

A large yellow chevron graphic pointing to the right, composed of two parallel diagonal lines.

Level Crossings – From the Road User's Point of View

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Why the Inspection?

- > Reluctance of road managers to enter into Safety Interface Agreements
- > 'Near miss' or 'failure to stop' reports.
- > The focus has traditionally been on level crossings from the railway's point of view.....what about the road user's point of view?
- > Test the adequacy of regimes to inspect all aspects of level crossings.



Why the Inspection?

This perhaps sums it up best:

1.6 COOPERATION BETWEEN ROAD AUTHORITIES AND RAIL INFRASTRUCTURE MANAGERS

Attention is drawn to the need for meaningful cooperation on maintenance and safety issues at railway crossings between the relevant road authorities (also known as road managers) and rail infrastructure managers (e.g. via level crossing interface agreements where they exist, as per National Rail Safety Law). The safety of railway users is heavily dependent among other things, on the successful control and guidance of road users approaching a crossing. Equally the safety of road users is dependent on their ability to detect the approach of a train. Although the responsibility for provision and maintenance of various traffic control devices may be split between multiple parties, there needs to be coordination of risk assessment, maintenance and safety audit activities. Any changes in infrastructure or operation contemplated by one party that may increase the risk should be done in consultation with the other. This includes the addition of new road vehicle classes to particular routes, and changes in rail line speed.

AS1742.7:2016 Manual of uniform traffic control
devices Part 7: Railway crossings

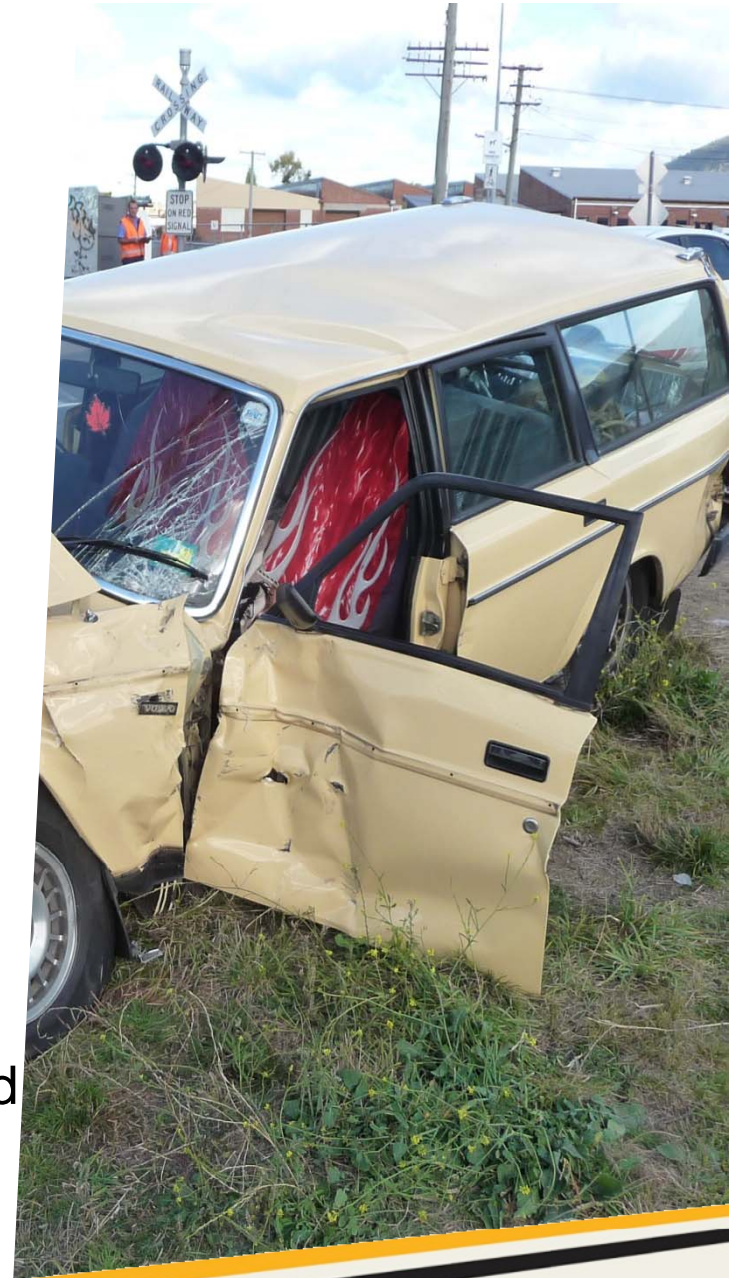
AS 1742.7

Section 1.6 of the standard highlights:

Safety of railway and road users is heavily dependent on the successful control and guidance of road users approaching a crossing and their ability to detect the approach of a train.

