impacts resulting from development be appropriately assessed. This includes impacts on heritage items. The Heritage Act is the relevant legislation designed to protect, conserve and manage environmental heritage, including items of archaeological significance. When changes are proposed for items listed in the State Heritage Register, the provisions of the Heritage Act shall be met. For heritage items listed on
the Section 170 State Agency Heritage Register, the principles and relevant guidelines contained in the Office of Environment and Heritage State Agency Heritage Guide – Management of Heritage Assets by NSW Government Agencies shall be followed.

All environmental factors, including heritage significance, should be considered at a sufficiently early stage of a project in order to influence concept designs. Any airspace development within a rail corridor shall respect heritage values and address heritage issues where applicable. Appropriate consideration shall be given to the three-dimensional characteristics of airspace development, including analysis of impacts upon heritage values. Such analysis should not be limited to impacts on individual buildings and structures, but shall also include consideration of likely impacts upon curtilage, view corridors, landscape, and general contextual setting. Airspace developments should not generate undue adverse impacts upon heritage significance or upon the amenity of a precinct, but should seek to reinforce or enhance existing qualities or activities where possible.

Long-term conservation and maintenance of heritage items shall not be affected or constrained by the airspace development, and any future development shall take account of anticipated maintenance requirements for heritage fabric.

8. Construction

Requirements for construction involve dilapidation surveys, risk assessment, crane and other aerial operations, track possessions and power outages, and the documentation to be submitted prior to construction.

8.1. General

Airspace developments shall be constructed in accordance with SPC 301 Structures Construction.

The construction program for an airspace development shall be agreed with TfNSW in advance of the commencement of construction so as to minimise TfNSW network user disruption during the construction phase.

During construction, existing access to TfNSW facilities and platforms for TfNSW customers and workers shall be maintained.

Construction work shall not disrupt train driver sighting of existing signals. Maintenance access to existing signalling infrastructure shall not be disrupted during the construction phase.

Prior to being given final approval to commence construction, the developer shall enter into a legal agreement to indemnify TfNSW against all loss or damage to TfNSW property and all claims that occur as a result of the development.
8.2. Dilapidation surveys

Prior to the commencement of construction works and prior to the issue of an Occupation Certificate, a joint condition inspection and survey of the TfNSW facilities and all property in the vicinity of the proposed airspace development shall be carried out by representatives of the developer and TfNSW. The existing condition and survey position of the TfNSW facilities and all property in the vicinity shall be agreed and recorded. This work shall be recorded in a report to be produced by the developer and supplied to TfNSW.

A comprehensive photographic record of the TfNSW facilities shall be produced by the developer prior to airspace development construction. This photographic record shall be provided to TfNSW prior to the commencement of airspace development construction.

The condition and survey position of TfNSW facilities and all property shall also be confirmed and recorded post-construction by the developer and TfNSW. This work shall be recorded in a report to be produced by the developer and supplied to TfNSW.

The need for continuing survey and condition monitoring by the developer post construction is a risk based decision and shall be agreed with TfNSW in advance of construction.

The condition and survey location of TfNSW facilities and all property shall be monitored by the developer during the construction of the works.

8.3. Risk assessment

Prior to the commencement of any works on site, the developer shall submit a Rail Related Risk Assessment Plan and Safe Work Method Statements to TfNSW for approval.

The Rail Related Risk Assessment Plan shall be prepared in accordance with the requirements of TfNSW’s Safety Management System, in particular TfNSW Enterprise Risk Management Standard and shall address the following:

- identification of both hazards and risks to the development and to TfNSW facilities
- a risk ranking in accordance with the Safety Management System
- controls showing how the risk to TfNSW facilities shall be managed
The Safe Work Method Statements shall detail the following:

- detailed work methods including the incorporation of the controls as stated in the Risk Assessment Plan
- an emergency response plan

8.4. **Crane and other aerial operations**

When not in operation, cranes are permitted to ‘weathervane’ into the rail corridor subject to the approval of the operator and maintainer and the Lead Electrical Engineer, ASA.

The requirements of SMS-06-GD-0268, Section 9 Work above exposed electrical equipment, shall be observed.

8.5. **Track possessions and power outages**

At any occasion where construction activity calls for train services to cease, or requires isolation of electrical supplies, the developer shall be required to meet all associated costs incurred by TfNSW.

