

RFLI - Rail for London (Infrastructure) Ltd

Document Number: RFLI-TIM-PE-OPR-0003

Revision: 3.1

Revision Date: November 2018

Rail for London (Infrastructure) Ltd. **Crossrail Central Operating Section Timetable Planning Rules 2019**

Issued by Network Strategy and Performance

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Document History

Revision	Date	Change
1.0	23/02/2017	First Issue
2.0	17/03/2017	Amendments incorporating feedback from RAB(C) & MTR Crossrail Ltd.
3.0	28/02/2018	Issued at D-44.
3.1	20/11/2018	Address details updated

Record of Holds in Document

Specify any Holds within the document.

Hold No	Section	Description of Hold	

Revision Tracking

Specify significant change from previous revisions of the document. (From Rev. 1.0 onwards)

Revision	Section	Description of Change	
2.0	Sections 4, 6, 7,8 and 9	Paras 4.1 and 4.2 updated references. 6.1 Clarification of mandatory timing points Paras 9.3 9.4 and 9.5 removed and replaced by 7.1 7.4 and 7.5 respectively. 7.3.3 tables amended. Section 8.8 fully revised	
3.0	All Sections	Final amendments for D-44 Updated for Westborne Park timings and addition of para 9.3.3. SRT additions for Canary Wharf/ Custom House.	

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1. Purpose

- 1.1.1 The purpose of this document is to define the Timetable Planning Rules (TPR) regulating the standard timings between stations and junctions together for the Crossrail Central Operating Section (CCOS) enabling trains to be scheduled into the working timetable in accordance with Rail for London Infrastructure Limited (RfL(I)) CCOS Network Code Part D.
- 1.1.2 The TPR is one of a pair of documents along with the CCOS Engineering Access Statement (EAS), when consulted by RfL(I) with the relevant users of the railway provide rights of access that, with track access agreements of train operators, are described as ‘firm rights’ and enjoy priority in the timetabling process.
- 1.1.3 TPR contains necessary information required to undertake the compilation of the timetable such as standard timing points, sectional running times for specific train types, headway and margin limits to be maintained between trains, station working rules and route capability data.

2. Scope

- 2.1.1 This document is applicable to the Crossrail Central Operating System owned and operated by Rail for London Infrastructure Limited (RfL(I)).

3. Index of Routes

XR 001	Portobello Junction to Abbey Wood (Alsike Road Junction)
XR 002	Stepney Green Junction to Pudding Mill Lane Junction

4. Sectional Appendices and Rule Book

4.1 Sectional Appendix

- 4.1.1 The CCOS Sectional Appendix applies (currently in draft). A copy will be available via the National Electronic Sectional Appendix (NESA).

4.2 Applicable Rule Book

- 4.2.1 The RfL(I) Crossrail Rule Book applies to CCOS.

5. CCOS Planning Definitions

5.1 Train Classification

First Character	Description
9	Passenger trains operating on the Central Operating System (COS)
3	Empty Coaching Stock (ECS) movements between Paddington (Crossrail) and Westbourne Park; Priority ECS if specially authorised.
5	Other ECS
6	Maintenance trains

Second Character	Description
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A	ECS to Old Oak Common Depot
C	To Chadwell Heath or Gidea Park
J	To Maidenhead or Reading
K	To West Drayton or Slough
T	To Heathrow Airport
U	To Abbey Wood via Canary Wharf (and ECS and maintenance trains to Plumstead sidings)
V	ECS to Ilford Depot
W	To Shenfield
Y	To Paddington via Tottenham Court Road (and ECS and maintenance trains to Westbourne Park sidings)

Third and fourth characters will run in sequential order throughout the day, with 01 following 99.

5.2 Days of Operation

Abbreviation	Description
M	Monday
T	Tuesday
W	Wednesday
Th	Thursday
F	Friday
S	Saturday
Su	Sunday
EWD	Every Week Day (Monday to Saturday)
Suffixes	
O	Adding this indicates that the train will run only on that day or those days shown
X	Adding this indicates that the train will not run on that day or those days shown
General	
BHX	Denotes that this train does not run on a bank holiday

5.3 Traction and Rolling Stock

Abbreviation	Description
EMU	Any electric multiple unit
ECS	Empty Coaching Stock (electric multiple units only)
OTM	On Track Machine - Infrastructure Maintenance Units/ Vehicles

