NSW GOVERNMENT

TS 00007:1.0

Standard

Elevated safe access platforms in train stabling yards and turnback sidings

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Document history

Revision	Effective date	Summary of changes
1.0	02/12/2021	First issue.

Preface

This standard details the design and performance criteria, allowable configurations and acceptance standards for elevated safe access platforms (ESAPs). It has been developed through consultation across TfNSW divisions and agencies.

ESAPs are intended to provide safe, secure and easy access to and from train crew compartments for persons at stabling yards and turn-back sidings in the Transport for NSW (TfNSW) rail network. This new standard details requirements for a standardised approach for the design, manufacture and installation of ESAPs.

This standard is a first issue.

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1 Scope

This standard establishes functional and design requirements, approved configurations and acceptance standards for elevated safe access platforms (ESAPs) to driver and guard crew compartments on various rolling stock.

ESAPs are required at TfNSW stabling yards and turn-back sidings to enable persons including drivers, guards, maintenance staff and cleaners, to gain safe access to crew compartments on stationary fleet to undertake maintenance and cleaning activities.

Currently this standard does not apply to regional and outer metropolitan train stabling yards and maintenance centres.

2 Application

The standard shall be applicable for the development of ESAPs to provide access and egress to trains crew compartments in stabling yards and turn-back sidings across the Transport for NSW (TfNSW) rail network.

This standard is intended for use by Authorised Engineering Organisations (AEOs) and is applicable to ESAPs to be used at all new and existing TfNSW stabling yards and turn-back sidings. This standard applies to the design of new ESAPs including upgrades and modifications. It will ensure user requirements for all stakeholders are adequately addressed and that these assets meet rail infrastructure maintainer's objectives for safety, reliability, and maintainability.

It is incumbent upon the AEO to ensure that the specific location(s) of the stabling yards and/or turn-back sidings and the types of train sets being stabled at these locations is confirmed to ensure that the design of the ESAPS is suitable.

This standard does not apply to the following:

a. Scaffolding used in similar situations

b. Access for people with disabilities

c. Temporary access, for example, by means of portable ladders

d. Access to plant rooms, lift motor rooms and the like.

3 Referenced 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.

International standards

ISO 9223 *Corrosion of metals and alloys – Corrosivity of atmospheres – Classification, determination and estimation*

ISO 9224 *Corrosion of metals and alloys – Corrosivity of atmospheres – Guiding values for the corrosivity categories*

ISO 14713.1 *Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures — Part 1: General principles of design and corrosion resistance*

ASTM G154-16 *Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials*

Australian standards

AS 1111.1 *ISO metric hexagon bolts and screws – Product grade C, Part 1: Bolts*

AS 1379 *Specification and supply of concrete*

AS 1170.4 *Structural design actions, Part 4: Earthquake actions in Australia*

AS 1657 *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*

AS 2312.1 *Protection against atmospheric corrosion by coatings – Paint coatings*

AS 3600 *Concrete structures*

AS 3990 *Mechanical equipment – Steelwork*

AS 4100 *Steel structures*

AS 4312 *Atmospheric corrosivity zones in Australia*

AS 4586 *Slip resistance classification of new pedestrian surface materials*

AS 4663 *Slip resistance measurement of existing pedestrian surfaces*

AS 5216 *Design of post-installed and cast-in fastenings in concrete*

AS/NZS 1158.3.1 *Lighting for roads and public spaces, Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements*

AS/NZS 1163 *Cold-formed structural steel hollow sections*

AS/NZS 1170.0:2002 *Structural design actions, Part 0: General principles*

AS/NZS 1170.1 *Structural design actions, Part 1: Permanent, imposed and other actions*

AS/NZS 1170.2 *Structural design actions, Part 2: Wind actions*

AS/NZS 1170.3 *Structural design actions, Part 3: Snow and ice actions*

AS/NZS 1252 (all parts) *High-strength steel fastener assemblies for structural engineering – Bolts, nuts and washers*

AS/NZS 1554.1 *Structural steel welding, Part 1: Welding of steel structures*

AS/NZS 1554.6 *Structural steel welding, Part 6: Welding stainless steel for structural purpose*s

AS/NZS 1665 *Welding of aluminium structures*

AS/NZS 2312.2 *Protection against atmospheric corrosion by coatings – hot dip galvanising*

AS/NZS 3500 (all parts) *Plumbing and drainage*

AS/NZS 3661.2 *Slip resistance of pedestrian surfaces, Part 2: Guide to the reduction of slip hazards*

AS/NZS 4600 *Cold-formed steel structures*

AS/NZS 4680 *Hot-dip galvanised (zinc) coatings on fabricated ferrous articles*

AS 7470:2016 *Human Factors Integration in Engineering Design – General Requirements*

Note: AS 7470 is an Australian Standard that is published and maintained by RISSB.

