

RAILTRACK PLC

MODEL CLAUSES FOR SPECIFYING CIVIL ENGINEERING WORKS

Level Crossings Guidance Notes for Specifiers

ISSUE NO. 1 REVISION A

RT/CE/C/008/230GN
Page 1 of 21

Date: 31 January 1997

Compiled by: Delro (York) Ltd
Northcote House
North Lane
Haxby
York YO3 3JU

Edited by: Keith Ross
Structures Standards Engineer
Civil Engineering Directorate
King's Cross

Approved by: Model Clauses (Civil Engineering)
Committee on 23 April 1997

Signature:
for Director, Civil Engineering

John Horsler
Civil Engineer, Structures Compliance
Chairman Model Clauses (Civil Engineering) Committee

Amendments

Amendments and additions since the previous issue are marked by a vertical line in the right hand margin.

© Railtrack PLC 1997

This document is the property of Railtrack PLC. It shall not be reproduced in whole or in part without the written permission of the publisher for use external to Railtrack.

Published by

Director Civil Engineering,
Railtrack PLC,
East Side Offices
Kings Cross Station,
London N1 9AP

Controlled document

N O :



CONTENTS	Page
1. Introduction	3
2. Sections of the Model Clauses for Level Crossing Works	3
3. Content of the Model Clauses	
3.1 General	3
3.2 Installation at Green Field Sites	3
3.3 Renewals by Like for Like Replacement, Improvements or Modernisation	4
3.4 Maintenance of Existing Sites	4
4. Level Crossing Standard Drawings	4
5. Combined Permanent Way and Surfacing System Layout Plan	4
6. Agreed Final Installation Ground Plan (AFIGP)	5
7. Occupation and Accommodation Level Crossings	
7.1 General	5
7.2 Vertical Road Profile	6
7.3 Crossing Surface	7
7.4 Gates	7
7.5 Signs	8
7.6 Sighting and Visibility	8
7.7 Cattle cum Trespass Guards	9
7.8 Maintenance of Crossings	9
8. Site Works: Technical Integration	9
9. Specification for the Survey of Level Crossings	10
10. Road Markings and Signs for Level Crossings	
10.1 Preamble	10
10.2 Legal Requirements	10
10.3 Level Crossing Site Specific Requirements	10
10.4 Specific Railway Requirements	11
10.5 Typical Signing, Audible Warning Unit and Road Marking Requirements:	11
Automatic Half Barrier Crossings (AHBC) and Automatic Barrier Crossing Locally Monitored (ABCL)	12
Automatic Open Crossings Locally Monitored (AOCL)	13
Manned Barrier Crossings including CCTV	13
Open Crossings (OC)	14
Miniature Stop Lights (MSL) - User Worked Crossings	15
Bridleway Level Crossings	15
Footpath Level Crossings	15
11. Glossary of Level Crossing Terms	15
12. Level Crossing Abbreviations	21

1. INTRODUCTION

The Clauses contained within the Level Crossing Sections of the Model Clauses in conjunction with other relevant parts of the Model Clauses should enable the Specifier to produce Contract documentation which specifies the unique requirements for civil engineering works at level crossings.

The Model Clauses within the Level Crossing Sections, in conjunction with the Level Crossing Standard Drawings, are deemed to represent 'best practice' with respect to the control and implementation of civil engineering works at level crossings. Information contained within the Clauses and Drawings derive their origins from 'best practice' developed within British Rail and thus gains pedigree from many years of experience from within the railway civil engineering community.

2. SECTIONS OF THE MODEL CLAUSES FOR LEVEL CROSSING WORKS

There are many types of level crossings within the ownership and responsibility of Railtrack PLC, all requiring a specific approach to their construction, some types are more complicated than others.

Elements of the Specification which are common to all types of crossings are specified in Section 230: General Requirements for Level Crossings.

By far, the greater amount work is generated for level crossings used by the public. Clauses relating to these crossing types are specified in Section 231: Public Vehicular Level Crossings.

Works specifically relating to crossings with limited access are specified in Section 232: Occupation and Accommodation Level Crossings.

Works specifically relating to pedestrian, animal and all other minor types of crossing are specified in Section 233: Footpath, Bridleway and Other Minor Types of Level Crossings.

When specifying works for the crossing types associated with Sections 232 and 233, the Specifier is recommended to also consult Section 231, in addition to Section 230, with a view to including any relevant Clauses within the Contract Specification.

3. CONTENT OF THE MODEL CLAUSES

3.1 General

The Model Clauses within each Level Crossing Section follow the logical sequence of the construction process and allows for the various levels of complexity which may be encountered at any given level crossing.

The Model Clauses within each Section allow for the following three levels of complexity within the construction process:

3.2 Installation at green field sites

For any given crossing type, the Contract Specification for the construction of a level crossing, regardless of type, at a location on the railway where no permanent level crossing previously existed, should include virtually all Clauses from the applicable Section, as well as Section 230.

