Argent St George, London and Continental Railways and Exel

King's Cross Central

Transport Assessment

April 2004

Appendix 7

ARUP

Argent St George

King's Cross St Pancras LUL PEDROUTE Study

King’s Cross Central Impact on London Underground

ISSUE

Argent St George

King's Cross St Pancras LUL PEDROUTE Study

King's Cross Central Impact on London Underground

November 2003

Ove Arup & Partners Ltd
13 Fitzroy Street, London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 775
www.arup.com

Job number 67890/09

ARUP

Document Verification

Job title	King's Cross St Pancras LUL PEDROUTE Study		Job number 67890/09
Document title	King's Cross Central Impact on London Underground		File reference
Document ref			

Revision	Date				
Draft 1	11/11/03	Filename	0022KCC impacts report 11 Nov.doc		
		Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Rachel Moss/ Andrew Jenkins	Ian Field	Elliot Wishlade
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

CONTENTS

		Page
1.	**INTRODUCTION**	**1**
1.1	Objectives	1
1.2	Background	1
2.	**NETWORK DEVELOPMENT**	**3**
2.1	Original Network	3
2.2	New Network	3
3.	**PASSENGER DEMAND SCENARIOS**	**5**
3.1	Original Demand Matrices	5
3.2	Updated Demand Scenarios	5
3.3	King's Cross Central	6
4.	**RESULTS**	**8**
4.1	Test 1	8
4.2	Test 2	8
4.3	Test 3	10
4.4	Test 4	10
5.	**CONCLUSIONS**	**13**

APPENDICES

APPENDIX A
Demand Matrices

APPENDIX B
Test 1 Service Factor Plots

APPENDIX C
Test 2 Service Factor Plots

APPENDIX D
Test 3 Service Factor Plots

APPENDIX E
Test 4 Service Factor Plots

1. INTRODUCTION

1.1 Objectives

1.1.1 The main objective of this report is to assess the impact of King's Cross Central (KCC) development trips on the London Underground (LUL) Station, which has been modelled for the Base Case in 2007, when the Northern Ticket Hall and Western Ticket Hall works will be complete and operational.

1.2 Background

1.2.1 The objective of the modelling has been to test the impact on the LUL station of additional pedestrian flow demand due to the King's Cross Central developments north of the mainline station.

1.2.2 As a sensitivity case, allowance has been made for possible growth on mainline rail of 2.5% per annum between the existing (2002) and base (2007) cases.

1.2.3 The 2007 Phase 2 LUL model, which was included in the King's Cross St Pancras Phase 2 PEDROUTE Study, produced by Arup (February 2002), has been updated to reflect peak period mainline rail arrivals and departures. It also includes existing Thameslink interchanges (i.e. pre-Thameslink 2000), which have been loaded into LUL from Midland Road, via the Northern Ticket Hall and Western Ticket Hall. The existing Pentonville Road Thameslink Station is closed.

1.2.4 The King's Cross Central development trips, the derivation of which is described in Transport Assessment for KCC, have been added to the 2007 models to test the impact of these development trips on the LUL station during peak AM and PM conditions.

1.2.5 A summary of the model scenarios is included in Table 1 below.

Table 1: Summary of Model Scenarios

Scenario	Description
Test 1: 2007 AM and PM 2002 mainline rail demand	Phase 2 LUL model with 2007 LUL demand and mainline rail arrivals and departures (6 intercity and 9 suburban services, derived from the 2002 working timetable) based on 2002 demand, with existing Thameslink interchange flows at Midland Road..
Test 2: 2020 AM and PM 2002 mainline rail demand + King's Cross Central trips	As Test 1 with King's Cross development trips added, assuming 100% build-out of KCC development to test maximum demand on LUL infrastructure.
Test 3: 2007 AM and PM 2007 mainline rail demand	Phase 2 LUL model with 2007 LUL demand and mainline rail arrivals and departures (6 intercity and 9 suburban) based on 2002 demand expanded by 2.5% per annum to 2007, with existing Thameslink interchange flows at Midland Road. The growth factor has been determined by NR
Test 4: 2020 AM and PM 2007 mainline rail demand + King's Cross Central trips	As Test 3 with King's Cross development trips added, assuming 100% build-out of KCC development to test maximum demand on LUL infrastructure.

2. NETWORK DEVELOPMENT

2.1 Original Network

2.1.1 The original network was taken from the King's Cross St Pancras Phase 2 PEDROUTE Study, produced by Arup (February 2002). This Phase 2 LUL network extends to all LUL platforms, and includes the Tube Ticket Hall, the new Northern Ticket Hall and the new Western Ticket Hall. It also includes all street accesses to the station.

2.2 New Network

2.2.1 The Phase 2 network has been updated to include the following surface level links:

- From KCC to North West Stair;
- From KCC to Southern Stair;
- From KCC to Western Ticket Hall;
- From Suburban Shed to Southern Stair;
- From Main Train Shed to Southern Stair.

2.2.2 These connections have been added to facilitate route choice, particularly for King's Cross Central passengers, regarding which LUL access they use.

2.2.3 The existing Thameslink (i.e. pre-Thameslink 2000) flows have also been included, to and from Midland Road.

2.2.4 The new network block structure is shown in Figure 1, and Table 2 below describes the origin/destination locations that are included in the model:

Figure 1: Base LUL Network including Surface Level Connections

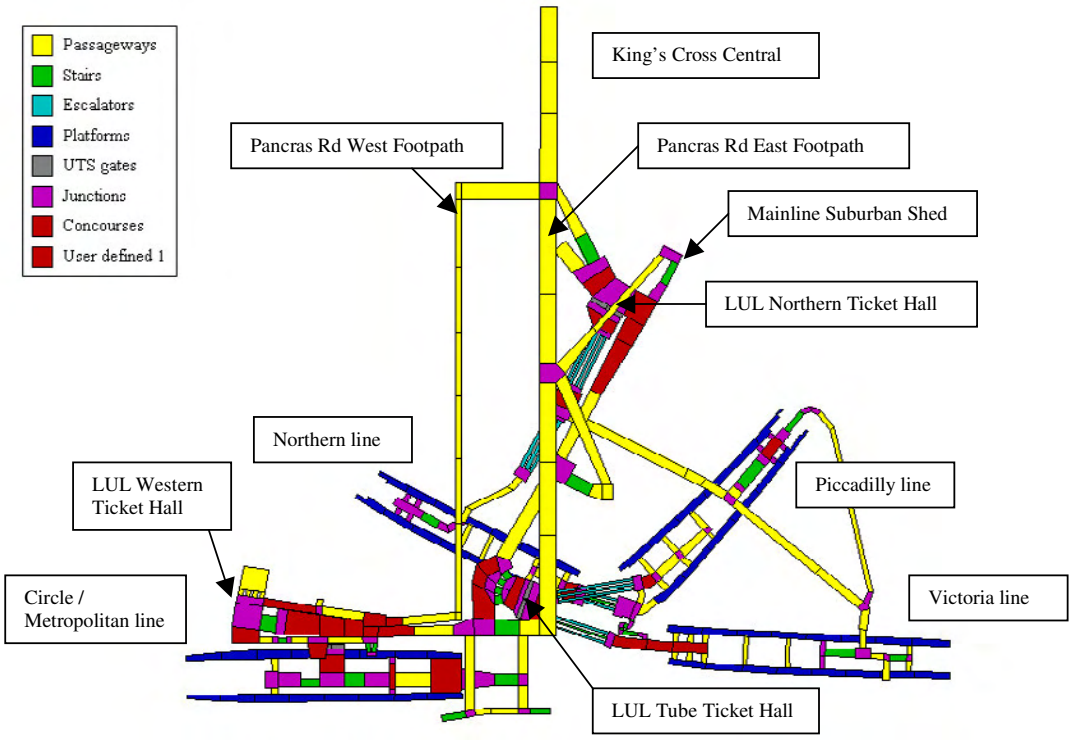


Table 2: Summary of Locations

Location	Description of location
1	Metropolitan / Circle / Hammersmith and City lines eastbound (Platform 2)
2	Metropolitan / Circle / Hammersmith and City lines westbound (Platform 1)
3	Northern line northbound (Platform 7)
4	Northern line southbound (platform 8)
5	Piccadilly line eastbound (Platform 5)
6	Piccadilly line westbound (platform 6)
7	Victoria line northbound (Platform 3)
8	Victoria line southbound (Platform 4)
10	Entrance / exit from King's Cross mainline station concourse
12	Entrance / exit from north side of Euston Road (adjacent to King's Cross)
13	Entrance / exit from south side of Euston Road
14	Entrance / exit from west side of Pancras Road into Western Ticket Hall
15	Entrance / exit from St Pancras domestic station into Western Ticket Hall
16	Entrance / exit from Thameslink into Western Ticket Hall
17	Entrance / exit from north side of Euston Road (adjacent to St Pancras)
18	Entrance / exit from King's Cross mainline suburban platforms
19	Entrance / exit from east side of Pancras Rd into Northern Ticket Hall
20	Entrance / exit from St Pancras international into Northern Ticket Hall
21	Entrance / exit from St Pancras international station into Western Ticket Hall
22	Entrance / exit from St Pancras domestic station into Northern Ticket Hall
23	Entrance / exit from Thameslink into Northern Ticket Hall
24	Entrance / exit from south side of Euston Road (near the bus stops)
25	Entrance / exit from King's Cross Central developments

3. PASSENGER DEMAND SCENARIOS

3.1 Original Demand Matrices

3.1.1 The original AM and PM peak period demand matrices were taken from the Phase 2 study. The original AM and PM matrices assume a 2007 base for LUL flows, with Thameslink 2000 flows.

3.2 Updated Demand Scenarios

All updated forecast demand scenarios included as part of this study are presented as Appendix A to this report.

Test 1: 2007 (2002 Rail Demand)

3.2.1 The Phase 2 AM and PM demand matrices were updated for the Test 1 model. They include the following:

- Movements to and from mainline rail to reflect existing peak period mainline rail timetable of 6 intercity / 9 suburban (in 2002);
- Assumed 65% modal split between mainline rail and LUL.

3.2.2 The Thameslink 2000 passenger demand, which is included in the original Phase 2 matrix has been replaced by the existing Thameslink passenger demand (i.e. pre-Thameslink 2000) at Midland Road Station, entering the LUL Station via the Northern Ticket Hall and the Western Ticket Hall. The existing Thameslink passenger demand has been taken from the King's Cross St Pancras Phase 1 PEDROUTE Study, produced by Arup (January 2002).

3.2.3 This Test 1 2007 model has been tested for both the AM peak period (07.00-10.00 hours) and the PM peak period (16.00-19.00 hours).

Test 2: 2020 (2002 Rail Demand, no growth) with King's Cross Central

3.2.4 As Test 1 but with additional King's Cross Central development trips (see Section 3.3).

Test 3: 2007 (2007 Rail Demand)

3.2.5 The Test 1 AM and PM demand matrices were updated for the Test 3 model. They include the following:

- Movements to and from mainline rail to reflect existing peak period mainline rail timetable of 6 intercity / 9 suburban (in 2007);
- Assumed 65% modal split between mainline rail and LUL.

3.2.6 Mainline rail demand has been factored from 2002 (as per Test 1) to 2007 using 2.5% per annum, applied generally to all trips to and from the mainline station throughout the AM and PM peak periods.