SA HB 197, *An introductory guide to the slip resistance of pedestrian surface materials*

Transport for NSW standards

ESC 215 *Transit Space*

T HR CI 12002 ST *Durability Requirements for Civil Infrastructure*

T HR EL 12002 GU *Electrolysis from Stray DC Current*

T HR EL 12004 ST *Low Voltage Distribution and Installations Earthing*

T HR EL 12005 ST *Bonding for 1500 V DC Traction Systems*

T HR SS 80001 ST *Infrastructure Lighting*

T HR SS 80002 ST *Low Voltage Electrical Installations*

T HR SS 80003 ST *Infrastructure Emergency Lighting*

T MU SS 90001 ST *Safe Pedestrian Surfaces*

TN 070:2016 *Signage – general requirements*

T HR RS 00100 ST *RSU 100 Series – Minimum Operating Standards for Rolling Stock – General Interface Requirements*

T MU AM 01003 ST *Development of Technical Maintenance Plans*

Sydney Trains Operational Standards

Legislation

The Australian Building Code Board, *National Construction Code*, Volume 3

Other referenced documents

John L. Clarke 2019, *Structural Design EUROCOMP Design Code and Handbook*, CRC Press

RailCorp 2006, *Design Guidelines for the Upgrade and Construction of New and Existing Train Stabling Yards and Turnback Sidings*, Final version 1.0

TfNSW 2017, *Sustainable Design Guidelines* version 4.0

TfNSW 2021, *QA Specification R53 Concrete for General Works*, Edition 3 / Revision 5

RailCorp 2012, *Passenger Fleet Rolling Stock Diagram Book*, RS00_0000_00MP

4 Terms, definitions and abbreviations

The following terms, definitions and abbreviations apply in this document:

AEO Authorised Engineering Organisation

AMB Asset Management Branch

Asset Steward entity responsible for the management and performance of assets (including asset condition, risk and reporting) on behalf of the asset custodian for the required lifecycle stage and duration of the partner relationship. (e.g. contracted operators and maintainers)

car marker sign to help train drivers stop trains in correct positions

crew compartment an area on a train where train crew, drivers and guards, perform their duties

ESAP elevated safe access platform; is inclusive of the platform structure, landings, stairs, handrails, fixings and associated services

floor the surface of a platform, landing or walkway

FRP fibre reinforced polymer (plastic)

going the horizontal distance along a stair tread from the nosing of one tread to the nosing of the next stair tread above or below it

guardrailing a system of panels or rails that provides edge protection to a platform or landing

handrail a rail that provides a handhold on a platform or landing

headroom the vertical clearance from finished floor level to the underside of overhead obstacles

infill panel typically a solid panel or mesh panel that prevent persons or obstacles from falling through a guardrail

kinematic outline a two-dimensional cross-sectional representative of the swept path of all the vehicles authorised at a particular location

landing the area at the bottom, top or between a flight of stairs

level access two abutting floor surfaces which are at the same level

NIF New Intercity Fleet

nosing the front leading edge of a stair tread

OHW Overhead wire

OHWS Overhead wiring structure

persons end users using the ESAPs to access crew compartments, including, drivers, guards, emergency staff, maintenance and cleaning staff and other persons as required

platform a surface designated to support persons working or resting elevated above normal ground level

platform positioning the physical positioning of the ESAP in relation to the rolling stock

RIM Rail Infrastructure Manager

riser the vertical height from one stair tread to the adjacent stair tread above or below

RISSB Rail Industry Safety and Standards Board

ROM Regional and Outer Metropolitan

safety yellow A ‘yellow line’ either painted or tiled onto a surface to demarcate a safety zone from a danger zone

SFAIRP so far as is reasonably practicable

slip resistance the effective resistance of a walking surface

stair sloping structure within the range of 20 degrees to 45 degrees and fitted with stair risers and goings

stair flight a single flight of stair risers and goings not interrupted by landings

TfNSW Transport for NSW

TMC technical maintenance code

toe-board a fixed vertical component along the edge on a platform or landing

tread the horizontal surface of step

TSYTS train stabling yards and turn-back sidings

walkway the walking surface upon which the ESAP is installed

1500V dc a 1500 V structure is a structure which has 1500 V equipment attached to it with insulators. This includes structures specifically designed for supporting overhead wiring and structures built for other purposes but also supporting overhead wiring, such as overbridges.

5 General design and fabrication requirements

An operational safety review and human factors safety assessment shall be performed on the stabling yard or sidings layout. The review is done to provide a safety assured design of access and egress walkways, track level crossings, ESAPs, safety fencing, lighting, signage, security, communications, signalling, civil, track and overhead power system infrastructure prior to development of new ESAPs. Refer to *Design Guidelines for the Upgrade and Construction of New and Existing Train Stabling Yards and Turnback Sidings*, Final version 1.0.

An operational and maintenance plan for the ESAPs shall be provided to the Rail Infrastructure Manager (RIM) for ongoing activities.

The design and fabrication of fixed platforms, landings, walkways and stairs shall comply with Section 5.1 through to Section 5.4.

5.1 Loading

Loading is discussed in Section 5.1.1 and Section 5.1.2.

5.1.1 General

Design loading shall be in accordance with AS 1657, AS/NZS 1170.0 and AS/NZS 1170.1. In locations where the loading due to wind, snow or earthquake is foreseen, then provisions shall be made for loadings in accordance with AS/NZS 1170.2, AS/NZS 1170.3 and AS 1170.4 respectively.