3.3 Renewals by like-for-like replacement, improvements or modernisation

The vast majority of works at level crossings, regardless of type, occur at locations where level crossings already exist. Construction works therefore arise as a result of old equipment or infrastructure becoming life-expired. Renewal may be on a like-for-like basis, or if deemed not to satisfy current safety standards, subject to modernisation. Change in the use of crossing with respect to pedestrians, vehicular and rail traffic may also lead to improvement in for example the crossing surface, or other updating of crossing infrastructure.

For any given crossing type, the Specification for a renewal, improvement or modernisation of a level crossing should include the majority of Clauses from the relevant Section, and Section 230.

3.4 Maintenance of existing sites

Clauses within the relevant Level Crossing Sections may be used for the specification of minor remedial and maintenance works at level crossings. The Clauses do not specify a frequency of inspection or level of maintenance, but provide a performance standard that should be achievable in practice.

For any given crossing type, a Specification for maintenance of level crossings should include only a minority of Clauses within the relevant Section, and minimal use of Section 230.

Clauses have been written on the assumption that maintenance work will more than likely be a renewal or partial renewal basis as distinct from repair or upgrading.

4. LEVEL CROSSING STANDARD DRAWINGS

Twenty one Level Crossing Standard Drawings specifying requirements for civil engineering works at level crossings are listed in Appendix 230A. Such drawings may be used as Contract Drawings or for guidance.

Although prescriptive specification should be minimised to allow for innovation, due account should be taken of the Health and Safety Executive - H.M. Railway Inspectorate 'Guidance on Level Crossings'. Use of the level crossing Standard Drawings and associated Clauses should assist towards achieving this objective.

5. COMBINED PERMANENT WAY AND SURFACING SYSTEM LAYOUT PLAN

At some crossings undergoing major works it may be necessary to change or alter the Permanent-Way and level crossing surfacing system. The 'Combined Permanent Way and Surfacing System Layout Plan' should enable the existing and proposed Permanent Way and surfacing system to be precision matched on Site, to ensure exact alignment of the crossing surfacing system in relation to the centre-line of the carriageway, and also to ensure correct interfacing between the Permanent Way and the level crossing surfacing system.

At automatic barrier controlled crossings, it is essential that vehicles do not ground on the level crossing surface between the barriers or on the approaches to the barriers such that the barriers cannot be closed. In order to confirm that the level crossing surface is acceptable for the required 'category of profile' applicable to the level crossing, a longitudinal level survey of the carriage way should be carried out as specified in Section 231: Public Vehicular Level Crossings..

6. AGREED FINAL INSTALLATION GROUND PLAN (AFIGP)

All existing public vehicular level crossings, and some private ones, will have a Record Ground Layout Plan showing the 'as installed' installation. If it is proposed to alter the installation, such that current dimensioning or any other layout detail is altered which infringes upon the existing operation of the level crossing with respect to road or rail traffic, a revised Draft Installation Ground Plan should be specified for the Works.

Following procedures (beyond the scope of this Specification) an Agreed Final Installation Ground Plan will be produced.

The AFIGP should specify the physical arrangements and all associated required dimensions for all items of road and rail infrastructure appertaining to the level crossing installation.. The Specifier should be aware that references are made, within numerous Model Clauses, to the AFIGP.

All proposed works at public vehicular crossings, whether green field sites, like-for-like renewals or modernisation schemes, will require the eventual production of an AFIGP as a basis on which construction works can be carried out at any given crossing. The Model Clauses and Level Crossing Standard Drawings, are meaningless unless combined with a site specific AFIGP.

Accordingly the Specifier should ensure that the AFIGP or Record Ground Layout Plan is included within the Tender documents, along with the relevant Specification and Level Crossing Standard Drawings.

Maintenance work or alterations on a like for like basis at an existing level crossing should be carried out in accordance with the Record Ground Layout Plan.

Where an existing level crossing is to be altered, site works which do not give the impression of changed protection arrangements may be carried out provided that the AFIGP has been approved by the Railway Inspectorate. Where however the work would give the road user of altered protection arrangements, the relevant Section Order must be obtained before work can commence.

7. OCCUPATION AND ACCOMMODATION LEVEL CROSSINGS

7.1 General

Occupation and accommodation level crossings are otherwise known as User Worked Crossings. An occupation crossing can be regarded as one where there is a private road over the railway, for example leading to a farm, where visitors could be expected at any time. An accommodation crossing can be regarded as a field to field crossing, essentially for the use of the farmer.

The Specification given in Section 232: Occupation And Accommodation Level Crossings is the minimum specification for private occupation and accommodation level crossings, and accords with the requirements to achieve compliance with the "Nairns" recommendations. (Nairns is the location of a private level crossing between Aberdeen and Inverness where a serious accident occurred when a train was derailed as a result of a collision with a road vehicle grounded on the level crossing, and after which, following an inquiry by the Railway Inspectorate, minimum requirements for hog across occupation and accommodation level crossings were required to be provided.)

