

Reference material

Advanced train control Migration System (AMS) Specifications – AMS Identification of High Risk Speed Sign Reductions

This document is published as reference material to support the implementation of Automatic Train Protection as part of the roll out of the Advanced Train Control Migration System project.

The content described might be of assistance to individuals and organisations performing work on Transport for NSW Rail Assets.

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Authorised by: Chief Engineer, Asset Standards Authority
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AMS PROJECT SPECIFICATIONS: AMS IDENTIFICATION OF HIGH RISK SPEED SIGN REDUCTIONS

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Authored by: Coppel Lai Senior Design Engineer		Date: 23/05/16
Reviewed by: Graeme Cutler Senior Technical Manager		Date: 23/05/2016
Reviewed by: Michael Little Manager Safety Assurance		Date: 23.5.2016
Reviewed by: Roy Ale Senior Manager Operational Integration		Date: 23.5.16
Reviewed and Accepted by: Frederic Tricoche Principal Engineering Manager Systems		Date: 23/05/16
Approved for Release by: Craig Southward ATP Project Director		Date: 24/5/16

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Document History

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0.3	10/05/2016	G. Cutler	Report template change
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Reference material only



Foreword

This guideline forms a part of the AMS Project Specifications which detail the requirements for the implementation of ATP / AMS on the TfNSW heavy rail network. This principle specifically covers the ETCS Level 1 System using Limited Supervision.

This guideline specifically covers the identification of high risk speed sign reductions.

To gain a complete overview of ATP / AMS signalling design requirements, this document should be read in conjunction with the AMS suite of signalling design principle and guideline modules.

Note

The following guideline is to be used by AEO's engaged by the ATP program for the ATP / AMS concept design implementation. This is to ensure that a consistent methodology is applied.

It has been produced during the development of the AMS Project Specifications and subsequent further development of the principle may be required as the specifications evolve.

It is an interim document until the ASA standard is published.

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1. Introduction

This design guideline defines rules that are to be applied by designers of the AMS system; specifically they are to be used to determine whether a speed sign needs to be protected by the AMS system. It is not to be used to alter existing speed signs, the defined speeds or their locations, or assess whether a speed sign is required to be fitted.

This guideline is to be applied to all the speed signs installed within the TfNSW infrastructure to determine whether the speed difference between the Speed Sign Under Review (SSUR) and the Previous Speed Sign (PSS), in conjunction with the trackside infrastructure past the SSUR, is likely to lead to a derailment. If a derailment, due to this speed difference, is likely to occur then the SSUR is determined to be **a High Risk Speed Sign Reduction (HRSSR)** and needs to be protected by the AMS system.

The guidelines have been developed as a result of the Review of High Speed Transit Through Plain Track report and internal workshops within TfNSW. These have:

1. Determined the likely increase of a risk that is typically associated with a derailment due to a train travelling at a higher speed than indicated at the speed sign under review;
2. Recommended a permitted overspeed percentage between speed sign under review and the previous speed sign provided the defined limitations do not first apply;
3. Defined factors (such as the impact of related infrastructure) that suppress the allowable overspeed between the SSUR and the PSS).

2. Purpose

This document forms part of the AMS project specification that details the AMS design requirements for the implementation of the AMS system on the NSW rail network.

This design guideline defines the rules to be used to identify speed signs that need to be supervised and hence protected by the AMS system.

Reference material only

Once a high risk speed sign reduction has been identified, the AMS Project Specifications: AMS Signal Design Principles must be used to determine the placement of the AMS ETCS Level 1 LS Mode infrastructure.

2.1. Scope

This document defines the guidelines associated with the identification of high risk speed sign reductions on the existing electrified NSW rail network that subsequently need to be protected by the AMS project.

The identification of area of infrastructure on which to apply the ATP is outside the scope of this document.

2.2. Application

This document applies to AEOs engaged to carry out the design for AMS works.

This design guideline has been written to facilitate the application of ETCS Level 1 LS on the Advanced Train Control Migration System (AMS) project. This design guideline will need to be reassessed as a result of new signalling works which utilise AMS.

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.

Transport for NSW standards / Project Specifications

AMS Project Specifications: AMS Signal Design Principles

AMS Project Specifications: AMS Identification of High Risk Turnouts

TN 028:2015 ESC -210 Track Geometry and Stability

Reference material only

AMS Technical Issue Paper

AMS-TIP-223 Speed Sign Supervision

AMS Technical Report

Review of High Speed Transit Through Plain Track

AMS Project Specification

AMS Identification of High Risk Turnouts

4. Terms and definitions

The following terms and definitions apply in this document:

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

AMS Advanced train control Migration System

ASA Asset Standards Authority

AS Approach speed to a turnout

ATP Automatic Train Protection; a system which supervises train speed and target speed, alerts the driver of the braking requirement, and enforces braking when necessary. The system may be intermittent, semi continuous or continuous according to its track to train transmission updating characteristics.