Floor design loads shall be comprised of the dead load of the designed structure plus one of the following minimum imposed loadings depending on which produces the most adverse effect:

a. Superimposed live loading of not less than 2.5 kPa uniformly distributed (vertical load).

b. Concentrated loading applied through a 100 mm x 100 mm pad of not less than 1.5 kN at any point with the greatest risk of failure, (vertical load).

c. Platforms shall be capable of supporting safety fixtures such as signage, barriers and extinguishers but need not necessarily be affixed with these items unless deemed necessary for the particular use case by the Asset Steward, (additional load).

d. Platforms shall be capable of physically supporting and providing the necessary services interconnections for amenity fixtures such as a sink, with associated cold water supply and drainage, but need not necessarily be affixed with these items unless deemed necessary for the particular use case by the Asset Steward, (additional load).

e. Platforms shall accommodate the load associated with general cleaning and inspection activities, which shall be assessed based on the specific equipment and method used.

5.1.2 Accidental impact load

The minimum accidental impact load shall be 30kN, applied as an ultimate design load (with a load factor of 1.0) distributed over a 1.5 m maximum length at any position along the ESAP surface support structure and separately acting either parallel to the track or normal to the track (at either inwards or outwards directions).

The AEO shall consult with the Asset Steward to identify the local operating conditions and perform a risk assessment to determine the risk associated with accidental impact loading. Subject to the outcomes of the risk assessment and endorsement by the RIM, the minimum accidental impact loading may exceed 30kN.

ESAPs shall be designed for a robustness load as nominated in accordance with Section 6 of AS/NZS 1170.0:2002. The following load cases shall be included:

- a load normal to the track acting towards the platform and applied simultaneously with the load parallel to the track applied at the end of the elevated platform in the most adverse position and direction
- a load normal to the track acting away from the platform and applied simultaneously with the load parallel to the track applied at the end of the elevated platform in the most adverse position and direction.

The accidental impact loads shall be applied at 1 m above rail level.

> Note: Loads in Section 5 have been nominated as the minimum value. The actual design loads would be a design decision based on these nominated load values and design loads from AS 1170 (all parts) and considering the proposed activities or particular site risks for the area of the platform. Additional barriers and special signage may also be needed to reduce risk of accidental impacts.

5.2 Slip resistance

Walking surfaces including steps, treads and platform floors, shall have a slip resistance level appropriate for the specific application and in compliance with T MU SS 90001 ST.

The minimum level of slip resistance for walking surfaces shall be equivalent to P4 Wet pendulum test classification / R11 oil-wet inclining platform test classification. Where slip resistance varies in one direction to another for a particular surface, for example some grid-style flooring, the minimum slip resistance of the surface in any direction shall meet the minimum prescribed level of slip resistance.

When selecting floor materials, designers are advised to take into consideration exposure to environmental conditions, oils, liquids, material build-up and sloping surfaces that will impact on the level of slip resistance.

Materials used for surfaces that have been certified as having acceptable slip resistance shall not be treated with a subsequent finish that degrades the slip resistance.

Notes:

- Guidance for identifying and reducing slip hazards is given in AS/NZS 3661.2 and SA HB 197.
- Test methods for slip resistance for existing and new surfaces are given in AS 4586 and AS 4663.

5.3 Headroom

The minimum clearance for headroom above ESAP floor level shall be 2400 mm. Minimum clearances for headroom shall not contravene clearance required for working safely under overhead wire structures.

Head clearance and access underneath ESAPs shall facilitate safe access for inspection and maintenance activities.

Where the minimum headroom clearances cannot be achieved, then other measures shall be taken to minimise the risk to ESAP users including one or more of the following:

- warning signage
- floor surface marking
- additional lighting.

5.4 Fixing of guardrailing components

All guardrailing components including posts, intermediate top rails, or infill panels shall be securely fixed to provide an integral structure.

6 Materials

Materials shall comply with the requirements of Section 6.1 through to Section 6.7.

Where listed materials in Table 1 are used in structural work comprising platforms, walkways, stairs, guardrailing and handrails, they shall comply with the relevant requirements of the listed Standards:

Table 1 – Materials used in structural work

Item	Material or Component	Standard
A	Aluminium	AS/NZS 1664.1 and AS/NZS 1644.2
B	Steel / or Similar	AS/NZS 4600, AS 3990 or AS 4100
C	Concrete	AS 3600, AS 1379
D	Fibre Reinforced Polymer	Refer Section 6.3
E	Welding	AS/NZS 1554.1, AS/NZS 1554.6 or AS/NZS 1665
F	Bolts	AS 1111.1 or AS/NZS 1252 (all parts)

Note:

For regulatory purposes, the National Construction Code takes precedence over these standards.

Timber products shall not be used in platform, landing, walkway or stair components.

Where required earthing and bonding measures shall be incorporated to mitigate touch potential.

The selection process set out in Figure 1 shall be applied to determine the most appropriate material for the construction of ESAPs. Depending on site specific requirements, the AEO designer may use aluminium, steel or FRP rather than the material determined from the aforementioned selection process, provided that:

- a whole of life cost assessment has been performed over a period of 60 years for the proposed material compared against the material identified from Figure 1
- the balance of the whole of life cost assessment and performance are in favour of the proposed material
- the proposed material satisfies all other relevant requirements of this standard.

