DESIGN PACKAGE C134
TOTTENHAM COURT ROAD STATION

Pedestrians, Vehicles, Highways and the Urban Realm

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Executive Summary

This report sets out the street level pedestrian and vehicle implications of the new Crossrail Tottenham Court Road West (TCRw) entrance. It also covers the highway restoration round the Goslett Yard worksite.

Acceptability under Schedule 7

The current station design, being submitted for Approval under Schedule 7, differs from the Hybrid Bill scheme in 2 key ways:

- The moving of the entrance from Oxford Street to Dean Street, and
- The relocation of Fareham Street north by some 8 metres.

The impacts of the Hybrid Bill scheme on the free flow of traffic were assessed as acceptable under the Environmental Statement. The relocation of Fareham Street has no impact on the flow of traffic and it will still fulfil its traffic role providing a west to east route. The relocation of the station entrance will have no impact upon traffic.

In order to assess the full pedestrian impact of TCRw, the 2016 without Crossrail situation has been modelled in order to understand background pedestrian movement. This highlighted that the vast majority of pedestrians in the surrounding streets were using Oxford Street.

The realignment of Fareham Street will provide a more direct pedestrian route for Crossrail Passengers heading to the west from the Dean Street ticket hall and hence help mitigate any increase in the congestion currently experienced on Oxford Street.

The background pedestrian flows have been combined with the predicted number of pedestrians entering and exiting TCRw (taken from RailPlan) and used to show the predicted pedestrian flows and level of service surrounding TCRw with the entrance located on both Dean Street and on Oxford Street.

These models demonstrated that if the station entrance were to be located on Oxford Street, pedestrian flows on this street would to increase. This is undesirable and care needs to be taken to ensure that the congestion already experienced on Oxford Street is not exacerbated unnecessarily by the presence of TCRw. However, if the entrance were to be positioned on Dean Street, the model revealed that the increase in pedestrians on Oxford Street was less with a preference for using Hollen Street, Great Chapel Street and Dean Street.

Observations and pedestrian surveys suggest that pedestrian activity is higher in the afternoon and evening than the morning, and thus this has been chosen to demonstrate the impacts of the two entrance scenarios in terms of afternoon Level of Service (LoS) with a pedestrian demand of base +20%.

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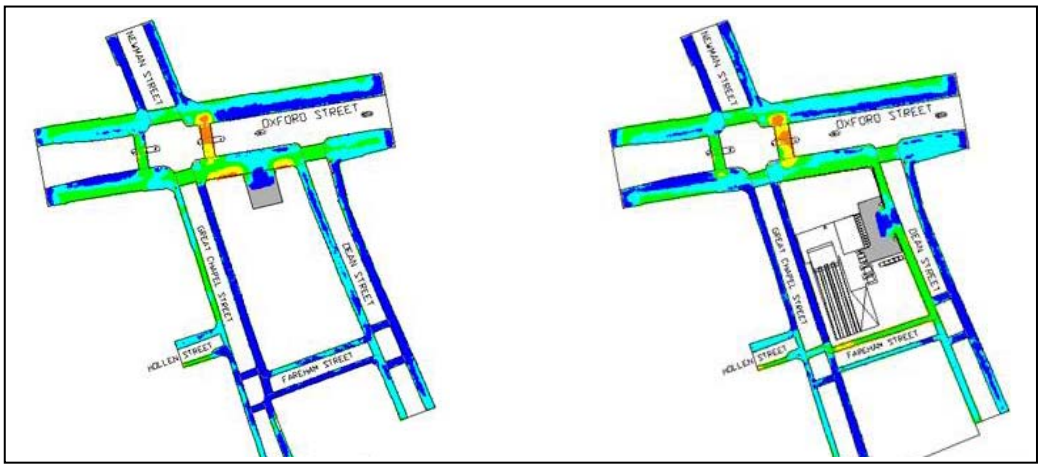

Hybrid Bill Scheme **Schedule 7 Scheme**

The modelling shows that the overall pedestrian LoS on the footway on Oxford Street adjacent to the Western ticket hall is better in the current scheme as compared to the consented scheme. There is clearly a relocation of Crossrail passengers away from Oxford Street. Thus the current scheme is broadly similar, even slightly better, in pedestrian level of service terms than the consented scheme.

There is a small section of the northern footway of Fareham Street which shows a level of service of D, using the existing footway widths. Given that Fareham Street is being relocated and reconstructed the footways will be increased in width and thus the level of service will improve to C.

Pedestrian on pedestrian collisions are not a major safety concern and there is no evidence of a link between the level of service and the pedestrian safety, however, use of the carriageway by pedestrians to avoid congestion would give rise to safety concerns. The level of service reduction from A/B to C will have little or no impact on walking speed and thus there will be no temptation for pedestrians to use the carriageway.

In conclusion the current scheme, even if implemented while retaining the existing street layout, will be an acceptable change the Oxford Street Entrance scenario. Thus there are no grounds for rejecting the schedule 7 application in terms of safety or free flow of traffic.

Aspirations for Pedestrian and the Urban Realm

From a street and pedestrian perspective, the schedule 7 scheme assumes a 'Do-Minimum' solution, albeit an acceptable one. In terms of the Urban Realm this is therefore seen as a starting point, and Crossrail is working in partnership with Westminster City Council, as well as other local stakeholders, to develop exemplary street design and urban realm around Tottenham Court Road station entrances.

