Division / Business Unit: Safety and Systems
Function: All Disciplines
Document Type: Procedure

Permanent Speeds

EGP-37-01

Applicability

ARTC Network Wide

SMS

Publication Requirement

Internal / External

Primary Source

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.0	17 Jun 24	Standards	Stakeholders	Manager Track & Civil Standards	Head of Engineering Standards 18/06/2024

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	17 Jun 24		First issue of document. Intended to ensure the Permanent Speeds are consistent with infrastructure rating and are rationalised as to be meaningful to rail traffic operations. It is applicable when there is a change to infrastructure that impacts the speed rating.

Table of Contents

Table of Contents **2**
1 General **3**
1.1 Purpose 3
1.2 Scope 3
1.3 Procedure Owner 3
1.4 Reference Documents 3
1.5 Definitions 3
2 Determining Permanent Speed **4**
2.1 Sub Systems Data to be Collected. 4
2.2 Combination of Data 5
2.3 Rationalising of Speed 7
2.4 Double and Bidirectional Track 8
2.5 Accommodation of Different Traffic Classes 9
2.6 Cross Overs, Turnouts, Crossing Loops, Goods Loops, Sidings & Yards 9
2.7 Change Requirements 9

1 General

1.1 Purpose

The Permanent Speed is the maximum permissible speed of the railway infrastructure at a given location. The Permanent Speed accounts for limits in track, civil and signalling design. Actual operational speeds will often be lower due to braking and acceleration or other rollingstock limits and safe working rules and TSRs.

This procedure is intended to ensure the Permanent Speeds are consistent with infrastructure rating and are rationalised as to be meaningful to rail traffic operations. Further this procedure seeks to support network wide consistent recording and posting of permanent speeds.

This procedure does not replace the requirements of track and civil or signalling system design.

1.2 Scope

This procedure covers the determination of appropriate permanent track speed. It is applicable where there is a permanent change to infrastructure that impacts the speed rating.

1.3 Procedure Owner

The Head of Engineering Standards is the Procedure Owner. Queries should be directed to standards@artc.com.au in the first instance.

1.4 Reference Documents

The following documents support this procedure:

- ARTC Track and Civil Code of Practice ETS-05-00 Track Geometry
- ARTC Track and Civil Code of Practice Section 11 Railway Operating Signs
- ARTC Signalling Procedures
- ARTC Route Access Standard (RAS)
- ARTC Network Rules and Procedures
- EGP-03-01 Rail Network Configuration Management
- EGW-03-01 Using Network Alteration Notices (NANs) for Configuration Change Management
- EGW-03-02 Using Ellipse for Configuration Change Management

1.5 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
ARTC	Australian Rail Track Corporation Ltd.
RAS	Route Access Standard
LRS	Linear Referencing System

2 Determining Permanent Speed

When there is a permanent change to infrastructure that impacts the design speed rating the permanents speeds shall be reviewed in accordance with this procedure.

Permanent speeds may be reviewed using this procedure at any time.

2.1 Sub Systems Data to be Collected.

The following information of the railway sub systems should be collected for the track impacted by the change:

- The rating of the track geometry and turnouts.
- The speed rating of the signalling.[1]
- The maximum speed found under route capacity on the section pages of the RAS.
- The rating of passive at grade crossings (including pedestrian crossings). [2]

1. *Rating of the signalling system shall include signal sighting and active road crossing system interfaces.*
2. *Passive crossing speed rating shall be determined on the outcome of an evaluation in accordance with level crossing standards. The speed will be applicable for the entire sighting distance on the approach. The information should be collected for each direction.*

The information should be tabulated and recorded against the mainline kilometrage consistent with the LRS (linear referencing system).