3.2.7 Mainline rail demand being fed into the LUL models therefore increases as described in Table 3.

Table 3: Mainline Rail Demand Tests 1 and 2, and 3 and 4

		Tests 1 and 2	Tests 3 and 4
Mainline Rail to LUL Two Way Flows	AM	13,837	15,526
	PM	16,077	18,197

3.2.8 Existing interchange movements to and from the new Thameslink station at Midland Road are included as per Tests 1 and 2.

Test 4: 2020 (2007 Rail Demand) With King's Cross Central

3.2.9 As Test 3 but with additional King's Cross Central development trips (see Section 3.3). This assumes background rail growth of 2.5% between 2002 and 2007. From 2007 to 2020 no background growth is expected, since KCC will be the main component of growth in the King's Cross area.

3.3 King's Cross Central

3.3.1 The AM and PM King's Cross Central development trips were added to the Test 1 and Test 3 demand matrices for both the AM and PM peak periods. The number of trips was derived from the peak hour trip generation flows in the Transport Assessment for KCC, and these are presented as Table 4 below. The hourly flows were expanded to peak period flows using established factors for the AM and PM peaks.

Table 4: King's Cross Central Development Trips

		Peak hour	Peak Hour to Peak Period Factor	Peak 3 hours
AM	**KCC to LUL**	2919	1/0.52	5613
	LUL to KCC	5490		10558
PM	**KCC to LUL**	5490	1/0.45	12200
	LUL to KCC	2919		6887

3.3.2 The Test 2 and Test 4 King's Cross Central models have been tested for both the AM peak period (07.00-10.00 hours) and the PM peak period (16.00-19.00 hours).

3.3.3 It is important to note that the King's Cross Central demand applied to the model represents 100% of demand generated by the whole KCC site, i.e. full build-out. This is likely to occur sometime after 2020, and has been applied to this modelling exercise in order to test maximum demand on LUL infrastructure.

3.4 Modelling Parameters

3.4.1 King's Cross Central and mainline rail trips are freely assigned within the model between LUL street entrances. This results in free route choice between:

- the North West stair;
- the South stair;

- the Euston Road (north side) stair; and,
- the Pancras Road stair (allowing access to the Western ticket Hall).

4. RESULTS

4.1 Test 1

Service Factors

4.1.1 Appendix B shows the peak 15 minute service factors for the Test 1 2007 AM and PM model scenarios.

4.1.2 The majority of the station and connecting passageways experience very little congestion (SF 0-2) during both the AM and PM peak 15 minute periods.

4.1.3 During the AM peak period, sections of all the underground platforms reach high levels of congestion (SF 3-4). The southbound Northern line platform experiences the worst levels of congestion, with SF 3-4 along the length of the platform between 08.45 and 09.00 hours.

4.1.4 The Northern Ticket Hall and the North West stair experience minimal congestion (SF 0-1).

4.1.5 During the PM peak period, the levels of congestion are less significant. Only small sections of some of the platforms (Victoria line southbound and Piccadilly line southbound) reach high levels of congestion (SF 3-4) during the peak 15 minute period.

4.1.6 The Northern Ticket Hall and the North West stair experience minimal congestion (SF 0-1).

Average Delay

4.1.7 The average passenger delay for the AM model period is 18 seconds. This represents approximately 9% of the total passenger movement time.

4.1.8 The average passenger delay for the PM model period is 22 seconds. This represents approximately 11% of the total passenger movement time.

4.2 Test 2

Service Factors

4.2.1 Appendix C shows the peak 15 minute service factors for the Test 2 AM and PM model scenarios.

4.2.2 The levels of congestion reflect the increase in demand as a result of including the King's Cross Central development trips.

4.2.3 The LUL entry gateline in the Northern Ticket Hall exhibits SF3-4 between 08.30-09.00 hours.

4.2.4 Platform congestion increases on the Northern Line southbound, Piccadilly Line southbound and Victoria Line southbound during the period 08.45 hours with SF3-4 evident.

4.2.5 The Northern Ticket Hall (with the exception of the LUL entry gateline as noted), Tube Ticket Hall and Western Ticket Hall are all free of congestion during the AM and PM peak periods.

4.2.6 Platform congestion during the PM peak period increases marginally compared with Test 1, with Service Factors 3-4 spreading on the Victoria Line northbound and Piccadilly Line southbound during the period 1800-1815 hours.

Average Delay

4.2.7 The average passenger delay for the AM model period is 25 seconds. This represents approximately 11% of the total passenger movement time.

4.2.8 The average passenger delay for the PM model period is 28 seconds. This represents approximately 12% of the total passenger movement time.

Northern Ticket Hall UTS Gate Flows

4.2.9 Given the sensitivity of this area, further analysis has been undertaken for the five minute passenger flows through the UTS gates in the Northern Ticket Hall are included in Table 5. The flows are provided for the time period between 08.15 and 09.15 hours.

Table 5: Test 2 Northern Ticket Hall Gateline Flows

Time Period	Test 2 AM					
	Entry into LUL	Gateline Capacity 5 Minute (25ppm per gate)	Gateline Capacity 5 Minute (33 ppm per gate)	Exit from LUL	Gateline Capacity 5 Minute (25ppm per gate)	Gateline Capacity 5 Minute (33 ppm per gate)
0815-0820	846	1000	1320	471	1000	1320
0820-0825	993	1000	1320	792	1000	1320
0825-0830	947	1000	1320	525	1000	1320
0830-0835	869	1000	1320	594	1000	1320
0835-0840	1038	1000	1320	804	1000	1320
0840-0845	942	1000	1320	560	1000	1320
0845-0850	967	1000	1320	672	1000	1320
0850-0855	1004	1000	1320	673	1000	1320
0855-0900	970	1000	1320	516	1000	1320
0900-0905	981	1000	1320	731	1000	1320
0905-0910	862	1000	1320	532	1000	1320
0910-0915	953	1000	1320	674	1000	1320

4.2.10 The flows into LUL are over 1000 for most of the hour. Hence the high levels of congestion in this area. The flows out of LUL are lower – ranging from between approximately 500 to 900 over the hour.

4.2.11 It is clear that the two way entry and exit flows for the Northern Ticket Hall gateline never exceeds the two way total gateline capacity, based either on 25 or 33 passengers per minute per gate. There is therefore some flexibility in terms of the operation of this gateline in order to maximise capacity and reduce congestion.

4.3 Test 3

Service Factors

4.3.1 Appendix D shows the peak 15 minute service factors for the Test 3 2007 AM and PM model scenarios. Demand to and from rail has been uplifted to represent 2007, factored up from 2002 by 2.5% per annum.

4.3.2 The majority of the station and connecting passageways experience very little congestion (SF 0-2) during both the AM and PM peak 15 minute periods.

4.3.3 During the AM, sections of all the underground platforms reach high levels of congestion (SF 3-4). The southbound Northern line platform experiences the worst levels of congestion, with SF 3-4 along the length of the platform between 08.45 and 09.00 hours.

4.3.4 The southbound Piccadilly Line platform also experiences high Service Factors of SF3-4 for the period 0830-0845 hours and again between 0900 and 0915 hours.

4.3.5 The Northern Ticket Hall and the North West stair experience minimal congestion (SF 0-1).

4.3.6 During the PM, the levels of congestion are less significant. Only small sections of some of the platforms (Victoria line northbound and Piccadilly line southbound) reach high levels of congestion (SF 3-4) during the peak 15 minute period.

4.3.7 The Northern Ticket Hall and the North West stair experience minimal congestion (SF 0-1).

Average Delay

4.3.8 The average passenger delay for the AM model period is 18 seconds. This represents approximately 10% of the total passenger movement time.

4.3.9 The average passenger delay for the PM model period is 22 seconds. This represents approximately 11% of the total passenger movement time.

4.3.10 Average passengers delays are no worse than under Test 1 demand conditions.

4.4 Test 4

Service Factors

4.4.1 Appendix E shows the peak 15 minute service factors for the Test 2 AM and PM model scenarios. Demand to and from rail has been uplifted to represent 2007, factored up from 2002 by 2.5% per annum.

4.4.2 The levels of congestion reflect the increase in demand as a result of including the King's Cross Central development trips.

4.4.3 The LUL entry gateline in the Northern Ticket Hall exhibits SF3-4 between 0830-0915 hours.

4.4.4 The down escalators connecting the Northern Ticket Hall with the LUL platforms exhibit Service Factors 3-4 during the morning peak period.

4.4.5 Platform congestion increases on the Northern Line southbound, Piccadilly Line southbound and Victoria Line southbound during the period 0845-0900 hours with SF3-4 evident.

4.4.6 The Northern Ticket Hall (with the exception of the LUL entry gateline as noted), Tube Ticket Hall and Western Ticket Hall are all free of congestion during the AM and PM peak periods.

4.4.7 Platform congestion is also evident on the Metropolitan/Circle Line eastbound with SF3-4 between 0830-0845 hours, with limited areas of SF3-4 evident on eastbound and westbound platforms throughout the AM peak period.

4.4.8 Congestion on the Piccadilly Line southbound is also evident during the AM peak period with SF3-4 evident between 0830-0915 hours.

4.4.9 Platform congestion during the PM peak period affects the Piccadilly Line southbound, with Service Factors 3-4 evident.

Average Delay

4.4.10 The average passenger delay for the AM model period is 27 seconds. This represents approximately 12% of the total passenger movement time.

4.4.11 The average passenger delay for the PM model period is 28 seconds. This represents approximately 13% of the total passenger movement time.

4.4.12 Average passengers delays are no worse than under Test 3 demand conditions.

Northern Ticket Hall UTS Gate Flows

4.4.13 Given the sensitivity of this area, further analysis has been undertaken for the five minute passenger flows through the UTS gates in the Northern Ticket Hall are included in Table 6. The flows are provided for the time period between 08.15 and 09.15 hours when congestion at the Northern Ticket Hall gateline is most severe.

Table 6: Test 4 Northern Ticket Hall Gateline Flows

Time Period	Test 4 AM					
	Entry into LUL	Gateline Capacity 5 Minute (25ppm per gate)	Gateline Capacity 5 Minute (33 ppm per gate)	Exit from LUL	Gateline Capacity 5 Minute (25ppm per gate)	Gateline Capacity 5 Minute (33 ppm per gate)
0815-0820	868	1000	1320	501	1000	1320
0820-0825	944	1000	1320	769	1000	1320
0825-0830	1022	1000	1320	640	1000	1320
0830-0835	939	1000	1320	627	1000	1320
0835-0840	1018	1000	1320	657	1000	1320
0840-0845	1010	1000	1320	701	1000	1320
0845-0850	1033	1000	1320	665	1000	1320
0850-0855	983	1000	1320	647	1000	1320
0855-0900	1025	1000	1320	700	1000	1320
0900-0905	1037	1000	1320	639	1000	1320
0905-0910	971	1000	1320	601	1000	1320
0910-0915	1018	1000	1320	697	1000	1320

4.4.14 The flows into LUL are over 1000 for most of the hour. Hence the high levels of congestion in this area. The flows out of LUL are lower – ranging from between approximately 500 to 900 over the hour.

4.4.15 However, as with the Northern Gateline flows for Test 2, it is clear that the two way entry and exit flows for the Northern Ticket Hall gateline never exceeds the two way total gateline capacity, based either on 25 or 33 passengers per minue per gate. There is therefore some flexibility in terms of the operation of this gateline in order to maximise capacity and reduce congestion.