The additional urban realm improvements, in addition to the realignment of Fareham Street, are principally

- pedestrianising Dean Street,
- widened footways around the station north of Carlisle Street,
- a change to footway loading and parking pads, and
- a new crossing over Oxford Street.

The realignment of Fareham Street, closer to Hollen Street, would create a more readable route for pedestrians coming from the west. By pedestrianising Dean Street outside the Station, between Fareham Street and Oxford Street, an oasis (as aspired to by ORB) can be provided. In addition, removing vehicles from this short section will also enable a crossing over Oxford

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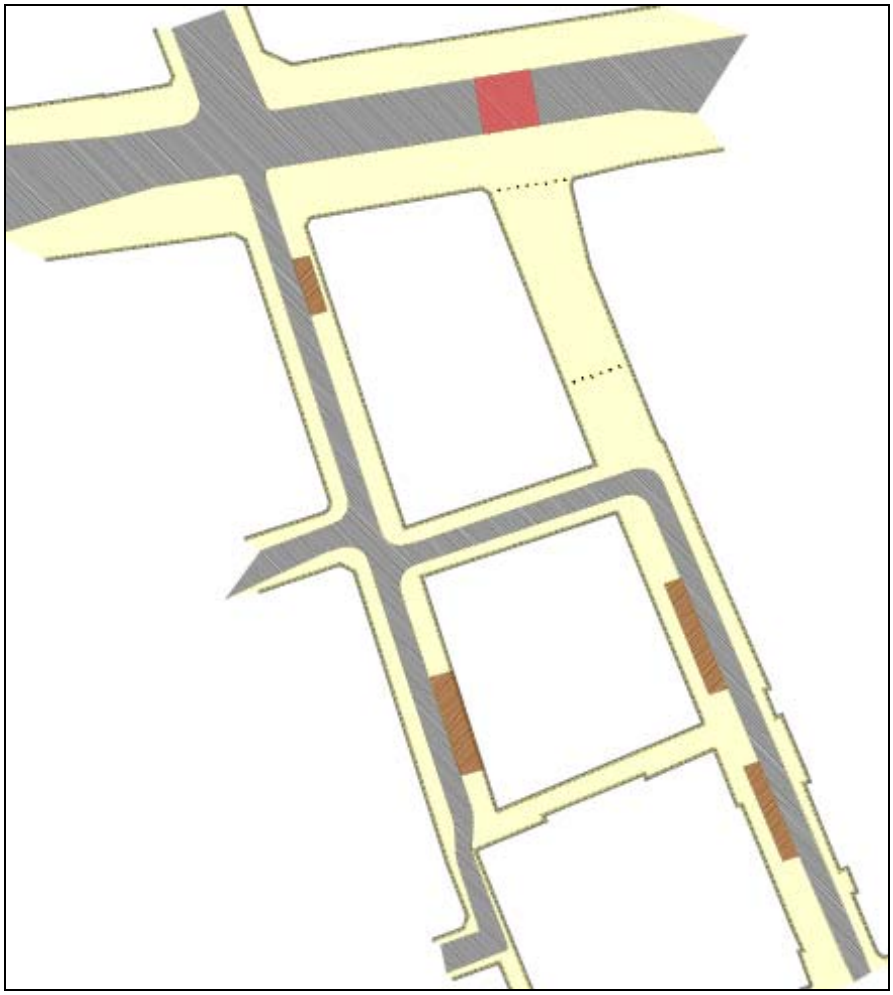
Street as close as possible to the station entrance relieving the other pedestrian crossing points close by. Currently, the footways on Dean Street south of Fareham Street and Great Chapel Street are relatively narrow and therefore need to be widened in order to service the increased level of pedestrian footfall in the area that will be associated with Crossrail. This in line with the new Transport for London (TfL) Comfort Guidance.

At Goslett Yard the street is a cul-de-sac and thus used, by and large, only by pedestrians but also deliveries and the Urban Real reflect this. The Aspirations for the Urban Realm are presented below.



Aspirational Public Realm Scheme

For moving vehicles the main changes are the closure of Dean Street, north of Fareham Street and the narrower carriageway, to allow wider footways. Vehicle flows were surveyed and the Oxford Street and Dean Street junction and at the junction of Dean Street and Fareham Street, the two closest junctions to TCRw, in February 2009. Based on these findings, it is estimated that the removal of Dean Street, north of Fareham Street would transfer less than 80 vehicles an hour to the flow of Fareham Street if all the trips that used it relocated to Fareham Street.

While TCR forms an important interchange with other rail lines both east and west ticket halls provide interchange with other modes, Buses, Taxis and Cycles.

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There are existing bus stops either side of TCRw, and they are not affected by the highway changes. Interchange with the eastbound stops will be helped by the new pedestrian crossing in the Aspirational Highway Layout

Due to the narrow footways and carriageways surrounding TCRw, it is not considered appropriate to provide additional taxi ranks immediately adjacent to the station; the only location where kerbside space can be reallocated in favour of Taxis is on the east side of Newman Street facing north. However, there are a high number of taxis using the surrounding roads, so it is anticipated that taxis will be easily accessible in an informal way.