Planning and arrangements for track possessions and electric traction power outage are scheduled in the long-term via TfNSW consultation and require notice of up to twelve months.

Access to the rail corridor and working near TfNSW facilities is only permitted when TfNSW is satisfied that adequate safety precautions are in place.

8.6. **Documentation to be submitted prior to construction**

Prior to the commencement of construction the developer shall submit to TfNSW the documentation listed below:

- dilapidation survey report which includes a comprehensive photographic record
- a Rail Related Risk Assessment including a Risk Management Plan; and detailed Safe Work Method Statements for all demolition works, earthworks, drainage and building construction
- a complete set of construction drawings
- details of all proposed crane activities and other aerial operations
- an environmental management plan with respect to safeguarding the rail corridor
- a Construction Management Plan and Demolition Management Plan
- proposed interface arrangements at completion of work which clearly define future maintenance responsibility for all new and existing assets which are effected by the development
• a detailed construction program which identifies intended track closure dates

The timing and format of this submission shall be in accordance with the requirements of A guide to working in and around the rail corridor, RailCorp November 2005.

9. Maintenance and operation

The airspace development design shall include provision for ease of access to, and sufficient clearance around components for inspection and maintenance activities. Maintenance activities shall not violate the transit space requirements specified in ESC 215 Transit Space.

The developer shall produce an interface and maintenance responsibility document in advance of construction. This document shall be for the approval of TfNSW in accordance with the requirements of A guide to working in and around the rail corridor, RailCorp November 2005.

Maintenance activities include maintenance activities for all TfNSW facilities in addition to maintenance activities for the airspace development.

Components, materials and finishes shall be selected so as to minimise maintenance during the life of the structure.

Maintenance requirements shall be specified, in the form of a technical maintenance plan, in the design documentation for the structure. The requirements shall include examination tasks and frequencies, damage limits, and repair standards. The requirements of ESC 100 Civil Technical Maintenance Plan and ESC 302 Structures Defect Limits shall apply. However, it may be necessary to document additional site specific maintenance requirements.

The requirements and high level processes for the development of technical maintenance plans are detailed in T MU AM 01003 ST Development of Technical Maintenance Plans.

10. Design criteria

Airspace developments shall have a design life of 100 years.

All designs for airspace developments shall comply with AS/NZS 1170 Structural Design Actions, AS 5100 Bridge Design, the Building Code of Australia (BCA) and the requirements specified in this engineering standard.

The airspace development design shall identify all additional or altered TfNSW facilities required and provide for them over the full life cycle.

Design documentation shall identify applicable standards for construction, including construction methods, processes and materials.
10.1. Fire rating

The fire safety design objective for air space developments is to provide an adequate level of fire safety for occupants of both the railway and facilities supported by the air space development, firefighters, and maintenance and other emergency services personnel. Fire safety objectives include the following:

- safety of members of public, staff, and emergency services personnel within the rail corridor
- facilitation of effective emergency services intervention
- protection of adjoining property (including railway property) and third parties
- minimisation of interruption to railway operations in the event of fire
- minimisation of property damage

The air space development shall provide a level of fire resistance in order to maintain its structural stability and fire separation in case of a fire incident, appropriate to the following:

- time required for evacuation of railway users and air space development occupants
- time required for emergency services intervention
- characteristics of fires for which structural stability and fire separation is expected
- potential consequences of failure of structural elements and/or fire separating elements and/or fire separating elements (including openings)
- expected rail traffic mix, including the potential presence of diesel powered track maintenance, freight or passenger rolling stock, as well as the potential presence of dangerous goods
- other fire safety systems present, such as fire suppression
- fire safety objectives as defined above, particularly asset protection and rail line operational continuity in the event of a fire incident

The deemed to satisfy solutions identified below are one way in which compliance can be demonstrated to meet the fire safety requirements identified above.

Freight rolling stock lines are identified in Appendix A.

The fire separation requirements identified above can be deemed to be satisfied for air space developments over NSW rail lines which are not operated with freight rolling stock by demonstrating compliance with both requirements below:

- The airspace development shall provide a fire resistance level of not less than 240/240/240 when exposed to the standard (cellulosic) fire curve of AS 1530.4 from below the airspace development (for example, a train fire).
• The airspace development shall provide a fire resistance level of not less than 240/240/240 when exposed from within the facilities supported by the airspace development to a building fire to the standard (cellulosic) fire curve of AS 1530.4.