5. CONCLUSIONS

A number of key conclusions can be drawn from this assessment of passenger conditions in King's Cross LUL station during the AM and PM peak periods under the tested demand scenarios. These are summarised as follows:

- That congestion during the Base 2007 AM and PM peak periods, assuming either existing (2002) or growthed mainline rail demand, is limited to the LUL platforms;
- The inclusion of the King's Cross Central development trips into the LUL network results in additional congestion on the LUL platforms and localised congestion at the Northern Ticket Hall gateline, particularly during the AM peak period;
- The assessment of AM peak period five minute flows through the Northern Ticket Hall gateline for Tests 2 and 4 shows that in aggregate terms there is sufficient capacity given the layout of sixteen gates;
- That management of the Northern Ticket Hall gateline under periods of peak demand would alleviate any temporary localised congestion; and
- That platform congestion is expected to be alleviated in the future given the improvement in train frequencies as a result of the Public Private Partnership initiatives.

APPENDIX A

Demand Matrices

A1. TEST 1: 2007 AM (2002 RAIL DEMAND)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
Met/circle Eb	1	0	0	306	841	253	681	518	107	72	1360	618	55	447	100	55	34	55	0	223	0	0	618	6343
Met/circle Wb	2	0	0	19	71	212	357	255	197	60	1088	381	133	268	100	133	25	133	0	134	0	0	381	3047
Northern Nb	3	120	600	0	0	204	550	109	140	559	1235	279	82	0	6	82	261	82	260	0	536	50	279	5610
Northern Sb	4	839	731	0	0	202	1307	130	77	223	316	124	20	0	5	20	101	20	45	0	89	41	124	4413
Picc. Eb	5	876	322	148	1362	0	0	116	86	103	360	104	126	0	62	126	50	126	513	0	1027	559	104	6170
Picc. Wb	6	2405	1979	586	2047	0	0	69	254	100	28	65	21	0	18	21	50	21	45	0	89	160	65	8023
Victoria Nb	7	378	34	347	412	200	392	0	0	559	408	74	62	0	84	62	261	62	290	0	580	749	74	5028
Victoria Sb	8	1639	1664	642	731	372	756	0	0	318	749	175	115	0	128	115	147	115	290	0	580	1150	175	9861
KX BR	10	488	618	208	447	16	656	22	589	0	0	148	0	0	0	0	0	0	607	0	1213	0	148	5159
WHSmith/taxis	12	527	562	109	536	55	78	50	472	0	0	83	0	491	0	0	0	0	0	245	0	0	83	3291
Euston Rd S	13	162	173	33	164	15	25	17	146	23	221	0	7	67	0	7	4	7	0	33	0	0	0	1104
Pancras Rd W	14	33	37	10	13	4	61	65	60	0	0	6	0	44	0	0	0	0	0	22	0	0	6	369
St Pancras domestic to WTH	15	1159	1031	0	0	0	0	0	0	0	459	48	32	0	0	32	0	0	0	0	0	0	48	2809
Thameslink 2000 to WTH	16	171	171	17	17	14	157	46	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	888
Euston Rd N	17	33	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	369
KX suburban N	18	721	912	306	660	23	967	32	870	0	0	72	0	0	0	0	0	0	306	0	611	0	72	5551
Pancras Rd N	19	33	37	10	13	4	61	65	68	0	0	6	0	0	0	0	0	0	22	0	44	0	6	369
CTRL international to NTH	20	0	0	16	151	32	637	26	1089	46	0	0	0	0	0	0	5	16	0	0	0	0	0	2018
CTRL international to WTH	21	579	515	4	38	8	159	6	272	0	229	24	16	0	0	16	0	0	0	0	0	0	24	1890
St Pancras domestic to NTH	22	0	0	40	379	80	1593	64	2721	92	0	0	0	0	0	0	10	32	0	0	0	0	0	5011
Thameslink 2000 to NTH	23	0	0	154	154	123	1418	419	2655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4920
Euston Rd S bus stops	24	162	173	33	164	15	25	17	146	23	221	0	7	67	0	7	4	7	0	33	0	0	0	1104
	:TOTAL	10333	9596	2997	8212	1915	9942	2171	10320	2177	6674	2212	676	1428	501	676	950	676	2386	712	4769	2718	2212	84254

A2. TEST 1: 2007 PM (2002 RAIL DEMAND)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
Met/circle Eb	1	0	0	643	571	1122	590	1632	50	923	2156	219	100	1017	156	100	924	100	0	509	0	0	219	11063
Met/circle Wb	2	0	0	623	103	1150	1353	1366	544	616	1703	172	81	961	156	81	616	81	0	480	0	0	172	10248
Northern Nb	3	95	875	0	0	1243	2675	590	582	717	2201	222	40	0	2	40	716	40	201	0	403	14	222	10878
Northern Sb	4	41	519	0	0	681	473	379	115	543	730	72	51	0	2	51	544	51	32	0	64	19	72	4338
Picc. Eb	5	636	948	1660	749	0	0	639	553	1408	427	44	266	0	188	266	1405	266	1130	0	2260	1690	44	14537
Picc. Wb	6	510	403	350	530	0	0	44	350	45	412	37	23	0	22	23	44	23	70	0	155	195	37	3072
Victoria Nb	7	213	90	211	534	1229	136	0	0	765	1569	159	171	0	229	171	765	171	1165	0	2331	2054	159	12123
Victoria Sb	8	257	410	191	664	31	374	0	0	0	157	17	154	0	31	154	0	154	0	0	0	276	17	2887
KX BR	10	462	435	120	327	35	116	191	587	0	0	85	0	0	0	0	0	0	113	0	225	0	85	2779
WHSmith/taxis	12	631	617	130	649	7	308	343	326	0	0	94	0	212	0	0	0	0	0	106	0	0	94	3417
Euston Rd S	13	459	581	105	257	36	184	166	122	98	306	0	17	49	0	17	60	17	0	25	0	0	0	2490
Pancras Rd W	14	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	535
St Pancras domestic to WTH	15	247	313	0	0	0	0	0	0	0	1351	66	82	0	0	82	0	0	0	0	0	0	66	2207
Thameslink 2000 to WTH	16	109	109	2	2	9	100	108	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	566
Euston Rd N	17	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	535
KX suburban N	18	204	267	74	201	21	72	117	359	0	0	13	0	0	0	0	0	0	13	0	26	0	13	1459
Pancras Rd N	19	107	35	12	50	7	149	72	68	0	0	7	0	0	0	0	0	0	7	0	14	0	7	535
CTRL international to NTH	20	0	0	46	158	40	573	171	290	317	0	0	0	0	0	0	182	41	0	0	0	0	0	1818
CTRL international to WTH	21	124	157	12	40	10	143	43	72	0	676	33	41	0	0	41	0	0	0	0	0	0	33	1425
St Pancras domestic to NTH	22	0	0	115	395	99	1433	428	725	632	0	0	0	0	0	0	364	82	0	0	0	0	0	4273
Thameslink 2000 to NTH	23	0	0	10	10	79	096	966	1155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3133
Euston Rd S bus stops	24	459	581	105	257	36	184	166	122	98	306	0	17	49	0	17	60	17	0	25	0	0	0	2498
	:TOTAL	4856	6489	4432	5509	5749	10057	7555	6293	6162	11994	1255	1040	2316	783	1040	5677	1040	2739	1159	5478	4248	1255	97122

A3. TEST 2: 2020 AM (2002 RAIL DEMAND WITH KING'S CROSS CENTRAL)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
Met/circle Eb	1	0	0	306	841	253	681	518	107	72	1360	618	55	447	100	55	34	55	0	223	0	0	618	946	7289
Met/circle Wb	2	0	0	19	71	212	357	255	197	60	1088	381	133	268	100	133	25	133	0	134	0	0	381	2287	6234
Northern Nb	3	128	600	0	0	284	550	189	140	559	1235	279	82	0	6	82	261	82	268	0	536	58	279	1410	7028
Northern Sb	4	839	731	0	0	202	1307	130	77	223	316	124	20	0	5	20	101	20	45	0	89	41	124	344	4757
Picc. Eb	5	876	322	148	1362	0	0	116	86	103	360	104	126	0	62	126	50	126	513	0	1027	569	104	2167	8337
Picc. Wb	6	2405	1979	585	2047	0	0	69	254	100	28	65	21	0	18	21	50	21	45	0	89	160	65	361	8384
Victoria Nb	7	378	34	347	412	200	392	0	0	559	408	74	62	0	84	62	261	62	290	0	580	749	74	1066	6094
Victoria Sb	8	1639	1664	642	731	372	756	0	0	318	749	175	115	0	128	115	147	115	290	0	580	1150	175	1977	11838
KX DR	10	400	610	200	447	16	666	22	509	0	0	140	0	0	0	0	0	0	607	0	1210	0	140	0	5159
WHSmith/taxis	12	527	562	109	536	55	78	50	472	0	0	83	0	491	0	0	0	0	0	245	0	0	83	0	3291
Euston Rd S	13	162	173	33	164	15	25	17	146	23	221	0	7	67	0	7	4	7	0	33	0	0	0	0	1104
Pancras Rd W	14	30	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	0	369
St Pancras domestic to WTH	15	1159	1031	0	0	0	0	0	0	0	459	48	32	0	0	32	0	0	0	0	0	0	48	0	2809
Thameslink 2000 to WTH	16	171	171	17	17	14	157	46	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	888
Euston Rd N	17	30	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	0	369
KX suburban N	18	721	912	306	660	23	967	32	870	0	0	72	0	0	0	0	0	0	306	0	611	0	72	0	5551
Pancras Rd N	19	33	37	10	13	4	61	65	68	0	0	6	0	0	0	0	0	0	22	0	44	0	6	0	369
CTRL international to NTH	20	0	0	16	151	32	637	26	1089	46	0	0	0	0	0	0	5	16	0	0	0	0	0	0	2018
CTRL international to WTH	21	579	515	4	38	8	159	6	272	0	229	24	16	0	0	16	0	0	0	0	0	0	24	0	1890
St Pancras domestic to NTH	22	0	0	40	379	80	1593	64	2721	92	0	0	0	0	0	0	10	32	0	0	0	0	0	0	5011
Thameslink 2000 to NTH	23	0	0	154	154	123	1418	419	2655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4920
Euston Rd S bus stops	24	162	173	33	164	15	25	17	146	23	221	0	7	67	0	7	4	7	0	33	0	0	0	0	1104
Kings Cross Central	25	637	714	193	251	77	1177	1254	1312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5615
	:TOTAL	10970	10310	3190	8463	1992	11119	3425	11632	2177	6674	2212	676	1428	501	676	950	676	2386	712	4769	2718	2212	10558	100427