Due to low levels of traffic on the surrounding streets, there will be no cycle path provision surround TCRw. Cycle Parking stands will be provided south of Fareham Street and numbers will be increased in the adjacent streets and squares. In addition a cycle docking station will be located on Soho Square, with the opportunity to investigate additional sites in due course.

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1 Introduction

As part of the Crossrail redevelopment of Tottenham Court Road station, a second entrance to the station has been proposed in order to provide for Crossrail users coming to and from Soho. This entrance (Tottenham Court Road west, hereafter referred to as TCRw) is located in the area bound by Oxford Street, Great Chapel Street, Diadem Court and Dean Street, with Fareham Street running between the two blocks.

The new entrance will provide direct access to the Crossrail Line One and Central Line platforms with onward connection to the Northern Line. Passive provision is being provided for connections to Crossrail Line Two.

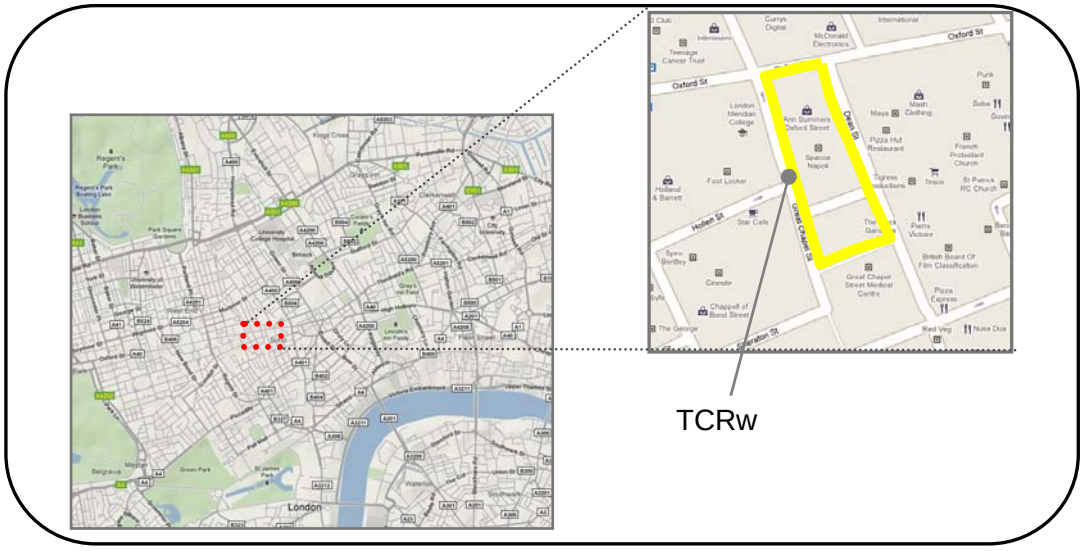

Figure 1.1 – Location Plan

This report sets out the street level pedestrian and vehicle implications of the station including changes to the location of the station entrance. It also covers the highway implications around in Goslett Yard, around the Crossrail vent and access building, hereafter referred to as GYB.

Thus the report is structured as follows:

- Section 2: Approvals and the Schedule 7;
- Section 3: Existing Pedestrian Flows on Street;
- Section 4: Predicted Pedestrian Flows from Station;
- Section 5: Impact of the Current Scheme Compared to the Consented Scheme;
- Section 6: Pedestrian Benefits;
- Section 7: Urban Realm and Opportunities;
- Section 8 Vehicles, Cycles, Access, Servicing and other Public Transport;
- Section 9: Conclusions;
- Section 10: Consents and
- Section 11: Ongoing Design Development.

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2 Approvals and the Schedule 7

2.1 Definition of the Schedule 7 Scheme

The current scheme for TCRw, being submitted for Approval under Schedule 7, differs from the Hybrid Bill scheme in a number of ways, albeit the current scheme is entirely within the limits of deviation. The key changes, as they affect the operation of the streets are:

- The moving of the entrance from Oxford Street to Dean Street, and
- The relocation of Fareham Street north by some 8 metres.

The drivers for the entrance change were numerous and include the retention of a retail frontage on Oxford Street and controlling the level of pedestrian activity on Oxford Street.

The impacts of the Hybrid Bill scheme on the free flow of traffic were assessed as acceptable under the Environmental Statement. The Hybrid Bill scheme contained no changes to the surrounding kerb lines.

Apart from the relocation of Fareham Street, neither does the current scheme.

The GYB scheme does not require Schedule 7 consent.

2.2 Assessment of the Schedule 7 Scheme

The relocation of Fareham Street has no impact on the flow of traffic; it will still fulfil its traffic role providing a west to east route in Soho giving access to Soho Square. The geometry of the streets are such that the length of trips will not change and the turns made by vehicles will be the same.

The pedestrian impact of the change has been assessed by use of micro-simulation modelling. A Legion model was built and has been used both to assess the change and to inform ongoing design of the streets.

