

SECTION 221

PERMANENT WAY FOR BRIDGEWORKS

Design and construction of the Permanent Way generally

- 1** 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 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.

(221.001)

Abbreviations

- 2** Abbreviations used in the Contract Specification shall have the following meanings:

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

- 3** 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.

(221.003)

Permanent Way design

- 4** Except where specified otherwise on the Contract Drawings or in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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.

Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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 half chords and a drawing of the proposed alignment and track levels shall be provided.

The minimum transition length shall be three half chords.

Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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, 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.

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.

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 or other minimum period specified in Section 227: Particular Specification for Permanent Way for Bridgeworks 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**

5

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.

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

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
Standard Drawings**

- 6** 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	Tel: 0121 654 7328
Meridian	Fax: 0121 654 7387
85 Smallbrook Queensway	
Birmingham B5 4HY	

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

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

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

W. S. Atkins Rail (CEDAC) Ltd	Tel: 0171 497 1502
Berkshire House	Fax: 0171 379 8563
171, High Holborn	
London WC1V 7AA	

(221.006)

**Detail to be shown
on the Permanent
Way drawings**

7

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)

8

On bridges exceeding 20.0 metres in length where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks guard rails in accordance with Standard Permanent Way Drawings Nos. RE/PW/077, 086, 094 or 293 as applicable shall be provided.

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

9

Where specified in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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.

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.

Suitable edging such as precast concrete pavement edging or treated timber in accordance with Section 160: Structural Timber 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.

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.

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.

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

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.

(221.009)

**Permanent Way
materials generally**

10

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

- (i) Railtrack Line Standards listed in Appendix A to Railtrack Line Standard RT/CE/SI02,
- (ii) Railtrack Line Specifications, and BR Specifications listed in Table 221/I,

- (iii) Permanent Way Standard Drawings in accordance with Clause 221.006.

Table 221/1	
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, or otherwise specified in this Specification, all materials shall be new.

Where permitted otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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, 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**

- 11** 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.

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

- I2** 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

- I3** Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, 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.

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

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

(221.013)

Supply of rail for plain line

- I4** Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, new and serviceable rail in lengths upto and including 18.3 metres to be used for plain line for the Works shall be supplied by the Contractor.

New and serviceable rail in lengths upto and including 18.3 metres may be obtained from Railtrack or rail suppliers approved by Railtrack who have Qualified Supplier status. Suppliers who currently have Railtrack's approval are as follows:

Voest Alpine Schienen Gmbh
Kerpelystrasse 199
PO Box 1
A 8074 Leoben-Donawitz
Austria

Telephone: 0061 2 344 5555
Fax: 0061 2 344 7372

Material de Voie
Parc du Saint Laurent
Immeuble Toronto
54, Route de Sartrouville
78320 Le Pecq
France

Telephone: 0033 1 30 13 24 13
Fax: 0033 1 30 15 24 00

British Steel Track Products
Moss Bay
Derwent Howe
Workington
Cumbria CA14 5AE

Telephone: 01900 64321
Fax: 01900 64800

When rail is supplied by Railtrack, rail shall be ordered by the Contractor through Railtrack's Rail Controller using the Rail Order Forms in Appendix 210A.

The address and telephone number of the Rail Controller is:

1st Floor, Room 114,
St Peter's House
Gower Street,
Derby DE1 1SB

Tel: 01332 207024
Fax: 01332 207023

The lead time required by Railtrack for the ordering of rail in excess of 18.3 metres is 12 weeks.

All new rail and serviceable rail in lengths greater than 18.3 metres will be supplied and delivered by Railtrack free of charge to the Rail Nodal Point specified in Section 227: Particular Specification for Permanent Way for Bridgeworks. Rail in lengths greater than 18.3 metres will be delivered to Site from the Rail Nodal Point in material trains provided by Railtrack.

Unless specified otherwise in Section 227: Particular Specification for Permanent Way for Bridgeworks, delivery of new and serviceable rail to the Site in lengths less than 18.3 metres shall be arranged and carried out by the Contractor.

Where rail is to be delivered by Railtrack, the lengths and tonnage of rail required by the Contractor shall be agreed by the Employer's Representative prior to ordering of rail. Approximate quantities of rail in lengths greater than 18.3 metres to be supplied by Railtrack are specified in Section 227: Particular Specification for Permanent Way for Bridgeworks.