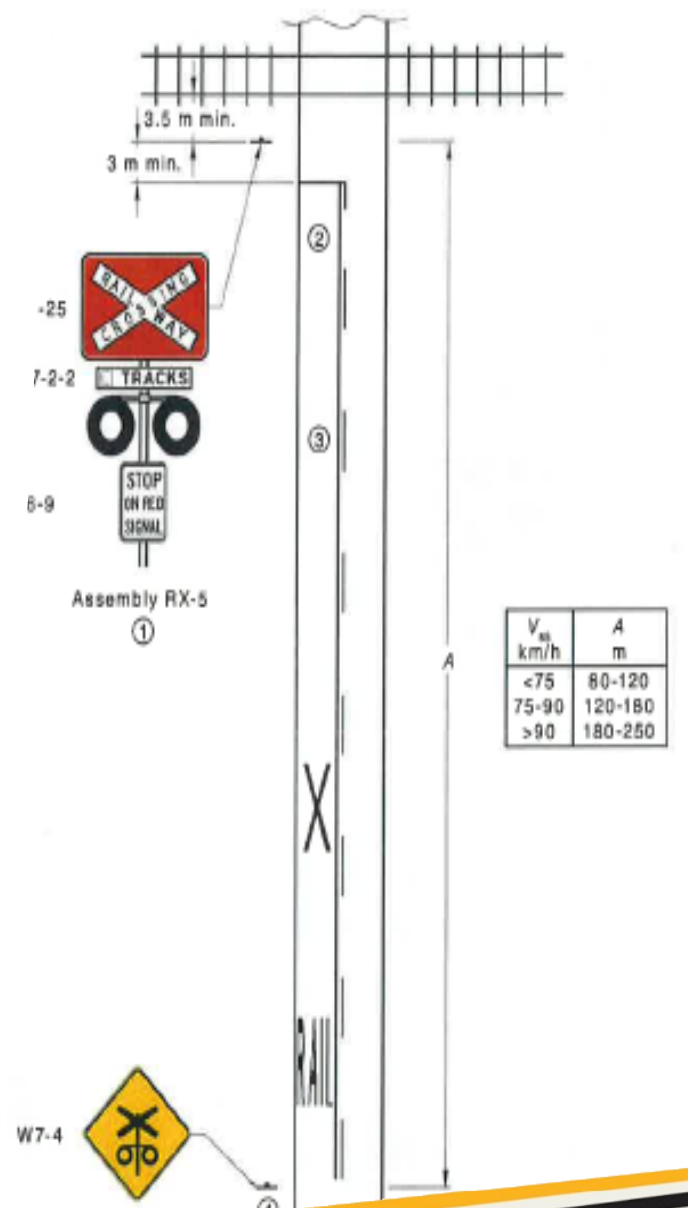
Which means:

There is a need for meaningful co-operation and co-ordination between road managers and rail infrastructure managers to assess and manage risk, inspect (audit) and maintain facilities.



Arrangements to Maintain Level Crossings (Tasmania)

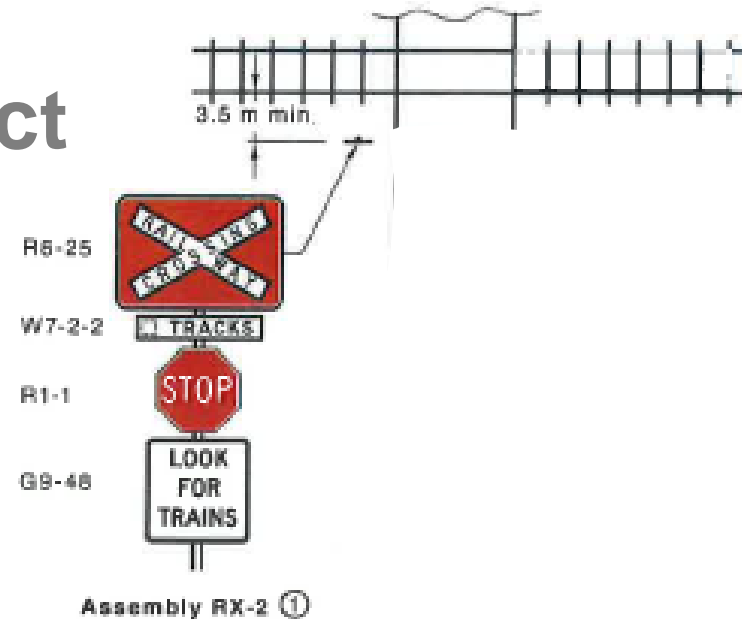
- *Rail Infrastructure Act 2007 (Tas.).*
- 'Informal' arrangements between local supervisors.
- Arrangements between local councils and State infrastructure department.
- Common understanding?
- Is it working?



Rail Infrastructure Act 2007 (Tas)

Rail Infrastructure Manager

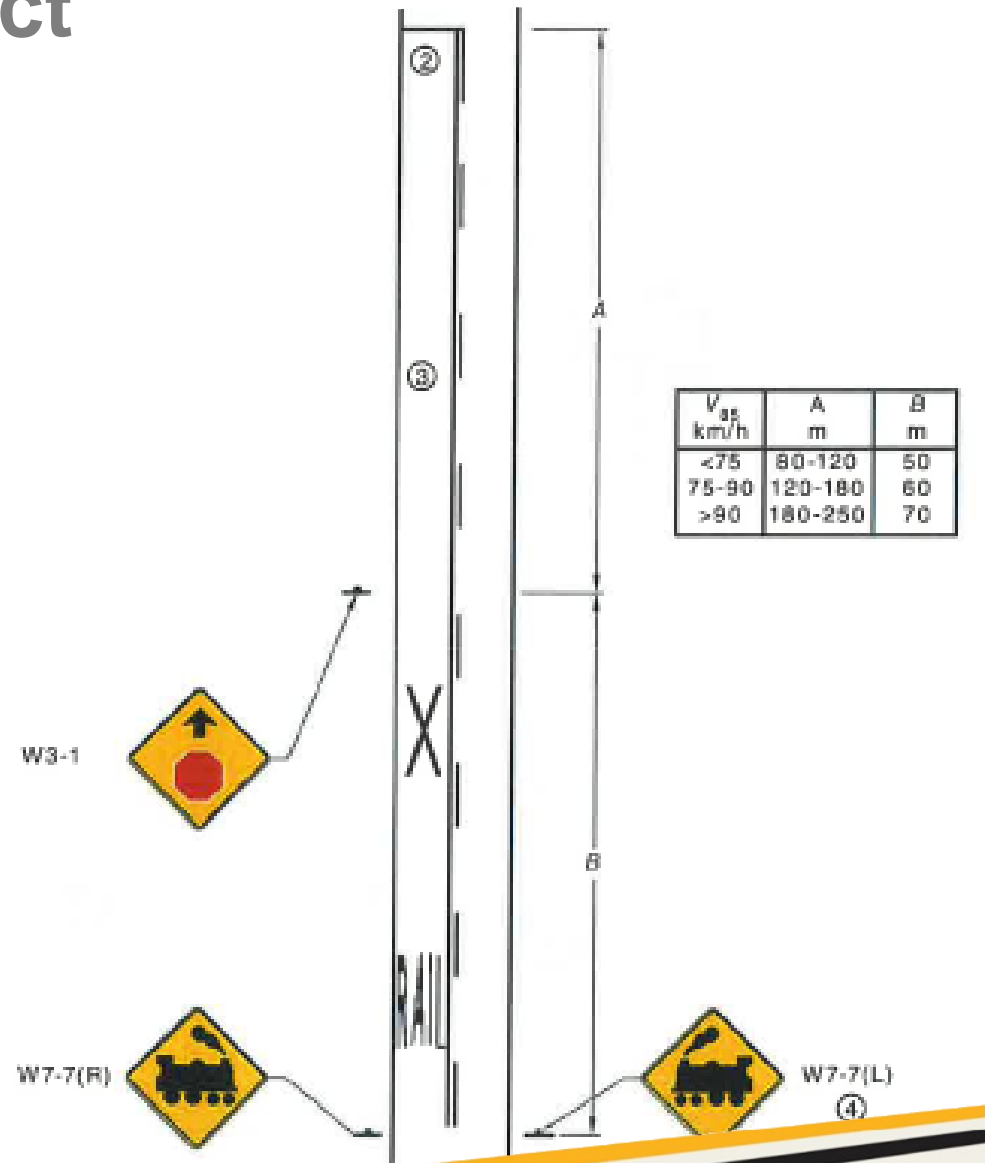
- > Rail Infrastructure.
- > Stop/Give Way signs.
- > Active LX equipment.
- > Road surface & footpath between the rails and 600mm from outermost rails.



