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NR/L2/TRK/001

Module 18

Buffer Stops and Train Arresting Devices

Inspection, Maintenance and Risk Assessment

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Issue record

Issue	Date	Comments
5	June 2012	Modular document created
6	December 2016	Specifies fixed; sliding/friction; hydraulic buffer types and operational risk assessments
7	September 2021	Specifies additional requirements for operational risk assessment; cross references other documents with requirements for risk assessment of buffer stops. Includes definition of Buffer Stop as a Stop Signal.

Reference documentation

NR/L2/TRK/001	Inspection and Maintenance of Permanent Way
NR/L2/TRK/2012	Design and Construction of Track
NR/L2/MTC/10662/05	Process for the creation of new or revised maintenance regimes using Reliability Centred Maintenance (RCM) Module 5 Track end to end process
NR/L3/TRK/002/F28	Track Maintenance Handbook – Inspection of buffer stops
NR/L3/TRK/003	Index of Track Engineering Forms
NR/L3/TRK/003/TEF3028	Inspection of Buffer Stops (NR/WI/TRK/003/TEF3028)
NR/GN/TRK/7001/TWI2G071	Track Work Instruction 2G071 How to maintain buffer stops
NR/GN/TRK/7001/TWI2G075	Track Work Instruction 2G075 How to maintain sand drag
RIS-7016-INS Issue 1.1	Interface between Station Platforms, Track, Trains and Buffer Stops
RIS-7058-CCS	Lineside Signals and Indications
GIGN5633	Recommendations for the Risk Assessment of Buffer Stops and End Impact Walls

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1 Scope

This module of NR/L2/TRK/001 and the associated TEF 3028 applies to:

a) Fixed buffer stops;

b) Sliding/friction buffer stops;

c) Hydraulic buffer stops;

d) Combined friction/hydraulic buffer stop;

e) Sand drags; and

f) Those who assess the risk from rail vehicles overrunning a buffer stop.

Note: Design and Installation requirements are incorporated within NR/L2/TRK/2102 Design and Construction of Track.

2 Purpose of a Buffer Stop

The purpose of a buffer stop is:

a) to identify the “Limit of Movement Authority” to the driver of a rail vehicle.

b) to dissipate energy and arrest the movement of a rail vehicle which passes the Limit of Movement Authority;

c) to protect passengers and train crew in the event of an overrun of a terminal line;

d) protect staff, members of the public, and structures within the buffer stop Overrun Risk Zone from the effect of an overrun of a terminal line; and

e) protect trains on adjacent running lines in the event of an overrun of a terminal line.

