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RAILTRACK PLC

MODEL CLAUSES FOR SPECIFYING CIVIL ENGINEERING WORKS

SECTION 221 Permanent Way for Bridgeworks

ISSUE NO. 1 REVISION A

**RT/CE/C/008/221N
Page 1 of 59**

Date: 31 March 1997

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Committee on 15 January 1997 and
14 May 1997

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for Director, Civil Engineering

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Amendments

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

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SECTION 221

PERMANENT WAY FOR BRIDGEWORKS

SECTION CONTENTS

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SECTION 221

PERMANENT WAY FOR BRIDGEWORKS

NOTES TO SPECIFIER:

These notes do not form part of the Specification.

Derivation of the Section

221.1 *This Section of the Model Clauses has been derived from an amalgam of the various Model Clauses specified in the other Sections for Permanent Way, Sections 210 - 219 inclusive. The Specifier may wish to refer to those Sections for additional Model Clauses and advice in the Notes to Specifier in those Sections should the requirements for a particular Contract fall outside the scope of this Section.*

Scope of the Section

221.2 *This Section has been compiled to be used to provide a single document to specify the Permanent Way requirements applicable for either new bridge construction or for bridge maintenance renewals. It may not include all necessary Model Clauses applicable for bridge reconstructions including significant Permanent Way layout changes, where Section 212: Installation of New and Renewal of Existing Permanent Way may contain more applicable Model Clauses, especially with respect to rail supply.*

This Section has been written assuming that the track will be either:

- reinstated with existing track components,*
- replaced like for like,*
- upgraded due to the bridge design.*

Direct fastened track is not covered by this Section as such track is considered part of the bridge design.

The Section assumes that one bridge at a single location is to be constructed. If this is not the case, amendments to mimic the Specification for track renewals in respect of multi location Sites may be needed.

The Section should be able to be used for the bridge installation methods specified in Sections 120 - 126: Bridge Installation Methods and Temporary Works.

Design of Permanent Way

221.3 *This Section of the Model Clauses allows for two options in respect of track replacement and associated design requirements:*

- (i) track relaid to existing design alignment and levels (longitudinal and cross fall) with the form of construction unchanged,*
- (ii) track relaid to an amended design alignment and/or levels (longitudinal and cross fall), and possibly a change in the form of construction, all of which except when shown on the Contract Drawings is assumed will be designed by the Contractor.*

Any requirements for track design have been assumed to be limited to requirements for small lifts or slews to improve clearances, or to achieve required track levels over the bridge. Accordingly the Section includes Clauses that specify requirements for track slewing and lifting to tie the relaid track on the bridge to existing tracks.

Such adjustments to the line or level of the track have been assumed to be considered within the feasibility study for the bridge design and to have outline proposals submitted for approval in Principle procedures for the bridgeworks, but may still require the inclusion of a Clause for design certification.

**Particular
Specification**

221.4 Unlike a Permanent Way renewals specification, some of the requirements for Permanent Way associated with bridgeworks may be shown on Contract Drawings detailing the bridge. Thus references in this Section to Section 227: Particular Specification for Permanent Way for Bridgeworks' may need to be changed to 'Contract Drawings' and vice versa.

**Supply of rail and
reuse of rail and
other components**

221.5 The Model Clauses in this Section should be selected following an inspection of the Permanent Way by Railtrack, and for plain line either the rails are found:

- (i) to be serviceable and subject to the method of bridge installation such rails will be reused,
- (ii) not to be serviceable, and are therefore to be scrapped and the Contractor will supply new or serviceable rail.

The Contractor will be responsible for supplying new or serviceable rail of lengths upto 18.3 metres. Should longer rail lengths be required, rail supply will be by Railtrack, and consideration will need to be given inclusion of the relevant Clause for use of the long welded train from Section 212: Installation of New or Renewal of Permanent Way.

The type of track to be reinstated has been assumed to be as follows:

- jointed track reinstated as jointed track or LWR,
- LWR and CWR reinstated with LWR and CWR respectively.