5.4 Line Codes

5.4.1 Line Codes are not required.

5.5 Activity and Other Codes

Abbreviation	Description
RM	Reverse Move

6. Route Description

6.1 Planning Geography

6.1.1 All timing points in the CCOS are specified in the tables in 6.1.3 below.

6.1.2 Timing Points shown in bold are mandatory.

6.1.3 Table of Timing Points

XR 001 Portobello Junction to Abbey Wood (Alsike Road Junction)				
Timing Point	Eastbound	Westbound	Code	Notes
Portobello Junction		3 4 5 6 D1		<i>To/from Great Western Main Line (GW103)</i>
Westbourne Park				Siding or line detail must be shown
Royal Oak Crossover			X	
Paddington (Crossrail)				
Bond Street			S	
Tottenham Court Road				
Fisher Street Crossover			X	
Farringdon (Crossrail)			S	
Liverpool Street (Crossrail)				
Vallance Road Crossover			X	
Whitechapel			S	
Stepney Green Junction				<i>To/from Pudding Mill Lane Jn (XR 002)</i>
Canary Wharf				
Victoria Dock Crossover			X	
Custom House				Platform detail must be shown
Custom House Crossover			X	
Woolwich (Crossrail)			S	
Plumstead Maintenance Depot			S	Timing point for trains to/from Maintenance Depot
Plumstead Carriage Sidings			S	Timing point for trains to/from Sidings
Plumstead Reversing Siding			S	Timing point for trains to/from Sidings or to/from Maintenance Depot
Plumstead East Junction				
Abbey Wood (Crossrail)				Platform detail must be shown
Abbey Wood Crossrail Siding				
Abbey Wood Transfer Line			F	
Alsike Road Junction			F	<i>To/from Dartford Junction (SO290)</i>

XR 002 Stepney Green Junction to Pudding Mill Lane Junction				
Timing Point	Eastbound	Westbound	Code	Notes
Stepney Green Junction				<i>To/from Portobello Junction (XR001)</i>
Pudding Mill Lane Junction	EL			<i>To/from Seven Kings (EA 1010)</i>

6.2 Route Opening Hours

6.2.1 Route opening hours are provided in section 4 of the CCOS EAS.

7. Route Restrictions

7.1 General Capacity Constraints

7.1.1 Where single line working is to operate or trains are to be routed to run on a line other than that normally planned for them, constraints on capacity will apply. Please refer to the CCOS EAS.

7.2 Traction Power Supply Restrictions

- 7.2.1 Under normal conditions, the 25kV traction power supply will not place any restrictions on the use of approved electric traction.
- 7.2.2 Under maintenance conditions, sections of the electrified network may be blocked to electric traction. These restrictions are contained within the EAS for the relevant year. Further restrictions may arise in connection with engineering possessions requested via the EAS amendment process.

7.3 Ventilation System Restrictions

- 7.3.1 No more than two trains may occupy a ventilation section at any time. This is enforced via the signalling system (refer to 8.1).
- 7.3.2 Eastbound and westbound tunnels are separate ventilation sections.
- 7.3.3 The ventilation sections are as follows:

XR 001 Portobello Junction to Abbey Wood (Alsike Road Junction)			
Code	Tunnel	Description	
VS01E	EASTBOUND	Royal Oak Portal to Paddington (Crossrail) [exc.]	
VS02E		Paddington (Crossrail) station	
VS03E		Paddington (Crossrail) [exc.] to Bond Street [exc.]	
VS04E		Bond Street station	
VS05E		Bond Street [exc.] to Tottenham Court Road [exc.]	
VS06E		Tottenham Court Road station	
VS07E		Tottenham Court Road [exc.] to Farringdon (Crossrail) [exc.]	
VS08E		Farringdon (Crossrail) station	
VS09E		Farringdon (Crossrail) [exc.] to Liverpool Street (Crossrail) [exc.]	
VS10E		Liverpool Street (Crossrail) station	
VS11E		Liverpool Street (Crossrail) [exc.] to Whitechapel [exc.]	
VS12E		Whitechapel station	
VS13E		Whitechapel [exc.] to Stepney Green	
VS16E		Stepney Green to Canary Wharf [exc.]	
VS17E		Canary Wharf station	
VS18E		Canary Wharf [exc.] to Victoria Dock Portal	
VS19E		Connaught Tunnel	
VS20E		North Woolwich Portal to Woolwich [exc.]	
VS21E		Woolwich station	
VS22E		Woolwich [exc.] to Plumstead Portal	
VS22W		WESTBOUND	Plumstead Portal to Woolwich [exc.]
VS21W			Woolwich station
VS20W	Woolwich [exc.] to North Woolwich Portal		
VS19W	Connaught Tunnel		
VS18W	Victoria Dock Portal to Canary Wharf [exc.]		
VS17W	Canary Wharf station		
VS16W	Canary Wharf [exc.] to Stepney Green		
VS13W	Stepney Green to Whitechapel [exc.]		
VS12W	Whitechapel station		
VS11W	Whitechapel [exc.] to Liverpool Street (Crossrail)		
VS10W	Liverpool Street (Crossrail) station		
VS09W	Liverpool Street (Crossrail) [exc.] to Farringdon (Crossrail) [exc.]		
VS08W	Farringdon (Crossrail) station		
VS07W	Farringdon (Crossrail) [exc.] to Tottenham Court Road [exc.]		
VS06W	Tottenham Court Road station		