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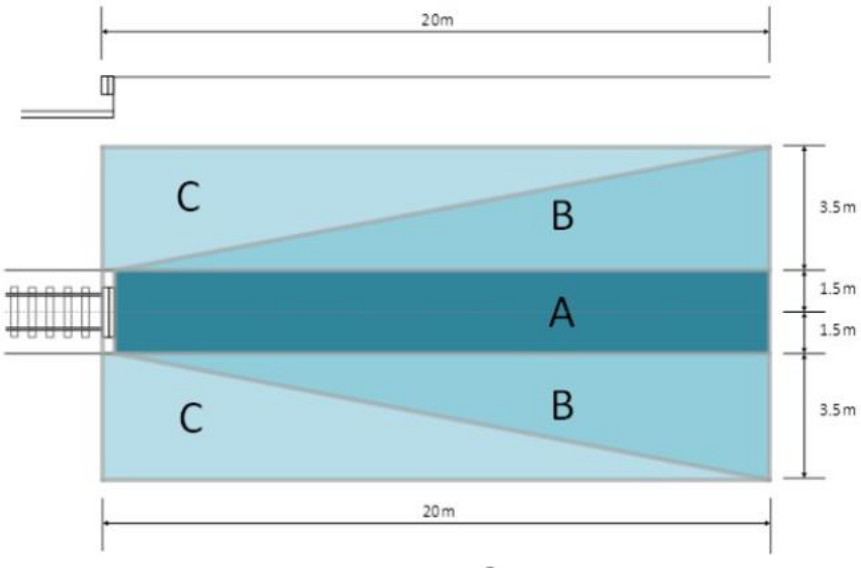
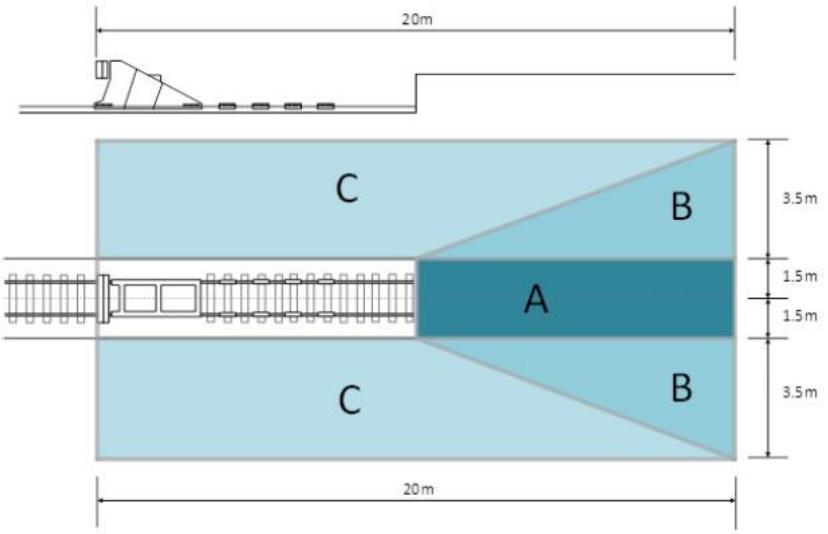
3 Definitions

Term	Definition
Buffer Stop / Arresting Device	The term applies to the following variants a) fixed buffer stops; b) sliding/friction buffer stops; c) hydraulic buffer stops; d) combined friction/hydraulic buffer stop; e) sand drags.
Combined Friction Hydraulic Buffer Stop	A device designed with a friction head (inside a galvanised tube) to absorb impact forces without moving the buffer stop.
Corrective Maintenance	A maintenance task to rectify a fault so that the equipment or system can be restored to an operational condition within the tolerances or limits required. Examples of corrective maintenance are: treatment of rust; correction of track componentry; repositioning of buffer stop to original position and restoring resistance devices; replacement of damaged components (including ineffective rail joints) which may render the buffer stop ineffective, for example cracked/split timber; damaged rubber faceplate, retaining angles or bent plates preventing alignment at interface with the train couplings.
Frangible Platform or Decking	A frangible platform is designed to collapse in a controlled manner as a result of impact, usually from sliding or friction buffer stops. *NOTE: Frangible decking is formed from a number of decking units supported by beams. When impacted by a buffer stop, the beams guide the decking units and allow them the move freely and smoothly with the buffer stops.*
Operational Risk Assessment	A recommended method to identify and assess the adequacy of a buffer stop for its' location and operating parameters (based upon RSSB GIGN5633 Recommendations for the Risk Assessment of Buffer Stops, Arresting Devices and End Impact Walls).
Overrun Risk Zone	The area beyond the buffer stop based on the assumption that, in most cases, a train overrun at a buffer stop will travel in a straight line (area A), in some cases, the train may deviate from