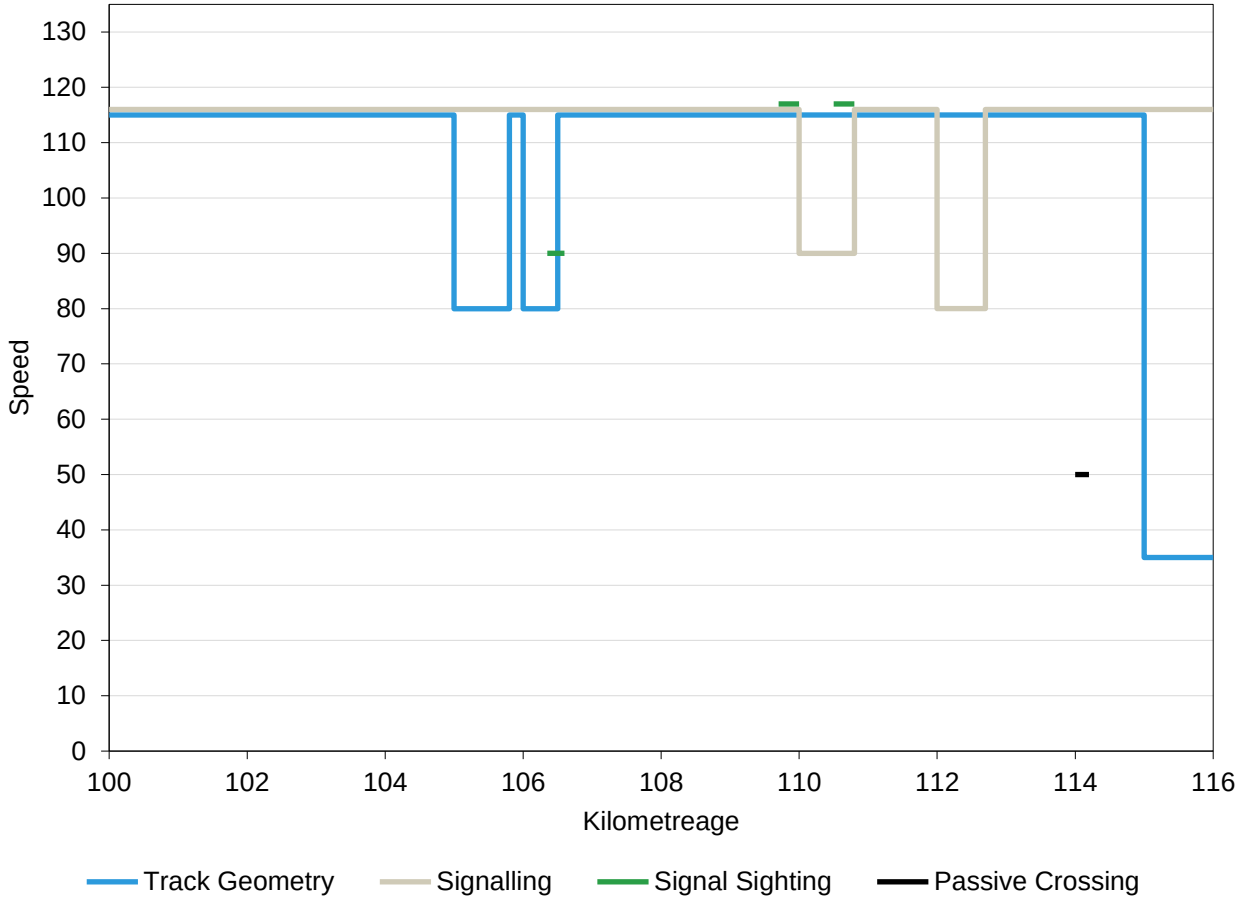
Speeds may be reduced for further reasons such as:

- permanent hazards and known risks.
- heritage structures

2.2 Combination of Data

The data should be charted. By charting the system rating data, it is easy to identify the potential maximum posted speeds.

The speed rating for a subsystem may be different in each direction. For instance, sighting limitation may apply on the approach to an asset or braking distances are different up and down grades.