VS05W		Tottenham Court Road [exc.] to Bond Street [exc.]
VS04W		Bond Street station
VS03W		Bond Street [exc.] to Paddington (Crossrail) [exc.]
VS02W		Paddington (Crossrail) station
VS01W		Paddington (Crossrail) [exc.] to Royal Oak Portal

XR 002 Stepney Green Junction to Pudding Mill Lane Junction		
Code	Tunnel	Description
VS14E	East-bound	Stepney Green to Eleanor Street
VS15E		Eleanor Street to Pudding Mill Lane Portal
VS15W	West-bound	Pudding Mill Lane Portal to Eleanor Street
VS14W		Eleanor Street to Stepney Green

7.4 Platform Lengths

7.4.1 The table below shows the maximum length of train that may use each of the platforms at the following passenger stations. All lengths are quoted in metres.

7.4.2 The quoted lengths are the useable lengths from headwall to headwall unless otherwise specified (e.g. ramp to ramp).

7.4.3 Passenger trains longer than the quoted lengths will not be accepted.

Station	Platform	Effective Length (m)	Notes	
Paddington (Crossrail)	A	205	All platforms fitted with platform edge screen doors.	
Paddington (Crossrail)	B			
Bond Street	A			
Bond Street	B			
Tottenham Court Road	A			
Tottenham Court Road	B			
Farringdon (Crossrail)	A			
Farringdon (Crossrail)	B			
Liverpool Street (Crossrail)	A			
Liverpool Street (Crossrail)	B			
Whitechapel	A			
Whitechapel	B			
Canary Wharf	A			
Canary Wharf	B			
Custom House	A			No platform edge screen doors
Custom House	B			
Woolwich	A		Both platforms fitted with platform edge screen doors.	
Woolwich	B			
Abbey Wood	3		No platform edge screen doors	
Abbey Wood	4			

7.5 Siding Lengths

7.5.1 The table below shows the maximum length of train that may use each of the sidings at the following locations. All lengths are quoted in metres.

Location	Siding	Effective	Notes
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		Length (m)	
Westbourne Park	A	205	Through siding
Westbourne Park	B		
Westbourne Park	C		
Westbourne Park	EB		Eastbound running line
Westbourne Park	WB		Westbound running line
Plumstead	Reversing		
Abbey Wood	Crossrail		Abbey Wood Crossrail Siding beyond platform 3

7.6 Bi-Directional Operation

7.6.1 The CCOS running lines are fully signalled for bi-directional operation.

8. Rolling Stock Restrictions

8.1 Communications Based Train Control signalling system

8.1.1 Rolling Stock must be fitted with a Communications Based Train Control (CBTC) signalling system¹ compatible with Siemens Rail Automation "Trainguard MT" Communications Based Train Control signalling system to operate over the CCOS.

8.1.2 An automatic reversing facility is available to assist in the prompt reversal of trains terminating at Paddington (CCOS) station and to move trains between Abbey Wood station and Plumstead stabling sidings. This facility may also be used to operate over the crossovers at Fisher Street, Vallance Road and Custom House.

8.1.3 CBTC will interface with standard lineside signalling at the interfaces with the NR Network at Portobello Junction in the West and between Pudding Mill Lane Junction and Stratford station in the East.

8.1.4 Rolling Stock traversing the interfaces must be able to operate on the move without interruption between the respective signalling systems.