Rail Infrastructure Act 2007 (Tas)

Road Manager

- > Road surface & footpath outside 600mm from outermost rails.
- > Traffic signs
- > Road markings



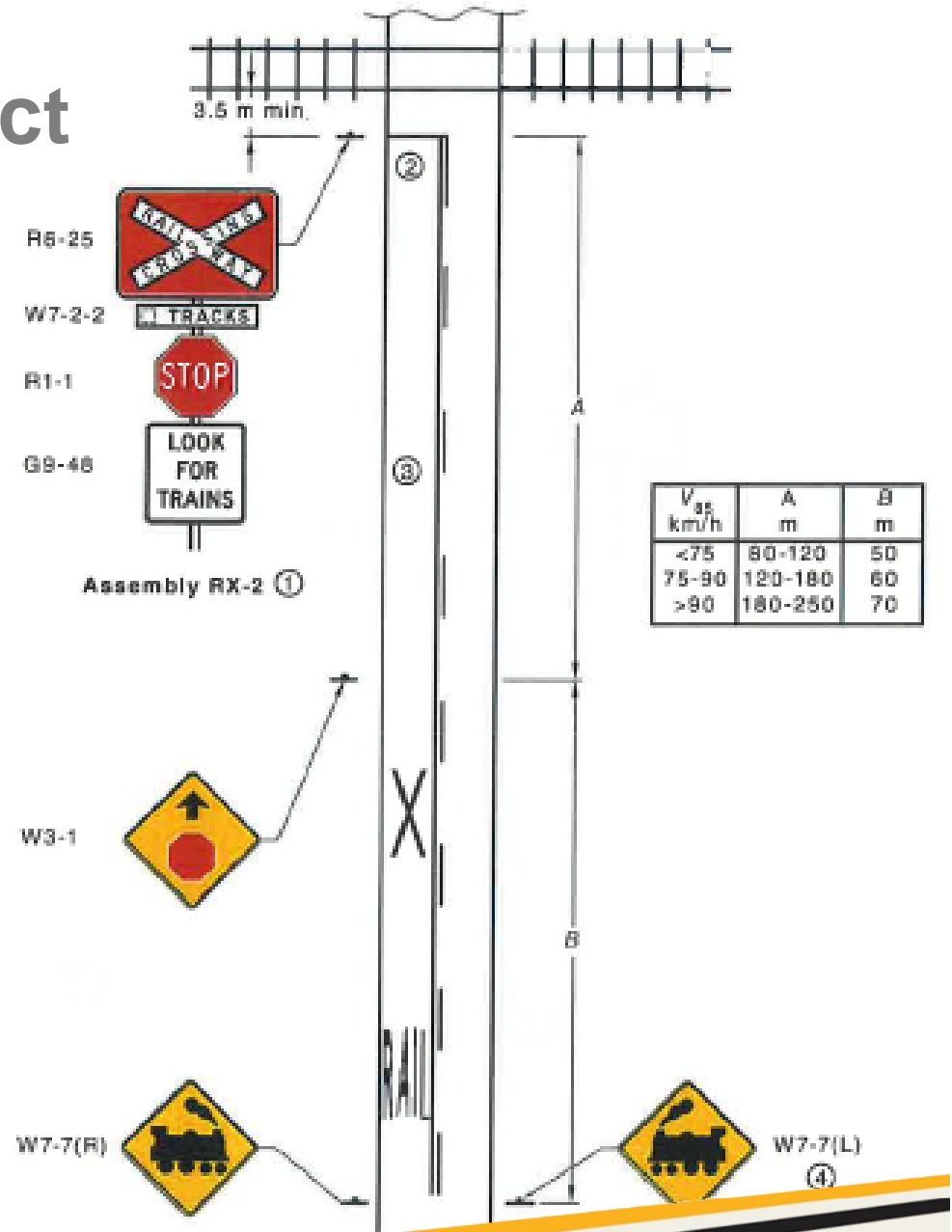
Rail Infrastructure Act 2007 (Tas)

Rail Infrastructure Manager

- > Rail Infrastructure.
- > Stop/Give Way signs.
- > Active LX equipment.
- > Road surface & footpath between the rails and 600mm from outermost rails.