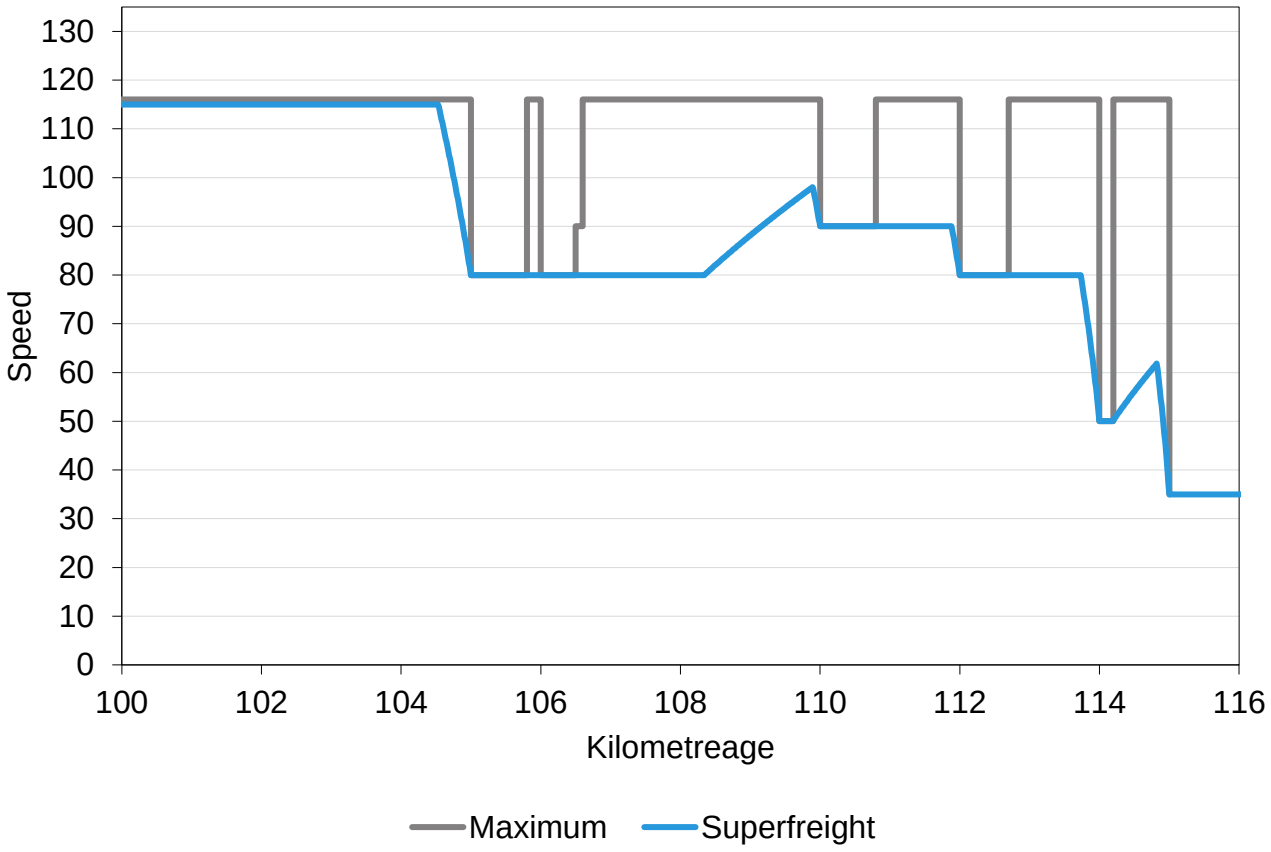
Example Data Figure 1

The example represents a re-rating of legacy infrastructure in the down direction. In the example the route speed is 115 km/h. The track geometry speed is limited at three locations due to curves.

The signalling system speed is limited at two locations in accordance with standards, one for a level crossing warning time and another to match braking distance to signal spacing.

Signal sighting has been included for three locations. Only one is less than the route speed.

A passive level crossing at the 114km has limited sighting which is only safe for 50 km/h.