8.2 Passenger Stock Restrictions

8.2.1 The CCOS is currently cleared only for Bombardier Aventura Model LV-BXR-13 (Class 345) against the RfL(I) Standard CRL1-XRL-O6-STD-CR001-50005: Crossrail Central Operating Section Requirements for Maintaining Infrastructure Clearances

8.2.2 The Vehicle Change (Part F of the CCOS Network Code) process deals with the introduction of new vehicles.

8.2.3 The installation of Platform Screen Doors at all stations between Paddington (Crossrail) and Woolwich inclusive with the exception of Custom House dictate that only Class 345 rolling stock may call at these stations.

¹ A derogation from regulation 14 (2) (d) of the Railways (Interoperability) Regulations 2011 was granted to CCOS 26/01/2012 pending future migration to Level 3 ETCS.

8.3 Locomotive Route Availability

8.3.1 The maximum axle load for the CCOS shall be commensurate with the Network Rail RA 4 rating.

8.3.2 When diesel-powered locomotives are required to operate, there must be no restrictions in place on the tunnel ventilation system.

8.3.3 Locomotive types currently cleared for operation on CCOS are as follows:

- GM/EMD Class 66 Type (under line possession conditions only)

8.4 Freight Wagon Restrictions

8.4.1 No freight wagons are currently route cleared through CCOS.

8.5 Freight Train Load Limits

8.5.1 Maximum axle load as per 8.2.1. Note 8.4.1 above.

8.6 Freight Train Length Limits

8.6.1 The maximum length of any train consist is limited to 205metres.

8.7 Engineers Train Restrictions

8.7.1 Timetabled engineering trains (e.g. measurement and recording) are limited to a maximum length of 150metres and should be fitted with a compliant CBTC system.

8.7.2 Timetabled moves may not depart Plumstead before 23:00EWD or 22:30Su and must be timed to arrive by 06:00EWD or 08:00Su.

8.8 Automatic Train Operation (ATO) Limits

8.8.1 Trains must be planned to operate in Automatic Train Operation (ATO) mode in normal conditions.

8.8.2 Engineers trains or on-track machines (OTM) may operate in ATO mode if suitably equipped but should be planned to operate in CBTC Protected Manual Mode.

8.8.3 The ATO operation limits are as follows:

XR 001 Portobello Junction to Abbey Wood (Alsike Road Junction)			
Route Section	Passenger	ECS	OTM
Portobello Junction to Abbey Wood Crossrail Siding	Mandatory	Mandatory	Permitted
Plumstead East Junction to Plumstead Reversing Siding	Mandatory	Mandatory	Permitted
Plumstead Reversing Siding to Plumstead Carriage Sidings	N/A	Mandatory	Permitted
Plumstead Reversing Siding to Plumstead Maintenance Depot	N/A	N/A	Not Permitted

XR 002 Stepney Green Junction to Pudding Mill Lane Junction			
Route Section	Passenger	ECS	OTM
Stepney Green Junction to Pudding Mill Lane Junction	Mandatory	Mandatory	Permitted

8.9 Auto-Drive Operation

8.9.1 Auto-Drive/ Auto-Reverse Operation of ECS services may be planned as follows:

- Abbey Wood to Plumstead CS (driver in trailing cab from Abbey Wood to Reversing Siding);
- Plumstead CS to Abbey Wood (driver in trailing cab from Plumstead Reversing Siding to Abbey Wood);
- Paddington to Paddington via Westbourne Park (driver walking through train during transit);
- Tottenham Court Road to Tottenham Court Road via Fisher Street Crossover (driver walking through train during transit);
- Farringdon to Farringdon via Fisher Street Crossover (driver walking through train during transit);
- Whitechapel to Whitechapel via Vallance Road Crossover (driver walking through train during transit)

8.9.2 Auto-Reverse Operation of ECS services may be planned as follows:

- Woolwich to Plumstead CS via Plumstead East Junction (driver in trailing cab from Plumstead East Junction to Plumstead Reversing Siding);
- Plumstead CS to Woolwich via Plumstead East Junction (driver in trailing cab from Plumstead Reversing Siding to Plumstead East Junction).

8.9.3 Auto-Reverse Operation (Zorro Moves) of trains in passenger service are permitted but may only be planned at the following crossovers:

- Fisher Street;
- Vallance Road;
- Custom House East.

9. Running Times, Margins and Allowances

9.1 Sectional Running Times

9.1.1 Sectional Running Times (SRT) provided below are given in minutes based on Class 345 timing rolling stock (specifically designed for operating the CCOS).

