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Level 2

Signalling Design: Module X12 – Level Crossings: Automatic Open Crossing Locally Monitored

Endorsement and Authorisation

For endorsement and authorisation, please refer to NR/L2/SIG/11201

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Issue record

Issue	Date	Comments
1	December 2011	First Issue
2	June 2012	Updated to new ORR guidance

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 01/12/2012.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

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1 AUTOMATIC OPEN CROSSINGS - LOCALLY MONITORED.

1.1 GENERAL DESCRIPTION.

1.1.1 The crossing is worked automatically by the passage of trains.

1.1.2 Speed is limited to a maximum of 55mph.

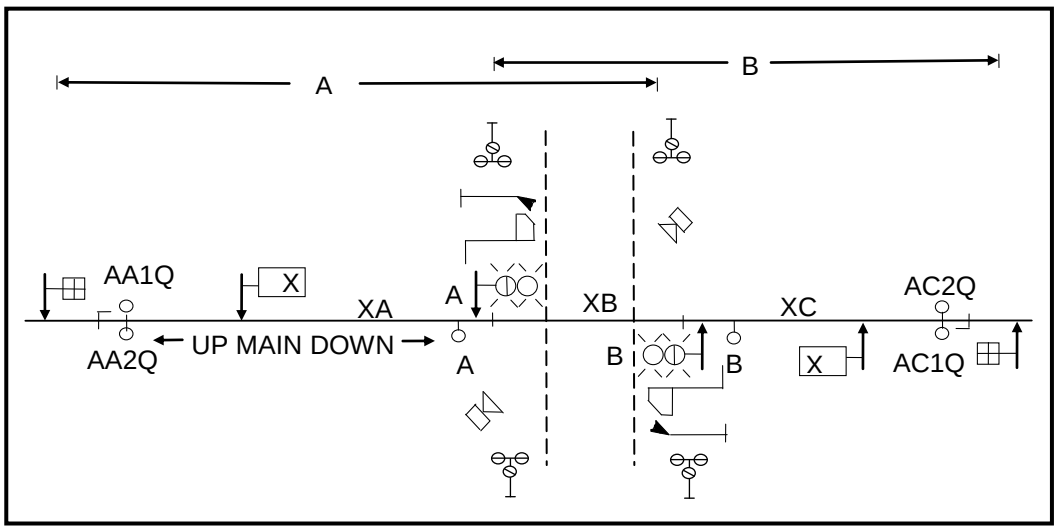

Figure 1 – Diagram of operating sequence and controls (AOCL).

1.1.3 Automatic open crossings locally monitored (AOCL) have no barriers. Each road approach is protected by a minimum of two road traffic light signals (RTL's). One unit is sited on each side of the road approach.

1.1.4 Audible warnings are provided for pedestrians. There are a minimum of two units. They shall be normally sited at the diagonally opposite nearside corners of the crossing facing onto the crossing area. Larger crossings may use four audible warning devices with one at each corner.

1.1.5 A drivers crossing indicator (DCI), is provided on each rail approach.

1.1.6 A scaled ground plan defines and locates all equipment sited at the level crossing.

1.1.7 Driver's emergency plungers are normally provided on each rail approach. They are contained in a locked box located nominally 2m in advance of the DCI, but may be positioned elsewhere. The lock is a drivers No 1 key. It is not required to prove that the doors of the emergency plunger box are closed and locked.

NOTE Older sites may not be fitted with emergency plungers

1.1.8 Telephones for users are normally provided but are not mandatory.

1.1.9 Where trains run at night, the crossing has floodlighting that activates when a train is approaching. This allows the driver of a train to check that the crossing is clear. The floodlighting is arranged as far as practical so that it is pointed at the crossing surface and does not cause glare to approaching trains.

1.1.10 The maximum length of trains permitted to operate over the level crossing shall be documented in the design details.

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2 TRAIN DETECTION SYSTEM CONTROLS.

2.1.1 Where a track circuit is used solely for the control of an AOCL, there is no requirement for the track circuit to be failsafe nor is there a maximum limit placed on residual voltage. Failure of the track circuit to de-energise shall result in the crossing not operating for the approaching train and the DRL and DWL not responding.

2.1.2 Where the residual voltage exceeds 30% of the track relay drop away value, the following note shall be added to the design details for the track circuit: “Note: This track circuit does not meet the residual voltage restrictions specified in NR/L2/SIG/11011, and shall not be used for any purpose other than the control of AOCL level crossings, unless modified to meet the requirements”.

2.1.3 Track sections situated within the crossing control area once occupied shall initiate the crossing operation. The crossing operation shall be maintained (by means of a stick control), until:

- The train has been proved to clear the crossing by sequential operation, or;
- A suitable time has elapsed after the track has cleared. In this situation, the DWL, having been displayed, shall be extinguished at least thirty seconds before the strike-in controls are released.

2.1.4 Failure of a track section shall result in the following consequences:

2.1.5 If a random track section occupation occurs which subsequently clears, - the operating sequence shall be initiated.

2.1.6 If a random track section occupation occurs which does not subsequently clear, - the operating sequence shall be initiated. At a suitable time after track circuit clearance, (Unless other track sections within the crossing control area are also occupied), the DWL shall be extinguished and the DRL illuminate. After a further 30 seconds the red flashing road lights extinguish. The crossing shall not work automatically for any further approaching train until the fault is cleared.