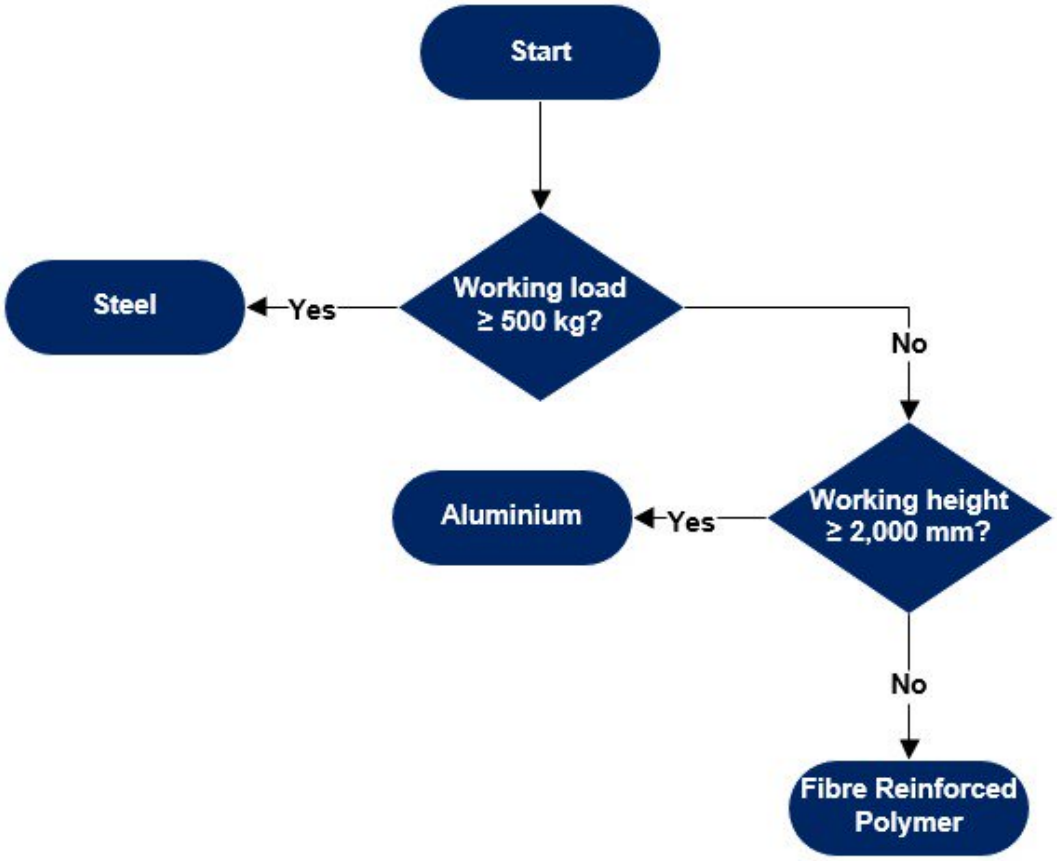

Figure 1 – Material selection process

6.1 Aluminium

Aluminium components in platforms shall comply with AS/NZS 1664.1, AS/NZS 1644.2 and AS 1657.

6.2 Steel

Galvanised hollow section steel pipe shall be hot-dip galvanised externally and internally in accordance with the requirements of AS/NZS 4680, AS/NZS 2312.2 and AS 4312.

Steel checker plate shall be galvanised with a thickness appropriate for the application and compliant with AS 1657.

Safety steel grating and expanded steel shall comply with AS 1657.

Steel structures shall comply with AS 4100.

Cold formed structural steel hollow sections shall comply with AS/NZS 1163.

Paint finish to steel shall comply with AS 2312.1.The selection of metals and finishes shall not lead to dissimilar metal reactions or galvanic corrosion. Refer to ISO 9223, ISO 9224 and ISO 14713.1.

6.3 Fibre reinforced polymer (FRP)

FRP materials shall meet the following requirements:

a. Components shall be certified by a suitably qualified engineer with competency in designing fibre composite structures.

b. Comply with relevant standards including the EUROCOMP Design Code and Handbook.

c. Resins shall be fire retardant FL-P22 isophathalic resin based, medium viscosity, high activity, maximum mechanical property polyester resin. Fire retardant FRP components shall be flame spread tested to a rating of 25 or less as required in ASTM E-84 Tunnel Test.

d. FRP components shall be Pultrusion processed.

e. FRP components shall be smooth, resin-rich, free from voids, and without dry spots, cracks, crazes or unreinforced areas.

f. UV resistant coating to be applied to all components, in accordance with testing standard ASTM G154.

g. Waterproof compound shall be applied to all cut or drilled FRP components.

h. All FRP hollow sections shall be reinforced with anti-crush inserts to provide adequate protection.

i. Unless required otherwise, all bolts, rivets and screws used on FRP components shall be Stainless Steel Grade 316.

6.4 Concrete

Concrete materials shall comply with relevant Australian Standards for the designated application and use.

Where concrete is used electrolysis effects shall be taken into consideration. Refer to T HR EL 12002 GU.

Concrete for footings shall be supplied and placed in accordance with TfNSW QA Specification R53. The basic requirements for concrete under Clause 2.4.1 shall be as follows:

a. Minimum strength grade = N32

b. Slump = 80 mm to 120 mm

c. Maximum nominal aggregate size = 20 mm.