BG Balise Group

CSM Ceiling Speed Monitoring

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DS Recommended or calculated design speed for the turnout

ETCS European Train Control System; a three level, unified, modular automatic train protection specification to enhance interoperability across Europe

EVC European Vital Computer; the on board computer that processes train data and track data to calculate the required braking, speed, distance and intervention functions. The Onboard also refers to the EVC in the guideline.

In advance of signal Past the signal in the direction of travel

In rear of signal On approach to the signal in the direction of travel

LOTA Limit of Track Section Ahead (of the **SSUR**)

LS Limited Supervision

PSS Previous Speed Sign

SSUR Speed sign Under Review

TfNSW Transport for New South Wales

TSM Target Speed Monitoring

5. Background

5.1. Overview of the Speed Signs and AMS Protection

AMS is based on the European Train Control System (ETCS) Level 1 Limited Supervision (LS) mode.

A design feature of AMS includes a High Risk Speed Sign Reduction Protection function. This protection can be used to ensure that the train speed through plain track is within a defined tolerance of the speed indicated by the speed sign; otherwise there is a risk that the train may travel too fast for the plain track which may result in a train derailment. With AMS, the requirement for high risk speed sign reduction protection will be determined based on the guidelines defined within this document. Speed signs will be fitted with AMS infrastructure

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that provides either Target Speed Monitoring (TSM) or Ceiling Speed Monitoring (CSM) as necessary, see AMS Project Specifications: AMS Signal Design Principles.

The following track speed signs are within the AMS scope and hence their assessments are governed by these guidelines

1. Permanent track speed signs; however, only 'Medium' and 'High' speed profiles shall be considered; and
2. Level crossing speed signs and conditional level crossing speed signs.

The following Track speed signs are not within the AMS scope and they are not governed by these guidelines:

1. Advisory speed signs;
2. Intermediate trainstop advisory speed signs;
3. Temporary speed signs;
4. Special (or tonnage related) speed signs;
5. Freight speed signs; and
6. Yard speed signs.

5.2. Overview of the design guidelines

The design guidelines to determine whether there is a High Risk Speed Sign Reduction and hence whether it needs to be protected by AMS consist of:

1. Identifying whether the Speed Sign Under Review has previously been determined to be a high risk speed sign as a result of a previous High Risk Turnout assessment. See section 5.3 for further details.
2. Identifying whether there is actually a speed reduction between the Speed Sign Under Review (SSUR) and the Previous Speed Sign (PSS). If there is not, no further

assessment needs to be undertaken. See section 5.4 for further details. If there is a speed reduction then the following steps need to be undertaken:

3. Determine whether the SSUR defines speed profiles allied to high consequence infrastructure or configuration:
 - a. A Level Crossing; or
 - b. A platform; or
 - c. Signal Overlap
4. Determine whether the limit of track ahead (LOTA) is straight and the speed reduction is greater than 25%; or
5. Determine whether the limit of track ahead (LOTA) is curved and the speed reduction is greater than 17%.

If step 1 or any one of steps 3 through 5 is true, then the SSUR will be defined as a High Risk Speed Sign Reduction and will require AMS high risk speed sign protection.

Notes:

1. Where the speed sign define different speed profiles (*e.g. high, medium or general*), then the high and the medium speed profiles must be used to determine the speed difference.
2. See section 7.3 for definitions of limit of track ahead (LOTA).

5.3. High risk turnout assessment and impact on speed sign reductions

The AMS Identification of High Risk Turnouts guideline defines an assessment process that will identify those turnouts that are considered to be high risk. As part of this assessment process a turnout can be identified as low risk due to the presence of a speed sign at least 157m before

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the toe of the turnout. Should this happen then the turnout will be identified as low risk and the speed sign in rear of the turnout will be identified as high risk.

It is expected that the High Risk Turnout assessment will be performed first and will, where appropriate, list those speed signs that have been identified as high risk due to their underlying protection of the speed into the turnout.

If the High Risk Turnout process has identified a high risk speed sign, then this SSUR is confirmed as a high risk speed sign reduction and no further application of this guideline for the particular SSUR is required.