Where rail is to be delivered by Railtrack, attendance shall be provided by the Contractor at the Site for unloading and reloading of rail.

Material trains for the delivery of rail from the Nodal Point to the Site will be supplied by Railtrack's Infrastructure Transport Services, with whom the Contractor shall make all necessary arrangements giving all necessary notice.

The address and telephone number of Railtrack's Infrastructure Transport Services is:

National Contracts Manager
2nd Floor
Prudential House
28 - 40 Blossom Street
York YO2 2AJ

Tel: 01 904 525079
Fax: 01 904 525676

Unloading of rail lengths upto and including 18.3 metres at the Site shall be carried out by the Contractor. All rail wagons shall be returned to the Rail Nodal Point.

(221.014)

Pads, clips and insulators

- 15** Pads, clips and insulators for new installation shall be provided in accordance with Railtrack Line Standard RT/CE/S049 appropriate to the type of sleeper or baseplate and rail section, and line speed.

(221.015)

Longitudinal timbers

- 16** Where shown on the Contract Drawings, that longitudinal timbers are to be provided, such timbers shall comply with Railtrack Line Standard RT/CE/S029, and shall be sized that holes for baseplates or chairscrews holes are not less than 75 mm from the edge of the wheel timber.

(221.016)

Certification of the Permanent Way design

- 17** The design of the Permanent Way for each particular Site shall be independently checked by competent Contractor's personnel, and for each Site, a completed Certificate of Design and Checking (Form B) based on the model shown in Appendix C together with certified Signalling plans and circuit design in accordance with Section 222: Signalling Interface with Permanent Way, shall be provided to the Employer's Representative for acceptance and countersignature, a minimum eight weeks prior to work commencing or other minimum period specified in Section 227: Particular Specification for Permanent Way for Bridgeworks.

(221.017)

**Method statement
for Permanent
Way work**

18 A method statement detailing work affecting the Permanent Way shall be provided for acceptance by the Employer's Representative not less than the minimum period before the bridgework is scheduled to be carried out as specified in Section 227: Particular Specification for Permanent Way for Bridgeworks.

Further to Railtrack Line Standard RT/LS/S008, the method statement shall be determined following hazard identification by the Contractor, and shall include as applicable, but shall not be limited to:

- (i) method and procedures to inspect and maintain the track,
- (ii) details of absolute possessions, protection (TII) and isolations of electrical traction supply equipment required to be taken,
- (iii) details of speed restrictions required to be applied,
- (iv) details of all temporary disconnections, alterations and relocation of signalling, telecommunications and electrification equipment,
- (v) method of materials delivery including unloading, and loading and removal from Site of redundant materials including where appropriate details of materials trains,
- (vi) method of setting out track geometry,
- (vii) details of Contractor's Equipment including if appropriate rail mounted vehicles to be used on the Site,
- (viii) method of materials recovery, including dismantling and lifting existing plain line rail and where applicable S&C, and method of stacking or material disposal,
- (ix) method of excavation and disposal of excavated material,
- (x) method to be adopted for attainment of specified compaction and level of subgrade, formation and ballast below sleeper level,
- (xi) method of installation of track components including reassembly of S&C, and rail welding and stressing,
- (xii) method of track consolidation and adjustment to line and level,
- (xiii) safety procedures,
- (xiv) details of competency standards to be applied to Contractor's personnel employed on the Site.

(221.018)

Method of working applicable to signalling and telecommunication equipment

- 19** Where signalling or telecommunications equipment (including rodding, signal wires, cables, track-circuits etc) is connected to the track or immediately adjacent to the track, no work or placing of materials which could affect such equipment shall be carried out until appropriate arrangements have been agreed with the Employer's Representative.

Where track circuits exist, insulated joints and rails across the four foot shall not be bridged by a steel tape, track gauge, bar, jack, shovel, pick or any other conductive object.

Any alteration to a track circuited line may be undertaken using where permitted in Section 227: Particular Specification for Permanent Way for Bridgeworks, handsignalmen to provide signalling through the track circuits involved, until the track circuits have been tested and made operational.