Other components have been assumed to be reinstated as existing unless a change in the installed Permanent Way is required consequential of the bridge design. Examples of such changes include:

- shallow depth or timber sleepers to minimise construction depth,
- replacement of wheel timbers and associated track fittings with ballast sleepered track.

The method of bridge installation may necessitate that rail is supplied in lengths to form jointed track which is assembled into track panels for installation. The use of jointed track over the bridge is not recommended, as it is detrimental to the bridge structure. However, this Section of the Specification includes some Clauses for jointed track on the assumption that jointed track maybe installed and welded into LWR or CWR before the track is handed back to the infrastructure maintenance contractor.

Any upgrading of the long welded rails to continuous rail has been assumed will be carried out in under a separate Contract for track renewals.

For existing S&C occurring on a bridge or at a new bridge location, the Model Clauses have been selected in this Section assuming that the S&C will be dismantled as required for lifting and stacking clear of the bridge installation and the S&C will be reassembled insitu as part of the Permanent Way reinstatement.

Should the bridge reconstruction be due to a new track layout with or without S&C such as part of a resignalling scheme, consideration should be given to the inclusion of other Clauses from Sections 210 - 217: Permanent Way inclusive to specify such work.

The various forms included as Appendices to Sections 210 - 219: Permanent Way are referenced in this Specification, but have not been copied over. Such applicable forms will need to be copied into a Contract Specification from the relevant Section.

**Inspection and
maintenance of the
track**

221.6 The requirements in this Section for inspection and maintenance of the track assume:

- (i) that inspection will be limited to inspection of only those items of the track that are affected by the bridgeworks, both before and after the bridge is installed,
- (ii) that the track will be in a reasonable state of maintenance, and that significant items of maintenance such as resleepering, unless part of the bridge design, rerailing etc. will not be necessary, but that minor items of maintenance such as replacing clips, keys, and packing etc to maintain the track alignment within the limits for geometrical irregularities may be required.

It is recommended that a condition survey of the track affected by the bridgework is carried out. Should any potential problems be identified, either the track maintenance contractor should be instructed to rectify such matters, or such items should be identified in the Contract scope with the relevant Model Clauses from Section 215: Maintenance of Permanent Way included in the Contract Specification.

**Approved
components and
processes**

221.7 A list of approved Permanent Way components and processes is maintained by Director Civil Engineering and should be revised and reissued every three months to Director Procurement, Project Delivery and Zonal Contracts Managers.

The Specifier should include a copy of the current list as an Appendix to the Contract and Clause 221.011 has been worded accordingly on this assumption. A list of recipients of the list of approved Permanent Way components and processes is available from:

Assistant Permanent Way Standards Engineer,
Director Civil Engineering,
Eastside Offices,
Kings Cross Station,
London N1 9AP

Telephone: 00 59212
Fax: 00 59210

**Competency of
operatives**

221.8 The list of training schools included in Clause 221.021 are the various training schools that were formerly part of British Rail, and was correct at 7 March 1997. However, in time it is anticipated that other organisations will be deemed competent to certify personnel in ultrasonic testing and welding of rail. The Specifier should check for names and addresses of any additional organisations from:

Civil Engineer, Permanent Way Compliance
Civil Engineering Directorate
Eastside Offices
Kings Cross Station
London N1 9AP

Tel: 00 59214
Fax: 00 29011

**Disposal of
excavated ballast**

221.9 The Model Clauses assume that no dumping of ballast excavated for the bridge installation will be permitted at the Site, and that such material will be removed from the Site by the Contractor. Should tipping of ballast at the lineside be an option the Specifier should consult Section 210: Permanent Way - General.

**Works affecting
signalling,
telecommunication
or electrification
equipment**

221.10 The Specifier should ensure that the relevant portions of the Contract Specification detailing requirements for signalling, telecommunications or electrification equipment is agreed and signed off by the responsible Zonal Engineer for each particular discipline.