The fire separation requirements identified above can be deemed to be satisfied for air space developments over TfNSW rail lines which are operated with freight rolling stock by demonstrating compliance with the sets of requirements below:

• When exposed to the full duration of the RABT-ZTV (rail) hydrocarbon fire curve from below the airspace development, the airspace structural stability and strength is not reduced below the applicable limits defined in AS 5100.

• When exposed to the standard (cellulosic) fire curve of AS 1530.4 from below the airspace development, the airspace development provides fire resisting separation of not less than 240 minutes of fire resisting integrity and 240 minutes of fire resisting insulation.

• The airspace development shall provide a fire resistance level of not less than 240/240/240 when exposed from within the facilities supported by the airspace development (a building fire) to the standard (cellulosic) fire curve of AS 1530.4.

Egress routes from facilities supported by the airspace development shall:

• be independent from the egress routes from the rail corridor

• be fire separated from the rail corridor by construction that provides an FRL of not less than 240/240/240 when exposed to the standard (cellulosic) fire curve of AS 1530.4

• discharge to a point which is on a road or an open space which is not on the effected structure that is suspended over the rail corridor

10.2. Drawing standards

Design drawings shall comply with T MU MD 00006 ST Engineering Drawings and CAD Requirements and shall detail the design loadings; horizontal and vertical clearances; and any other information that is relevant to ensure that the new airspace development is constructed and maintained in accordance with the design.

10.3. Geotechnical

The developer shall conduct a comprehensive geotechnical site investigation to determine the ground conditions. This site investigation shall be carried out in accordance with AS 1726 Geotechnical site investigations and T HR CI 12110 ST Earthworks and Formation. The developer shall also produce a geotechnical interpretive report to accompany this investigation.
10.4. **Electrical**

Airspace developments shall be designed to ensure that minimum clearances are observed to HV aerial lines, 1500 V dc overhead traction wiring and equipment, and exposed low voltage equipment, as per the requirements of Australian Standards, the regulations of the relevant electrical authorities and TfNSW electrical engineering standards.

TfNSW does not accept any liability whatsoever for the transfer of any stray current to the airspace development structure.

The electrical clearance requirements listed in the following documents shall be observed:

- T HR EL 10001 ST *HV Aerial Line Standards for Design and Construction*
- EP 08 00 00 01 SP *Overhead Wiring Standards for the Electrification of New Routes*
- T HR EL 08001 ST *Safety Screens and Barriers for 1500V OHW Equipment*

For earthing and bonding requirements associated with the structure of the airspace development and the electrical installations within the development, the requirements of earthing and bonding standards listed below shall be observed:

- EP 12 10 00 20 SP *Low Voltage Distribution Earthing*
- EP 12 10 00 21 SP *Low Voltage Installations Earthing*
- EP 12 20 00 01 SP *Bonding of Overhead Wiring Structures to Rail*
- T HR EL 12002 GU *Electrolysis from Stray DC Current*

Attachment bolts and connections between the airspace development and OHW structures shall comply with the requirements of the following:

- ESC 330 *Overhead Wiring Structures and Signal Gantries*
- TMC 331 *Design of Overhead Wiring Structures & Signal Gantries*

10.5. **Drainage**

Requirements for airspace development interaction with track drainage are contained within T HR CI 12130 ST *Track Drainage*. Drainage from the airspace development shall not outfall into the rail corridor track drainage. Drainage from the airspace development shall not be suspended above the track.

10.6. **Noise and vibration**

TfNSW does not accept liability for the generation of noise and vibration from normal railway operations (including track maintenance), or for its transmission into airspace developments.
When designing airspace developments for tunnel or enclosed structure environments, consideration shall be given to operational air-borne noise within the enclosed environment to ensure that it does not affect the ability of rolling stock to comply with AS/RISSB 7513 Railway Rolling Stock Interior Environment (all parts).