Track mounted signalling equipment
(215.058)

Where track mounted signalling equipment, such as ATP, automatic vehicle identification (AVI) or AWS, is installed, Permanent Way work shall be carried out in a manner which does not interfere with such equipment. Precautions shall be taken to ensure damage is not caused to such equipment.

Where necessary for the operation of on-track machines, such equipment shall be removed from the track and shall be reinstated on completion of the work by the on-track machine.

In areas where treadles are fitted to the track care shall be taken, when using on-track machines, to ensure that wherever possible the last movement of the machine(s) is in the normal direction of traffic, to ensure that the treadles are operating in the correct sequence prior to returning the track to traffic.

If it is not possible to plan and carry out the work so that the last movement is in the normal direction of traffic, the treadles shall be reset before the track is returned to traffic.

(221.019)

Method of work at structures generally

- 20** Restrictions on the use of the dynamic track stabiliser over or adjacent to structures as specified in Clause 221.053 shall apply.

Tampers, liners and other on track machines shall not be used over a bridge when the depth of ballast will provide less than 150 mm clearance below the machine in operating mode to the waterproofing layer.

Bars, picks or other sharply pointed tools shall not be used in a manner that will cause damage to waterproofing to bridges or other structures. Excavators with buckets without teeth shall be used over structures.

Floor plates, recesses in girders and refuges in parapets of underbridges shall be kept clear of tools, materials and rubbish at all times.

(221.020)

**Competency of
operatives**

- 21** Further to Railtrack Line Standard RT/LS/S008, work processes affecting the Permanent Way such as but not limited to rail drilling and cutting, rail stressing, rail welding, ultrasonic testing of rails and welds, shall be carried out only by competent certificated Contractor's personnel.

Ultrasonic testing of rails shall be carried out by Contractor's personnel who have attended and satisfactorily completed an ultrasonic testing of rails training course provided by:

NDT Training Centre
Serco Railtest Ltd
P.O. Box 243
Railway Technical Centre
London Road
Derby DE24 8ZZ

Tel: 013322 63397
Fax: 013322 62012/64965

Welding of rail shall be carried out by Contractor's personnel who have attended and satisfactorily completed a rail welding training course provided by one of the following companies:

AMEC Rail Limited
Training Centre
Fairbairn Close
(Off Beaumont Road)
Purley
Surrey CR2 2AT

Tel: 0181 666 6920/84
Fax: 0181 666 6417

Fastline Track Renewals
Training Centre
(York Welding School)
Old Biscuit Warehouse
Leeman Road
York YO2 4XD

Tel: 01904 522237
Fax: 01904 522013

GTRM Training Centre
Nunn Mills Road
(Off Bedford Road)
Northampton NN1 5NZ

Tel: 01604 30362
Fax: 01604 38385

First Engineering Ltd
Training and Development Centre
Quay Road
Rutherglen
Glasgow
G73 1LD

Tel: 0141 335 4488
Fax: 0141 335 4498

Amey Railways
Welding Training Centre
Training Development Department
2nd Floor
125 House
1 Gloucester Street
Swindon SN1 1SU

Tel: 01793 515117
Fax: 01793 515688

(221.021)

**Existing walkways,
accesses, and
lineside equipment**

22

Existing lineside equipment including, cables, cable troughing, catchpits, walkway surfacing shall not be damaged, and shall be adequately protected as necessary. Should damage to any lineside equipment be caused or suspected, arrangements shall be made immediately for:

- (i) inspection and testing as necessary by a competent person,
- (ii) permanent or temporary repairs as appropriate for safety,
- (iii) notification of details to the Employer's Representative.

(221.022)

**Disconnection,
alteration and
reinstatement of
d.c. electrification
traction supply
equipment**

23

The conductor rails and any associated electrical track equipment may require temporary disconnection, alteration and reinstatement during the Permanent Way work.

Where existing d.c. electrification traction supply equipment is required to be disconnected, moved or otherwise altered in order to carry out the Permanent Way work, such renewal, disconnections, alteration, reinstatement, and testing and commissioning of such equipment shall be in accordance with Section 223: Electrification Interface with Permanent Way.

All associated disconnections and alterations to the d.c. electrification traction supply equipment required for the Works shall be identified and stated in the Tender.

(221.023)