9.1.2 SRTs are split by type into 4 different timing links:

- 1) Start to Stop (S-S) – wheels start at first timing point to wheels stop at second timing point
- 2) Start to Pass (S-P) – wheels start at first timing point to front of train passing the second timing point
- 3) Pass to Stop (P-S) – the front of train passing first timing point to wheels stop at second timing point
- 4) Pass to Pass (P-P) – front of the train passing the first timing point and passing the second timing point

9.1.3 Eastbound SRTs are presented in the table below:

From	To	Line	S-S	S-P	P-S	P-P
Portobello Junction	Westbourne Park				1	½
Westbourne Park	Paddington (Crossrail)		2		1½	1½
Paddington (Crossrail)	Bond Street		2½			
Paddington (Crossrail)	Tottenham Court Road				3	2½
Bond Street	Tottenham Court Road		1			
Tottenham Court Road	Farringdon (Crossrail)		2½		2½	
Tottenham Court Road	Liverpool Street (Crossrail)				3	2½
Farringdon (Crossrail)	Liverpool Street (Crossrail)		1½			
Liverpool Street (Crossrail)	Whitechapel		2		2	
Liverpool Street (Crossrail)	Stepney Green Jn					2½
Whitechapel	Stepney Green Jn			1		
Stepney Green Jn	Canary Wharf				2	2
Stepney Green Jn	Pudding Mill Lane Jn					2½
Canary Wharf	Custom House		3		3	2½
Custom House	Woolwich		3½			
Custom House	Plumstead East Jn					4½
Woolwich	Plumstead East Jn		2½	2		
Plumstead Rev Siding	Plumstead East Jn		2½	2		
Plumstead Rev Siding	Plumstead CS		2			
Plumstead East Jn	Abbey Wood (Crossrail)				1½	
Abbey Wood (Crossrail)	Abbey Wood Crossrail Siding		2			

9.1.4 Westbound SRTs are presented in the table below:

From	To	Line	S-S	S-P	P-S	P-P
Abbey Wood Crossrail Siding	Abbey Wood (Crossrail)		2	1½		
Abbey Wood (Crossrail)	Plumstead East Jn			1		1
Plumstead CS	Plumstead Rev Siding		2			
Plumstead East Jn	Plumstead Rev Siding		3		2½	
Plumstead East Jn	Woolwich		2½		2	
Plumstead East Jn	Custom House					4½
Woolwich	Custom House		3½			
Custom House	Canary Wharf		3	2½		2½
Pudding Mill Lane Jn	Stepney Green Jn					2½
Canary Wharf	Stepney Green Jn			2		2
Stepney Green Jn	Whitechapel				1	
Stepney Green Jn	Liverpool Street (Crossrail)					2½
Whitechapel	Liverpool Street (Crossrail)		2	2		
Liverpool Street (Crossrail)	Farringdon (Crossrail)		1½			
Liverpool Street (Crossrail)	Tottenham Court Road			3		2½
Farringdon (Crossrail)	Tottenham Court Road		2	2		
Tottenham Court Road	Bond Street		1½			
Tottenham Court Road	Paddington (Crossrail)					2½
Bond Street	Paddington (Crossrail)		2½			
Paddington (Crossrail)	Westbourne Park CS		2	1½		1½
Westbourne Park	Portobello Junction			1		½

9.2 Headways

9.2.1 Headway values are given in minutes.

9.2.2 All routes are shown.

XR 001 Portobello Junction to Abbey Wood (Alsike Road Junction)			
Timing Points Included	Down	Up	Notes
Portobello Junction to Abbey Wood	2	2	
Abbey Wood (Crossrail) to Abbey Wood Crossrail Siding			Single Line – one train in section
Abbey Wood Crossrail Siding to Abbey Wood (Alsike Road Junction)			Single Line – one train in section

XR 002 Stepney Green Junction to Pudding Mill Lane Junction			
Timing Points Included	Down	Up	Notes
Stepney Green Junction to Pudding Mill Lane Junction	2	2	

9.3 Junction Margins and Station Planning Rules

9.3.1 All times shown are in minutes. Where adjustments to SRTs are shown, the value must be added to the normal SRTs. Negative adjustments are specially identified.

9.3.2 Minimum station allowances are the minimum practical for the particular type of stock. These are shown with exceptions being listed by line of route where applicable.

9.3.3 It is permitted to time a departure from a siding at Westbourne Park with a lower letter in the alphabet at the same time as an arrival at a higher letter (for example, a departure from Siding B may be timed to coincide with an arrival in Siding C). The margin values given in the table below apply.