SECTION 221

PERMANENT WAY FOR BRIDGEWORKS

Design and construction of the Permanent Way generally
(210.004)
(217.001)

221.001 The Permanent Way shall be designed and constructed to provide the construction standards specified in Railtrack Line Standard RT/CE/S102, as applicable to the track category specified in Section 227: Particular Specification for Permanent Way for Bridgeworks!**CHECK!** for the location of the bridge, and Railtrack Line Standard RT/CE/S011 for CWR with the additions or qualifications within this Section of the Specification.**CHECK!**
(221.001)

Abbreviations
(210.003)

221.002 Abbreviations used in the Contract Specification shall have the following meanings:

Delete those not applicable or not used in the Specification

ATP	—	automatic train protection
AWS	—	automatic warning system
BH	—	bull head (rail)
CWR	—	continuous welded rail
DTS	—	dynamic track stabiliser
ESR	—	emergency speed restriction
FB	—	flat bottomed (rail)
IB	—	impedance bond
IRJ	—	insulated rail joint (= insulated block joint)
LWR	—	long welded rail
PSR	—	permanent speed restriction
S&C	—	switches and crossings
TSR	—	temporary speed restriction

(221.002)

Existing track layout

221.003 Details of the construction of the existing track design alignment and track cross level and layout of existing S&C including record drawings may be viewed at the address given in Section 227: Particular Specification for Permanent Way for Bridgeworks!**CHECK!**
(221.003)

Permanent Way design
(211.001)
(211.014)

221.004 Except where specified otherwise on the Contract Drawings!**CHECK!** or in Section 227: Particular Specification for Permanent Way for Bridgeworks,**CHECK!** the existing:

- (i) ballast depth and form of track construction shall not be increased or decreased over the bridge,
- (ii) horizontal and vertical alignment and track cross level of the track over the bridge shall be as the existing track design.

C! Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks,**CHECK!** that the horizontal or vertical alignment and cross level of the track over the bridge is to be altered from the existing design, the design of the new horizontal or vertical alignment and/or cross levels of the track over the bridge including temporary and permanent tying-in to the existing alignment and clearances at the limits of the work shall be carried out by the Contractor.

Where the design of the vertical and/or horizontal alignment is to be carried out by the Contractor, an alignment scheme relative to the survey grid and the bridge based on 10 metre **!CHECK!** half chords and a drawing of the proposed alignment and track levels shall be provided.

The minimum transition length shall be three **!CHECK!** half chords.

Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** the design cross level (cant) shall be two thirds of the equilibrium cross level for the permitted speed at the location.

Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** that the form of track construction is to be altered from the existing, the track construction details shall be designed by the Contractor, except where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks. **!CHECK!**

The design of Permanent Way shall be carried out by competent Contractor's personnel, and shall be in accordance with Railtrack Line Standards RT/CE/S101 and RT/CE/S049, and for CWR, RT/CE/S011, and additional requirements specified in Section 227: Particular Specification for Permanent Way for Bridgeworks. **!CHECK!**

For Permanent Way designed by the Contractor, drawings and specifications detailing the design shall be produced by the Contractor, and details of the proposed track design shall be submitted to the Employer's Representative for acceptance a minimum 6 weeks **!CHECK!** or other minimum period specified in Section 227: Particular Specification for Permanent Way for Bridgeworks **!CHECK!** before Permanent Way work is due to commence at the Site.

Any proposed alterations and/or additions to the Permanent Way design 'Approved for Construction' shall be agreed by the Employer's Representative before the changes are implemented, and the modified design shall be accepted, including recertification where required by the Employer's Representative, before any associated work is brought into use.

(221.004)

**Design interface
with signalling,
electrification and
power equipment**
(211.011)
(211.012)

221.005 The design of the Permanent Way shall be compatible with the signalling track circuit system, and existing signalling and electrification and power equipment at the Site, and shall include all necessary IRJs, and electrical connections for signalling and for electrification and power. Where applicable, provision shall be made for mounting for S&T equipment.