6.5 Flooring materials

The following materials or their combinations are acceptable for use as floor surfaces in elevated platforms, landings, stair treads and walkways:

a. steel; grating, expanded mesh, and checker plate

b. aluminium; grating, expanded mesh and checker plate

c. concrete, cementitious slabs

d. fibre reinforced polymer (FRP) grating.

6.6 Guardrailing and handrail materials

Materials for guardrailing and handrails shall comprise one of the following:

a. galvanised steel pipe

b. aluminium sections

c. steel sections

d. FRP.

6.7 Toe-board and edge materials

Materials for toe-boards shall comprise one of the following:

a. steel plate

b. aluminium plate

c. FRP.

Toe-boards shall be fixed to the sides of platforms and landings where the height of the platform floor and spatial configuration within which the platform is installed poses a risk of objects falling onto areas below.

Toe-boards shall comply with the requirements of AS 1657.

7 Elevated safe access platforms

ESAPs are required at TfNSW stabling yards and turn-back sidings to enable persons including; drivers, guards, emergency staff, maintenance staff and cleaners, to gain safe access to crew compartments on stationary fleet to undertake maintenance and cleaning activities.

The design of ESAPs shall recognise that operational and timetabling needs change over time, and this leads to different fleets using existing sites for different purposes. ESAPs shall not be positioned such that they constrain future timetabling and maintenance opportunities where different or alternative fleets may need to be accommodated at existing TfNSW sites. ESAPs

shall be positioned such that they are effective for the largest possible selection of fleets and maintenance activities. The positioning shall include demonstrated consideration for fleets that do not currently operate into the particular location now, but may need to enter these locations in the conceivable future operation modes.

ESAPs that are fixed to footings shall allow for future relocation of the platform if required.

ESAPs shall comply with WorkSafe requirements for working at heights.

ESAP platforms, landings and associated stairs shall comply with the requirements in Section 7.1 through to Section 7.7 of this standard.

7.1 Performance requirements

Platforms shall achieve the following performance requirements:

a. Platforms shall be capable of providing safe, reliable and efficient level access for persons to access train crew compartments, without the need for a person to grab any supporting structure or fixture, where such persons may be staff, cleaners, maintenance or emergency persons.

b. Platforms shall comply with safe access and egress statutory provisions.

c. Platforms shall provide access to rolling stock roofs for maintenance and cleaning activities.

d. Platforms shall have fittings (guardrailing) to prevent falls from the platform floor and steps, except for the transition from the platform floor to rolling stock where the floor shall have a safety strip coloured ‘safety yellow’ along the platform edge adjacent to the train set. Refer TN 070:2016 for ‘safety yellow’ colour specification.

e. If required for specific project requirements guardrails with access gates may be installed along the platform edge adjacent to rolling stock to provide additional safety while allowing access to the stabled rolling stock – gates shall be in the closed position when rolling stock is not stabled.

f. Where the gap between the ESAP floor edge adjacent to rolling stock exceeds 172 mm then “Mind The Gap” safety warning signage shall be installed on the ESAP floor surface.

g. Platform floor surfaces shall be free-draining and resistant to the accumulation of liquids.

h. Platform floor surfaces shall be evenly laid with even surface levels between adjacent surfaces.

i. Apertures in grated flooring shall comply with AS 1657.

j. Platforms shall be readily visible for safety purposes when illuminated by external lighting.

k. Platforms shall not impede evacuation from the train, including emergency services.

l. Platforms may require safety fixtures such as signage, barriers and extinguishers. The inclusion of these items will be determined by the Asset Steward and statutory requirements.

m. Platforms shall be configured in a manner that meets site specific site and operational requirements of each stabling yard and turn-back siding location at which the platforms will be used.

n. Platforms shall allow train crewing operational requirements to be carried out including visibility to specific elements along the outside of the train and bogie wheels and ensure signalling can be achieved.

o. ESAPs shall be configured to allow access without constraining the ability of a person to install and remove equipment from the train and a cleaner to carry on and remove cleaning equipment.

p. Affected services, due to positioning of ESAPs, shall be rectified to ensure compliance with relevant standards.

q. Platforms shall be capable of satisfying the operational requirements set out in Section 16.

r. Platforms shall have a design life of not less than 60 years. FRP platforms shall have a design life of not less than 30 years. Refer to T HR CI 12002 ST.

s. The platform design requirements shall take into consideration human capabilities, limitations, and other characteristics in order to ensure a safe and fit-for-purpose asset in accordance with Section 3.1 of AS 7470:2016.

t. Platforms shall cater for the environmental conditions at each site in accordance with Section 15.

u. If required to be movable ESAPs shall be designed such that they can be moved or removed with minimum effort, and footings shall be designed such that the ESAP structure can be removed, and the remaining footing does not pose a safety, maintenance or operational risk. Wherever possible ESAPs within a site should have a consistent footprint and footing design so that ESAPs can be moved or removed should operational needs change in the future.

v. High grade UV structure surface protection shall be provided for durability.

w. Footing shall incorporate provisional conduits for waste and potable water pipes for future sinks and taps on ESAPs.

x. Corrosivity category shall comply with AS 4312.