Maximum Potential Speed Figure 2

Figure 2 shows the maximum permanent speed following the combination of data. It can be seen there are many changes of speed, some within close proximity, some small some large. Such a speed profile lacks practicality. Modelled maximum performance for an 1800m train is shown in blue. Actual train speed is likely to be less.

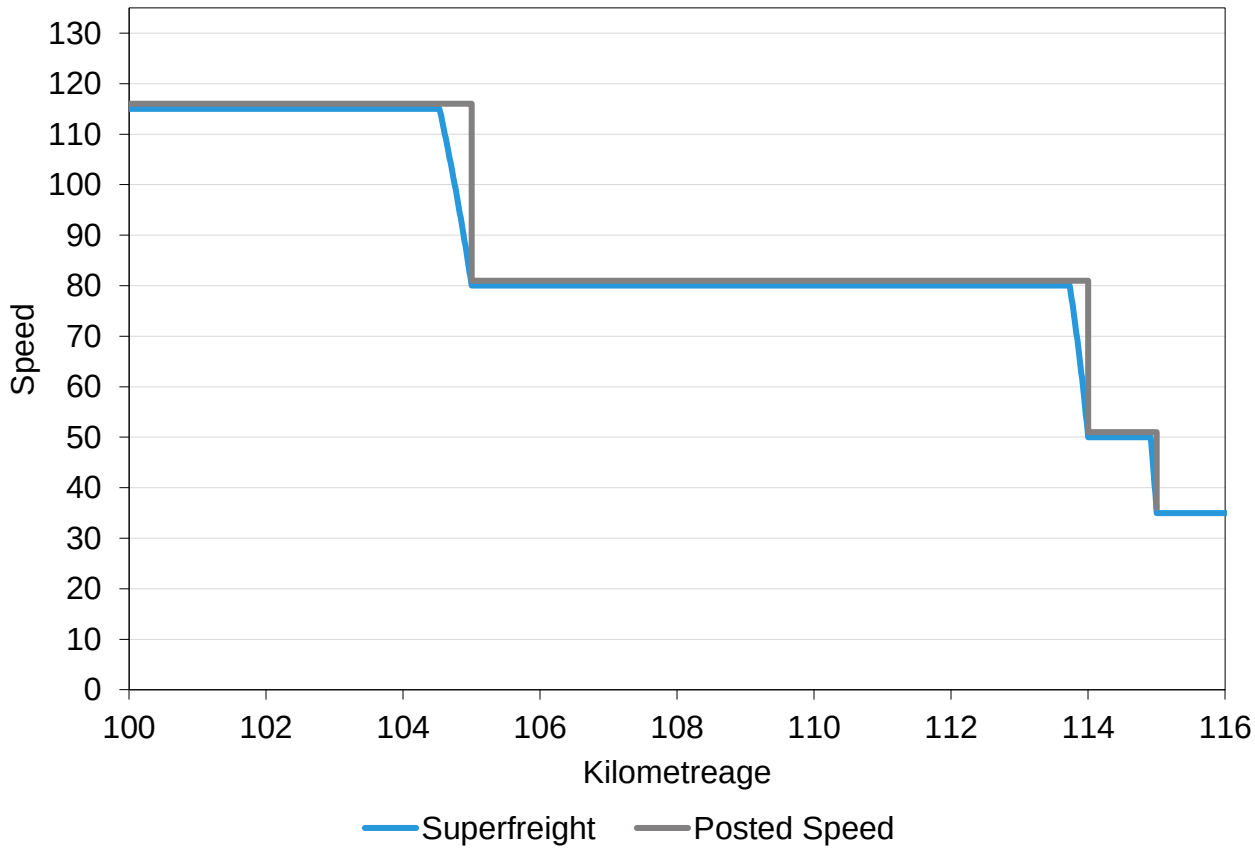
2.3 Rationalising of Speed

The permanent speed shall be equal to or less than the maximum permissible speed of each of the subsystems except in instances where all the following conditions are met:

- Train operational speed for potential rollingstock cannot exceed sub system ratings.
- Sub system ratings have resulted in close changes of speed.
- Posted signage is of no practical value to rail traffic crews.
- Significant transit time would be lost by posting a lower speed.