10.7. Survey

The developer shall conduct a land survey prior to the commencement of the design of the airspace development. This land survey shall confirm the correct rail boundary locations. The veracity of these locations shall then be agreed and confirmed with TfNSW in advance of the commencement of construction. The land survey shall also identify the location of the airspace development relative to the agreed rail boundary and the TfNSW facilities.

10.8. Services

The developer shall also conduct services search to determine the type and extent of existing services in the development area. This search shall be carried out in accordance with T HR CI 12190 ST Service Installations within the Rail Corridor.

The proposed airspace development shall make full provision for supporting, relocating and accommodating all existing and foreseeable future services (TfNSW and external utility organisations) to, and on, the site. The developer shall meet the cost of such installations and alterations. The location of services shall be designed to facilitate future access for maintenance and to minimise network user disruption over the full life cycle.

Services shall not be located in the area between the underside of the floor of the airspace development and the land of the rail corridor.

Openings or penetrations above and horizontally within 3m of the overhead wiring system are not permitted.

Gas, water, drainage, sewerage, mechanical, telephone, data, or electrical services for the development shall be housed in service ducts and brought down to ground level at the street boundary.

10.9. Access

The following access requirements shall be incorporated in the design of the permanent works:

- The developer shall obtain written approval from TfNSW for the suitability and capacity of passageways, steps, escalators, and so on, when it is proposed to change existing access between the station precinct and the adjacent public streets. The developer’s submission shall include how TfNSW or the public may be affected by the proposed changes to access.
• Approved arrangements shall be made for access for TfNSW customers and workers to platforms, and for workers’ areas between tracks.

• Given the presence of the airspace development, access to TfNSW facilities across the full life cycle shall not require disruption to train operations.

10.10. Aesthetics

Airspace developments shall be designed to have a pleasing appearance when viewed from any part of the rail corridor below.

How an airspace development would likely be perceived from positions along the rail corridor shall be an important consideration during the concept design, planning and construction stages.

Service pipes, ducts, vents and the like, or other installations, fixtures relating to the development that may be perceived as being unattractive or unsightly shall not be exposed such that they would be obviously visible from below. Rather, they should be concealed, covered or visually integrated as part of the designed aesthetic.

The decking over the track shall be of reinforced or pre-stressed concrete construction.

10.11. Clearances to railway tracks

Horizontal and vertical clearances for airspace developments shall comply with ESC 215 Transit Space.

Provision shall be made for any future railway track as advised by TfNSW.

On platforms, the minimum clear space between the track centreline and any supporting structure shall comply with the requirements set down in ESC 215 Transit Space.

No part of the development shall encroach upon the clearance limits without the specific approval of TfNSW.

10.12. Seismic loading

Airspace developments over the rail corridor shall be designed for seismic loading in accordance with AS 1170.4. The earthquake design category for airspace developments shall be Type III; that is, essential to post-earthquake recovery.

10.13. Approved materials

Approved construction materials for all structural elements are steel and concrete. Timber materials shall not be used.
10.14. **Protection of TfNSW property**

The design of the airspace development shall mitigate the risk of materials, objects or debris being thrown, dropped or falling onto a track below. This risk shall be considered and mitigated across the full life cycle of the airspace development.

No airspace development openings shall facilitate the throwing of objects onto passing trains or TfNSW facilities. Where balconies or windows which face the rail corridor are closer than 20 meters to the rail corridor boundary, they shall be fully enclosed or restricted to a maximum opening of 80 mm.

The airspace development shall be designed such that it can be demolished to the level of the ‘deck’ or ‘roof’ over the railway tracks, platforms, and access ways, without disturbance to rail operations or TfNSW customers.

10.15. **Collision protection – new airspace developments**

Piers supporting airspace developments are at risk of impact from a derailed train that could result in collapse of the structure onto TfNSW facilities or trains below.

All supports for airspace developments shall comply with the requirements for collision loading and protection of supports set out in AS 5100. This requirement includes the provision of deflection walls where required by AS 5100.

All new airspace developments shall have a clear span over the railway corridor.

However, supports may be located on platforms and shall comply with the minimum requirements below:

Platforms shall be earth filled and designed in accordance with ESC 350 *Platforms and retaining walls*.

The transverse position of the support (with respect to the centreline of the track) shall be in accordance with ESC 215; that is, a minimum of 4.3 metres from the centreline of the track.