STANDARD VALUES – MINIMUM	
Dwell Time	
Bond Street, Custom House, Farringdon, Whitechapel and Woolwich	½
Canary Wharf, Liverpool Street, Paddington and Tottenham Court Road	1
Class 345	
Passenger to ECS with no change of direction	½
	1
Junction Margin	
Standard Value	1½
Departure following conflicting arrival	1
Minimum Turnarounds	
Class 345 (standard)	7
Class 345 (Auto-Reverse)	2
Platform / Siding Re-occupation	
Same direction	1½
Opposite direction	2
Zorro Moves	
Standing time between each leg of a Zorro Move	½
Definition of Peak Services	
AM Shoulder Peak [SX only]	0700-0744*, 0915-0959*
AM Peak [SX only]	0745-0914*
<i>*arrival time at Tottenham Court Road</i>	
PM Shoulder Peak [SX only]	1600-1644**, 1815-1859**
PM Peak [SX only]	1645-1814**
<i>**departure time from Tottenham Court Road</i>	

9.4 Timing Allowances

9.4.1 None will apply to Crossrail Class 345 services as a 10% uplift has been included in SRTs.

10. Timetabling Considerations

10.1 Advertised and Working Times

10.1.1 Light engine movements outside of planned possessions are not permitted.

10.2 Timing of Light Locomotives

10.2.1 Light engine movements outside of planned possessions are not permitted.

10.3 Single Line Working

10.3.1 CCOS is bi-directionally signalled throughout.

11. Procedure for Amending the Values in the Timetable Planning Rules

11.1 General Considerations for Timetable Planning Rule Changes

11.1.1 The purpose of this section is to set out clear principles when generating new or amended values for inclusion into TPRs.

11.1.2 This methodology should be used by RfL(I) and Timetable Participants when proposing or supporting TPR changes, unless another methodology is deemed appropriate, agreed and documented by all parties concerned.

11.1.3 The construction of a robust timetable needs to balance safety, capacity and performance expectations and the aspirations of all stakeholders involved.

11.1.4 TPR should provide for current and anticipated service levels, taking cognisance of the Decision Criteria set out in D4.6 of the CCOS Network Code and CCOS Specialised Infrastructure designation.

11.1.5 Values generated by this methodology will be subject to procedures set out in condition [D2.2] of the CCOS Network Code.

11.2 Guiding Principles

11.2.1 Where a gap or deficiency in the delivery of the timetable has been identified, there are four potential courses of action to consider:

- Revise operational activities
- Infrastructure interventions
- TPR review
- Timetable change

11.2.2 TPR values can be calculated in a number of legitimate ways including:

- a. Through actual timing of trains;
- b. Use of On Train Monitoring Recorder (OTMR) systems;
- c. Uses of CBTC system actual timing values;

- d. Use of computer simulation tools;
- e. By any other agreed methodology.

- 11.2.3 Prior to proposal of upwards revisions of TPR values, the aim should be to enhance operational delivery prior to altering TPR values. This approach must be agreed by the parties with defined outputs and delivery timescales, whereby all parties accept the risk of performance under delivery in the interim as a result of delaying TPR change. All stakeholders are responsible for reviewing and optimising their own operational delivery performance.
- 11.2.4 The impact of a proposed TPR value change must be considered by all parties concerned and if deemed necessary, a timetable impact assessment undertaken.
- 11.2.5 A timetable impact assessment may not be necessary in circumstances where TPR value reduction is proposed, but opportunities to improve the timetable should still be taken.
- 11.2.6 All TPR change proposals must be considered in the context of any potential need to apply increased and decreased values together as part of a holistic improvement.
- 11.2.7 TPR values, excluding SRTs, can never be less than the technical value. The process for the generation of SRTs is covered in 11.6 below.
- 11.2.8 Changes to individual TPRs will be supported by evidence showing how the values were developed. Sources of evidence are to be agreed by the affected parties.
- 11.2.9 Supporting information must be stored in a format accessible to RfL(I) and Timetable Participants and must be made available upon request.
- 11.2.10 A process of rounding will apply to all technical values generated through this methodology in order to express planning values in multiples of half minutes and be compatible with industry-wide systems.