2.1.7 It is not necessary to provide standby power supplies for track sections used solely to control an AOCL for safety purposes, but standby’s may well be provided for reliability and availability purposes

3 POSITIONING OF STRIKE-IN POINTS.

3.1.1 The minimum warning time at AOCL crossings shall be 19 seconds for crossings up to 15m long. Over this length an additional 1 second warning is required for each additional 3m of crossing length.

NOTE Changes to ORR guidance in 2011 removed the previous minimum of 27 secs which has been used in the vast majority of existing crossings. The requirement is now that “The period between the display of the RTL’s and the arrival of the fastest train is sufficiently long to enable road vehicles and pedestrians to clear the crossing”. The time taken by an 18.75m long vehicle to cross a 15m crossing at 5mph (2.2m/s), is 16 secs. If this vehicle began to cross at the end of the amber light period, this would be 19 secs from the crossing warning initiating. The figure of 1 sec for every 3m of longer crossings also comes from ORR guidance. In practice other factors in the design of the crossing often mean the warning time is longer than the minimum specified here, but this must be confirmed.

3.1.2 When positioning the strike-in an allowance shall be made for equipment response times. For a conventional relay controlled crossing this normally includes 2

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secs for a train to be detected and start the crossing sequence plus a further 2 secs for the flashing RTL's to be proved working before the DWL can illuminate..

3.1.3 For an electronic interlocking or crossing controller, the response times must either be known or worked out before the crossing is designed.

3.1.4 Where there are two or more lines, the strike-in point is also positioned to give the Minimum Road Open Time (MROT). (Nominally 10 seconds.)

3.1.5 The crossing speed may already be fixed by some aspect of the crossing, but if not, it can be calculated and subsequently the strike-in points calculated in accordance with the following procedure and diagram.

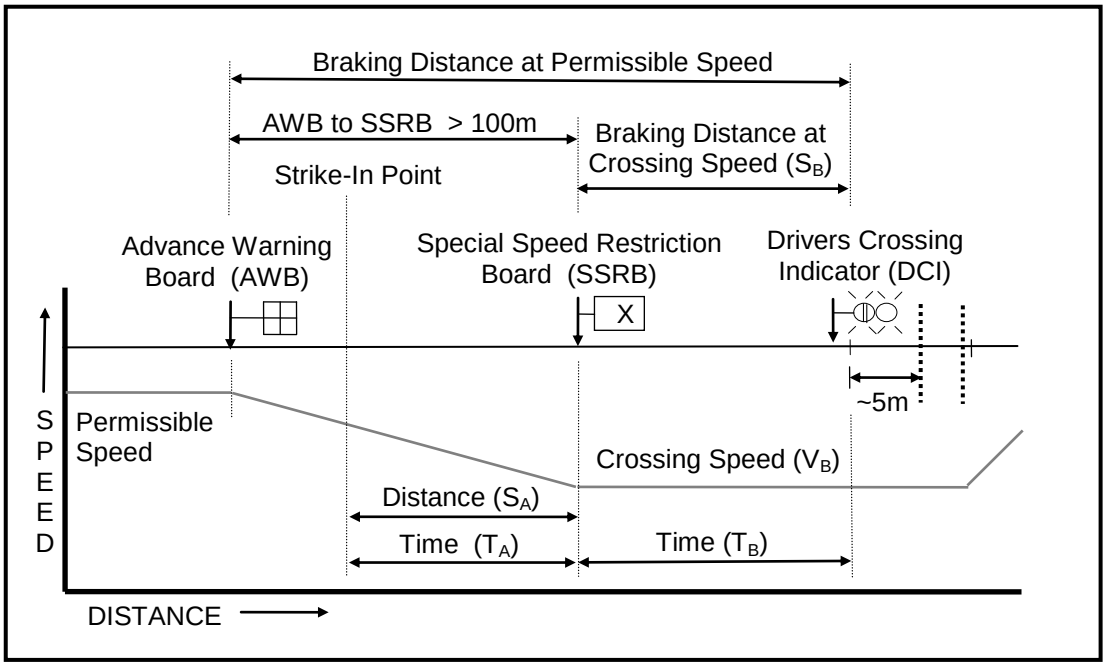

Figure 2 – AOCL Design.

3.1.6 Determine the maximum distance at which the crossing is clearly visible for each rail approach. Position the Special Speed Restriction Board (SSRB) at this point, subject to a maximum of 600m;

3.1.7 From the passenger and composite braking distance tables in GK/RT0075, obtain the speeds rounded to 5mph from which passenger and freight trains can brake to a stand before the crossing from the SSRB position. These speeds become the crossing differential speeds for passenger and freight and are shown on the SSRB. Speed is limited to a maximum of 55mph (90kph) and a minimum of 10mph (15kph). Only two differential crossing speeds may be used on the SSRB;

3.1.8 Calculate T_B in the diagram by dividing the distance of the SSRB from the crossing by the passenger speed;

3.1.9 From the composite table in GK/RT0075, obtain the braking distance from the crossing at the permissible speed. As long as this position is at least 100m, on the approach side of the SSRB, then this becomes the position of the advance warning board (AWB). If however this position works out at less than 100m, then the AWB is positioned 100m on the approach to the SSRB;

3.1.10 The DWL is required to illuminate before the train reaches the SSRB. The

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