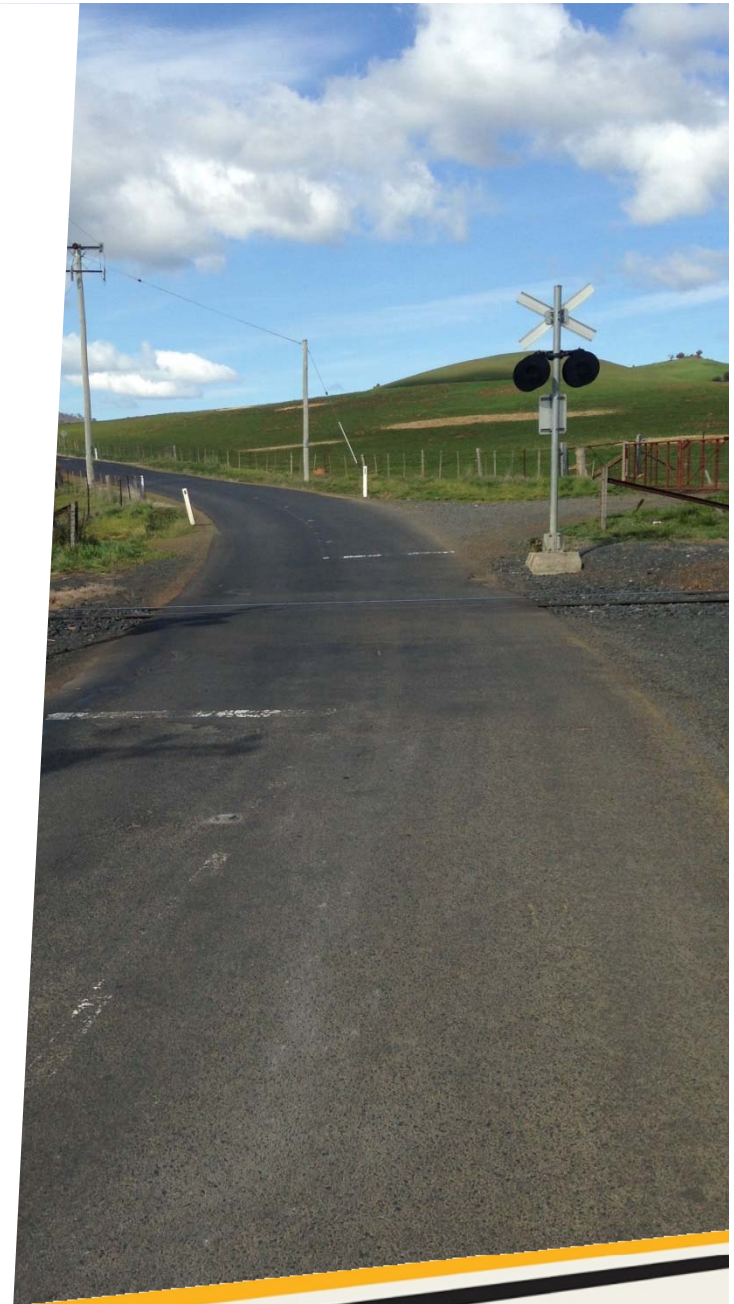
Road Manager

- > Road surface & footpath outside 600mm from outermost rails.
- > Traffic signs
- > Road markings



Scope of the Inspection

- > Make a visual assessment of whether appropriate **signage and road markings** are present and their condition
- > Form a general opinion as to the **adequacy of sight lines** at passive controlled public level crossings