An example may be a curve followed by a tangent where the curve rating is 60km/h and the following tangent 115km/h. 200m into the tangent there is a passive crossing where sighting limits the speed on its approach to 90 km/h. Further along is a steep grade making it difficult for trains to gain speed. Here it is acceptable to post the permanent speed as changing from 60 to 115 at the tangent point.

Although some ratings may only be applicable to the front of train, such as for signal sighting. Posted permanent speeds are adhered to for the length of the train.



Rationalised Permanent Speed Figure 3

Figure 3 shows a possible rationalised posted speed complying to the limitations shown in figure 2. The train would take around 30 seconds longer to cover this distance and saves 40L of fuel as compared to figure 2. A passenger train however could lose 80 seconds and an alternate solution with more speed changes may be appropriate.

A practical rationalisation requires consideration of multiple factors and reasonable compromise. In addition to sub system ratings when rationalising permanent speeds, the following factors should be considered:

- Rollingstock performance, both fast and slow.
- Train length
- Grades
- Operational requirements including transit time.
- Excessive level crossing warning time
- Human factors[1,2]

1. *Typically, level crossing warning times are designed to match the posted speed. In the absence of a predictor, where operational speeds are significantly less traffic delays may be excessive as well as an increased likelihood of road users disobeying active warning equipment.*
2. *Examples may be excessive speed signs in a short distance creating confusion for rail traffic crews or significant sudden reduction in speed creating risk of overspeed that could be controlled by an intermediate speed.*

Modelling of train performance can be instructive in reaching reasonable posted permanent speeds.

Permanent speeds need not be a function of legacy infrastructure rating. Savings are sometimes found by practical improvements to infrastructure such as curve easing, relocation of signals, sighting improvements, clearing vegetation etc. Reducing speed can cause operational impacts such as increased transit time, fuel consumption and emissions which in turn making rail a less effective or desirable transport mode. Consideration should be given to alternatives balancing operational impact and capital cost.

Major projects should adopt a strategy to keep alignment between the sub systems speed ratings. Significant differences in speed ratings between sub systems can incur increased capital and maintenance costs and reduce operational performance.

2.4 Double and Bidirectional Track

Where there are multiple mainline tracks, each track shall be rated separately.

Bidirectional tracks shall be rated in each direction.

Where there are multiple mainline tracks adjacent to one another, within ARTC's management, and one or more is bidirectional the following applies:

- The permanent speeds should be the same for both tracks in a given direction and posted permanent speeds can be clearly seen from each track or
- Where the speeds differ, they shall be clearly documented in the RAS and posted trackside or
- The speed of the movement on the bidirectional track is adequately controlled by rules and procedures (such as signalling indication)

2.5 Accommodation of Different Traffic Classes

Some tracks have different posted speeds for different traffic classes, reflecting their respective capability.

Where there are multiple speed classifications:

- Ratings of the sub systems shall be appropriate to the traffic class being assessed.
- Changes to permanent speeds should occur concurrently unless the change is only applicable to one traffic class.

2.6 Cross Overs, Turnouts, Crossing Loops, Goods Loops, Sidings & Yards

ARTC manages a legacy of different networks operating rules and procedures as well as signalling systems.

Where the rated speed of a divergent route from the mainline, such as at a mainline junction or crossover, is lower than preceding speed and not adequately controlled by rules and procedures or wayside signal indication a permanent speed sign specific to the route shall be posted.

2.7 Change Requirements

Where permanent speeds are to be introduced or changed the Configuration Change Management Process shall be followed. Supporting endorsement should be provided by both Track and Signalling Engineering.

In territory where in cab signalling or similar is used to manage SPAD risk or train overspeed system configuration may need to be updated.

Change management should address changes to wayside posting, publication in the RAS, changes to system infrastructure and communication to stakeholders in a way that manages safe operating speeds and avoids confusion.