The longitudinal position of the support (with respect to the platform) shall be a minimum 20 metres from the end of a ramped platform, or a minimum 2.6 metres from the end of a vertical (that is, non-ramped) platform.

10.16. **Collision protection – existing airspace developments**

Many existing airspace developments do not comply with the provisions for collision loading and protection specified in AS 5100. Existing structures that required protective measures were identified in the RailCorp (February 2011) *Structures over Track Risk Model* engineering report.

When it is necessary to investigate a structure that was not identified in the report, then a risk assessment process outlined below shall be carried out and the analysis shall be consistent
with that contained in the RailCorp (February 2011) *Structures over Track Risk Model* engineering report.

The risk assessment shall be carried out in accordance with TfNSW’s Safety Management System, in particular TfNSW Enterprise Risk Management Standard. The assessment shall consider the following criteria:

- site condition, including cuttings and embankments
- derailment history
- type of structure, that is, the potential for collapse and damage to TfNSW facilities
- track components in the direction of travel, for example, catchpoints, turnouts, slips, diamonds or scissor crossovers
- track geometry, that is, straight or curved track
- track speed at the location
- type of rolling stock
- future usage and growth in patronage

The risk assessment shall also consider any other relevant site specific criteria.

Reference shall be made to AS 5100.2 Supplement 1 for further guidance.

Where major refurbishment of an existing development is proposed, the structure shall be treated as a new development and the provisions of Clause 10.15 above shall apply.

Major refurbishment works are defined to include:

- Any structural alterations to the columns or supports.
- Anything that increases the dead, superimposed dead or live load on the columns or supports.
- Any works that increase the structural height of the building.
- Any refurbishment to buildings within the development that, in the opinion of TfNSW, is not insignificant or minor. Minor work includes, for example, the refurbishment of an individual shop. However, if several shops are being refurbished at or around the same time, such refurbishments will be considered as a whole rather than individually.
- Any other works or refurbishment that, in the opinion of the TfNSW, is considered major.

### 10.17. Derailment containment device – general

The need for derailment containment devices shall be a risk based decision in accordance with the requirements of the TfNSW Enterprise Risk Management Standard.
Where derailment containment devices are provided at a location, the design AEO shall ensure that a train remains clear of the protected structure in the event of a derailment which is successfully contained by the derailment containment device.

Where the hazard exists on one side of the track, a single guard rail may be provided for that side only. Single guard rails shall not be used on ballasted track.

Guard rails shall not be used to provide additional risk mitigation for structures that comply with collision loads specified in ASA standards.

10.18. Derailment containment device – configuration

Single or twin arrangement guard rails are approved derailment containment devices for use on track slabs.

The normal arrangement for guard rails comprises two parallel guard rails (that is, twin guard rails) with a tapered ‘vee’ section on the train approach side. Standard details for single guard rail installations shall be approved by the Lead Civil Engineer, ASA.

Concrete upstands located between running rails shall not be used as an alternative to derailment containment devices.

Guard rails shall be installed in accordance with the following requirements:

- Guard rail shall be new rail manufactured in accordance with AS 1085.1 *Railway track material – Part 1: steel rails* or recycled rail Category 1 (White rail).
- Guard rail section shall be the same as the running rail or one section size less than the running rail.
- Top of the guard rail shall be no higher than the adjacent running rail and no more than 50 mm below the running rail.
- Guard rail shall be plated and fastened on both sides to every sleeper. ‘A’ clips shall be used for fastening the guard rail.
- Guard rails shall extend parallel for a minimum 20 metres in advance of the at risk support on the train approach side.
- Guard rails shall extend parallel for a minimum of 3 metres beyond the at risk support on the train departure side.
- A tapered nose section (‘vee’), minimum 3.6 metres long, shall be installed on the train approach side of the guard rail. The minimum vee length shall be in addition to the required approach length specified above. The nose of the vee shall be bolted.
- Where rail traffic is bi-directional, the guard rail shall extend 20 metres beyond the at risk support on both approach and departure sides.
• Where rail traffic is bi-directional, the tapered nose section shall be installed on both sides.

• The clearance between the gauge face of the running rail and adjacent face of guard rail shall be 380 mm.

• Block-out holes for guard rail fastenings in concrete sleepers shall be grouted with an approved high strength grout. A minimum compressive strength of 70 MPa shall be achieved prior to loading.