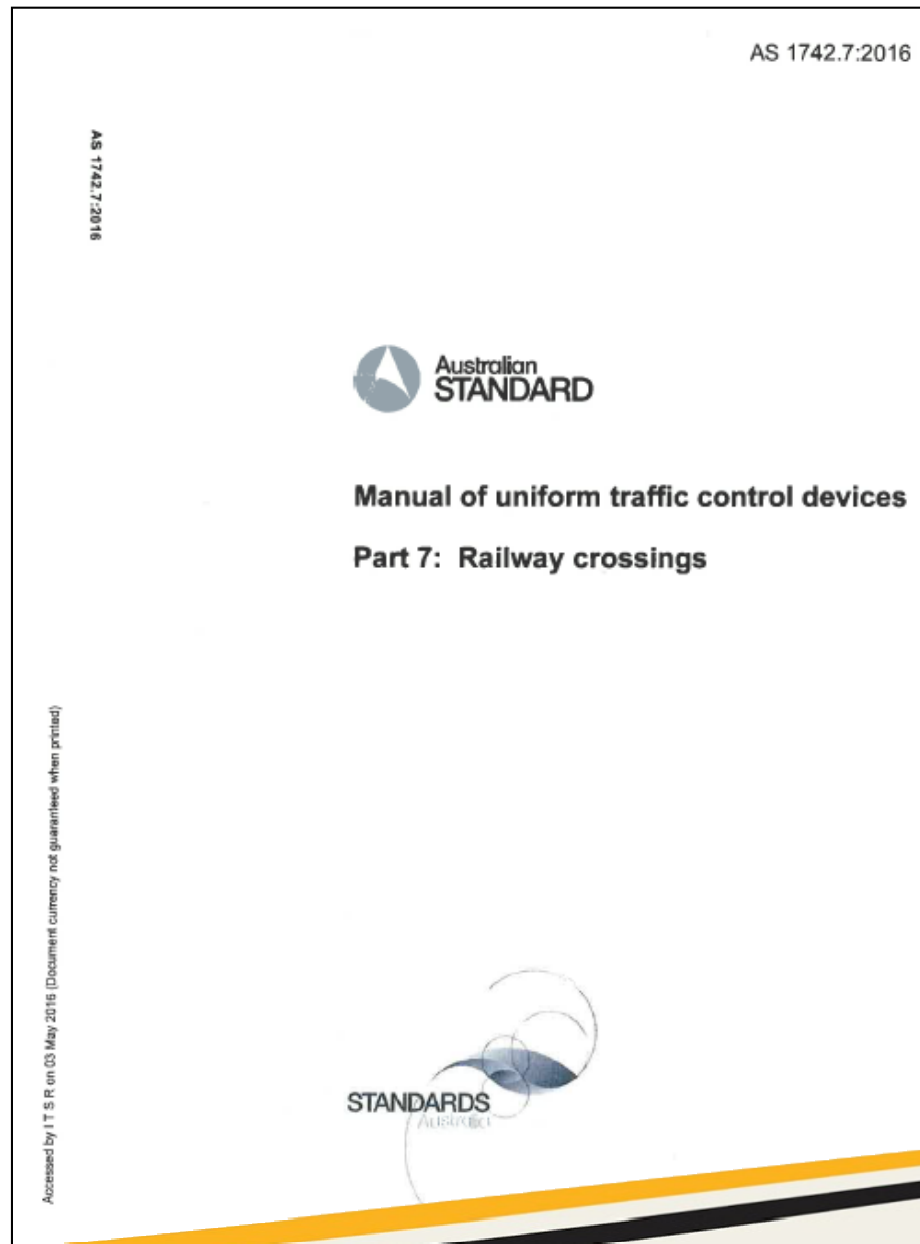


How we undertook the Inspection

- > Sampled 111 of the 241 public level crossings on the TasRail network (46%):
 - 41 passive control
 - 70 active control
- > Inspection undertaken by road.
- > Measurements estimated with the help of a hand held laser range finder.

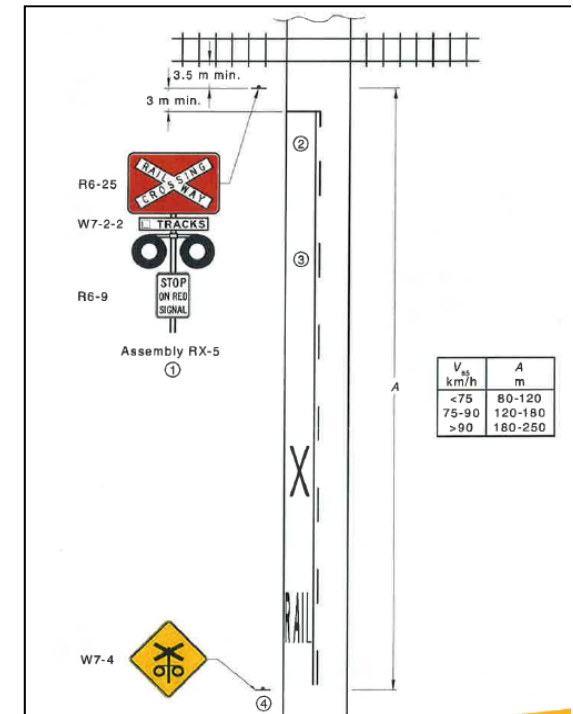
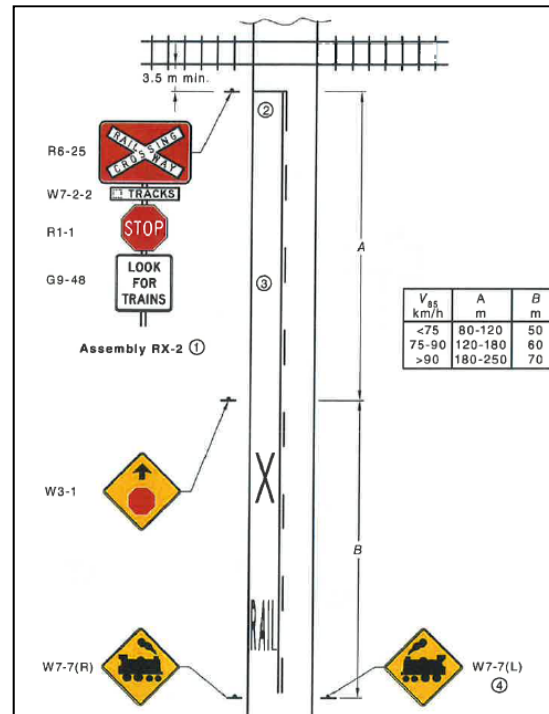
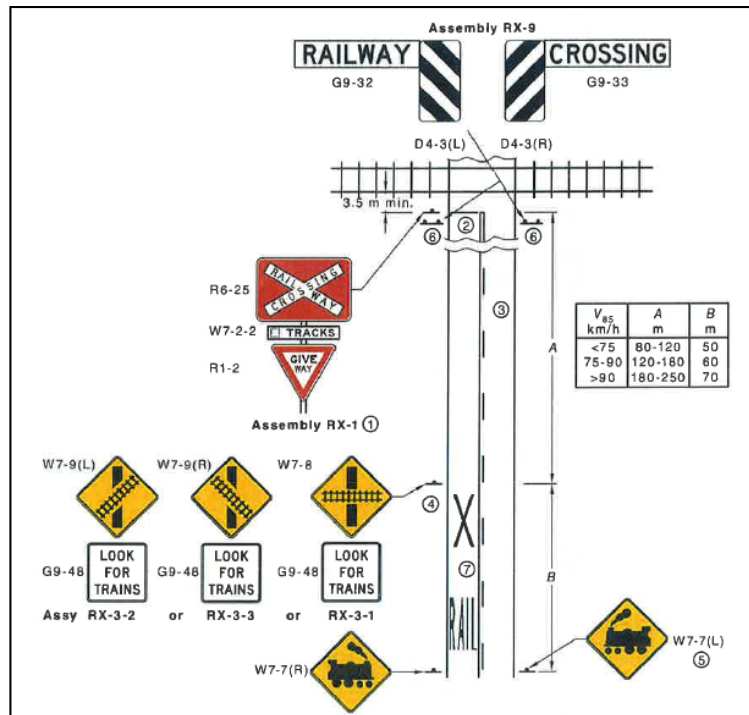


Criteria



Criteria - Signage

➤ Figures 4.3 to 4.11 in AS1742.7



Criteria – Line Markings

> Section 3 of AS1742.7

SECTION 3 PAVEMENT MARKINGS

3.1 GENERAL

A summary of requirements for pavement markings on sealed approaches to crossings is as follows:

- (a) RAIL X marking (see Clause 3.2) shall be used on all high-speed approaches of adequate seal width except at crossings on side roads where the distance to the crossing is less than specified in Clause 3.2.
- (b) Stop or give-way line (see Clauses 3.3 and 3.4) shall be used on all approaches in all cases.
- (c) No-overtaking lines (see Clause 3.5) comprising either single barrier line, double one way and double two way barrier lines shall be used on all undivided road approaches where the sealed width is 5.5 m or greater.