11.3 Procedure for Amending Timetable Planning Rules

- 11.3.1 When producing TPR change proposals, RfL(I) and/or the Timetable Participant will set out why the change is proposed, and the planned date for implementation.
- 11.3.2 The proposal will consist of:
- A proposal number, provided by the appropriate RfL(I) TPR forum
 - Source data and assumptions for both infrastructure and rolling stock
 - Supporting evidence as agreed by RfL(I) and affected parties
 - Outputs from the simulation model or other methodology, Technical values, planning values, and any rounding applied expressed in seconds and/or %age uplift
 - RfL(I) will consult in accordance with the CCOS Network Code
 - RfL(I) will document responses and decisions taken on implementation or otherwise, so that each TPR entry has an audit trail

11.4 Sectional Running Time Amendment

- 11.4.1 Section 9.1 above contains the current SRTs.

11.4.2 A SRT is the time taken for various train types (Timing Loads) to traverse a Network Link, representing the fastest route of that Network Link.

11.4.3 All SRTs are compiled individually by:

- Direction of travel
- Each track on multiple lines
- Optimal performance possible for line and rolling stock, including acceleration or deceleration impact as appropriate

11.4.4 To take account of factors such as permissive moves, slow speed junctions, crossovers and platform sharing, additional time in the form of adjustment allowance should be added to schedules and listed in Section 9.3 above. If this additional allowance applies to all trains using the SRT, this allowance should be included in the SRT.

11.4.5 SRTs are agreed between TOCs and RfL(I) as part of the agreement of the CCOS TPR. Normally they will not change from one timetable to the next.

11.4.6 New and revised SRTs are agreed between TOCs and RfL(I) on an individual basis and are supplied by the method agreed in each instance.

11.4.7 RfL(I) will, however, re-calculate SRTs for particular train/route combinations in the following circumstances:

- a. Where a TOC anticipates using a train/route combination for which no suitable SRTs exist;
- b. Where RfL(I) anticipates a change to route data, e.g. line speed changes;
- c. Where there is evidence that the SRTs in current use do not adequately represent real train performance;
- d. Where it is cost-effective to re-calculate all SRTs on a route at the same time as a re-calculation for a particular train type.

11.4.8 A 10% allowance should be included in the calculation to take account of the lack of explicit engineering allowances in the TPR.

11.4.9 RfL(I) carries out rounding of the calculated SRTs to obtain values in half minutes. Rounding is carried out cumulatively over a route, with intermediate times being rounded down and arrival at final destination being rounded up. However, during this process the accumulative value of the SRTs should never be more than +/- half-a-minute from the accumulative value of the 'raw' data at important locations such as junctions and major stations.

11.4.10 RfL(I) carries out other adjustments to the rounded SRTs, e.g. to remove obvious anomalies

11.4.11 RfL(I) may adjust SRTs for different train types to show the same numeric values in order to make maximum use of available line capacity.

11.5 Headways

11.5.1 The current headway values are listed in Section 9.3 above.

11.5.2 The planning headway is the minimum planned time interval between two successive train schedules at a specific timing point on the same line in the same direction, such that the second

train can meet its SRT. This is expressed in multiples of half minutes and is derived from the technical headway rounded to at least the next half minute or above by agreement.

11.5.3 Where necessary and appropriate, differential planning headways shall be created for different combinations of:

- Train type (including weight, length and speed)
- Stopping pattern
- Diverging or converging movements

For example, two trains departing from a terminal station may have a different headway depending on whether they depart towards the same line (converging), or to different lines (diverging), as in the latter scenario the route of the second train can be set earlier with least restrictive aspects. In the case of a non-stopping train following a train through a platform, the headway needs to allow the first train to accelerate from the platform without the second train seeing restrictive aspects on approach. This is also the case in scenarios where stopping trains follow one another into a station platform.

11.5.4 The technical headway is the minimum permissible time interval between two successive trains at a specific timing point on the same line in the same direction, such that the second train can meet its SRT. This is expressed in seconds.

11.6 Junction Margins

11.6.1 Current Junction Margin values are provided in section 9.3 above.

11.6.2 A Junction Margin is the minimum permissible time interval between two trains that are performing conflicting moves at a timing point, such that the second train can meet its SRT. This is expressed in multiples of half minutes derived from the technical value expressed in seconds.

11.6.3 Where necessary and appropriate, differential junction margins shall be created for different combinations of:

- Train type (including weight, length and speed)
- Stopping or passing movements
- Diverging or converging movements

For example, a train accelerating from rest across a junction will require a greater margin to avoid impact on the second train, than a train crossing the same junction at line speed. The stopping pattern of both trains must also be taken into account so that acceleration or deceleration relative to line speed is taken into account.