5.4. Overview of identifying a low risk speed sign reduction

There are a number of situations where the SSUR will be considered a low risk speed sign reduction and hence not require AMS high risk speed sign protection, these are:

1. Where the speed difference between the SSUR the PSS is less than or equal to (\leq) 0kph; or
2. Where the length of the Limit of Track Ahead (LOTA) is straight, the speed reduction is greater than 0% but less than or equal to (\leq)25% and there are no specific infrastructure posing potential hazards in the LOTA; or
3. Where the length of the LOTA of the SSUR is curved, the speed reduction is greater than 0% but less than or equal to (\leq) 17% and there are no specific infrastructure posing potential hazards in the LOTA.

Should anyone of these situations be true then the SSUR will **not** be identified as a high risk speed sign reduction. See section 7.3 for the definition of LOTA.

Reference material only

6. Low risk speed sign reductions

6.1. Overview

If the percentage in speed reduction is below the threshold then the SSUR is considered to be low risk. The threshold is dependent on the track alignment and infrastructure (if present) in the track section ahead of the SSUR. Under certain circumstances the threshold is 0%, i.e. no overspeed is allowed into the track section ahead meaning that any speed reduction will result in the SSUR being classified as high risk.

7. High risk speed sign reduction assessment

7.1. Overview

If the SSUR cannot be categorised as a low risk speed sign reduction in accordance with section 6, it is necessary to determine if:

1. it must be protected because of its relationship to the surrounding infrastructure or configuration; or
2. the length of the LOTA is straight and the speed reduction between the SSUR and the PSS is greater than (>) 25%, i.e. is the Speed on the **SSUR** $\times 1.25 \leq$ the Speed on the **PSS**; or
3. the length of the LOTA is curved and the speed reduction between the SSUR and the PSS is greater than (>) 17%, i.e. is the Speed on the **SSUR** $\times 1.17 \leq$ the Speed on the **PSS**.

If any one of steps 1 through 3 is true, then the SSUR will be defined as a high risk speed sign reduction and require AMS high risk speed sign protection.

Note: See section 7.3 for definitions of LOTA.

Reference material only

7.2. Speed reduction between speed signs calculation

The speed reduction calculation utilises the speeds defined by the SSUR and the PSS. If the speed reduction from the PSS to the SSUR is greater than 25% then the SSUR is identified, without the need for any further assessment, to be a high risk speed sign reduction and requires AMS high risk speed sign protection.

Depending on the alignment of the LOTA, the threshold of up to 25% will be lowered to 17%.

However, whenever there is a speed reduction, of less than or equal to (\leq) 25%, the surrounding infrastructure within the length of the LOTA will need to be assessed before the SSUR can be positively determined to be a low risk speed sign reduction, see 7.3.2 and 7.3.3.

Note:

1. Where the speed signs define different speed profiles (e.g. high, medium or general), then the high and the medium speed profiles must be used to determine the speed difference.
2. See section 7.3 for definitions of LOTA.

7.3. Limit of Track Ahead (LOTA)

7.3.1. Overview

In cases where there is a speed reduction from the PSS to the SSUR, each of the following will have to be considered during the assessment:

1. whether there are specific infrastructure posing potential hazards within the length of the LOTA.
2. whether the alignment of the track within the LOTA is straight or curved.

7.3.2. Determining the length of the LOTA

The length of the LOTA is to be calculated based on the:

3. the speed indicated on the PSS;
4. maximum 2 second brake application time prior to the activation of the emergency brake; and

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5. a train brake deceleration rate of 0.6ms^{-2} .

Where there is a speed reduction from the PSS to SSUR, at the point that the train approaches the SSUR it is assumed, at worst, that the train could be travelling (dependent on the train type) at the speed defined on the PSS. The train then has to decelerate down to the speed defined by the SSUR.

However, before the train starts to slow, the brake application time of 2 seconds is to be taken into account in order to calculate the maximum distance the train could have travelled, before it can, under reasonable worst case circumstances, be said to be travelling at the SSUR defined speed.

Hence, the distance required for the train to slow down from a speed on the PSS to a speed on the SSUR, is the distance travelled in 2s plus the braking distance and this length is defined as the **LOTA**. Table 1 provides assistance in determining the likely worst case distance travelled, depending on the PSS speed and the required SSUR speed.

The values in Table 1 are rounded down speeds that a train will be travelling, depending on an initial input speed (speed on PSS) and the distance a train will have travelled beyond the SSUR once the train has knowingly begun to decelerate. For example: a train with an initial speed of 110km/hr will require approximately 200m to slow down to 100km/hr based on a 0.6ms^{-2} deceleration rate and a 2 seconds brake application time.. Therefore, for the given example (speed on PSS is 110km/hr and the speed on SSUR is 100km/hr), 200m determines the length of the LOTA.