The modelling process for this assessment is shown in Figure 2.1

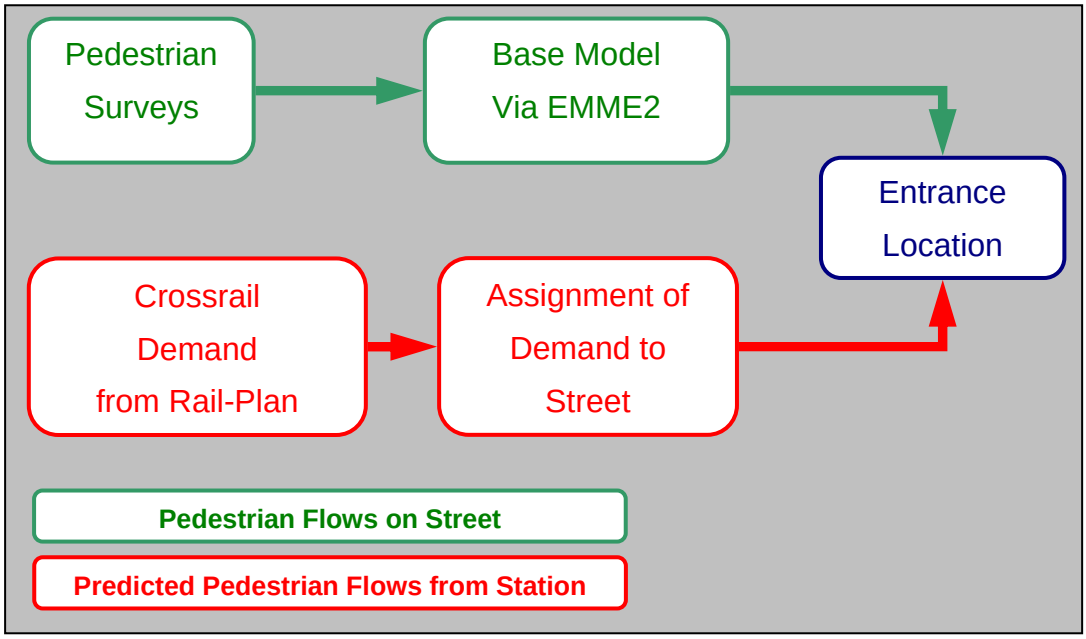

Figure 2.1 – Modelling Process for Schedule 7 Pedestrian Assessment

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3 Existing Pedestrian Flows on Street

In order to assess the full impact on pedestrians on the surrounding streets, the "existing situation" has been modelled by Atkins Intelligent Space (see Appendix A for the full report). This provides a representation of the 2016 without Crossrail scenario, and gives a picture of the background pedestrian movements (i.e. those not linked to Crossrail).

3.1 Survey Data

In order to carry out pedestrian modelling, raw data was obtained through surveys undertaken on street in January 2010. Nine pedestrian origin/destination (OD) points were identified and 12-minute flow counts were taken every half an hour at these locations. Surveys were undertaken on a weekday during the AM peak (08:00-10:00) and PM peak (17:00-19:00), and on a weekend during the afternoon (14:30-17:30). Figure 3.1 below shows the count locations, and Table 3.1 shows the count results. These figures were then uplifted by 3% to represent 2016 pre-Crossrail figures (see Table 3.1).

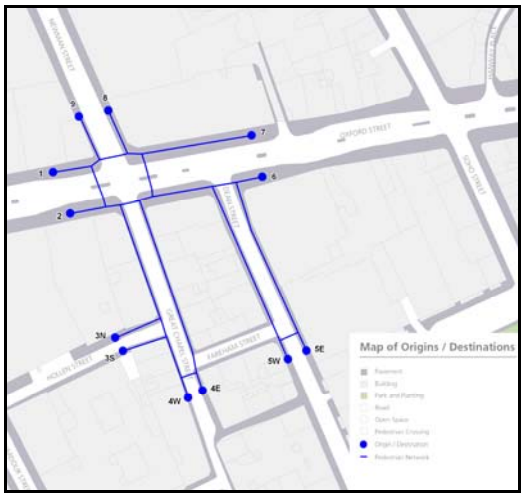

Figure 3.1 – Pedestrian Origin/Destination Locations

Location		Weekday AM				Weekday PM				Saturday			
No.	Name	Flow IN		Flow OUT		Flow IN		Flow OUT		Flow IN		Flow OUT	
1	Oxford St West North	525	16.0%	425	13.8%	1787	21.4%	1745	19.1%	2177	21.7%	2372	22.9%
2	Oxford St West South	440	13.4%	580	18.9%	1437	17.2%	1435	15.7%	1852	18.4%	1757	16.9%
3	Hollen St	167	5.1%	97	3.2%	150	1.8%	427	4.7%	147	1.5%	230	2.2%
4	Great Chapel St	60	1.8%	237	7.7%	212	2.5%	357	3.9%	142	1.4%	205	2.0%
5	Dean St	282	8.6%	465	15.1%	611	7.3%	661	7.2%	595	5.9%	437	4.2%
6	Oxford St East South	847	25.8%	297	9.7%	1690	20.2%	2225	24.4%	2007	20.0%	2532	24.4%
7	Oxford St East North	837	25.5%	510	16.6%	1747	20.9%	1944	21.3%	2970	29.5%	2715	26.2%
8	Newman St East	87	2.7%	240	7.8%	535	6.4%	215	2.4%	112	1.1%	82	0.8%
9	Newman St West	37	1.1%	225	7.3%	185	2.2%	110	1.2%	50	0.5%	50	0.5%
	TOTAL	**3282**	**1**	**3076**	**1**	**8354**	**1**	**9119**	**1**	**10052**	**1**	**10380**	**1**