Criteria – Sight Lines

- Section 4.2.1 and Appendix D of AS1742.7

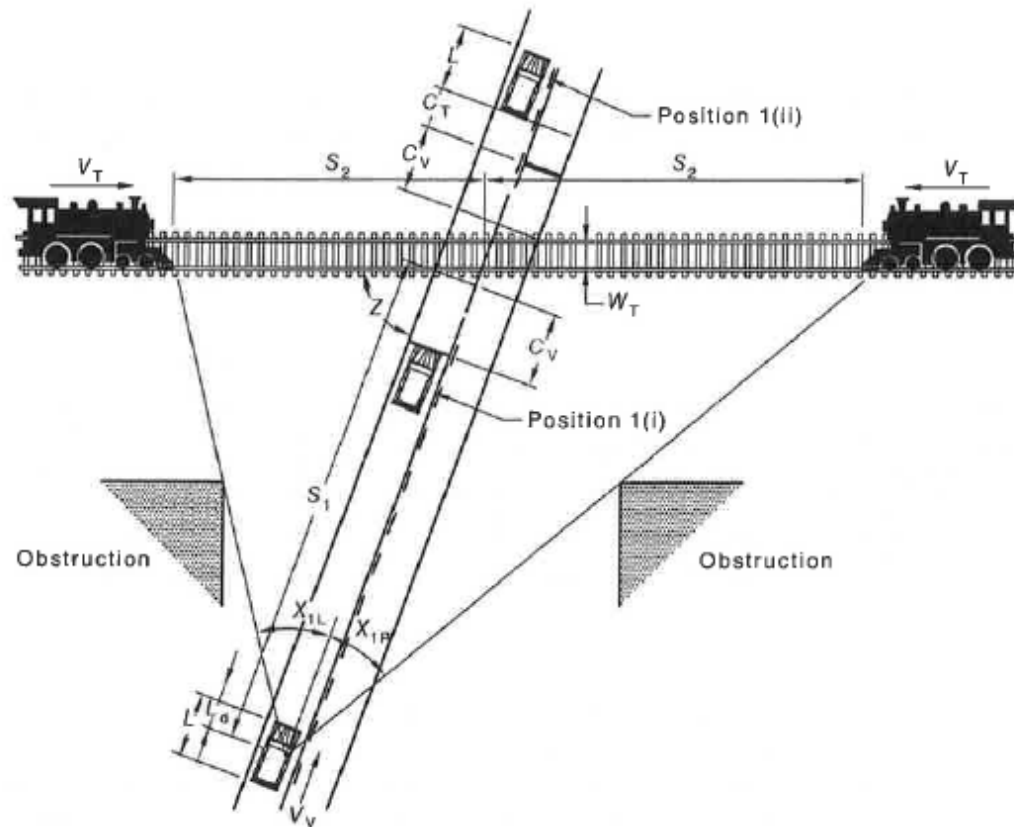
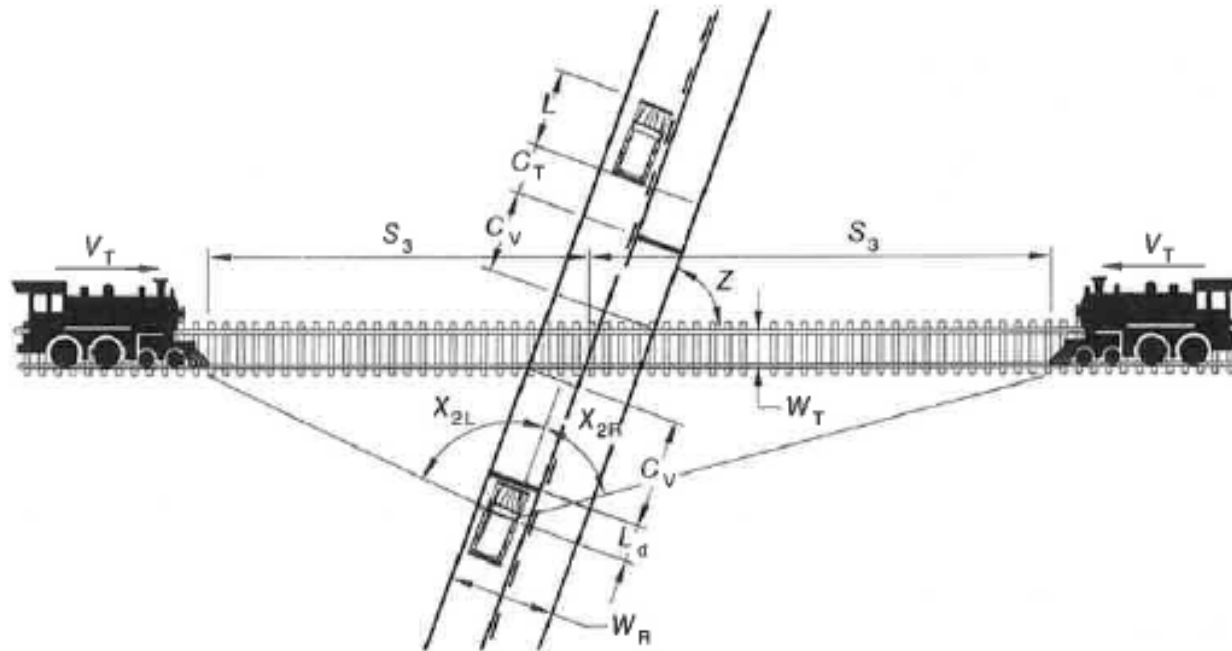