A4. TEST 2: 2020 PM (2002 RAIL DEMAND WITH KING'S CROSS CENTRAL)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
Met/circle Eb	1	0	0	643	571	1122	590	1632	58	923	2156	219	108	1017	156	108	924	108	0	509	0	0	219	793	11856
Met/circle Wb	2	0	0	623	103	1150	1353	1366	544	616	1703	172	81	961	156	81	616	81	0	480	0	0	172	695	10843
Northern Nb	3	95	875	0	0	1243	2675	590	582	717	2201	222	40	0	2	40	716	40	201	0	403	14	222	294	11172
Northern Sb	4	41	519	0	0	581	473	379	115	543	730	72	51	0	2	51	544	51	32	0	64	19	72	375	4713
Picc. Eb	5	636	940	1650	749	0	0	639	553	1400	427	44	255	0	100	255	1405	255	1130	0	2260	1690	44	1073	16410
Picc. Wb	6	518	483	360	533	0	0	44	360	45	412	37	23	0	22	23	44	23	78	0	155	195	37	169	3541
Victoria Nb	7	213	90	211	534	1229	136	0	0	765	1589	159	171	0	229	171	765	171	1165	0	2331	2054	159	1256	13379
Victoria Sb	8	257	410	191	664	31	374	0	0	0	157	17	154	0	31	154	0	154	0	0	0	276	17	1131	4018
KX BR	10	462	435	120	327	35	116	191	587	0	0	85	0	0	0	0	0	0	113	0	225	0	85	0	2779
WHSmith/taxis	12	631	617	130	549	7	308	343	326	0	0	94	0	212	0	0	0	0	0	106	0	0	94	0	3417
Euston Rd S	13	459	581	105	257	36	184	166	122	98	306	0	17	49	0	17	60	17	0	25	0	0	0	0	2498
Pancras Rd W	14	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	0	535
St Pancras domestic to WTH	15	247	313	0	0	0	0	0	0	0	1351	66	82	0	0	82	0	0	0	0	0	0	66	0	2207
Thameslink 2000 to WTH	16	109	109	2	2	9	100	108	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	566
Euston Rd N	17	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	0	535
KX suburban N	18	284	267	74	201	21	72	117	359	0	0	13	0	0	0	0	0	0	13	0	26	0	13	0	1459
Pancras Rd N	19	107	35	12	50	7	149	72	68	0	0	7	0	0	0	0	0	0	7	0	14	0	7	0	535
CTRL international to NTH	20	0	0	46	158	40	573	171	290	317	0	0	0	0	0	0	182	41	0	0	0	0	0	0	1818
CTRL international to WTH	21	124	157	12	40	10	143	43	72	0	676	30	41	0	0	41	0	0	0	0	0	0	30	0	1425
St Pancras domestic to NTH	22	0	0	115	395	99	1433	428	725	632	0	0	0	0	0	0	364	82	0	0	0	0	0	0	4273
Thameslink 2000 to NTH	23	0	0	10	10	79	896	906	1196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3100
Euston Rd S bus stops	24	459	581	105	257	36	184	166	122	98	306	0	17	49	0	17	60	17	0	25	0	0	0	0	2498
Kings Cross Central	25	2611	854	293	1220	171	3636	1757	1659	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12201
	.TOTAL	7467	7343	4725	6729	5920	13693	9312	7952	6162	11994	1255	1040	2316	783	1040	5677	1040	2739	1159	5478	4248	1255	6486	115809

A5. TEST 3: 2007 AM (2007 RAIL DEMAND)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
Met/circle Eb	1	0	0	306	041	253	601	510	107	02	1360	610	55	447	100	55	30	55	0	223	0	0	610	6357
Met/circle Wb	2	0	0	19	71	212	357	255	197	68	1088	381	133	268	100	133	28	133	0	134	0	0	381	3958
Northern Nb	3	128	600	0	0	284	550	189	140	633	1235	279	82	0	6	82	295	82	268	0	536	58	279	5726
Northern Sb	4	839	731	0	0	202	1307	130	77	252	316	124	20	0	5	20	114	20	45	0	89	41	124	4456
Picc. Eb	5	876	322	148	1362	0	0	116	86	117	360	104	126	0	62	126	57	126	513	0	1027	569	104	6190
Picc. Wb	6	2405	1979	505	2047	0	0	69	254	114	20	65	21	0	10	21	57	21	45	0	09	160	65	0043
Victoria Nb	7	378	34	347	412	200	392	0	0	633	408	74	62	0	84	62	295	62	290	0	580	749	74	5136
Victoria Sb	8	1639	1664	642	731	372	756	0	0	360	749	175	115	0	128	115	167	115	290	0	580	1150	175	9922
KX BR	10	563	699	236	505	18	743	25	667	0	0	167	0	0	0	0	0	0	687	0	1372	0	167	5838
WHSmith/taxis	12	527	562	109	536	56	78	60	472	0	0	83	0	491	0	0	0	0	0	246	0	0	83	3291
Euston Rd S	13	162	173	33	164	15	25	17	146	26	221	0	7	67	0	7	4	7	0	33	0	0	0	1107
Pancras Rd W	14	33	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	369
St Pancras domestic to WTH	15	1159	1031	0	0	0	0	0	0	0	459	48	32	0	0	32	0	0	0	0	0	0	48	2809
Thameslink 2000 to WTH	16	171	171	17	17	14	157	46	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	888
Euston Rd N	17	33	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	369
KX suburban N	18	790	1011	309	731	25	1072	35	964	0	0	79	0	0	0	0	0	0	309	0	677	0	79	6150
Pancras Rd N	19	33	37	10	13	4	61	65	68	0	0	6	0	0	0	0	0	0	22	0	44	0	6	369
CTRL international to NTH	20	0	0	16	151	32	637	26	1089	52	0	0	0	0	0	0	6	16	0	0	0	0	0	2024
CTRL international to WTH	21	579	515	4	38	8	159	6	272	0	229	24	16	0	0	16	0	0	0	0	0	0	24	1890
St Pancras domestic to NTH	22	0	0	40	379	80	1593	64	2721	104	0	0	0	0	0	0	11	32	0	0	0	0	0	5024
Thameslink 2000 to NTH	23	0	0	154	154	123	1410	419	2655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4920
Euston Rd S bus stops	24	162	173	33	164	15	25	17	146	26	221	0	7	67	0	7	4	7	0	33	0	0	0	1107
	:TOTAL	10475	9776	3057	8342	1920	10132	2177	10492	2463	6674	2239	676	1428	501	676	1075	676	2499	712	4994	2718	2239	85943

A6. TEST 3: 2007 PM (2007 RAIL DEMAND)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
Met/circle Eb	1	0	0	643	571	1122	590	1632	50	1045	2156	219	100	1017	156	100	1045	100	0	509	0	0	219	11305
Met/circle Wb	2	0	0	623	103	1150	1353	1366	544	697	1703	172	81	961	156	81	697	81	0	480	0	0	172	10409
Northern Nb	3	95	875	0	0	1243	2675	590	582	811	2201	222	40	0	2	40	810	40	201	0	403	14	222	11066
Northern Sb	4	41	519	0	0	681	473	379	115	614	730	72	51	0	2	51	616	51	32	0	64	19	72	4481
Picc. Eb	5	636	948	1660	749	0	0	639	553	1593	427	44	266	0	188	266	1689	266	1130	0	2260	1690	44	14906
Picc. Wb	6	510	403	350	530	0	0	44	350	51	412	37	23	0	22	23	50	23	70	0	155	195	37	3003
Victoria Nb	7	213	90	211	534	1229	136	0	0	866	1569	159	171	0	229	171	866	171	1165	0	2331	2054	159	12324
Victoria Sb	8	257	410	191	664	31	374	0	0	0	157	17	154	0	31	154	0	154	0	0	0	276	17	2887
KX BR	10	523	492	136	371	39	131	216	664	0	0	97	0	0	0	0	0	0	128	0	254	0	97	3145
WHSmith/taxis	12	631	617	130	649	7	308	343	326	0	0	94	0	212	0	0	0	0	0	106	0	0	94	3417
Euston Rd S	13	459	581	105	257	36	184	166	122	110	306	0	17	49	0	17	67	17	0	25	0	0	0	2519
Pancras Rd W	14	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	535
St Pancras domestic to WTH	15	247	313	0	0	0	0	0	0	0	1351	66	82	0	0	82	0	0	0	0	0	0	66	2207
Thameslink 2000 to WTH	16	109	109	2	2	9	100	108	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	566
Euston Rd N	17	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	535
KX suburban N	18	321	302	83	227	24	81	133	407	0	0	15	0	0	0	0	0	0	15	0	30	0	15	1690
Pancras Rd N	19	107	35	12	50	7	149	72	68	0	0	7	0	0	0	0	0	0	7	0	14	0	7	535
CTRL international to NTH	20	0	0	46	158	40	573	171	290	359	0	0	0	0	0	0	206	41	0	0	0	0	0	1883
CTRL international to WTH	21	124	157	12	40	10	143	43	72	0	676	33	41	0	0	41	0	0	0	0	0	0	33	1425
St Pancras domestic to NTH	22	0	0	115	395	99	1433	428	725	715	0	0	0	0	0	0	412	82	0	0	0	0	0	4404
Thameslink 2000 to NTH	23	0	0	10	10	79	096	966	1155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3133
Euston Rd S bus stops	24	459	581	105	257	36	184	166	122	110	306	0	17	49	0	17	67	17	0	25	0	0	0	2519
	:TOTAL	4954	6581	4457	5578	5756	10082	7596	6417	6971	11994	1268	1040	2316	783	1040	6423	1040	2756	1159	5511	4248	1268	99235

A7. TEST 4: 2020 AM (2007 RAIL DEMAND WITH KING'S CROSS CENTRAL)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
Met/circle Eb	1	0	0	306	841	253	681	518	107	82	1360	618	55	447	100	55	38	55	0	223	0	0	618	946	7303
Met/circle Wb	2	0	0	19	71	212	357	255	197	68	1088	381	133	268	100	133	28	133	0	134	0	0	381	2287	6245
Northern Nb	3	128	600	0	0	284	550	189	140	633	1235	279	82	0	6	82	295	82	268	0	536	58	279	1410	7136
Northern Sb	4	839	731	0	0	202	1307	130	77	252	316	124	20	0	5	20	114	20	45	0	89	41	124	344	4800
Picc. Eb	5	876	322	148	1362	0	0	116	86	117	360	104	126	0	62	126	57	126	513	0	1027	569	104	2167	8357
Picc. Wb	6	2405	1979	585	2047	0	0	69	254	114	28	65	21	0	18	21	57	21	45	0	89	160	65	361	8404
Victoria Nb	7	378	34	347	412	200	392	0	0	633	408	74	62	0	84	62	295	62	290	0	580	749	74	1066	6202
Victoria Sb	8	1639	1664	642	731	372	756	0	0	360	749	175	115	0	128	115	167	115	290	0	580	1150	175	1977	11899
KX DR	10	553	699	205	505	10	740	25	667	0	0	167	0	0	0	0	0	0	607	0	1072	0	167	0	5000
WHSmith/taxis	12	527	562	109	536	55	78	50	472	0	0	83	0	491	0	0	0	0	0	245	0	0	83	0	3291
Euston Rd S	13	162	173	33	164	15	25	17	146	26	221	0	7	67	0	7	4	7	0	33	0	0	0	0	1107
Pancras Rd W	14	30	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	0	369
St Pancras domestic to WTH	15	1159	1031	0	0	0	0	0	0	0	459	48	32	0	0	32	0	0	0	0	0	0	48	0	2809
Thameslink 2000 to WTH	16	171	171	17	17	14	157	46	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	888
Euston Rd N	17	30	37	10	13	4	61	65	68	0	0	6	0	44	0	0	0	0	0	22	0	0	6	0	369
KX suburban N	18	798	1011	339	731	25	1072	35	964	0	0	79	0	0	0	0	0	0	339	0	677	0	79	0	6150
Pancras Rd N	19	33	37	10	13	4	61	65	68	0	0	6	0	0	0	0	0	0	22	0	44	0	6	0	369
CTRL international to NTH	20	0	0	16	151	32	637	26	1089	52	0	0	0	0	0	0	6	16	0	0	0	0	0	0	2024
CTRL international to WTH	21	579	515	4	38	8	159	6	272	0	229	24	16	0	0	16	0	0	0	0	0	0	24	0	1890
St Pancras domestic to NTH	22	0	0	40	379	80	1593	64	2721	104	0	0	0	0	0	0	11	32	0	0	0	0	0	0	5024
Thameslink 2000 to NTH	23	0	0	154	154	123	1418	419	2655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4920
Euston Rd S bus stops	24	162	173	33	164	15	25	17	146	26	221	0	7	67	0	7	4	7	0	33	0	0	0	0	1107
Kings Cross Central	25	637	714	193	251	77	1177	1254	1312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5615
	.TOTAL	11112	10490	3250	8593	1997	11309	3431	11804	2463	6674	2239	676	1428	501	676	1075	676	2499	712	4994	2718	2239	10558	102116