Requirements for the provision of fire protection equipment on platforms shall comply with legislative requirements.

7.2 Platform supports

Platform supporting structure shall be as follows:

a. structures shall be free standing and not rely on adjacent structures for structural stability

b. structures shall be fixed so that the removal of any element will either not affect the structural integrity of the remaining platform sections or that the remaining elements can be supported by temporary structures until the removed element is replaced

c. fixings, methods of attachment, shall comply with the provisions of AS 1657 and AS 5216

d. where incorporated 'rag bolts' shall be exposed and the grout tapered away from the support, to prevent water ponding at the base of the post

e. 'rag bolts' must not create a trip hazard if ESAP's are relocated to a different position.

7.3 Platform lengths

Platform lengths shall comply with the following requirements:

a. ESAPs shall be of adequate length to accommodate varying rolling stock lengths which are stabled at each specific location.

b. For a stabling road facilitating a single 8-car set, the ESAP platform length may typically span between 5.5 m to 6.0 m. For stabling road facilitating stabling more than one 8-car set, the length of the ESAP platform will be required to span between the 1st car of the first train to the 8th car of the second train. The length will be dependent upon the separation gap between the trains – which may vary between sites. The ESAP platform between the 4th and 5th car crew compartment doors are preferred to be independent from each other, where possible. This is to allow access to the division / amalgamation area. Where site constraints prevent this, ESAP platforms shall be combined with an additional set of stairs leading to the division/amalgamation area.

c. ESAP along turnback roads will require an extension sufficient to allow train drivers and/or guards to witness the change of rear and front light colours (red to white, and vice versa). Platform length shall be continuous to accommodate both middle crew compartments.

7.4 Platform positioning

Platforms shall be positioned to comply with the following requirements:

a. Platform position enables train drivers to stop the train when the driver's shoulder is aligned with the location of the car marker or when the driver's door is aligned with the car marker.

b. Platform position enables persons to board and alight from crew compartments to the platform.

c. Platform position allows for access to crew compartment doors for eight (8) car set positions in existing stabling yards and turn-backs.

d. Platform position allows for access to crew compartment doors for ten (10) car set positions including NIF trains, for new stabling yards and turn-backs.

e. Platform shall provide level access with crew compartments. Where level access cannot be achieved for specific rolling stock, then a safe means of transition from platform to crew compartments shall be provided.

f. Gap between crew compartment door and ESAPs coping edge shall be reduced to SFAIRP.

g. The platform design and position shall not interfere with established operational lines of sight requirements. Glare, reflections and line of sight requirements shall be in accordance with Section 3.8 of AS 7470:2016.

h. Platform position shall be coordinated with existing structures and services including columns, pits, drainage, light poles, sewer drainage lines, signalling equipment, electrical services and hydraulic services.

i. The direction of travel of the platform shall be parallel relative to the alignment of rolling stock carriages.

j. Platforms shall not facilitate climbing (particularly to OHW structures).

k. Where required at specific locations ESAPs shall be designed to facilitate safe access to MTPVs, grinders and other infrastructure equipment to facilitate maintenance and cleaning activities.

7.5 Platform dimensions

Platform dimensions shall comply with the following requirements:

a. Systems Requirements Specification or, in the absence of a Systems Requirements Specifications, the Project Design Brief.

b. Platform length to comply with Section 7.3.

c. Platform floor height shall comply with Section 7.4 of this standard and ESC 215.

d. Platform width shall be a minimum 760 mm, (1200 mm wide preferred), however may be increased as necessary to accommodate the physical configuration of the local site requirements, space and service requirements for safety and amenity fixtures, and subject to (e) and (f) requirements.

e. Platform width shall not encroach upon the vertical plane extending from the edge of the walkway surface.

f. Platform widths shall consider requirements in T HR RS 00100 ST Section 2.3 and in particular the details of the various rolling stock outlines.

g. For information regarding gap dimensions between the platform and car including determining if a gap filler is required to accommodate the various rolling stock fleets (for example, V Sets are narrower than OSCars), refer to T HR RS 00100 ST.

7.6 Platform stairs and landings

Stairs to elevated platforms shall provide access to the platform floor leading to the driver and guard doors and may also be required to provide access to the roof of the train set. Access to the roof of the train set may be by a continuation of a single set of stairs to the platform floor or a second set of stairs from the platform floor.

Stairs to elevated platforms shall have the following attributes:

a. Stair width shall not be less than 650 mm clear between handrails (700 mm preferred) on the sides not directly adjacent to the train set.

b. Slope between stairway stringers and horizontal shall be not less than 20 degrees and not greater than 45 degrees, (with 30 degrees to 38 degrees preferred).

c. Number of risers in a flight of stairs shall comply with AS 1657.

d. Stairways exceeding 36 risers shall comply with AS 1657.

e. Risers and goings shall comply with AS 1657.

f. Nosing shall be clearly visible against background and adjacent surfaces.

g. Stair handrails shall comply with AS 1657.

h. Handrail ends shall be turned down to form end so that ends to not create catch point for bags and equipment.

i. Landings shall comply with AS 1657.

j. Slip resistance to stair treads shall comply with Section 5.2 of this standard.

If required by the RIM, incorporate closing gate at top of stairs opening inwards to the platform.