Table 3.1 – Existing (2010) Pedestrian Flows around TCRw

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Location		Weekday AM				Weekday PM				Saturday			
No.	Name	Flow IN		Flow OUT		Flow IN		Flow OUT		Flow IN		Flow OUT	
1	Oxford St West North	541	16.5%	438	14.2%	1841	22.0%	1797	19.7%	2242	22.3%	2443	23.5%
2	Oxford St West South	453	13.8%	597	19.4%	1480	17.7%	1478	16.2%	1908	19.0%	1810	17.4%
3	Hollen St	172	5.2%	100	3.2%	155	1.8%	440	4.8%	151	1.5%	237	2.3%
4	Great Chapel St	62	1.9%	244	7.9%	218	2.6%	368	4.0%	146	1.5%	211	2.0%
5	Dean St	290	8.9%	479	15.6%	629	7.5%	681	7.5%	613	6.1%	450	4.3%
6	Oxford St East South	872	26.6%	306	9.9%	1741	20.8%	2292	25.1%	2067	20.6%	2608	25.1%
7	Oxford St East North	862	26.3%	525	17.1%	1799	21.5%	2002	22.0%	3059	30.4%	2796	26.9%
8	Newman St East	90	2.7%	247	8.0%	551	6.6%	221	2.4%	115	1.1%	84	0.8%
9	Newman St West	38	1.2%	232	7.5%	191	2.3%	113	1.2%	52	0.5%	52	0.5%
	TOTAL	**3380**	**1.03**	**3168.28**	**1.03**	**8605**	**1.03**	**9393**	**1.03**	**10354**	**1.03**	**10691**	**1.03**

Table 3.2 – Without-Crossrail 2016 Pedestrian Flows around TCRw

Table 3.2 shows the first and second highest flow during each peak highlighted in red and orange respectively, and the lowest flow highlighted in green. This illustrates that Oxford Street has the highest pedestrian flows consistently in every peak and direction. By contrast, Hollen Street and Newham Street show low pedestrian levels. This information is further supported by Table 3.3, which shows the total number of pedestrians by area. This reveals the high percentage of pedestrians entering the modelled area along Oxford Street in comparison to the surrounding area.

Location		Total Pedestrians	
No.	**Name**	**Number**	**Percentage**
1	Oxford Street West North	9031	20.4%
2	Oxford Street West South	7501	16.9%
3	Hollen Street	1218	2.8%
4	Great Chapel Street	1213	2.7%
5	Dean Street	3051	6.9%
6	Oxford Street East South	9598	21.7%
7	Oxford Street East North	10723	24.2%
8	Newman Street East	1271	2.9%
9	Newman Street West	657	1.5%
	TOTAL	**44263**	**100.0%**

Table 3.3 – Pedestrian Flows Entering Modelled Area (2010)

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3.2 Pedestrian Origin and Destinations

The observed data was used to create an initial Origin and Destination matrix based on shortest distance. The matrix was further processed using crossing flows EMME2 to create a final Origin and Destination Matrix for Without-Crossrail pedestrian flows on street for use in the modelling.

From --> To	Oxford W Nth	Oxford W Sth	Hollen Nth	Hollen Sth	Gt Chapel W	Gt Chapel E	Dean W	Dean E	Oxford E Sth	Oxford E Nth	Newman E	Newman W	Total
Oxford W Nth	0	43	1	1	1	1	3	3	8	423	51	60	595
Oxford W Sth	16	0	18	18	36	36	87	87	207	4	6	6	521
Hollen Nth	0	18	0	0	39	39	1	1	4	0	0	0	103
Hollen Sth	0	18	0	0	39	39	1	1	4	0	0	0	103
Gt Chapel W	0	10	10	10	0	0	1	1	2	0	0	0	34
Gt Chapel E	0	10	10	10	0	0	1	1	2	0	0	0	34
Dean W	1	69	1	1	2	2	0	0	65	13	1	1	159
Dean E	1	69	1	1	2	2	0	0	65	13	1	1	159
Oxford E Sth	7	430	8	8	16	16	181	181	0	90	9	8	954
Oxford E Nth	454	3	0	0	0	0	13	13	33	0	235	189	940
Newman E	15	4	0	0	0	0	0	0	1	63	0	6	90
Newman W	7	2	0	0	0	0	0	0	0	21	2	0	33
Total	502	677	50	50	136	136	289	289	392	628	306	271	3725

Table 3.4 – Without-Crossrail Pedestrian O&D Weekday AM

From --> To	Oxford W Nth	Oxford W Sth	Hollen Nth	Hollen Sth	Gt Chapel W	Gt Chapel E	Dean W	Dean E	Oxford E Sth	Oxford E Nth	Newman E	Newman W	Total
Oxford W Nth	0	16	0	0	0	0	14	14	162	1887	170	10	2275
Oxford W Sth	16	0	7	7	6	6	149	149	1519	10	12	1	1880
Hollen Nth	0	5	0	0	37	37	4	4	45	0	0	0	134
Hollen Sth	0	5	0	0	37	37	4	4	45	0	0	0	134
Gt Chapel W	1	6	52	52	0	0	5	5	52	0	0	0	173
Gt Chapel E	1	6	52	52	0	0	5	5	52	0	0	0	173
Dean W	17	154	7	7	6	6	0	0	184	13	1	1	395
Dean E	17	154	7	7	6	6	0	0	184	13	1	1	395
Oxford E Sth	157	1333	58	58	48	48	154	154	0	122	10	6	2149
Oxford E Nth	1619	25	1	1	1	1	27	27	320	0	107	55	2183
Newman E	302	22	0	0	0	0	5	5	58	225	0	10	627
Newman W	30	2	0	0	0	0	6	6	58	174	16	0	291
Total	2160	1727	184	184	141	141	373	373	2678	2445	317	84	10809