FIGURE D1 APPROACH VISIBILITY AT PASSIVE CONTROL RAILWAY CROSSINGS WITH GIVE-WAY SIGN CONTROL

Criteria – Sight Lines

- Section 4.2.1 and Appendix D of AS1742.7

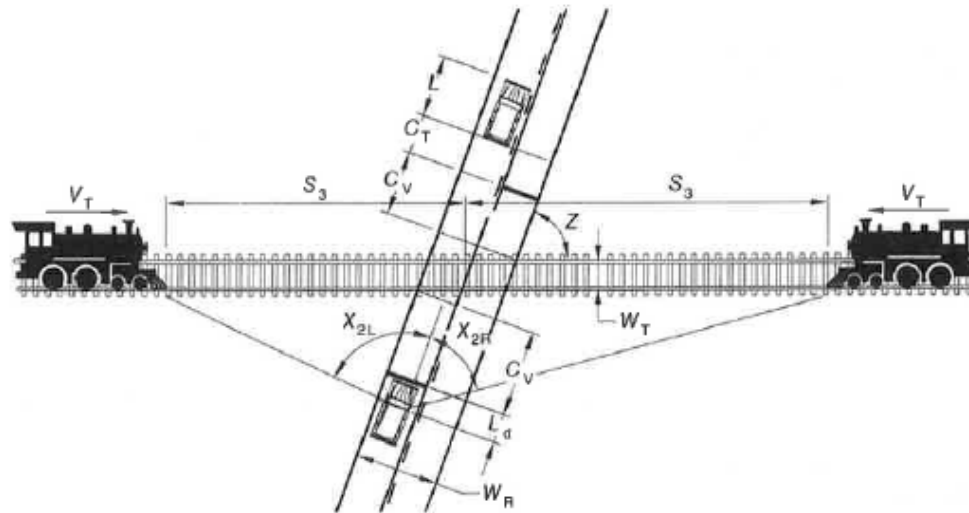


Motorist stopped at crossing requires adequate time to accelerate and safely clear the crossing.

FIGURE D2 STOP AND START UP VISIBILITY AT PASSIVE CONTROL RAILWAY CROSSINGS

Criteria – Sight Lines

- Section 4.2.1 and Appendix D of AS1742.7



Motorist stopped at crossing requires adequate time to accelerate and safely clear the crossing.

FIGURE D2 STOP AND START UP VISIBILITY AT PASSIVE CONTROL RAILWAY CROSSINGS

Criteria – Sight Lines

> Section 4.2.1 and Appendix D of AS1742.7

Distance S_3 is the minimum distance at which an approaching train from either direction must be seen in order for the design vehicle to start off and clear the crossing by the safety margin shown in Figure D2. Distance S_3 is given by the following:

$$S_3 = \frac{V_T}{3.6} \left[J + G_s \left(2 \frac{\frac{W_R}{\tan Z} + \frac{W_T}{\sin Z} + 2C_v + C_T + L}{a} \right)^{1/2} \right]$$

Assumptions:

- > Normal track speed as listed by RIM.
- > Sight line requirement is based on the type of vehicle permitted unrestricted access under applicable traffic regulations (usually semi-trailer).
- > Grade correction factor assumed as level.
- > Road speeds base on posted speed limit (not 85th percentile).

The Results - Signage

Railway Signs

Generally in good condition.

(Inspection & maintenance of active LX equipment has been routinely tested during other ONRSR audit activities).

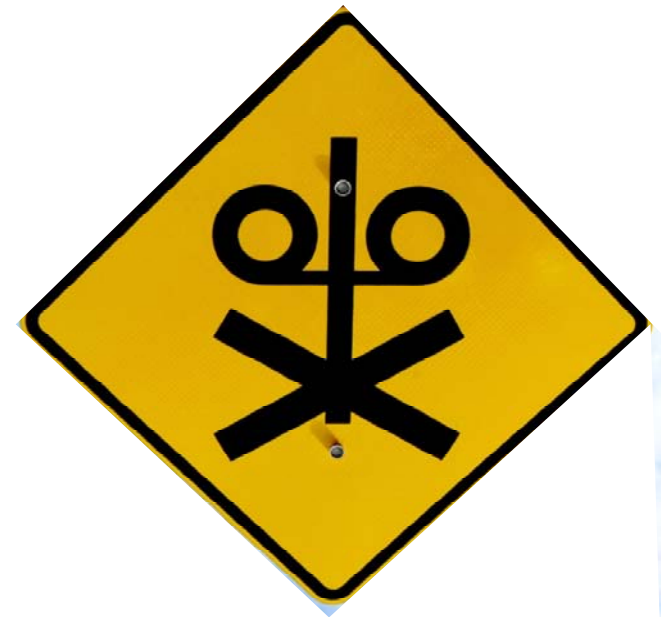


The Results - Signage

Road Signs

20% of the sample required maintenance of advanced warning signs:

- > Replace missing signs
- > Turn the signs to face traffic
- > Straighten leaning poles
- > Need to be removed from a crossing that was closed.



The Results – Line Markings

32% of the sampled sites had well worn, faded or missing stop lines.



The Results – Line Markings



The Results – Sight Lines

S₃ sight line was limited or partially obstructed to varying degrees at 32 of the 41 sites sampled.

- > Vegetation – small trees, bushes, tree branches and even grass growing in the rail corridor. Minor bushes and branches had major effects on sight lines.
- > Seven sites where the S₃ sight line was severely limited by building structures, fences, gardens, signage and surrounding embankments. Recommended the RIM undertake a detailed risk assessment.