Note:

1. **Table 1 is provided for approximation purposes only and the actual length of LOTA is to be calculated.**
2. **If the different speed profiles on the same set of PSS and SSUR return different distances, e.g. Medium profile of speed reduction from 100km/hr to 80km/hr is 300m but 120km/hr to 100km/hr is 400m, the longer of the two distances (400m) is to be used.**

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7.3.3. Infrastructure posing potential hazards within the LOTA

Whenever there is a speed reduction from the PSS to the SSUR, regardless of the percentage, if there is any infrastructure posing a potential hazard within the length of the LOTA, the SSUR will have to be assessed in accordance with the following:

1. Level crossing, with warning time information, within the LOTA

A level crossing with warning time information, if present within the length of the LOTA, is to be assessed on a case by case basis.

This is because level crossing warning times are not always exactly the same as those shown on the signalling plan, due to the actual location of the strike-in points.

For example a specified 30 seconds warning time at 100kph may work out to be 35 seconds under normal operating conditions when the actual location of the strike-in point is taken into consideration, translating to a 117km/hr speed on approach to the level crossing whilst sufficient warning time (30 seconds) is still maintained.

In other words in some case there are implementation specific built-in margins for this potential overspeed error. If the speed on the PSS is greater than the overspeed margin in accordance to the actual warning time, on approach to the level crossing, then the SSUR is to be considered a high risk speed sign reduction as long as there is a speed reduction from the PSS to the SSUR, regardless of the reduction percentage.

2. Level crossing, protected by a signal but with no associated warning time, within the LOTA

A level crossing, protected by a signal but without an associated warning time, if present within the length of the LOTA, will require the SSUR on approach to the level approach to be considered as a high risk speed sign reduction if **both** of the following are true:

- There is a speed reduction from the PSS to the SSUR, regardless of the reduction percentage; and

- The level crossing has been identified as a high risk level crossing by the AMS Project (refer to deficient overlaps, catch points and level crossing report).

3. Manually operated level crossing, not protected by signal, within the track section ahead

A manually operated level crossing, if present within the length of the LOTA and if it has been identified), will require the SSUR on approach to the level crossing to be considered as a high risk speed sign reduction if **both** of the following are true:

- There is a speed reduction from the PSS to the SSUR, regardless of the reduction percentage; and
- The level crossing has been identified as a high risk level crossing by the AMS Project (refer to deficient overlaps, catch points and level crossing report).

4. Platform(s) within the length of the LOTA

Platform(s), if present within length of the LOTA, will require the SSUR on approach to the platform(s) to be considered as a high risk speed sign reduction as long as there is a speed reduction from the PSS to the SSUR, regardless of the reduction percentage.

7.3.4. Alignment within the length of LOTA

Where there is a speed reduction from the PSS to the SSUR, and the LOTA does not contain any hazard imposing infrastructure specified in the section 7.3.3, one of two speed reduction rules is to be applied for determining whether the SSUR is high risk.

The percentage of speed reduction to be applied for the identification of high risk speed sign reduction, will be dependent on the alignment within the length of the LOTA (refer to sections 5 & 7 for details on percentages). The track alignment will be defined as either straight or curved depending on the maximum approach speed (speed on PSS) and the radius of the track, as follows:

1. The length of the LOTA is considered straight if the maximum approach speed (i.e. speed indicated on the PSS) is greater than 115kph and that the radius of the track

Reference material only

section is greater than or equal to 950m. **However, if the radius is less than 950m then the length of the LOTA is considered curved.**

2. The length of the LOTA is considered straight if the maximum approach speed (i.e. speed indicated on the PSS) is less than or equal to (\leq) 115kph and the radius of the track section is greater than or equal to 500m. **However, if the radius is less than 500m then the length of the LOTA is considered curved.**

Note: if length of the LOTA is composed of compound radius, the smallest radius (tightest curve) is to be used for determining the nature of the track alignment.