Table 3.5 – Without-Crossrail Pedestrian O&D Weekday PM

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From --> To	Oxford W Nth	Oxford W Sth	Hollen Nth	Hollen Sth	Gt Chapel W	Gt Chapel E	Dean W	Dean E	Oxford E Sth	Oxford E Nth	Newman E	Newman W	Total
Oxford W Nth	0	8	0	0	0	0	1	1	59	2745	0	0	2815
Oxford W Sth	18	0	10	10	8	8	41	41	1992	57	57	1	2244
Hollen Nth	0	4	0	0	30	30	1	1	31	1	0	0	98
Hollen Sth	0	4	0	0	30	30	1	1	31	1	0	0	98
Gt Chapel W	0	3	26	26	0	0	0	0	23	1	0	0	80
Gt Chapel E	0	3	26	26	0	0	0	0	23	1	0	0	80
Dean W	4	75	2	2	2	2	0	0	316	2	0	0	406
Dean E	4	75	2	2	2	2	0	0	316	2	0	0	406
Oxford E Sth	126	1818	60	60	50	50	159	159	0	61	0	0	2543
Oxford E Nth	2916	185	5	5	4	4	3	3	203	0	163	141	3633
Newman E	0	31	0	0	0	0	0	0	0	174	0	0	205
Newman W	0	1	0	0	0	0	0	0	0	178	0	0	179
Total	3070	2208	131	131	127	127	207	207	2993	3222	221	143	12787

Table 3.6 – Without-Crossrail Pedestrian O&D Saturday

The realignment of Fareham Street provides a more direct pedestrian route for Crossrail passengers travelling between the western ticket hall and the west than Oxford Street, and hence reduces the overall percentage of pedestrians taking the Oxford Street route. This would help mitigate any increase in the congestion currently experienced on Oxford Street.

It is vital that any Crossrail development in the Oxford Street area does not unnecessarily add to the number of pedestrians using Oxford Street. As has already been discussed, Oxford Street already experiences congestion, and locating an entrance to the western ticket hall directly on Oxford Street would exacerbate this.

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4 Predicted Pedestrian Flows from Station

4.1 Introduction

In order to model the streets satisfactorily it is necessary to combine the Without-Crossrail flows and the predicted number of pedestrians using TCRw.

Two models have been developed, one showing predicted pedestrian movements on street with the entrance on Oxford Street, and one showing movements on street with the entrance on Dean Street.

The numbers used in the model have been based on figures taken from Rail Plan for the number of people predicted to be entering and exiting Crossrail at TCRw in 2016. The numbers taken from Rail Plan are presented in Table 4.1.

TCRw 2016	AM Peak	PM Peak
Entrance	700	5,500
Exit	9,250	5.750
Total	9,950	11,250

Table 4.1 – Rail Plan Predicted 2016 Figures for People Entering and Exiting TCRw

Sensitivity Tests have been carried out with a 20 percent uplift over the base case in order to assess future demand from 12 car trains, as presented in Table 4.2, and these have not been included in the on street predictions.

TCRw 2016	AM Peak	PM Peak
Entrance	945	7,425
Exit	12,488	7.763
Total	13,433	15,188

Table 4.2 – Rail Plan Predicted 2016 + 20% Figures for People Entering and Exiting TCRw

Crossrail Line 2 has not been assessed as part of this study. It is assumed that timescales for this project and the timescales for any street changes will fit more appropriately with the longer term planning documents such as the Local Development Framework and LIP2.

4.2 Methodology

An area of influence was identified, in which it could reasonably be considered that people would use TCRw as apposed to other stations or the TCR eastern entrance. This area of influence was the split into an inner and outer zone, with the assumption that 85% of TCRw users would be from the inner zone and 15% would be from the outer zone. These areas are outlined in Figure 4.1.

To the north and south of the area of influence there will be an attraction to use adjacent underground stations but there will still be the opportunity to walk on street to Crossrail. This assumption is inherent in RailPlan.

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The area of influence was then subdivided to assign zones within it to 12 key decision locations. These points were identified as key locations that people would pass in order to reach TCRw. These locations were purposely set beyond model entry points set in Section 2 in order to allocate each location to a zone within the area of influence and then to feed the pedestrian routes to the station via the model entry points. The decision locations identified are as follows:

- Hanway Street/Hanway Place junction;
- Soho Square North/Frith Street junction;
- Soho Square South/Soho Street junction;
- Dean Street/Richmond Mews junction;
- Broadwick Street/Wardour Street junction;
- D'Arblay Street/Wardour Street junction;
- Noel Street/Wardour Street junction;
- Wells Street/Oxford Street junction;
- Oxford Street/ Berwick Street junction;
- Berners Street/Oxford Street junction;
- Newman Street/Oxford Street junction; and
- Rathbone Place/Oxford Street junction.