The design of signalling affected by the bridgeworks shall be in accordance with Section 222: Signalling Interface with the Permanent Way. **!CHECK!**

The design of electrification and power equipment affected by the Permanent Way shall be in accordance with Section 223:
!C! Electrification Interface with Permanent Way, **!CHECK!** or
!C! Section 224: Electrical and Plant Interface with Permanent Way, **!CHECK!** as applicable.

Existing IRJs affected by the Permanent Way work shall be replaced with new in the same location unless specified otherwise in Section 227: Particular Specification for Permanent Way for
!C! Bridgeworks. **!CHECK!**

Glued insulated joints or 6 hole non glued (dry) insulated joints shall be provided in CWR, and non glued (dry) insulated joints in jointed track.

The requirement for temporary IRJs shall be determined as part of the design.

(221.005)

Permanent Way 221.006
Standard Drawings
(210.002)

All Permanent Way shall be in accordance with the relevant Permanent Way Standard Drawings. Drawings numbered in the Series RE/PW/XXX referenced in this Specification, are Permanent Way Standard Drawings. A list of all current Permanent Way Standard Drawings is available from:

Civil Engineering Directorate
Eastside Offices
Kings Cross Station
London N1 9AP

Tel: 0171 465 9218
Fax: 0171 922 9011

Copies of Permanent Way Standard Drawings are available from:

Owen Williams Railways
Meridian
85 Smallbrook Queensway
Birmingham B5 4HY
Tel: 0121 654 7328
Fax: 0121 654 7387

CEDG York Ltd
Hudson House
Toft Green
York YO1 1HP
Tel: 01904 522164
Fax: 01904 523876

*Check currency of
addresses and
telephone numbers*

Scott Wilson Mainline Ltd
Western House
1, Holbrook Way
Swindon SN1 1BY
Tel: 01793 515888
Fax: 01793 515844

Scott Wilson IDG Ltd
Buchanan House
58, Port Dundas Road
Glasgow G4 0HG
Tel: 0141 335 3272
Fax: 0141 335 2757

W. S. Atkins Rail (CEDAC) Ltd
Berkshire House
171, High Holborn
London WC1V 7AA

Tel: 0171 497 1502
Fax: 0171 379 8563

(221.006)

Detail to be shown on the Permanent Way drawings
(211.006)

Where the design of the Permanent Way is to be carried out by the Contractor, in addition to any requirements for the Contractor's purposes, Permanent Way drawings shall be produced in such a form and showing sufficient details to enable the drawings to be used by Railtrack (subject to any variations during the installation) as records of the work carried out and to be used in subsequent maintenance activities.

General Arrangement

The General Arrangement drawing (scale 1:200) shall show details including but not limited to the following:

- (i) the bridge and all the track forming the proposed new track alignment and any other adjacent lineside features,
- (ii) details of existing track alignment with details of existing form of construction and material types necessary to tie in the proposed track alignment to the existing track,
- (iii) positions and types of joints within and associated with the new track alignment,
- (iv) positions and types of joints outside the limits of the new track alignment,
- (v) details of the new horizontal /and track alignment including radii, direction of curvature, transitions including maximum and equivalent speeds, tangent points etc,
- (vi) details of the existing track alignments at the extremities of the new track alignment,
- (vii) details of existing and proposed cant, cant deficiency, equilibrium cant,
- (viii) details of proposed slews,
- (ix) type and number of new sleepers required,
- (x) track nomenclature and direction of traffic,
- (xi) a location diagram, North point,
- (xii) a key to all symbols and abbreviations used and reference to other relevant drawings,
- (xiii) reference to the applicable Railtrack office issuing Signal Approval Certificate and date of issue,
- (xiv) clearances to the bridge and adjacent structures,