10.19. Derailment containment device – signalling interface

Suitable isolation arrangements shall be made, where required, in track circuited and electrified areas.

The tapered nose section (‘vee’) shall be insulated with an approved component; Figure 1 shows a typical configuration. This insulation requirement applies to new installations and where refurbishment of the guard rails is undertaken.

Figure 1 – Typical configuration of tapered nose section (‘vee’) showing insulation joints

Where guard rails exceed 50 metres in length, additional insulation and bonding arrangements may be required. Design drawings shall specify that insulation and bonding arrangements shall be in accordance with the requirements of the ASA’s Lead Signals and Control Systems Engineer. For further information, refer to TfNSW engineering standard ESG 100.17 Signal design principles – Track circuits.
10.20. **Derailment containment device – joints in guard rails**

Joints in guard rails shall have at least two bolts on each side.

If standard fishplates are used, six bolts are required.

If modified fishplates are used, the four bolts shall have all the nuts on the inside. Fishplates shall be modified by machining, not by oxy-acetylene cutting. The plates shall have slotted holes for the bolts.

No joints, other than insulated joints, are permitted in the vee.

10.21. **Information to be supplied at the design stage**

Listed below is the minimum documentation that the developer shall submit to TfNSW together with a development proposal:

- Full survey details in both hard copy and electronic form, locating the development with respect to the railway boundary and rail infrastructure.
- Details of a services search, carried out in accordance with T HR CI 12190 ST Service Installations within the Rail Corridor, identifying any rail services or infrastructure affected by the development both within and outside the railway corridor.
- A report covering environmental issues and proposed protective measures during both construction and ongoing use of the development, including noise, vibration, air quality, water quality and pollution control.
- In electrified areas of the TfNSW rail network, a report on electrolysis risk and associated measures proposed to safeguard the proposed development from damage.
- Details of proposed lighting, signs and reflective materials visible within the rail corridor.
- A heritage impact statement.
- If a building or structure is proposed to be located within 20 metres of an operational rail line, details of proposed collision protection and, where required, a risk assessment of damage from a derailed train.
- An outline design and construction program which identifies likely proposed track closure periods and dates.
- Future maintenance plan for the development.

The timing and format of this submission shall be in accordance with the requirements of *A guide to working in and around the rail corridor*, RailCorp November 2005.
10.22. Lighting and ventilation

All TfNSW property affected by the airspace development is to be ventilated and/or air conditioned to comply with AS 1668 *The use of Ventilation and Air-conditioning in buildings* and Local Council Health Code requirements.

All TfNSW property covered by the airspace development shall be illuminated to levels required by Australian Standards. This illumination is to be provided by the developer.

Where a public entrance between a railway station and an adjacent public street is through the development, an emergency lighting circuit connected to the TfNSW supply is to be provided to light the access in the event that the light to the airspace development fails.
11. Decommissioning or disposal

Decommissioning is the final process of withdrawing an asset, such as an airspace development, from active service on the network.

Disposal is the process of removing an asset from the network. For example, demolition of an airspace development, followed by removal and recycling.

The decommissioning or disposal of an asset is the final stage of the asset life cycle. Proper planning of this part of the life cycle is an integral part of the strategic life cycle process.

The process to be undertaken for the disposal or decommissioning of an airspace development shall be as follows:

- A report shall be produced to confirm that the airspace development is surplus to requirements or that it is life expired.
- The report shall identify the benefits including financial and costs arising from the proposed decommissioning or disposal.
- The report shall confirm stakeholder engagement regarding the proposed action. Such engagement shall include, but not be limited to heritage, council and environmental body consultation.
- The means of decommissioning or disposal shall be a risk based decision carried out in accordance with the TfNSW safety management system. Refer to 30-ST-164 TfNSW Enterprise Risk Management Standard for requirements regarding the mitigation of risk SFAIRP.
- The report shall include a decommissioning or disposal plan for implementation.

Following decommissioning or disposal, the asset database shall be updated to reflect network changes.

95% of construction and demolition waste by weight of the decommissioned asset shall be diverted from landfill.
Appendix A  Freight lines

Figure 2 shows the TfNSW heavy rail freight lines.

Figure 2 - TfNSW rail freight lines