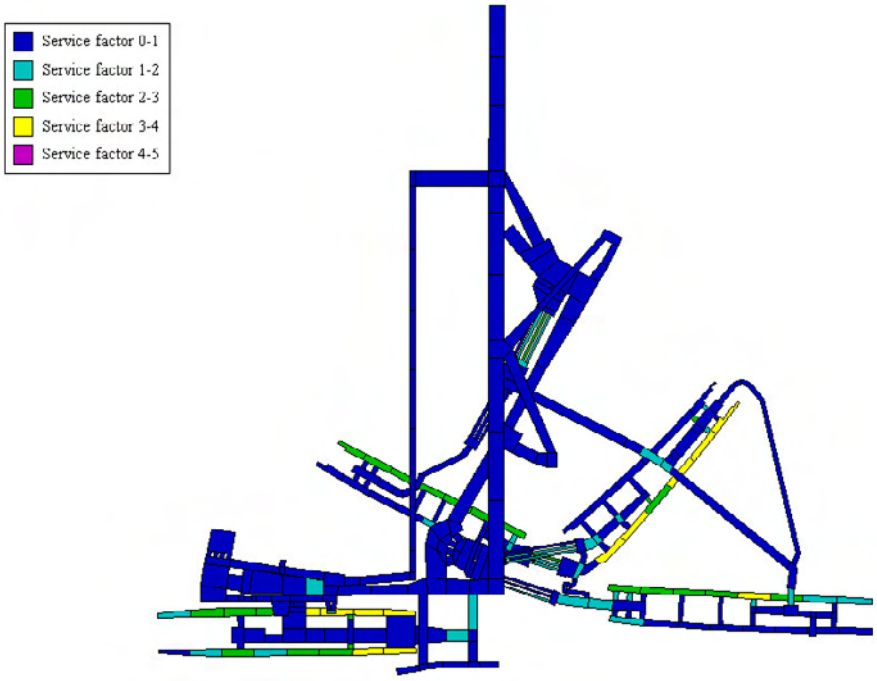
A8. TEST 4: 2020 PM (2007 RAIL DEMAND WITH KING'S CROSS CENTRAL)

	:	1	2	3	4	5	6	7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
Met/circle Eb	1	0	0	643	571	1122	590	1632	58	1045	2156	219	108	1017	156	108	1045	108	0	509	0	0	219	793	12098
Met/circle Wb	2	0	0	623	103	1150	1353	1366	544	697	1703	172	81	961	156	81	697	81	0	480	0	0	172	595	11004
Northern Nb	3	95	875	0	0	1243	2675	590	582	811	2201	222	40	0	2	40	810	40	201	0	403	14	222	294	11360
Northern Sb	4	41	519	0	0	581	473	379	115	614	730	72	51	0	2	51	616	51	32	0	64	19	72	375	4856
Picc. Eb	5	636	940	1650	749	0	0	639	553	1593	427	44	255	0	100	255	1509	255	1130	0	2260	1690	44	1073	16779
Picc. Wb	6	518	483	360	533	0	0	44	360	51	412	37	23	0	22	23	50	23	78	0	155	195	37	169	3552
Victoria Nb	7	213	90	211	534	1229	136	0	0	866	1569	159	171	0	229	171	866	171	1165	0	2331	2054	159	1256	13580
Victoria Sb	8	257	410	191	664	31	374	0	0	0	157	17	154	0	31	154	0	154	0	0	0	276	17	1131	4018
KX BR	10	523	492	136	371	39	131	216	664	0	0	97	0	0	0	0	0	0	128	0	254	0	97	0	3149
WHSmith/taxis	12	631	617	130	549	7	308	343	326	0	0	94	0	212	0	0	0	0	0	106	0	0	94	0	3417
Euston Rd S	13	459	581	105	257	36	184	166	122	110	306	0	17	49	0	17	67	17	0	25	0	0	0	0	2519
Pancras Rd W	14	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	0	535
St Pancras domestic to WTH	15	247	313	0	0	0	0	0	0	0	1351	66	82	0	0	82	0	0	0	0	0	0	66	0	2207
Thameslink 2000 to WTH	16	109	109	2	2	9	100	108	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	566
Euston Rd N	17	107	35	12	50	7	149	72	68	0	0	7	0	14	0	0	0	0	0	7	0	0	7	0	535
KX suburban N	18	321	302	83	227	24	81	133	407	0	0	15	0	0	0	0	0	0	15	0	30	0	15	0	1652
Pancras Rd N	19	107	35	12	50	7	149	72	68	0	0	7	0	0	0	0	0	0	7	0	14	0	7	0	535
CTRL international to NTH	20	0	0	46	158	40	573	171	290	369	0	0	0	0	0	0	206	41	0	0	0	0	0	0	1883
CTRL international to WTH	21	124	157	12	40	10	143	43	72	0	676	33	41	0	0	41	0	0	0	0	0	0	33	0	1425
St Pancras domestic to NTH	22	0	0	115	395	99	1433	428	725	715	0	0	0	0	0	0	412	82	0	0	0	0	0	0	4404
Thameslink 2000 to NTH	23	0	0	10	10	79	896	966	1155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3130
Euston Rd S bus stops	24	459	581	105	257	36	184	166	122	110	306	0	17	49	0	17	67	17	0	25	0	0	0	0	2519
Kings Cross Central	25	2611	854	293	1220	171	3636	1757	1659	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12201
	TOTAL	7565	7435	4750	6798	5927	13718	9353	8076	6971	11994	1268	1040	2316	783	1040	6425	1040	2756	1159	5511	4248	1268	6486	117928