		(xv)	location of all service routes including cess troughing and any undertrack duct routes.	
Longitudinal section			A longitudinal section (scale 1:500 longitudinal, 1:5 vertical) shall be provided to show the following information:	
		(i)	existing and proposed low rail levels,	
		(ii)	track gradients,	
		(iii)	lengths, radii and positions of vertical curves,	
		(iv)	location of the bridge and other adjacent structures, platforms etc,	
		(v)	position and values of bench marks.	
			Details to be shown in tabular format shall be as follows:	
		(i)	existing and proposed levels of low rail for each affected track,	
		(ii)	required lift,	
		(iii)	horizontal alignment and cant, including locations of tangent and intersection points,	
		(iv)	half chord locations,	
		(v)	clearances to the bridge and other structures, platforms, a.c. electrification overhead line equipment.	
			(221.007)	
Guard rails for the protection of bridges (rerailing devices) (219.005)	221.008 <i>!C!</i>		On bridges exceeding 20.0 metres in length where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, <i>!CHECK!</i> guard rails in accordance with Standard Permanent Way Drawings Nos. RE/PW/077, 086, 094 or 293 as applicable shall be provided.	
NOTE TO SPECIFIER			<i>Bridges that should be listed in the Particular Specification are those bridges that have not been designed to accommodate derailment loads or bridge stability loading.</i>	
			Entry ramps to the rerailing devices shall be provided 20.0 metres before the bridge parapet in the direction of travel.	
			(221.008)	
Cess walkway (219.001)	221.009 <i>!C!</i>		Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, <i>!CHECK!</i> a continuous cess walkway minimum 700 mm wide with a clear headroom of 2.1 metres shall be designed and constructed at the bridge location to connect the bridge walkway to the existing cess walkway with the edge of the walkway not less than the following minimum distance from the edge of the nearest rail on which trains may pass:	
		(i)	1250 mm for line speeds upto and including 100 mph,	

- (ii) 2000 mm for line speeds exceeding 100 mph.

The level of the cess walkway shall be not more than 500 mm above or below the level of the top of the sleeper. The longitudinal gradient of the cess walkway shall be not greater than 1 in 20. The surface of the walkway shall be non slip, free draining and readily compactable.

400 N/m accords with
UIC leaflet 776 - IR

A securely fastened smooth handrail 1000 mm high with 150 mm high toe guard shall be provided where there is a risk of a person falling or sliding more than 2000 mm from the cess walkway. The handrailing shall be designed to accommodate a horizontal force of 400 N/m acting at the height of the handrail.

!C! Suitable edging such as precast concrete pavement edging or treated timber in accordance with Section 160: Structural Timber!CHECK! shall be provided to the cess walkway to contain the walkway surface. Where reasonably practical, concrete cable troughing shall not be incorporated into the walkway.

The surface of the walkway shall be non slip, free draining and readily compactable.

Earth retaining (or slope regrading locally) and walkway support arrangements shall be designed as applicable to the location, and shall be compatible with the surroundings. Where the difference in level between the walkway surface and the existing ground is less than 600 mm high, the design of such arrangement is not required to be certified.

4 kN/m² accords with
UIC leaflet 776 - IR

!C! Where the difference in level between the walkway surface and the existing ground is greater than 600 mm high, such arrangements shall be designed to retain the supported soil and to prevent or contain surface erosion, or support an unfactored variable loading of 4 kN/m² and to retain the walkway construction as applicable. Such structures shall be designed and the design checked and certified as specified in the Contract.!CHECK!

Metal work used in the construction of the cess walkway or its supporting structure shall be electrically bonded in accordance with Railway Group Standard GM/TT0107 for 25kV AC electrified lines and Railway Group Standard GM/TT0108 for 750V DC 3rd rail electrified lines.

!C! An outline indication of the proposed means of retaining materials at different levels in connection with walkway construction shall be provided with the Tender.!CHECK! Full details of the proposed walkway design shall be submitted to the Employer's Representative for acceptance a minimum four!CHECK! weeks before walkway construction is due to begin.

!C! Before installation of the cess walkway the existing ground under the walkway surface shall be treated with a residual herbicide in accordance with Section 256: Weedkilling.!CHECK!