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Table 1 – Distance travelled based on an initial speed, a 2s reaction time and a required final speed

Distance Traveled (m) / Initial Speed (km/h)	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
135	134	128	121	115	108	100	92	83	73	62	48	27			
125	123	117	110	102	94	86	76	65	52	34					
120	118	111	104	96	88	78	67	55	38						
115	113	105	98	89	80	70	58	42	15						
110	107	100	92	83	73	61	47	25							
105	102	94	85	76	64	51	32								
100	96	88	79	68	56	39									
95	91	82	72	60	45	23									
90	86	76	65	52	33										
85	80	70	57	42	14										
80	74	63	49	30											
75	69	56	40	7											
70	63	49	29												
65	57	41	11												
60	51	32													
55	44	20													
50	37														
45	29														
40	20														
35															
30															
25															
20															
15															

Reference material only

8. Example identification of low risk and high risk speed sign reductions

8.1. Example of low risk speed sign reduction

8.1.1. Example 1 – Low risk speed sign reduction, straight length of LOTA with no infrastructure to protect

Key Information

120km/hr on PSS

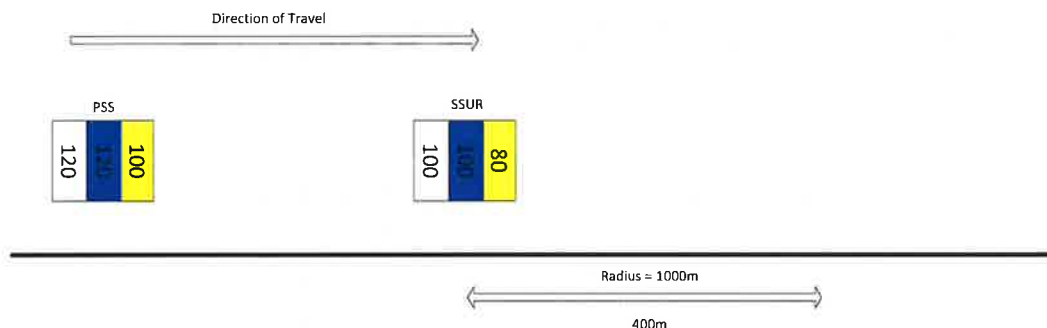
100km/hr on SSUR

Length of LOTA approximately 400m

Straight length of LOTA (Radius > 950m @ 120km/hr)

There is no constraining infrastructure within the length of LOTA

Figure 1 – Logical track layout for example 1 – low risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is no constraining infrastructure after the SSUR within the length of the LOTA, determine speed reduction rule percentage.

Reference material only

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- a. Maximum approach speed is 120km/hr (i.e. greater than 115km/hr), radius of track within the LOTA is 1000m (i.e. greater than 950m) – the length of the LOTA is considered **straight**.
- b. For straight length of LOTA, a **25%** speed reduction threshold is used.
- 3. Calculate whether speed reduction from the PSS to the SSUR is greater than 25%
 - a. Speed on SSUR = 100km/hr
 - b. $100\text{km/hr} \times 1.25 = 125\text{km/hr}$, greater than the 120km/hr on PSS
 - c. This is a low risk speed sign reduction

8.1.2. Example 2 – Low risk speed sign reduction, curved length of LOTA with no infrastructure to protect

Key Information

90km/hr on PSS

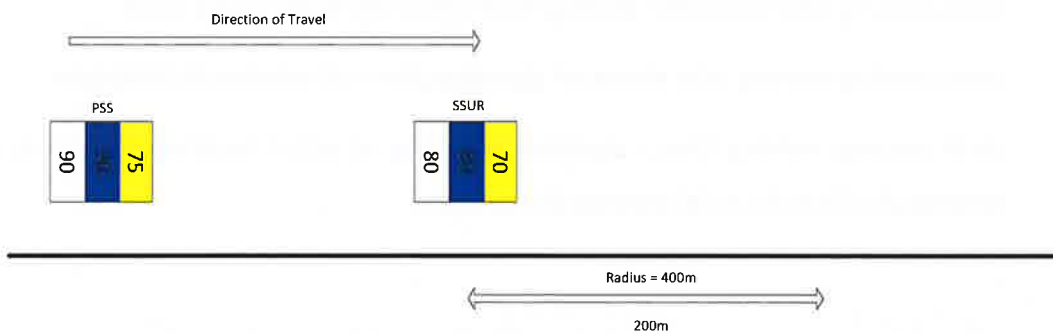
80km/hr on SSUR

Length of LOTA approximately 200m

Curved length of LOTA (Radius < 500m @ 90km/hr)