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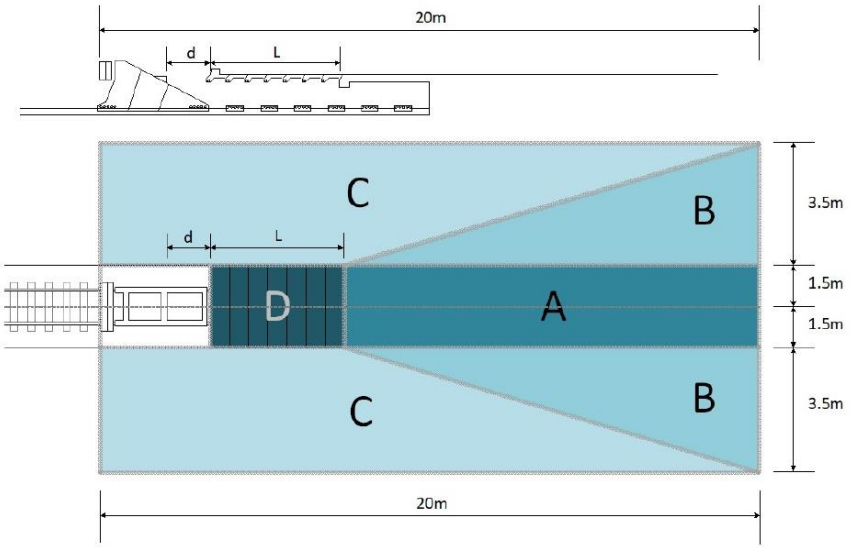
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	a straight line (area B) and, in a few cases, the train may jack-knife (area C). The overrun risk zone extends 20m behind the face of the buffer stop and 5m either side of the projected centre line of the track approaching the buffer stop.
	 Overrun risk zone for a fixed buffer stop (not to scale)
	 Overrun risk zone for energy absorbing buffer stop (not to scale)

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	 Overrun risk zone for an energy absorbing buffer stop with frangible decking (not to scale)
Preventative Maintenance	A maintenance task involving the systematic inspection of equipment where potential problems are detected and corrected in order to prevent equipment failure before it happens Examples of preventative maintenance are: greasing and re-torque of clamp/web fixing bolts; clearance of debris; replacement of loose or missing fastenings (usually carried out during the inspection); inspection of buffing tip for damage.
Reliability Centred Maintenance	Analysis techniques used to develop scheduled maintenance plans that provide an acceptable level of operability, with an acceptable level of risk, in an efficient and cost-effective manner.

4 Register

Maintain a register (in an approved corporate system) of all buffer stops. Include a description of the type of buffer stop (fixed, sliding/friction or hydraulic etc), for each location, in the register.

5 Operational Risk Assessment

Section 11 of Rail Industry Standard RIS-7016-INS (Requirements for Buffer Stops and End Impact Walls) requires that a risk assessment is in place to determine whether the buffer stop or arresting device is adequate for its location.

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The annual maintenance inspection TEF3028 contains operational risk assessment criteria which provide early indication whether:

a) the buffer stop or arresting device is adequate for its' location.

b) risks arising from potential buffer stop collisions are being adequately managed.

The operational risk assessment criteria shall be recorded on TEF3208 and where any are indicated, shall be submitted via the TME to the Route Engineer [Track].

The Route Engineer [Track] shall review TEF3028 and determine if there is a requirement for a Full Operational Risk Assessment using the criteria within Rail Industry Guidance Note GIGN5633 for all buffer stops or arresting devices in;

a) terminal stations;

b) bay platforms of through stations; and

c) assets located on running lines and sidings:

(i) where there is a requirement to protect trains on adjacent running lines in the event of an overrun of a siding; or

(ii) where there is risk to persons or property beyond the railway boundary in event of a buffer stop overrun.

***NOTE 1**: Fixed buffer stops are not designed to absorb energy. If there is a risk determined within the above locations, then generally, a fixed buffer stop is not the right device to use.*

The risk assessment shall address:

a) risk of harm to people;

b) risk to critical structures;

c) risk of collision with traffic on adjacent running lines or sidings;

d) the provision of end impact walls;

e) the type and condition of the buffer stop or arresting device provided;

f) any history of buffer stop collisions at that location; and

g) type of rail vehicles permitted.

***NOTE 2:** Particularly if there is a mix of new rolling stock, fitted with Dellner type couplers, and rolling stock fitted with old Buckeye, Tightlock or BSI couplers.*

***NOTE 3**: Rolling stock manufacturers are fitting Dellner type 10 couplers at various heights (from top of rail to c/l of nose cone). This affects the impact area of buffer stops and therefore it is important to note buffer stop locations with mixed rolling stock use.*

The Rail Industry Guidance Note GIGN5633 Rail-Risk-Toolkit/Buffer-stop-Assessment-Tool) gives an overall risk weighting factor that may be used to prioritise removal or mitigation of all identified risks.