(221.009)

**Permanent Way
materials generally
(216.001)**

221.010

!
!

All materials used shall be as specified on the Contract Drawings, **!CHECK!** or in Section 227: Particular Specification for Permanent Way for Bridgeworks **!CHECK!** as applicable and shall comply with:

- (i) Railtrack Line Standards listed in Appendix A to Railtrack Line Standard RT/CE/S102,
- !
(ii) Railtrack Line Specifications, and BR Specifications listed in Table 221/I, **!CHECK!**
- !
(iii) Permanent Way Standard Drawings in accordance with Clause 221.006. **!CHECK!**

Table 221/I	
Railtrack Line Specification	Title
RT/CE/S004	Switch and Crossing Assemblies
RT/CE/S015	Self Shielding Flux Cored Wire for the Weld Repairs of BS 11 Normal and 'A' Grade Rails
BR Specification	Title
BR 647	Lubricating Oil for Points and Fishplates
BR 654	Slide-Chair Lubricants
BR 667	De-Icing/Anti-Freezing Lubricants

Materials shall be selected to suit the track category and track types in accordance with RT/CE/S102 at the location.

!
!
Except where specified or otherwise permitted in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** or otherwise specified in this Specification, **!CHECK!** all materials shall be new.

!
Where permitted otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** the acceptability of the particular material proposed to be reused shall be agreed by the Employer's Representative.

Materials in accordance with Permanent Way Standard Drawings or Railtrack Line Standards shall be deemed approved.

!
Further to Railtrack Line Standard RT/LS/S008, **!CHECK!** materials and components stored temporarily on the Site shall be stored a minimum 3.0 metres clear of the rails, unless permitted otherwise elsewhere in this Specification and shall be secured to minimise the possibility of theft, vandalism, or disturbance by passing trains.
(221.010)

**Approved
Permanent Way
components and
associated
processes
(216.002)**

221.011

!
!

All Permanent Way components and associated processes shall be subject to approval by Railtrack, and where specified shall be in accordance with Section 227: Particular Specification for Permanent Way for Bridgeworks. **!CHECK!**

A list of current approved components and associated processes is available from:

Assistant Permanent Way Standards Engineer,
Director Civil Engineering,
Eastside Offices,
Kings Cross Station,
London N1 9AP

Tel: 0171 465 9212
Fax: 0171 465 9210

Permanent Way components and associated processes in accordance with a Railtrack Line Standard shall be considered approved.

Should the Contractor propose to utilise a component not previously approved by Railtrack, full details of the proposed component and where applicable, associated process shall be submitted to the Employer's Representative, and such components shall not be incorporated in the Works until Railtrack's approval has been obtained. Allowance for such approval procedures shall be deemed included in the Contract programme.

(221.011)

Track ballast
(216.005)

221.012 The source of track ballast proposed to be used shall be agreed by the Employer's Representative.

Quality assurance and testing shall be in accordance with Railtrack Line Standard RT/CE/C009. A copy of the certificate and records of testing confirming compliance with Railtrack Line Standard RT/CE/S006 shall be provided as appropriate to the frequency of testing.

Any stockpiling arrangements and the Contractor's delivery proposals shall be subject to the agreement of the Employer's Representative.

(221.012)

Rails
(216.006)
(216.007)

221.013 Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** the rail section and type of new and serviceable rail shall match existing.

Where the rail is supplied by the Contractor, a certificate of conformity to the relevant Railtrack Line Standard shall be supplied by the Contractor for all rail installed.

!C! The existing rail section and type is as stated in Section 227: Particular Specification for Permanent Way for Bridgeworks **!CHECK!** applicable to the location.

!C! Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, **!CHECK!** fishbolt holes in serviceable rail shall be cold expanded in accordance with Clause 221.045. **!CHECK!**

NOTE TO SPECIFIER

This requirement should be specified in the Particular Specification where existing abutting rails have been cold expanded, or where zonal policy requires fishbolt holes to be cold expanded at this location.