There is no constraining infrastructure within the length of the LOTA

Figure 2 – Logical track layout for example 2 – low risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is no constraining infrastructure after the SSUR within the length of the LOTA, determine speed reduction rule percentage
 - a. Maximum approach speed is 90km/hr (i.e. less than 115km/hr), radius of the track within the LOTA is 400m (i.e. less than 500m) – the length of the LOTA is considered **curved**.
 - b. For curved length of LOTA, a 17% speed reduction threshold is used.
3. Calculate whether speed reduction from the PSS to the SSUR is greater than 17%
 - a. Speed on SSUR = 80km/hr
 - b. $80\text{km/hr} \times 1.17 = 94\text{km/hr}$, greater than the 90km/hr on PSS
 - c. This is a low risk speed sign reduction

8.1.3. Example 3 – Low risk speed sign reduction, level crossing with associated warning time within the length of LOTA

Key Information

115km/hr on PSS

100km/hr on SSUR

Length of LOTA approximately 300m

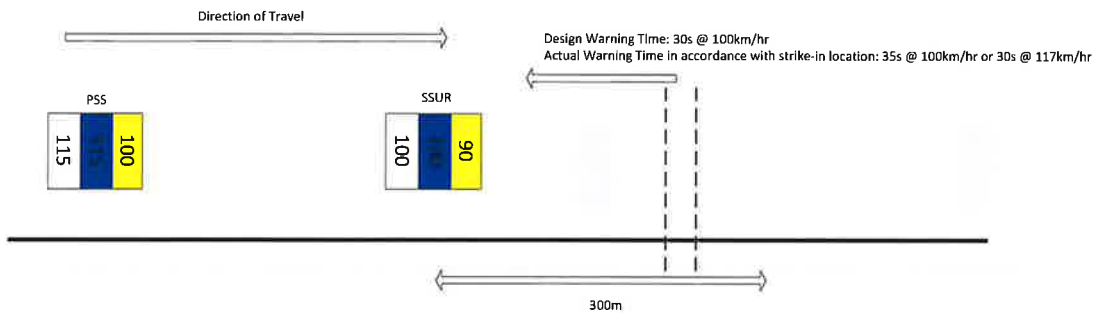
Level crossing with associated warning time within the length of the LOTA

Level crossing warning time shown on signalling plan – 30 seconds @ 100km/hr

Level crossing warning time, calculated according to actual location of strike-in point – 35 seconds @ 100km/hr, or 30 seconds @ 117km/hr

Reference material only

Figure 3 – Logical track layout for example 3 – low risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. Calculate actual level crossing warning time, 30 seconds @ 117km/hr in this case
 - a. Maximum approach speed (speed on the PSS) is less than the actual approach speed in accordance to the actual level crossing warning time
 - b. Speed on the SSUR x 1.17 = 117km/hr, is greater than the speed on the PSS
 - c. This is a low risk speed sign reduction

8.2. Examples of high risk speed sign reduction

8.2.1. Example 1 - high risk speed sign reduction, straight length of LOTA with no infrastructure to protect

Key Information

120km/hr on PSS

80km/hr on SSUR

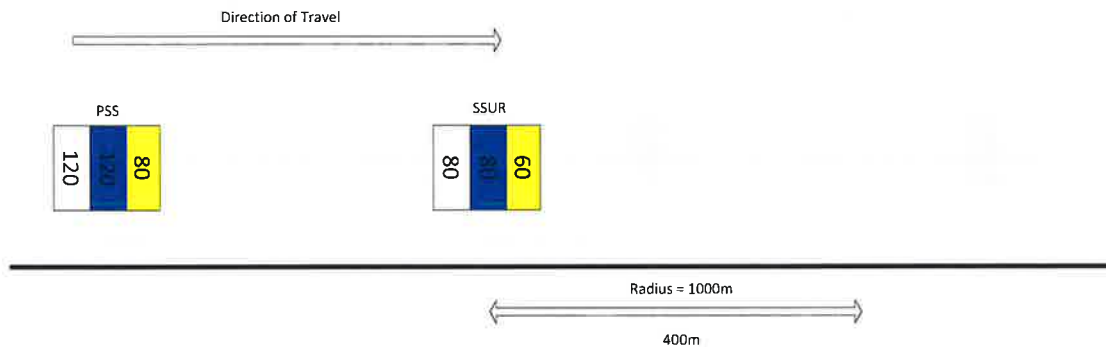
Length of LOTA approximately 400m

Straight length of LOTA (Radius > 950m @ 120km/hr)