***NOTE 4**: The responsibility for confirming that these assessments are in place is currently with the Route Engineer [Track].*

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6 Inspection

6.1 Record of inspections

Record inspections on TEF3028. The Section Manager [Track] (SM[T]) and Maintenance Engineer [Track] (TME) shall review the inspection reports to determine and prioritise the actions needed to address the faults identified.

6.2 Frequency

Inspect every buffer stop once per year unless this frequency is varied by new or revised track maintenance regimes developed using Reliability Centred Maintenance (RCM) analysis.

6.3 Features to be observed

Inspect and record on TEF3028:

a) Buffer Stop Operational Risk Assessment Criteria;

NOTE 1: *E.g. Type of track; falling gradient; lineside neighbour information.*

b) evidence of collision damage since the last inspection;

c) general condition of the unit, including paintwork;

d) condition and operation of warning lights;

e) factors affecting the ability of the buffer stop to function correctly in the event of impact;

NOTE 2: *E.g. any vegetation, debris or stored/scrap material.*

g) condition of the track and rail joints within the overrun risk zone, which shall be kept clear of material and scrap;

NOTE 3: *To prevent vehicles being guided towards the running line);*

g) torque of bolts;

h) if visible or known at time of inspection; the combination of rolling stock/coupler type using the track upon which the buffer stop is located.

6.4 Special requirements for sliding/friction buffer stops

The inspection of sliding/friction buffer stops shall include, in addition to those features observed in 6.3:

a) the condition of holding-down bolts;

b) cleanliness of the running rails in the slide path;

c) any obstructions; and

d) any build-up of debris trapped within the enclosed area.

NOTE*: A combined Friction Hydraulic Buffer Stop is designed to have 40 year maintenance cycle and is maintained by the manufacturer. Evidence of device failure will be the buffer beam being tight against the face and possible evidence of oil leakage.*

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7 Following any report of buffer stop collision

7.1 Assessment

See Figure 1 for sequential steps and decisions required.

Inspect, record on TEF3028 and report to Section Manager/Supervisor who shall notify, in the first instance, the Track Maintenance Engineer who shall contact:

a) the Route Engineer [Track] for a review of the operational risk assessment following any report of buffer stop collision;

b) the Route Engineer [Signalling] to assess the requirement to re-sight the buffer stop/buffer stop lighting;

c) the Route Engineer [EPME] to assess hydraulic or power damage (if hydraulic buffer stops have been affected/if any OHLE structure has been affected); and

d) the Route Engineer [Buildings and Civils] to assess impact on the frangible platform or decking system or any structure which may have been affected.

7.2 Temporary arrangements

Temporary Arrangement for operational reinstatement (agreed with Operational Control/TOC/FOC) may be required if full restoration of system functionality is not possible.

Any temporary arrangement shall be subject to the operational risk assessment rationale using the criteria within GIGN5633.

8 Sand drags

Inspect to confirm that:

a) sand is to the top of the retaining boards;

b) the sand has a soft top surface layer;

***NOTE**: if the filling is hard and compacted it will not sufficiently retard the travel of a rail vehicle).*

c) the extent of the sand drag is clear of any vegetation, debris or stored material.