The Results – Sight Lines



The Results – Sight Lines



The Results – Sight Lines



The Results – Sight Lines



The Results

- > S₃ sight lines were limited or partially obstructed to varying degrees at 32 of the 41 passive crossings sampled.
- > 32% of the sampled sites had well-worn, faded or missing stop lines.
- > 20% require maintenance attention to correct or replace missing advance warnings signs.

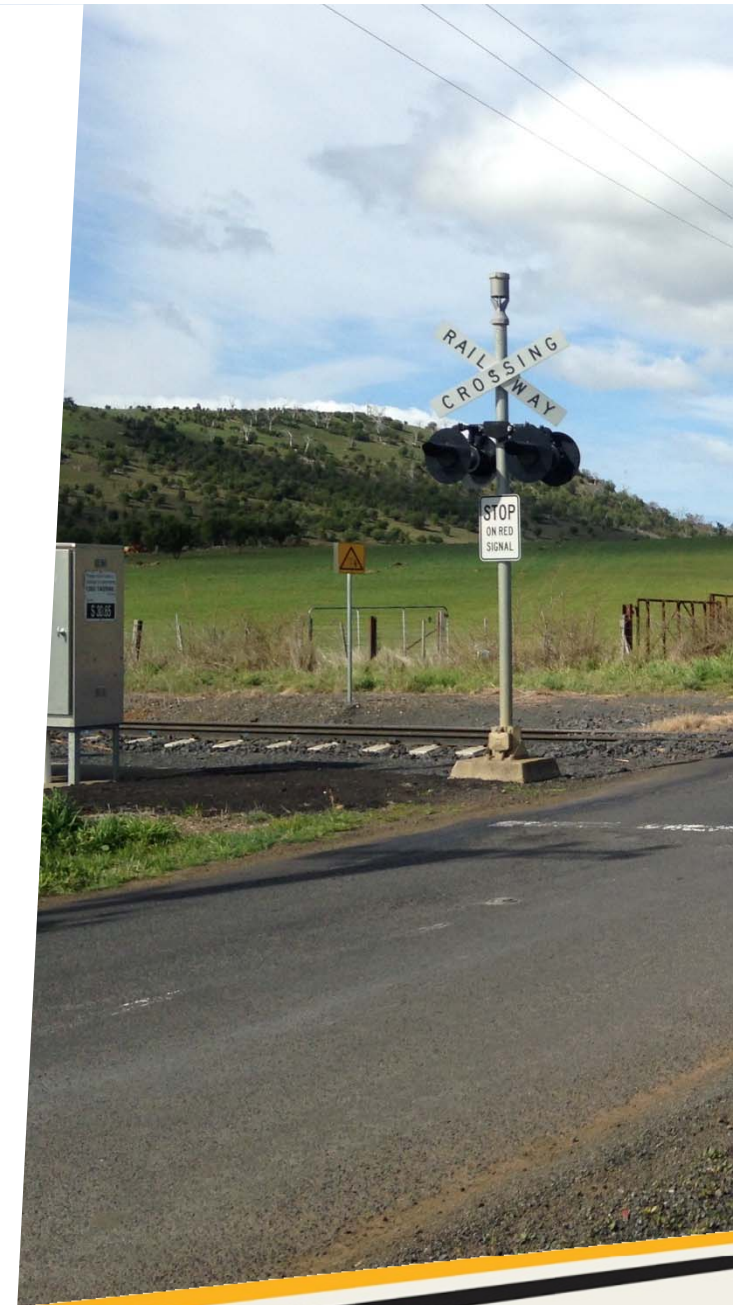
Conclusions

1. Current inspection regimes based on track patrols have a narrow focus on railway signs and track.
2. Imperative to assess sight lines from the road user's point of view:
 - > Remember to measure from the driving position of the road vehicle (general assumption according to AS1742 is 5 meters from the rail).
 - > Sight line requirement is based on the type of vehicle permitted unrestricted access under applicable traffic regulations.
 - > Vegetation "creeps up on you". Inspectors become conditioned to what they see over long periods of time as being normal and don't pick up that sight lines are compromised.



Conclusions (Cont.)

3. Inspection regimes of road markings and advance warning signs are ineffective (if they are occurring at all).
4. Closer co-ordination needed between RIM and Road Manager to ensure missing and deteriorating road infrastructure is identified and maintained.
5. There may not be a common understanding between the Rail Infrastructure Manager and Road Owner about their respective responsibilities at level crossings and the arrangements in place to fulfill those responsibilities.



In Other Words.....

- > No-one is really monitoring sight lines
- > No-one is really monitoring signs and road markings



Recommendations Arising from the Inspection

- > RIM undertake inspection of sight lines from the road user's point of view at all passive control level crossings across its network.
- > Road Managers undertake inspection of signs and road markings at all level crossings.
- > RIM and Road Managers to actively engage in establishing Safety Interface Agreements so that there is a common understanding of each parties responsibilities and the current arrangements to fulfill them.



Safety Interface Agreements

1. Jointly assess the risks and determine the measures to manage those risks.



Safety Interface Agreements

2. Clearly set out each other's roles and responsibilities and the arrangements to fulfill them:
 - > Roads pavement & footpaths
 - > Signage
 - > Vegetation
 - > Property or other developments which have the potential to affect sight lines and road or rail traffic patterns & speeds.
 - > Bridges (road over rail, rail over road)



Safety Interface Agreements

3. Inspection and Review

- > Assessment of sites.
- > Inspection regimes to ensure facilities/risk controls are kept in good condition.
- > Review of agreement.



Safety Interface Agreements

4. Communication Protocols

- For routine maintenance items requiring attention.
- Incident.
- Escalation & how disputes will be resolved.
- Review of sites.
- Review of agreement.



Safety Interface Agreements

5. Arrangements when works are to be conducted where it affects each other's operations:
 - > Works in the danger zone.
 - > Works in the vicinity (but not necessarily in the danger zone).
6. Keep a register of the agreements





Concluding slide