These can be seen in Figure 4.1.

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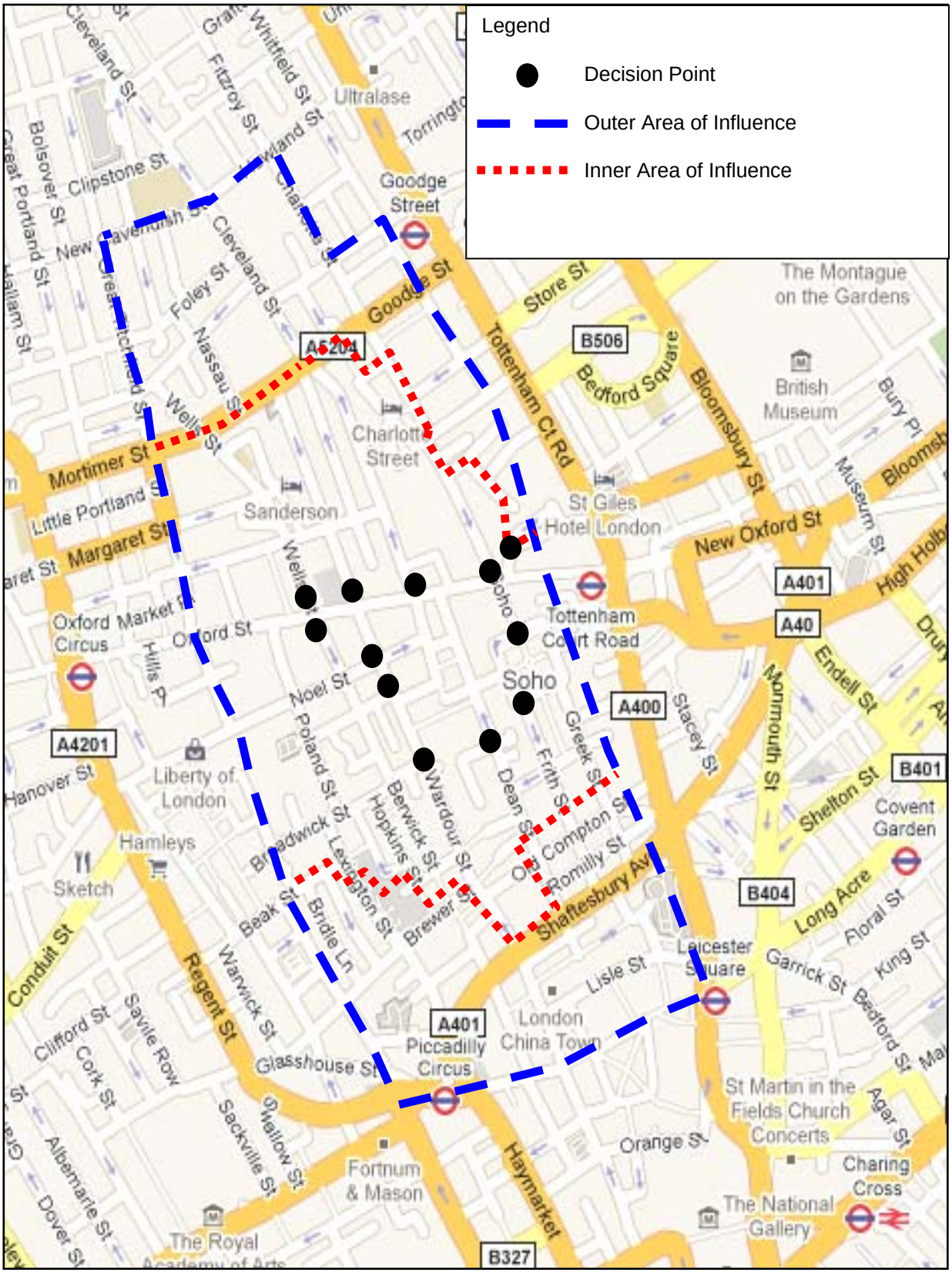

Figure 4.1 – Location Plan showing Area of Influence and Decision Points

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By dividing up the area of influence based on the decision location, it is possible to calculate the percentage of people passing each decision point, based on the area size of the zone that each decision point belonged to. These percentages could then be applied to the Rail Plan figures, and hence numbers passing each decision point calculated. A summary can be seen in Table 4.3, with full details available in Appendix B of this document.

Decision Point (DP)	Area of Influence (m²)	No. of people passing DP during AM peak		No. of people passing DP during PM peak	
		Towards Dean St Station	Away from Dean St Station	Towards Dean St Station	Away from Dean St Station
Oxford St	20,200	53	700	416	435
Wells St	38,400	103	1,336	812	849
Berners St	20,800	76	1,000	594	621
Newman St	28,300	86	1,291	768	803
Rathbone Pl	21,300	67	888	528	522
Hanway St	7,000	19	250	149	155
Soho Square N	30,800	81	1,067	634	663
Soho Square S	38,638	117	1,545	918	960
Dean St	26,400	91	1,201	714	746
Broadwick St	24,900	110	1,458	867	906
D'Arblay St	15,200	40	526	313	327
Noel St	34,562	91	1,197	712	744
Total	**306,500**	**945**	**12,488**	**7,425**	**7,763**

Table 4.3 – Predicted Number of People Passing each Decision Point

The next step then calculated the number of people passing each of the original 9 modelling entry points as highlighted in Section 2. This was calculated by plotting likely routes from each decision point to the TCRw entrance. The same routes were assumed in the reverse direction.