APPENDIX B

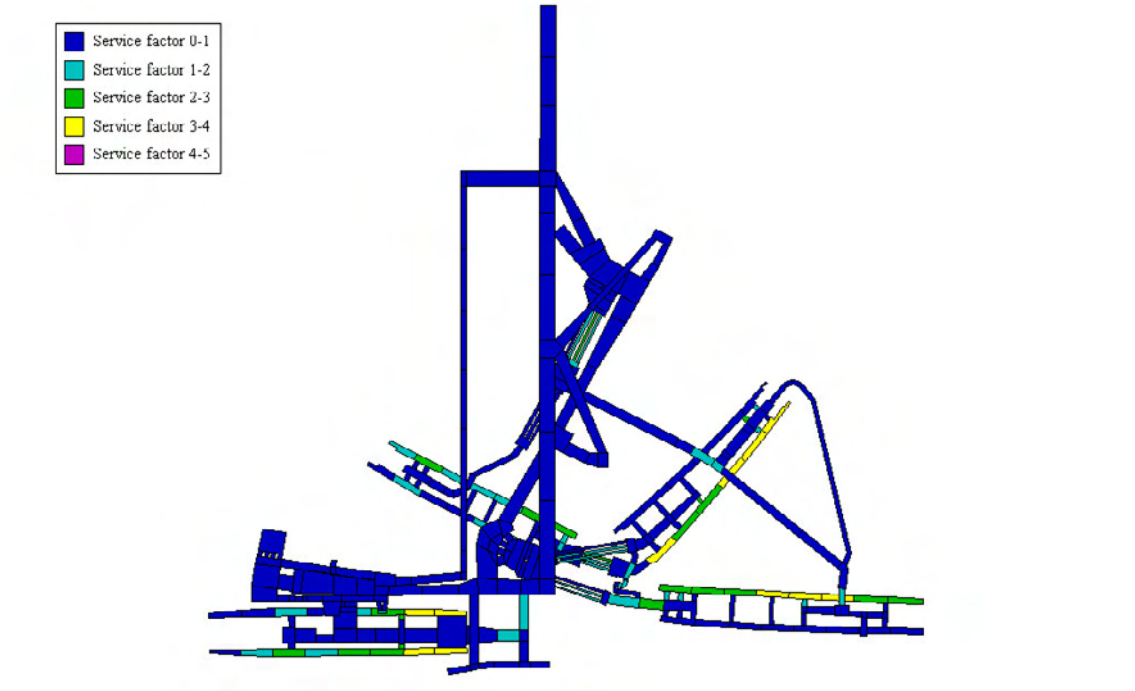
Test 1 Service Factor Plots

Test 1AM: 08.30-08.45

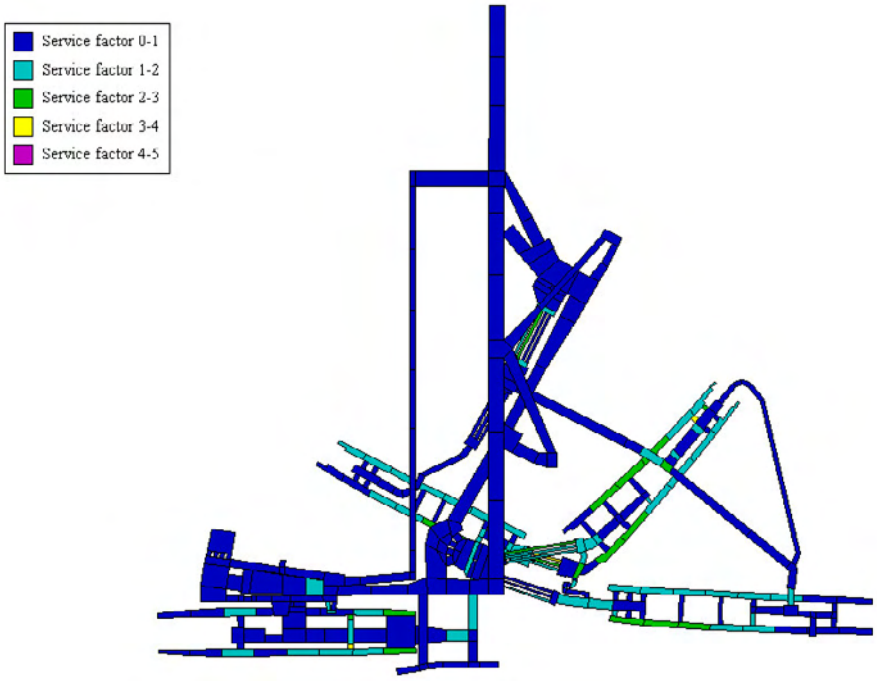


Test 1AM: 08.45-09.00

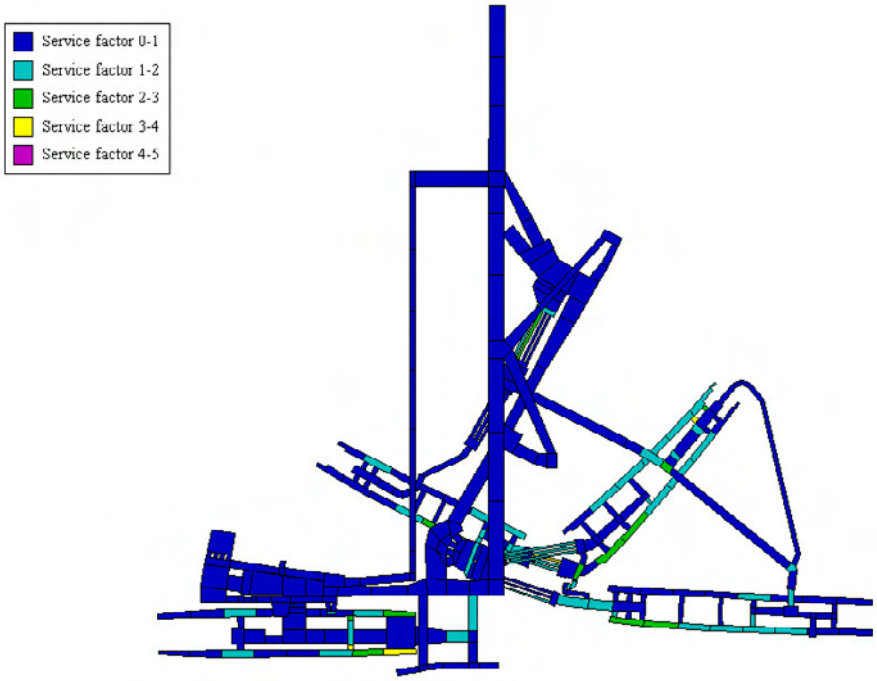
Test 1AM 09.00-09.15



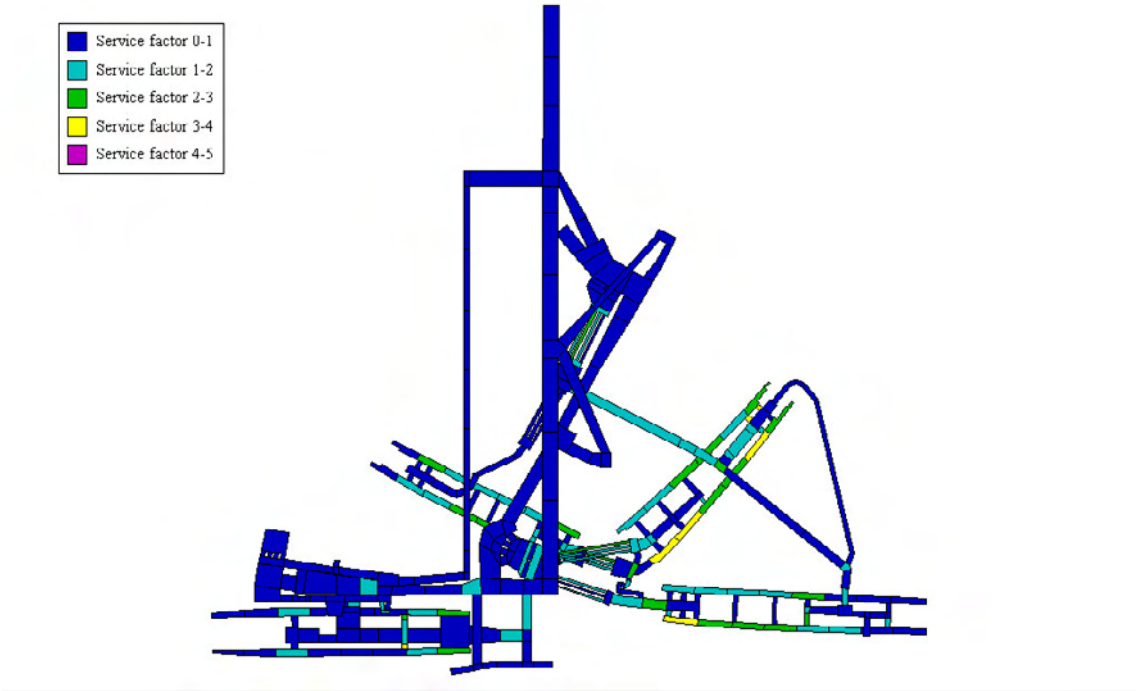
Test 1PM: 17.30-17.45



Test 1PM: 17.45-18.00



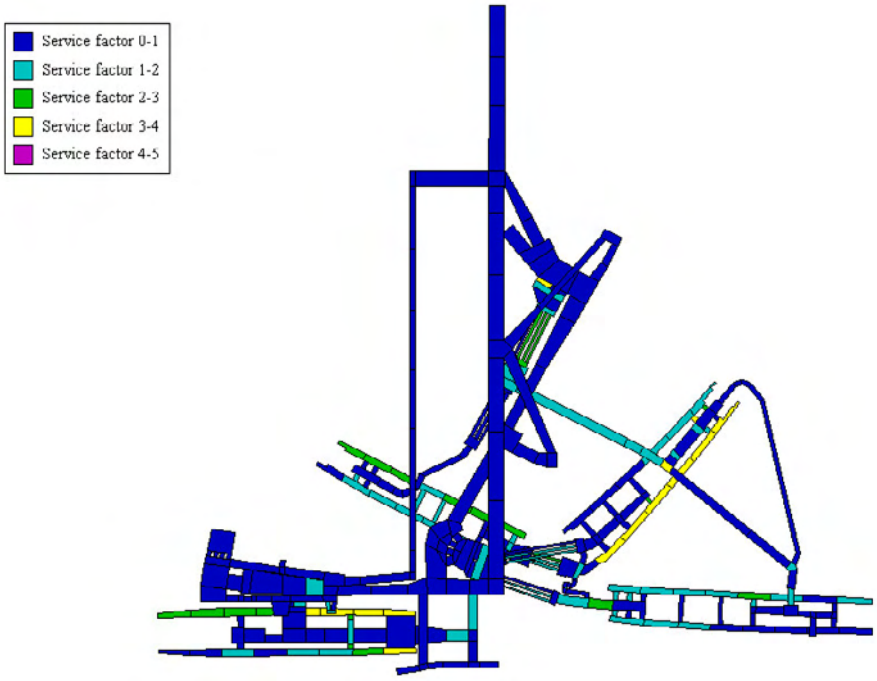
Test 1PM: 18.00-18.15



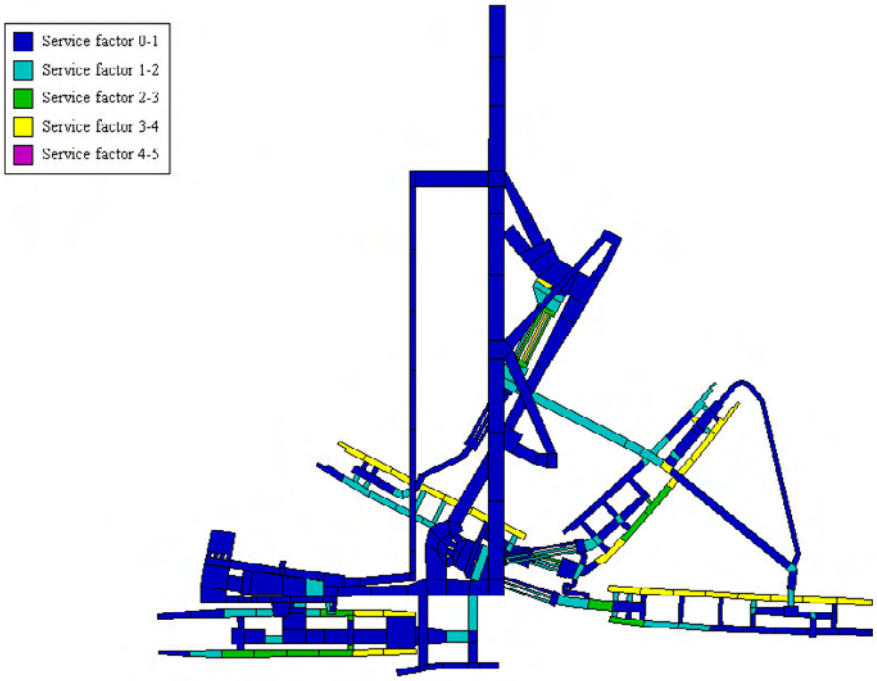
APPENDIX C

Test 2 Service Factor Plots

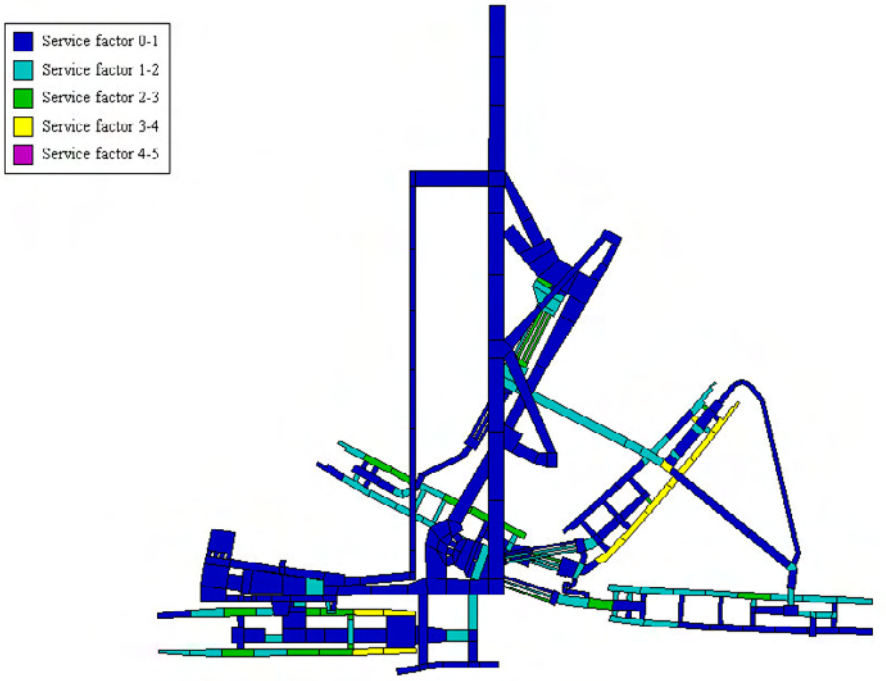
Test 2AM: 08.30-08.45



Test 2AM: 08.45-09.00

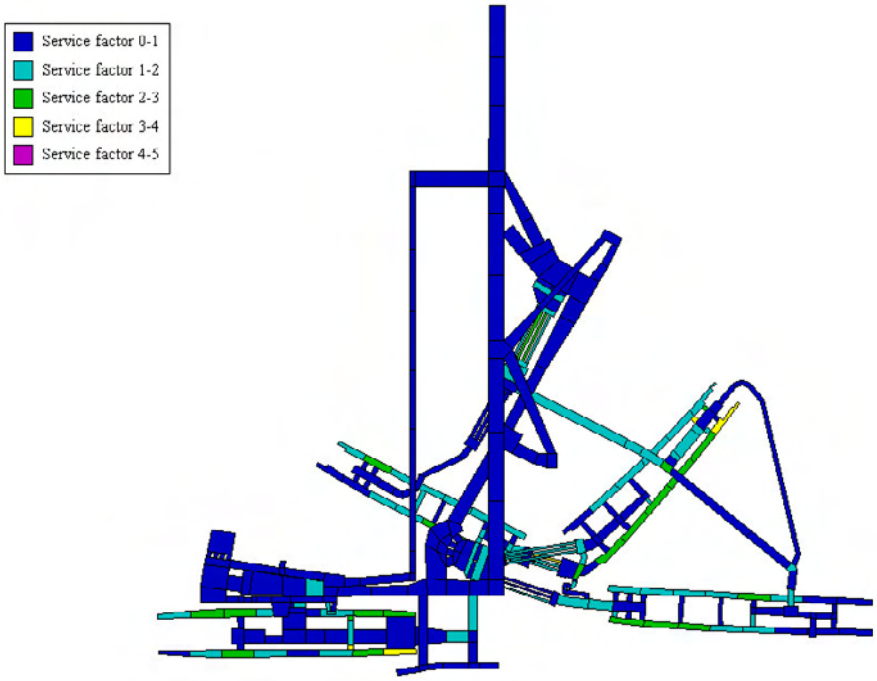


Test 2AM: 09.00-09.15

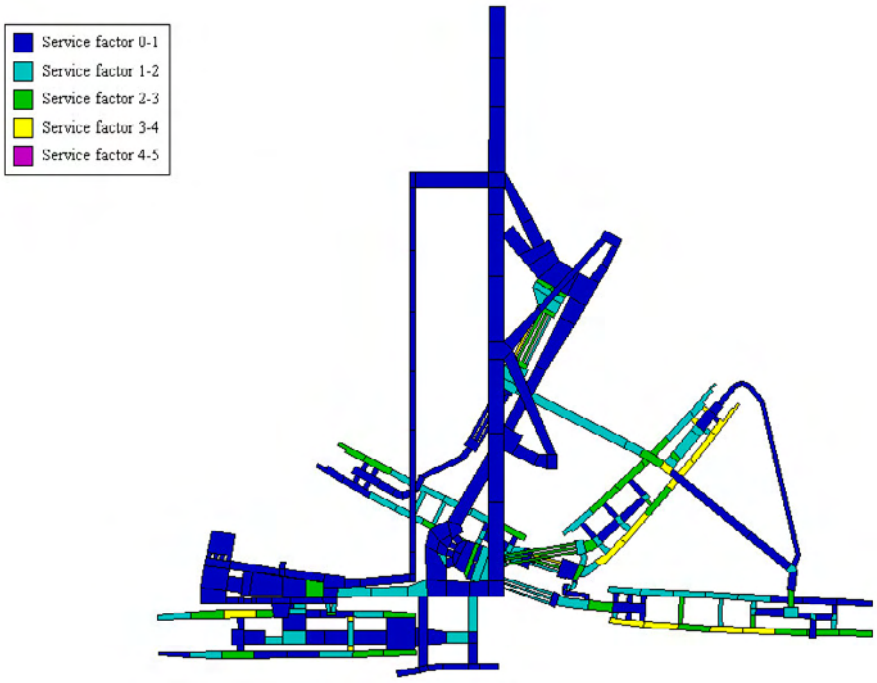


Test 2PM: 17.30-17.45

Test 2PM: 17.45-18.00



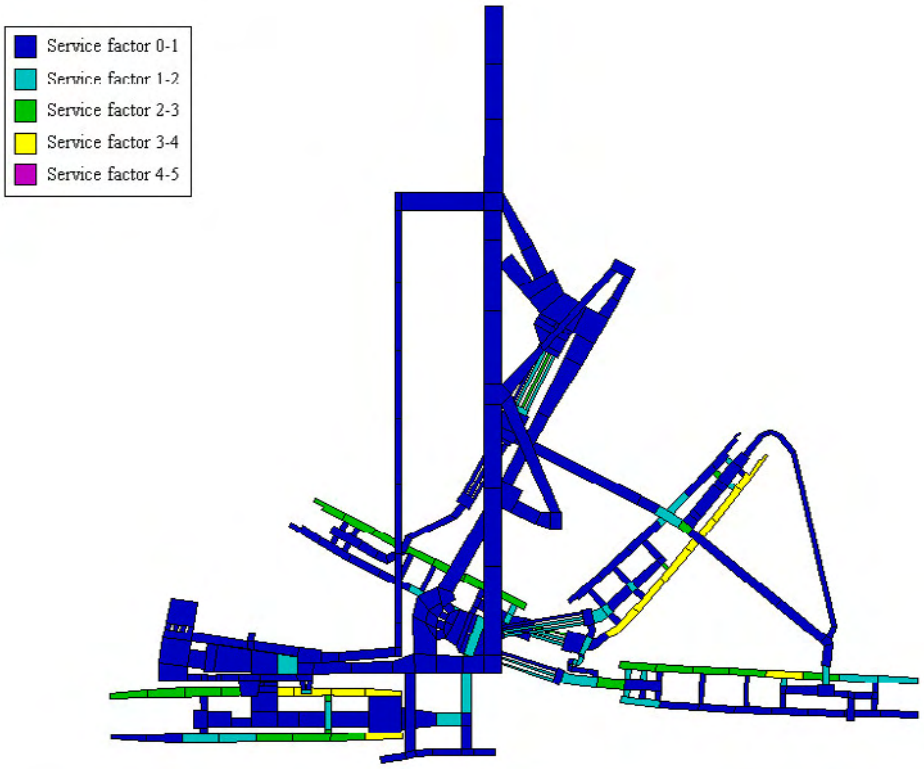
Test 2PM: 18.00-18.15



APPENDIX D

Test 3 Service Factor Plots

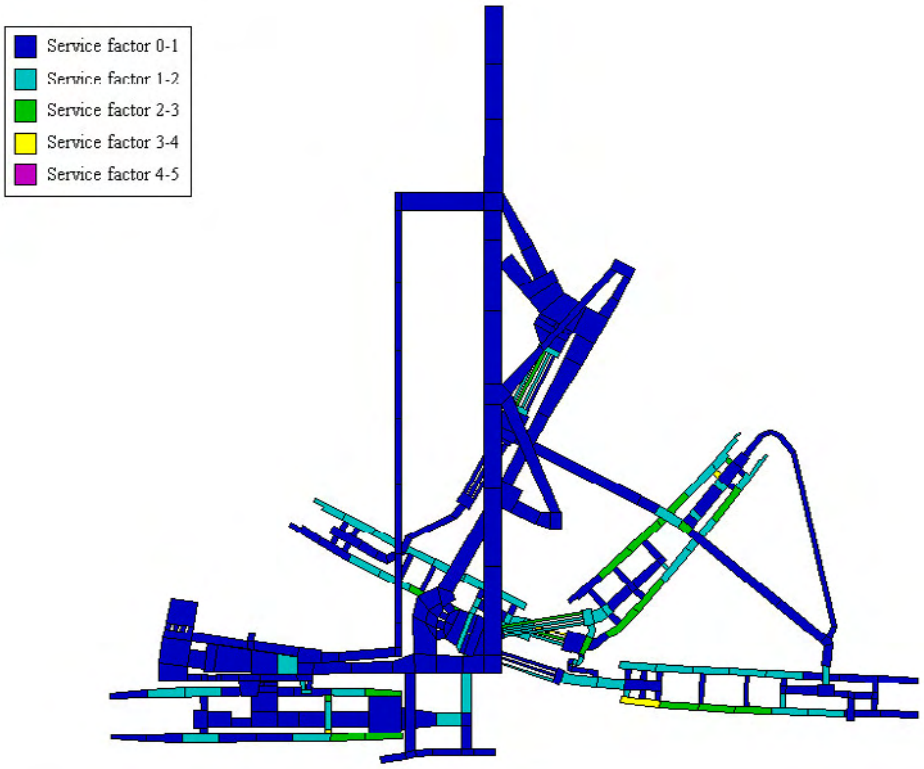