7.2 Vertical Road Profile.

A limited amount of vertical curvature is allowed for the road surface of any vehicular crossing. The profile for each category of crossing should meet specific hog requirements, where the term "hog" is used to define the maximum hump measured anywhere on the level crossing surface or immediate approaches, between two points separated by a distance equal to the wheelbase of a specified road or farm vehicle. The absolute MAXIMUM hog permitted on any crossing in either category is 150 mm but where substantial work is necessary at a level crossing involving significant alterations to that surface, a new profile should be designed employing a DESIGN hog of 100 mm.

The wheelbase to be adopted in assessing the vertical profile at a crossing is dependent upon the type of vehicular use as defined in the following category matrix:

	Use By Large/Heavy Vehicles or for Ploughing	Use by Cars and Light Farm Vehicles Only	Use by Livestock Only
Occupation Crossing Subject to Intensive or Regular Use	A	C	N/A
Occupation Crossing Subject to Infrequent Use	B	C	N/A
Accommodation Crossing Subject to Intensive or Regular Use	A	C	D
Accommodation Crossing Subject to Infrequent Use	B	C	D

The hog dimensions shall apply as follows:

- (i) for Category A crossings, over a wheelbase of 8.5 metres and extending out to 12 metres from the nearest running edge of the track,
- (ii) for Category B crossings, over a wheelbase of 6.5 metres and extending out to 9 metres from the nearest running edge of the track.
- (iii) for Category C crossings, over a wheelbase of 4 metres and extending out to 6 metres from the nearest running edge of the track;.
- (iv) for Category D crossings no profiling work is necessary.

Crossings in Category C or D were not affected by the "Nairns" requirements. A regular check should, however be carried out to ensure that any changes of use do not occur that would change the category to either A or B. If such a change of use becomes apparent, work should be put in hand to achieve the applicable profile requirements with minimum delay.

In the case of category A, B or C crossings, the maximum approach gradient to the crossing should not exceed 1 in 8 over the distance specified. In addition, where there is a sharp change in the profile at the bottom of a short slope, or where there is a steep slope up from the crossing, then the specification should be applied to ensure that the ends of the equipment do not ground.

On lines electrified by a. c. electrification overhead line equipment, a check should be made to ensure that vehicles/equipment which clear the bell gauges cannot, where there is a long steep slope up to the crossing, foul the electrical clearances to either the traction or return conductors.

In some cases, it may not be possible to meet the required specification within the railway boundary and the permission of landowners will have to be sought for alterations to be undertaken on their land. It is, however, a requirement of the agreement made between BR and the Railway Inspectorate following the Nairns incident that all crossings in categories A and B fully meet the profile stipulations.

It may, in certain circumstances, be necessary to purchase land for the work to go ahead. When this is the case, it will normally be necessary to seek the involvement of either the Infrastructure Liability Section or Railtrack Property and the approval of the Project Manager.

Where landowners refuse to allow alterations to their land, or to sell the required land to Railtrack, or there are other circumstances which make it impracticable to implement the specified requirements the Zonal Operations Manager should be advised.

The Zonal Operations Manager should decide as to the protection measures that are to be adopted in such cases. Measures that may be adopted by the Zonal Operations Manager may include the provision of telephones, permanent speed restrictions, the occasional use of crossing keepers, regular liaison with the authorised user(s) etc.

7.3 Crossing Surface

The crossing surface must be at least as wide as the distance between the gate posts. Provided that there is no infringement of conductor rail clearances, it is advisable to provide a surface that is 300 mm wider on each side than the distance between the gate posts.

That part of the crossing that crosses the tracks and is used by vehicles or equipment must have a surface consisting of a full timber deck or, preferably, proprietary level crossing panel units, tarmac or concrete. Exceptionally, on lightly used field to field crossings or where there is significant use by animals on the hoof, spent ballast held in position by braced timbers both parallel and at right angles to the rail, to ensure that the flangeway gap is maintained and that the surface is at (or nearly at) rail level, would be acceptable.

On low speed freight lines (15 mph or less), or crossings over sidings, a crossing surface to a lower standard appropriate to the site circumstances may be provided, such as ballast contained in braced timbers on reasonably well used crossings or uncontained ballast on very lightly used field to field crossings.

The surfacing on the approaches to the crossing must be constructed using DoT type 2 material, suitably rolled and consolidated. Wherever it is practicable to do so, the approach from the gate to the crossing surface should be level.

7.4 Gates

A single gate, hung so as to open away from the railway, should be provided on each side of the line, with secure self-latching catches provided to hold the gates fast in both the open and closed positions. The clearance between the gate posts should be the same on both sides of the railway, with the minimum opening giving 300 mm clearance on both sides of the widest vehicle expected to use the crossing.

All gates should be sufficiently close to the tracks to prevent a vehicle standing between the gate and the track but not closer than 2 metres from the nearest running edge of the track.

Separate provision for public footpaths or bridleways, in addition to the main gates, is not required unless the main gates are not freely available for use, for example by being kept locked. Existing stiles or wicket gates provided for public footpaths, or 1500 mm gates for public bridleways should be retained. Where existing stiles or wicket gates are provided but there is no public provision, these may be retained or recovered as appropriate according to the circumstances.