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Date:	02/06/2012
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Level 2

Signalling Design: Module X21 – Level Crossings: Manually Controlled Barriers With Obstacle Detector

Endorsement and Authorisation

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

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Issue record

Issue	Date	Comments
1	September 2011	First Issue
2	December 2011	Update
3	June 2012	Updated for MROT and auto lower strike-ins

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 MANUALLY CONTROLLED BARRIER WITH OBSTACLE DETECTOR (MCB-OD)

1.1 GENERAL DESCRIPTION.

1.1.1 These crossings are protected by colour light signals or motor worked semaphores that are capable of reverting to danger automatically behind a train. These signals shall be interlocked with the barriers so that it is not possible to clear the signals unless the road is fully closed by the barriers and a "Crossing Clear" is confirmed by the obstacle detector.

1.1.2 These crossings normally use four barriers, but on smaller roads where considerable widening would be needed to make four barriers practical, then two barriers may be used.

1.1.3 The optimum distance between the crossing and the protecting signals is standard overlap distance, but is often varied as a result of taking into account other factors:-

- If signal spacing is better as a result, the protecting signals may be in the range 50m to 600m without further consideration.
- If the crossing is closed to road a significant time in any hour, then reducing to 50m minimises road closure time.
- Where two crossings are sited in the same signal section, then the distance to the second crossing is often unavoidably more than 600m. This can be minimised by moving the protecting signal at the first crossing to or towards 50m.
- Protecting signals may be within 50m if some appropriate SPAD mitigation is provided.

1.1.4 It shall not be possible to raise the barriers unless the signals are replaced to Red, and are free of approach locking, or the train has passed the signals and traversed the crossing.

1.1.5 The road approaches are protected by road traffic light signals and barriers on both sides of the railway. Audible warnings to pedestrians are provided.

1.1.6 The barriers shall normally be kept raised unless required to be lowered for the passage of trains.

1.1.7 The crossing is normally worked automatically and proved clear of obstructions during the closing phase by an obstacle detector system.

1.1.8 A scaled ground plan shall be produced showing the road and rail layout and all equipment sited at the level crossing.

1.1.9 Where there are four barriers, the entrance barriers shall be arranged to lower before the exit barriers. When the entrance barriers have fully lowered, then if an obstacle detector is reporting the crossing is clear, the exit barriers shall lower. (Details of obstacle detector operation and interaction with the barriers are given later.)

1.1.10 When all barriers have fully lowered, then if the obstacle detector system reports the crossing is clear, (and no other interlocking prevents it), the protecting

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signals shall be allowed to clear.

1.1.11 A minimum of two audible warning devices are provided. They shall be normally sited at the diagonally opposite nearside corners of the crossing facing onto the crossing area. Larger crossings may use more warning devices. See the audible warning section for more details.

1.1.12 Telephones for public use shall be provided.

1.1.13 All crossings shall be provided with a Datalogger that monitors and records the crossing operation.

2 TRAIN DETECTION SYSTEM CONTROLS.

2.1.1 Train detection systems shall be provided between the protecting signals and the crossing for all signalled rail approaches. These systems shall maintain the interlocking once a train has passed the protecting signal until the train is clear of the crossing.

2.1.2 If a train passes a protecting signal at danger (SPAD), the level crossing red road signals shall immediately illuminate (Bypassing the amber phase in doing so.) The barriers shall not automatically lower.

2.1.3 If the protecting signal is less than 50m from the crossing, then the train can be allowed to approach the signal at red if one of the following measures is applied;

- “Stowmarket Controls” - The RTL’s shall illuminate automatically in a normal sequence with Amber followed by flashing reds when a train approaches within 125m of the crossing. If the route forward is set, the crossing sequence shall continue with barriers lowering and this shall be the normal method of operating the crossing where there is a station on the approach and stopping trains only pause for say a minute in the station. (There is no requirement for the protecting signal to be a minimum of 25m away where a station is involved.) This function may be achieved by a track circuit joint, Axlecounter or single treadle physically sited at or before the 125m point or be achieved using predictor based equipment. Where the route has not been set beyond the signal, the barriers shall not descend and the RTL’s shall automatically extinguish after a time. (default of 30 seconds) Subsequent setting of the route forward during this time shall continue the sequence from the point it has reached. If the time expires than a normal crossing closure sequence is initiated when the route forward is set. Where there are two or more lines, then to ensure MROT the 125m strike-in may be extended and a timer used to delay the amber lights starting until reaching the 125m point for the first train, (default 20 secs). If the barriers are already lowered because another train has already struck-in on another line, then on reaching the initial strike-in, this shall prevent the barriers raising. If the route forward is set, the protecting signal may clear immediately. If the route forward is not set, the barriers shall be held down for a time (default of 30 secs) after the train reaches the 125m point after which they shall rise and the red lights extinguish,
- Where trains are regularly brought to a stand for a time greater than say one minute at the protecting signal, then “SPAD Prediction” shall be considered. In principle this shall detect the speed and braking of the train at some point on the

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approach and shall illuminate the road lights automatically when the train approaches within 100m of the crossing and the prediction circuitry expects it to SPAD the protecting signal. In this case the flashing reds lights shall start immediately, bypassing the amber phase. An alarm shall be given at the supervising signalbox.

- Only applicable where because of the particular site arrangements, the move up to the protecting signal is only rarely used, - say less than once a week - in which case there is no requirement to provide any SPAD mitigation under this clause as it would not be cost effective to do so. However a minimum distance to the crossing of 25 Metres shall still be applied where it is practical to do so.
- Only applicable for bay or terminal platforms (Or any other situation where a train cannot arrive at the protecting signal heading towards the crossing): - There shall be a minimum distance to the crossing of 25 Metres except where the length of the platform and the stock using it means this distance would be impractical. In this case the distance between the protecting signal and the crossing may be reduced as necessary below 25 Metres to make the arrangement workable provided a train driver has good sighting of the protecting signal from any position he can start his train. (Provision of 25m or good sighting is considered sufficient mitigation for a "Starting against a Signal SPAD".)

NOTE The 125m point used in Stowmarket Controls" to activate the RTL's will give at least 8 secs warning at what has been deemed to be a reasonable worst case SPAD. The eight seconds allows 3 secs Amber then 5 secs Red. The positions used for SPAD prediction are expected to give 5 secs warning of Red lights from a similar SPAD.

2.1.4 Train detection systems shall be provided beyond the crossing to release the interlocking and to provide an auto raise sequence.

2.1.5 Failure of the train detection systems between the protecting signals and the crossing shall cause the RTL's to illuminate, (unless the signalbox is closed.) To extinguish the lights (to allow vehicles to pass over the crossing), requires the crossing to be operated in local control until the fault is rectified.

3 METHOD OF OPERATION.

3.1.1 The normal method of working is automatic using the obstacle detector system. Simple manual controls to raise and lower are provided to the signaller as a back-up.

3.1.2 Automatic operation is selected by the signaller setting the switch provided to the "Auto" position.

3.1.3 For automatic mode to take effect when selected, the following conditions must apply and shall also suspend automatic mode should they subsequently change:-

- "Auto" selected;
- Not in local control;
- Not failed
- Obstacle detector system not failed
- Crossing has not been operating an unusual time (See failure modes).
- Signal box not closed