Test 3AM: 08.30-08.45



Test 3AM: 08.45-09.00

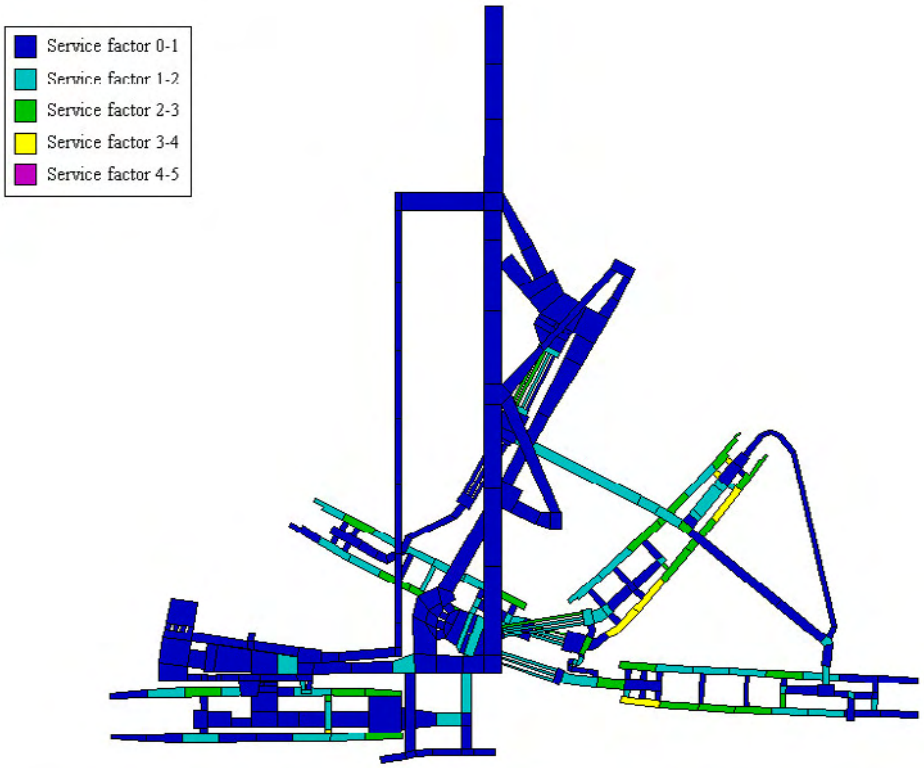
Test 3AM 09.00-09.15

Test 3PM: 17.30-17.45



Test 3PM: 17.45-18.00

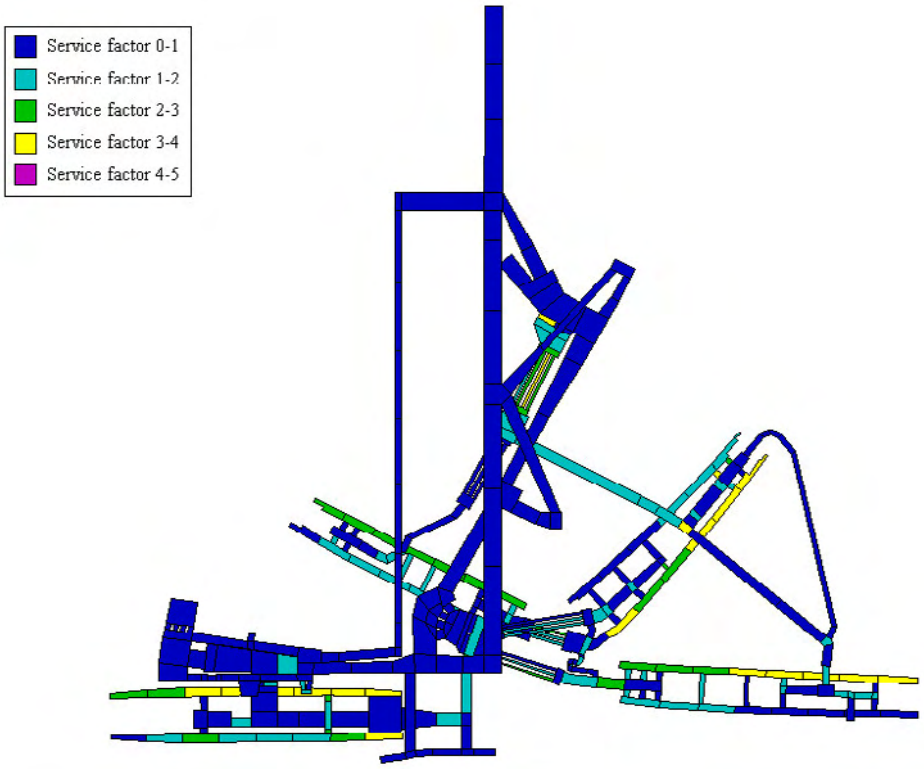
Test 3PM: 18.00-18.15



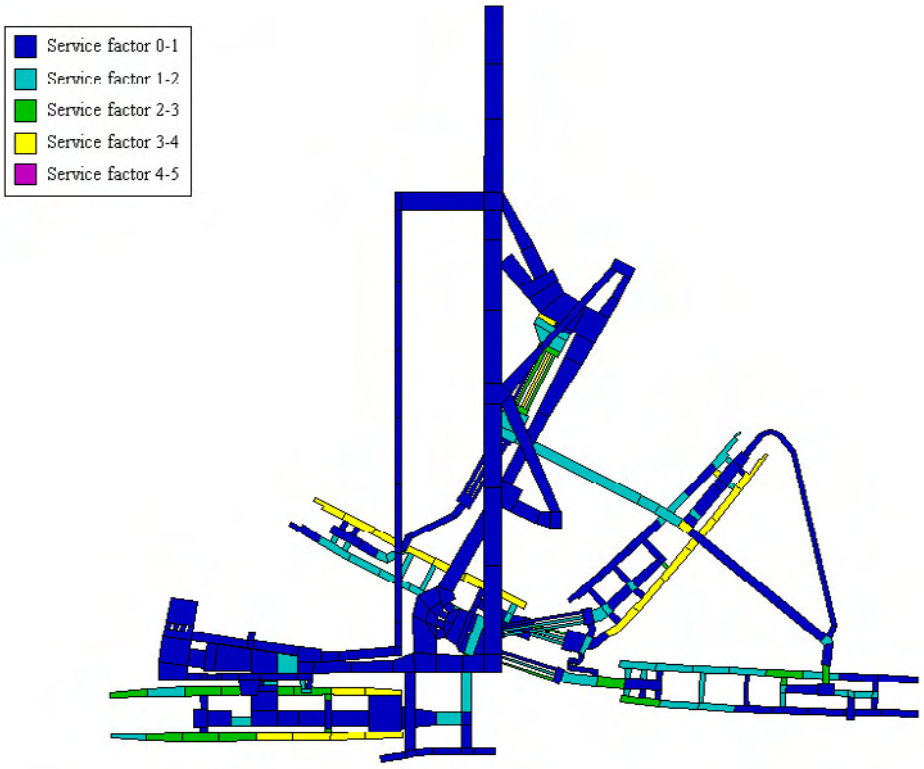
APPENDIX E

Test 4 Service Factor Plots

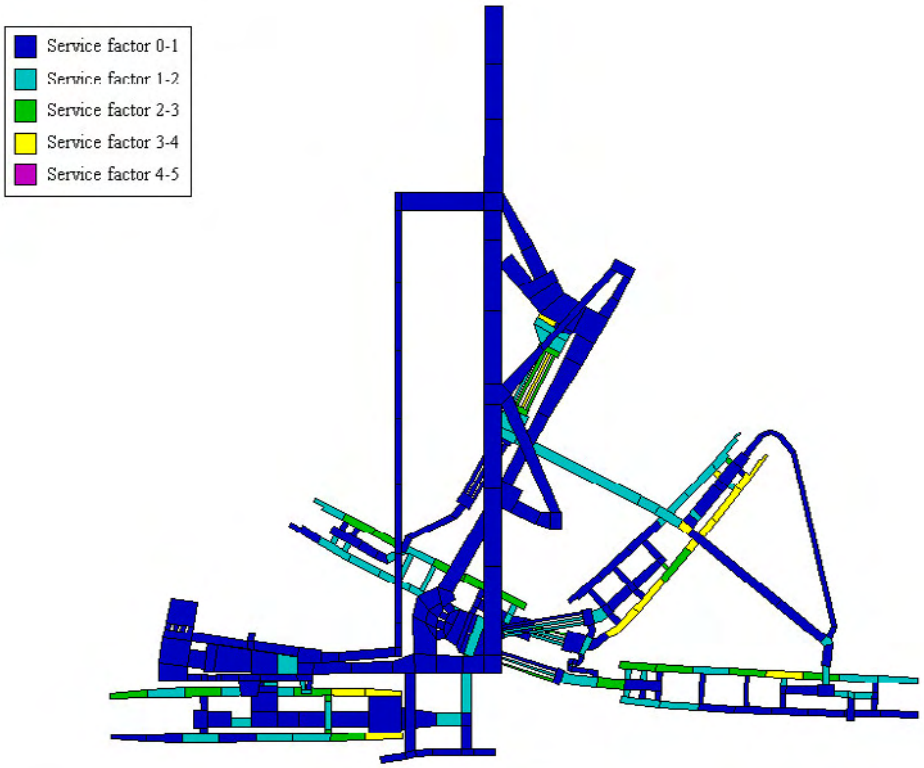
Test 4AM: 08.30-08.45



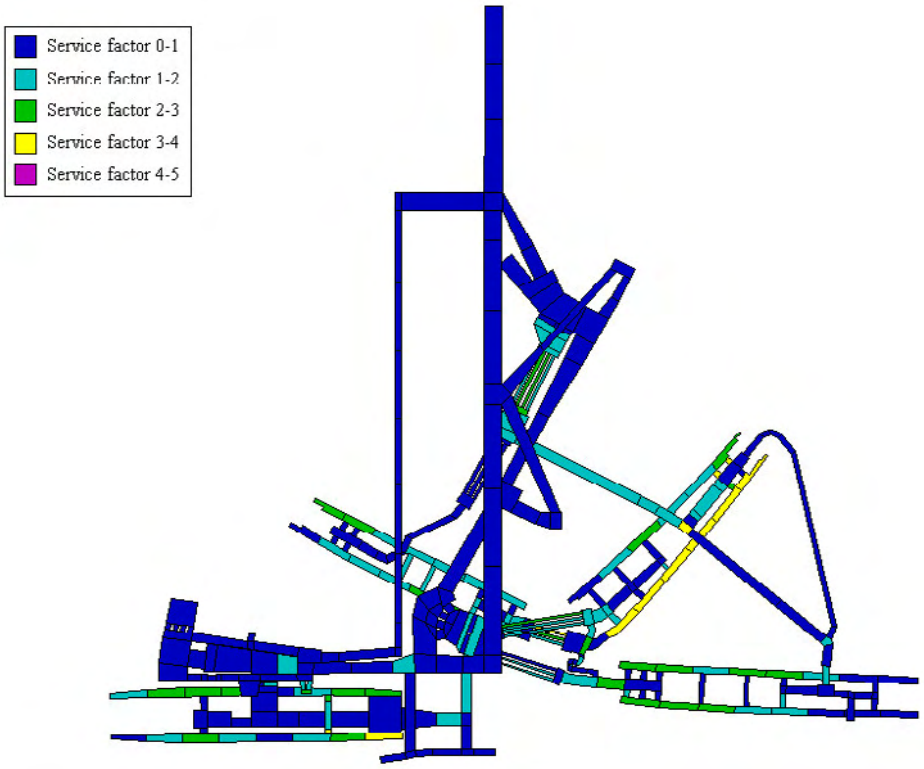
Test 4AM: 08.45-09.00



Test 4AM: 09.00-09.15

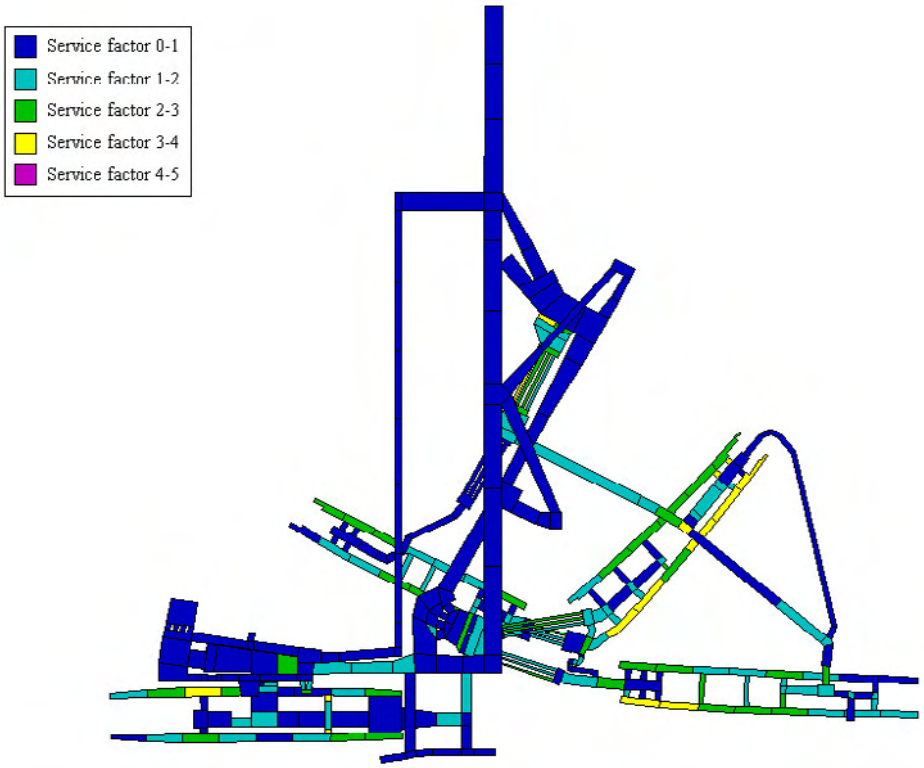


Test 4PM: 17.30-17.45



Test 4PM: 17.45-18.00

Test 4PM: 18.00-18.15



Ext/Direct 020 7843 0641
Our ref LULSSL-S704-LET-01055
Your ref
Date 5th December 2003

London Underground Limited
CTRL - King's Cross Re-development Project
3rd Floor, Derbyshire House
St. Chad's Street
London
WC1H 8AD

Chris Smith
Argent St George
5 Albany Courtyard,
Piccadilly,
London W1J 0HF

Dear Chris,

CTRL - KINGS CROSS STATION REDEVELOPMENT PROJECT
KING'S CROSS CENTRAL DEVELOPMENT- IMPACT ON LUL.

We acknowledge receipt of the report analysing pedestrian flows to and from the proposed development of King's Cross Central and the London Underground station.

Thank you for allowing London Underground to discuss the analysis with your team. In the light of this, we can confirm that the scheme you are developing, whilst having an impact on elements of the station such that for periods service factors go above LUL planning standards, this can be managed with appropriate mitigation. This coupled with delivery of the line upgrades as part of the contractual obligations on the Infracos under the PPP Contracts means the London Underground station should be able to cope with the forecast numbers associated with the development.

Yours sincerely,

Mike Crabtree
Project Sponsor