11.6.4 The calculation of a junction margin consists of a number of components:

1. Time taken between the front of the first train passing the timing point and its rear clearing the relevant axle counter
2. Time taken for the CBTC system to reset the route and give a movement authority to the second train
3. Time taken between the second train commencing movement and its front passing the timing point

11.6.5 A basic junction margin is the sum of 1, 2 and 3 above rounded to the next half-minute above to form the planning margin.

11.7 Platform Reoccupation

11.7.1 Current platform reoccupation values are provided in section 9.3 above.

11.7.2 Platform reoccupation is the time between first train departing and second train arriving at a specific platform in the same direction; this commonly defaults to, but should never exceed, the applicable headway.

11.7.3 Platform Reoccupation is measured separately to station dwell time.

11.7.4 The calculation of a platform reoccupation consists of a number of components:

1. Time taken between the first train departing the timing point and its rear clearing the relevant berth;
2. Time taken for CBTC to reset the route and give movement authority to the second train; and
3. Time taken between the second train commencing movement and it arriving at the timing point

11.7.5 Platform reoccupation is the sum of 1, 2 and 3 rounded to the next half-minute above to form the planning value.

11.8 Station Dwell Times

11.8.1 Current station dwell values listed in Section 9.3 above.

11.8.2 Station dwell times are the minimum time shown in timetables for trains to be at a stand in a station, from when train wheels stop on arrival to when wheels start on departure.

11.8.3 It includes time for doors to be released open, for passengers to leave and join the train, doors to be confirmed shut and for the train to be dispatched.

11.8.4 Where necessary and appropriate, differential station dwell times shall be created for different combinations of:

- Time of day (e.g. peak hours and weekends);
- Loading patterns;
- Rolling stock; and
- Station staffing arrangements.

11.8.5 Where no station-specific minimum value is specified a standard value of half a minute will apply.

11.8.6 Timetable Participants are responsible for ensuring that station dwell times are robust for operational usage.

11.9 Turnround Times

11.9.1 Turnround times are listed in Section 9.3 above.

11.9.2 Turnround Times are the minimum time required for rolling stock to be prepared on completing one service before it forms the next service.

11.9.3 Where necessary and appropriate, differential turnround times shall be created for different combinations of:

- Time of day;
- Rolling stock;
- Station staffing arrangements;
- Train operating staff agreements;
- Journey distance; and
- Miscellaneous operational instructions

11.9.4 Timetable Participants are responsible for ensuring that turnrounds are robust for operational usage and takes account of local operational railway characteristics.

11.10 Engineering Recovery Allowances

11.10.1 Engineering Recovery Allowance is additional time included in train schedules to cover the impact of planned temporary speed restrictions associated with engineering works on the network.

11.10.2 A 10% allowance is included in the SRT calculation.

12. References

12.1 RfL company documents

- CCOS Network Code Part D
- CCOS Network Code Part H
- CCOS Network Code Part J
- RfL(I) CCOS Rule Book

12.2 References

- The Secretary of State. (2006). Railways and other Guided Transport System (safety) regulations.

12.3 Abbreviations

ATO	Automatic Train Operation
CBTC	Communications-Based Train Control
CCOS	Crossrail Central Operating Section
EAS	Engineering Access Statement
IM	Infrastructure Manager
NR	Network Rail
OTM	On Track Machine
RfL	Rail <i>for</i> London

RfL(I)	Rail <i>for</i> London Infrastructure Limited
ROGS	The Railway and Other Guided Transport Systems (Safety) Regulations
SRT	Sectional Running Time
TfL	Transport <i>for</i> London
TPR	Timetable Planning Rules

12.4 Definitions

Automatic Train Operation	Train speed control, starting and stopping functions undertaken by the train (supervised by the Automatic Train Protection component of CBTC).
Auto-Drive	ATO with the driver or operator situated in the leading cab relative to the direction of travel
Auto-Reverse	ATO with the driver or operator not situated in the leading cab relative to the direction of travel
Communications-Based Train Control	Train-borne determination of a train's location, length and integrity. Employs a continuous data communications link between the train-borne equipment and wayside equipment.
Infrastructure Manager	As defined in Part 1 Section 2 of the Railway and Other Guided Transport Systems (safety) regulations (2006)
Zorro Move	Facilitates the movement of a train to another running line for same direction working using a trailing crossover by use of Auto-Reverse.