There is no constraining infrastructure within the length of LOTA

Reference material only

Figure 4 – Logical track layout for example 1 – high risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is no constraining infrastructure after the SSUR within the length of the LOTA, determine speed reduction rule percentage
 - a. Maximum approach speed is 120km/hr (i.e. greater than 115km/hr), radius of the track within the LOTA is 1000m (i.e. greater than 950m) – the length of the LOTA is considered straight.
 - b. For straight length of LOTA, a 25% speed reduction threshold is used.
3. Calculate whether speed reduction from the PSS to the SSUR is greater than 25%
 - a. Speed on SSUR = 80km/hr
 - b. $80\text{km/hr} \times 1.25 = 100\text{km/hr}$, less than the 120km/hr on PSS
 - c. This is a high risk speed sign reduction

8.2.2. Example 2 - high risk speed sign reduction, curved length of LOTA with no infrastructure to protect

Key Information

95km/hr on PSS

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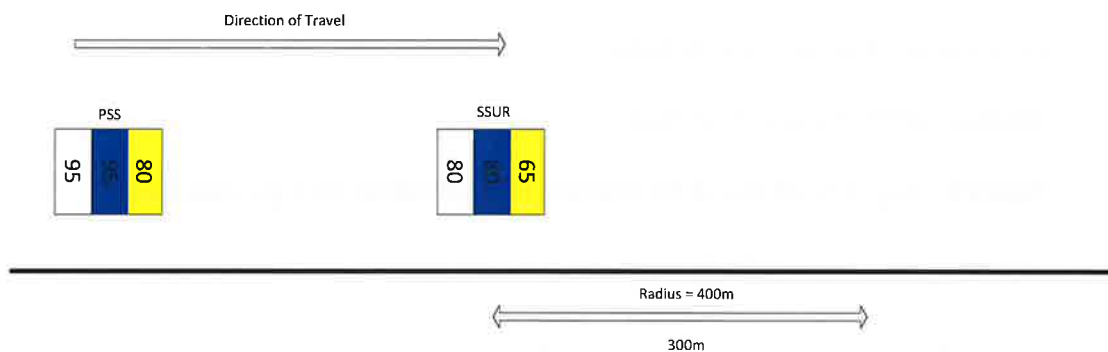
80km/hr on SSUR

Length of LOTA approximately 300m

Curved length of LOTA (Radius < 500m @ 95km/hr)

There is no constraining infrastructure within the length of LOTA

Figure 5 – Logical track layout for example 2 – high risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is no constraining infrastructure after the SSUR within the length of the LOTA, determine speed reduction rule percentage
 - a. Maximum approach speed is 95km/hr (i.e. less than 115km/hr), radius of the track within the LOTA is 400m (i.e. less than 500m) – the length of the LOTA is considered curved.
 - b. For curved length of LOTA, a 17% speed reduction threshold is used.
3. Calculate whether speed reduction from the PSS to the SSUR is greater than 17%
 - a. Speed on SSUR = 80km/hr
 - b. $80\text{km/hr} \times 1.17 = 93.6\text{km/hr}$, less than the 95km/hr on PSS

c. This is a high risk speed sign reduction

8.2.3. Example 3 - high risk speed sign reduction, platform within the length of the LOTA

Key Information

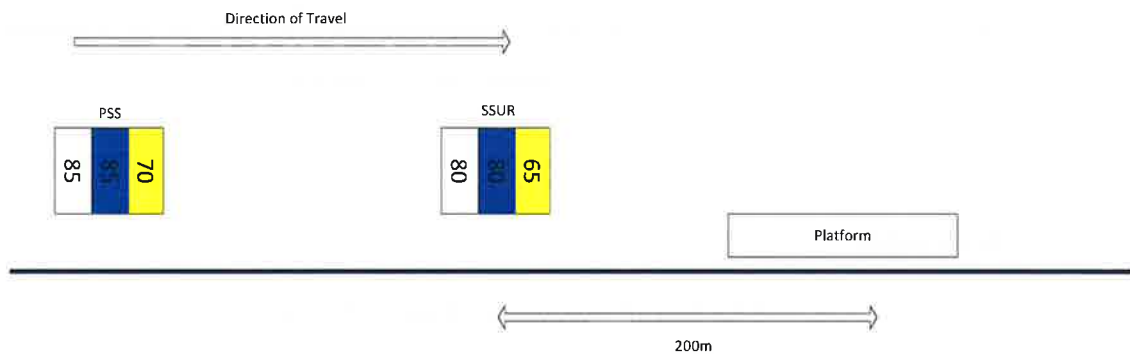
85km/hr on PSS

80km/hr on SSUR

Length of LOTA approximately 200m

Platform within the length of LOTA

Figure 6 – Logical track layout for example 3 – high risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is constraining infrastructure within the length of LOTA
 - a. Platform within the length of LOTA
 - b. There is a speed reduction from the PSS to the SSUR
 - c. **This is a high risk speed sign reduction**