Stair locations shall take into consideration emergency assembly points.

7.7 Platform anchoring

Platforms shall be anchored to structural footings with the following requirements:

a. Platform structures shall be fixed to concrete pad footings, designed to relevant Australian Standards and certified by a structural engineer.

b. Platform structures shall be fixed to concrete pad footing in a manner that allows for the platform to be disassembled in a non-destructive manner and relocated to different positions when required. The remnant footing shall be flush with surrounding floor level.

c. Geotechnical investigations shall be carried out to determine foundation characteristics.

d. FRP platforms shall incorporate FRP base plate and anchored to concrete footings, designed to Australian Standards and engineer's details.

e. Allowance is to be made for sloping or uneven walkways (upon which the platforms are installed), so that the platforms are safe for use and can provide level access to the train set.

f. Top of structural footing shall not create a trip hazard or encroach into walkways.

g. Top of structural footing shall be flush with surrounding floor level.

h. Platform anchoring including base plates shall be above the defined 1 in 100 year flood level of the site.

8 Transit space requirements

ESAPs shall be designed to the platform kinematic structure gauge requirements as described in ESC 215.

ESAP platform height shall comply with ESC 215.

ESAP lateral clearances shall comply with ESC 215.

Where reduced lateral clearances are deemed applicable (or required), written permission shall be sought from Asset Management Branch by means of a request for concession application.

9 Electrical services requirements

9.1 Low voltage

Electrical installations shall comply with T HR SS 80002 ST and T HR EL 12004 ST.

Electrical safety requirements within the stabling yard and turn-back shall be assessed to ensure the electric traction system does not present health or safety risks to persons using the ESAPs.

9.2 Earthing and bonding

Platforms shall be non-conductive to mitigate the risk of touch potential to staff.

If conductive materials are used, then an earthing and bonding risk analysis and bonding design shall be carried out. Appropriate earthing and bonding measures shall be incorporated to mitigate the risk of touch potential to persons using the platforms. Refer to T HR EL 12005 ST.

The earthing and bonding arrangement for the safe access platforms including equipotential bonding requirements, selection of material for handrails and other conductive components shall be selected in consideration of the bonding strategy for the stabling yard and siding facility. Refer to T HR EL 12005 ST for further information regarding bonding strategies. Where deviations from earthing and bonding arrangements are sought, written permission shall be sought from the Asset Management Branch.

Electrically isolating plates (similar to Sustarin) shall be provided at all steel to concrete interfaces.

Where required, in locations outside the electrified network, earthing and bonding shall address specific location requirements.

Deviations from earthing and bonding arrangements shall be subject to concession application.

9.3 Lighting

Lighting shall be provided to ensure adequate illumination for safe access, movement, and operational or maintenance activities within the vicinity of proposed ESAPs. Lighting of the platform shall comply with the requirements of lighting subcategory PA1 as defined in AS/NZS 1158.3.1. All other lighting shall comply with T HR SS 80001 ST. Glare and reflections on car markers, walking surfaces and other equipment used on and around the platform shall be eliminated where feasible. Where elimination of glare and reflections is not feasible, then glare and reflections shall be minimised SFAIRP in accordance with Section 3.8 of AS 7470:2016.

All lighting installed on the platform shall be double insulated. All emergency lighting shall comply with T HR SS 80003 ST.

10 Hydraulic services requirements

Hydraulic services include water supply, drainage and fixtures and may be required for cleaning or emergency wash-down purposes.

Internal cleaning of trains is a manual cleaning process undertaken using buckets, mops and hand cleaning techniques. Generally small quantities of water and chemicals are used. Cleaning stations are required to have lighting over the cleaning station, cold water access, sink and fixtures, wastewater disposal and drainage.

Platforms shall be capable of draining towards an existing drainage pit, interceptor or the like or be capable of being fitted with a means of directing drainage accordingly.

Platforms may incorporate amenity fixtures such as a sink, with associated cold-water supply and drainage. The inclusion of these items will be determined by project requirements.

Hydraulic systems shall comply with NCC, volume three and be designed, installed and operated in accordance with AS/NZS 3500 (all parts).

10.1 Cold water supply

Cleaning stations including sinks are required along one side of a train and may be located at or in the direct vicinity of the elevated safe access platform. The provision of hot water is not required. Cold water supply pipework and fittings shall be non-conductive.

10.2 Drainage

Wastewater from the platform, including hydraulic fixtures on the platform, is required to be disposed of via the wastewater system. Drainage fittings shall be non-conductive. Discharge of wastewater onto the ground is not allowed.

Drainage system shall not allow blockages due to cleaning processes such as mopping activities.

10.3 Fixtures

Hydraulic fixtures may only be installed at a platform where there is an existing wastewater system at the site and provision for drainage from the platform to the system. The means of drainage shall be via a piped system.

Where a piped wastewater system is available, then hydraulic fixtures may be provided. Where a piped wastewater system is not available and wastewater is discharged to the ground, then fixtures are not permitted.