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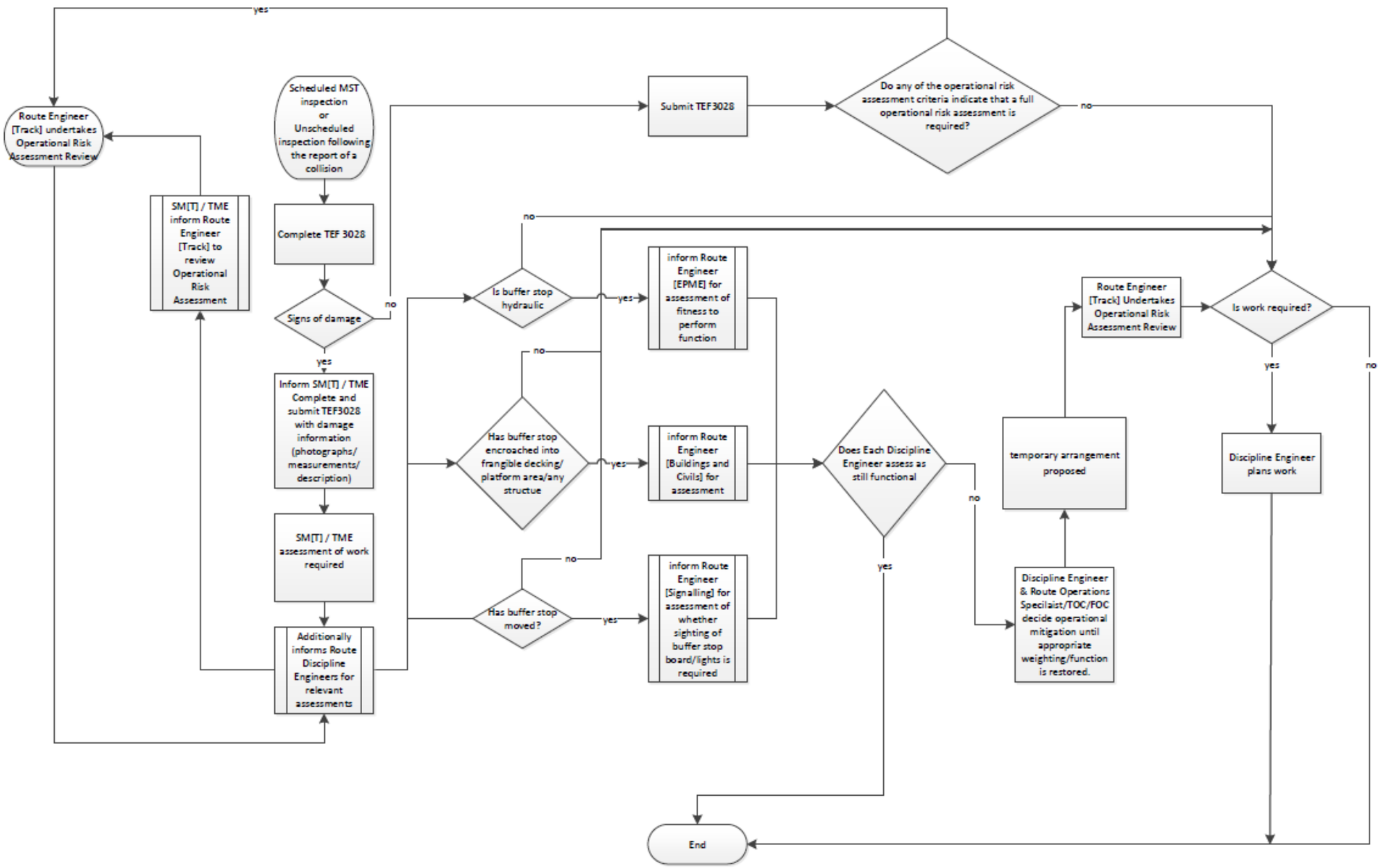


Figure 1 Buffer Stop Inspection Process Flow Chart

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9 Maintenance

Undertake buffer stop preventative and corrective maintenance, identified by inspection.

Undertake corrective maintenance to the installation design / manufacturer's recommendations (where these are available).

The design/installation will be unique to the location.

If the manufacturers O&M manual is not available, it may be traced using the unique ID/name plate.

- Rawie Friction Buffer stops have a data plate located on the RH facing side of the Buffer Stop and are generally defined by BE xxxxx and Fixed Buffer stops by FP xxxxx.
- Progress Rail / Balfour Beatty Buffer stops have a nameplate on the main body which will state the serial number and other information specific to the location/site conditions.
- For Rail-built buffer stops, the operational risk assessment will identify its fitness for the site conditions.

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