Reference material only

8.2.4. Example 4 – high risk speed sign reduction, AMS high risk level crossing within the length of the LOTA

Key Information

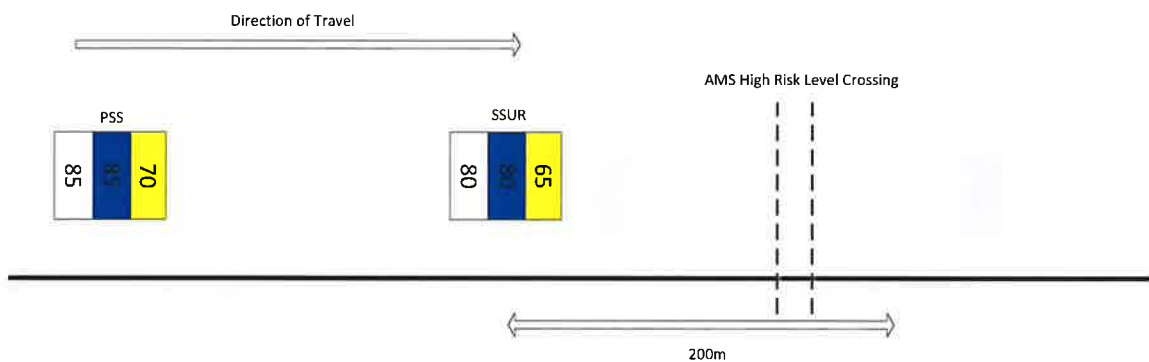
85km/hr on PSS

80km/hr on SSUR

Length of LOTA approximately 200m

AMS High Risk Level Crossing within the length of LOTA

Figure 7 – Logical track layout for example 4 – high risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. There is constraining infrastructure within the length of LOTA
 - a. AMS High Risk Level Crossing within the length of LOTA
 - b. There is a speed reduction from the PSS to the SSUR
 - c. **This is a high risk speed sign reduction**

8.2.5. Example 5 – high risk speed sign reduction, level crossing with associated warning time within the length of the LOTA

Key Information

Reference material only

115km/hr on PSS

100km/hr on SSUR

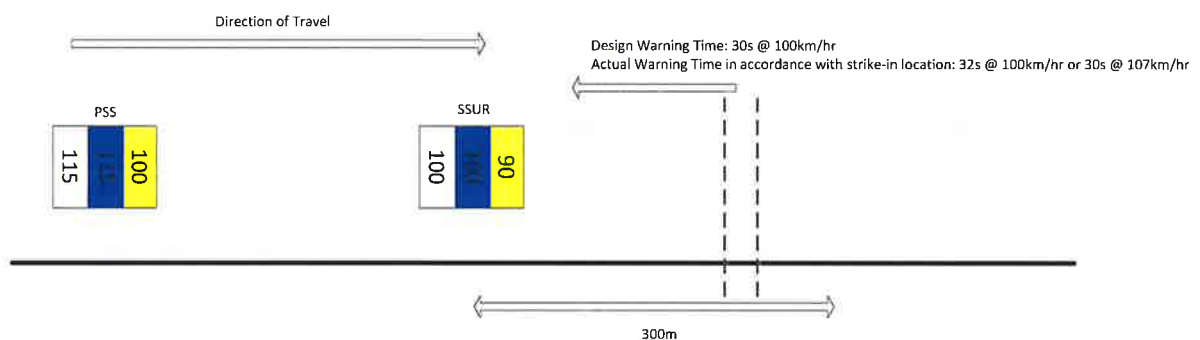
Length of LOTA approximately 300m

Level crossing with associated warning time within the length of the LOTA

Level crossing warning time shown on signalling plan – 30 seconds @ 100km/hr

Level crossing warning time, calculated according to actual location of strike-in point – 32 seconds @ 100km/hr, or 30 seconds @ 107km/hr

Figure 8 – Logical track layout for example 5 – high risk speed sign reduction



Assessment

1. Consider if it is a default *low risk* speed sign reduction.
2. Calculate actual level crossing warning time, 30 seconds @ 107km/hr in this case
 - a. Maximum approach speed (speed on the PSS) is greater than the actual approach speed in accordance to the actual level crossing warning time
 - b. Speed on the SSUR x **1.17** = 117km/hr, is **less** than the speed on the PSS
 - c. **This is a high risk speed sign reduction**

Reference material only