Where showers and eyes wash for chemical spills are required at the platform, these shall be as follows:

a. Positioned within a well illuminated area to ensure good visibility of the equipment.

b. Positioned not on the platform floor, stairs or within 700 mm of the stair landing.

c. Positioned to avoid obstructing the walkway safe access zone and to satisfy rolling stock kinematic clearance requirements.

d. Positioned to satisfy the structure gauge clearance.

e. Positioned in accordance with Section 6.8.4 of *Design Guidelines for the Upgrade and Construction of New and Existing Train Stabling Yards and Turnback Sidings*.

Only water efficient appliances shall be used as stipulated in *TfNSW Sustainable Design Guidelines* version 4.0.

11 Rolling stock requirements

ESAPs shall be capable of providing safe level access for persons to access the rolling stock at the stabling yard and turn-back sidings, without the need to for a person to grab any supporting structure or fixture. For examples of dimensions of rolling stock, refer to RS00_0000_00MP. It is incumbent upon the designer to ensure that the current dimensions of relevant rolling stock are confirmed.

ESAPs, including any permanently and/or temporarily attached equipment, devices, and tools used for cleaning and similar activities, shall comply for rolling stock clearance purposes with ESC 215 over the platform's life cycle.

Medium electric rolling stock shall typically be considered for use within metropolitan stabling yards.

Trip cock access is required at each end of trains (end wheelsets). Access is required on an elevated (pit) road with access for suitable lifting equipment. Estimated mass circa 40 kg.

All ESAPs shall be on the RIM's asset register as an asset class allocated to each TSYTS.

ESAPs technical maintenance plan shall be developed in accordance with T MU AM 01003 ST.

Specific fleet may include access hatches positioned under door locations. ESAPs shall allow for these hatches to be opened while the train is stabled.

The design consultant shall request design track alignment from the Asset Steward (if available).

For Sydney Trains assets, the TMC for this asset will be "AR09130200". The design, system and equipment description will be ESAP safe access platform. The Project name will be ESAP safe access platform TMP.

For any new ESAP asset, an evaluation of whether it will have the same TMC, (AR09130200), will need to be carried out as part of the TMP development process. However, if the new ESAP has the same MRA and TMP as existing ESAPs then the TMC will be the same. If, however differences in functionality, design or development are noted, leading to a new MRA, then a new TMC will be required.

The design consultant shall refer to rolling stock general arrangement and assembly drawings, and other reference drawings that is, cab arrangement and assembly and structural assembly drawings.

The design consultant shall also requirements for door height variations due to wheel diameter that is, new versus worn wheels, car lengths, car configurations and door locations as these items vary between fleets for example, to provide access to driver and guard cabs, trains will require a platform at car positions as follows:

- Tangara – 1, 4 and 5, and 8

- Waratah – 1 and 8
- NIF (if operating in driver only operation) – 1 and 10
- NIF (if operating with a customer service attendant) – 1, 4 and 5, 6 and 7, and 10.

Specific requirements relating to diesel fleet (rolling stock) shall be incorporated if required at specific locations.

12 Communications and control systems requirements

Communications requirements on elevated platforms shall comply with relevant Australian Standards and TfNSW Standards. For specific project requirements, confer with TfNSW Telecommunications Engineering, Asset Management Branch.

13 Car marker positions

Car markers shall be positioned on the platform and have the following requirements:

a. 8-car marker location derived from the optimum outcome of the track circuits and in consultation with Train Crewing Operation Readiness and the Signalling teams.

b. For existing stabling yards and turn-back sidings requirements the following applies:

   - Car marker requirements including car marker post shall comply with eight (8) car marking positions
   - TfNSW Standard ASDO Trackside Design Guidelines v2.1.

c. For new stabling yards and sidings:

   - Car markers requirements shall comply with NIF fleet requirements, 10 car marking positions.

14 Walkway requirements

Whilst the scope of this standard is limited to ESAPs, consideration shall be given to any limitations or risks associated with walkways which shall be addressed either by modification of the ESAP design or installation or remediation of the walkway.

The following are the performance requirements of walkways which, if not achieved, shall be addressed by either modification of the ESAP design or installation or managed in consultation with Asset Management Branch:

a. Walkways shall be sealed and provide access to each ESAP.

b. Walkways shall be adequately drained to prevent water or liquid ponding on surfaces.

c. Walkways shall be delineated by yellow lines and signage. Yellow lines shall be painted on the walkway surface in line with the train's kinematic outline requirements.

d. Walkways shall have lighting to enable safe access to the ESAP. The walkway shall be constructed to minimise the opportunity for people to suffer from slips, trips or falls.

e. Walkways shall be slip resistant in accordance with T MU SS 90001 ST.

15 Environmental and heritage requirements

Stabling yards and turn-back sidings environmental and heritage requirements shall comply with the following:

a. Environmental requirements in accordance with T MU EN 00005 ST.

b. New and upgrade works within heritage precincts, buildings or other environments shall comply with relevant legislative requirements.

16 Operational requirements

Operational requirements shall comply with the following:

a. The essential operational requirements of ESAPs are to provide safe, reliable and efficient access to crew compartment carriages by staff, cleaners and persons carrying out maintenance activities.

b. Existing stabling yards and turn-back sidings will cater for eight (8) car sets; including 192 m length eight (8) car double deck intercity trains and 163 m length eight (8) car double deck suburban trains.

c. New stabling yards and turn-back sidings will cater for NIF 10 car sets.

d. ESAPs shall be capable of being in operation seven days a week.