Once the routes were plotted, the optimal route between each decision point and TCRw was calculated, based on the amount of time taken to walk each route. This was based on:

- Route length;
- Walking speeds; and
- Delay.

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Walk time has been taken as 1.33 metres/second, except on Oxford Street where a lower speed of 1 m/s has been assumed, based on experience of pedestrian behaviour and the frontage types. Where a route utilises traffic signals, a 40 second delay has been assumed. Where a route crosses the proposed Pelican crossing that would be built as part of the Dean Street alignment, a delay of 20 seconds has been assumed. This has not been considered in the Oxford Street alignment as it. If the route crosses a side road without a crossing, this has been calculated as a 5 second delay. The routes do not take into consideration people crossing informally or jay-walking as the design philosophy is to design footways such that there will be no temptation to jay-walk; albeit it is likely that a proportion of pedestrians will anyway.

The number of people at each decision point was then applied from Table 4.4. This is based on pedestrians taking the shortest route, based on total walk time, from the decision point to the station. By calculating which of the nine decision points each route passed, an entrance flow and exit flow for the model at each of the points could be ascertained. This information is shown in Tables 4.4 and 4.5. Full details can be found in Appendix C.

Outer Decision Point	Shortest Route Name*	Total Walk Time (s)	Total Wait Time (s)	Total Travel Time	Number of People - AM Peak		Number of People - PM Peak		Inner Decision Point
					Entrance	Exit	Entrance	Exit	
Hanway St	Oxford St B	169	45	214	14	185	110	115	6
Rathbone Place	Oxford St B	123	25	148	50	658	391	409	7
Newman St	Oxford St A	63	25	88	72	957	569	595	8
Berners St	Oxford St C	147	40	187	56	740	440	460	1
Wells St	Wardour St A	232	45	277	77	1012	602	629	3
Oxford St	Berwick St	214	10	224	39	518	308	322	3
Noel St	Hollen St	105	5	110	67	887	527	551	3
D'Arblay St	Hollen St	141	5	146	30	390	232	242	3
Broadwick St	Sheraton St	209	5	214	82	1080	642	671	4
Dean St	Dean St	147	10	157	67	889	529	553	5
Soho South	Dean St	165	10	175	87	1144	680	711	5
Soho North	Soho St	158	5	163	60	790	470	491	6

Table 4.4 - TCRw Dean Street Alignment

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Outer Decision Point	Route Name*	Total Walk Time (s)	Total Wait Time (s)	Total Travel Time	Number of People - AM Peak		Number of People - PM Peak		Inner Decision Point
					Entrance	Exit	Entrance	Exit	
Hanway St	Oxford St B	140	45	185	14	185	110	115	6
Rathbone Place	Oxford St A	117	45	162	50	658	391	409	6
Newman St	Oxford St B	23	40	63	72	957	569	595	8
Berners St	Oxford St A; Oxford St C	119	40	159	28;28	370; 370	220;220	230;230	1
Wells St	Oxford St C	177	80	257	77	1012	602	629	2
Oxford St	Oxford St A	180	80	260	39	518	308	322	2
Noel St	Hollen St	114	5	119	67	887	527	551	3
D'Arblay St	Hollen St	149	5	154	30	390	232	242	4
Broadwick St	Sheraton St	217	10	227	82	1080	642	671	3
Dean St	Dean St	178	10	188	67	889	529	553	5
Soho South	Dean St	197	10	207	87	1144	680	711	6
Soho North	Soho St	158	5	163	60	790	470	491	5

Table 4.5 – TCRw Oxford Street Alignment

4.3 Results

Using these figures, it is therefore possible to calculate the total number of people passing each of the nine decision points. Table 4.6 shows the final numbers on which the Legion model is based, both for the Dean Street and Oxford Street entrance options.

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Decision Point		CRL Oxford St Option				CRL Dean St Option			
		Weekday AM		Weekday PM		Weekday AM		Weekday PM	
		Entrance	Exit	Entrance	Exit	Entrance	Exit	Entrance	Exit
1	Oxford St West North	56	740	440	460	56	740	440	460
2	Oxford St West South	116	1530	910	951	0	0	0	0
3	Hollen St	149	1967	1169	1222	212	2807	1669	1745
4	Great Chapel St	30	390	232	242	82	1080	642	671
5	Dean St	127	1679	999	1044	154	2033	1209	1264
6	Oxford St East South	150	1987	1182	1235	74	975	580	606
7	Oxford St East North	0	0	0	0	50	658	391	409
8	Newman St East	72	957	569	595	72	957	569	595
9	Newman St West	0	0	0	0	0	0	0	0
TOTAL		700	9250	5500	5750	700	9250	5500	5750

Table 4.6 – Final Legion Modelling Numbers

As previously discussed, the modelling undertaken by Atkins Intelligent Space for 2016 pre-Crossrail, indicated a high percentage of pedestrian footfall on Oxford Street. These percentages can be compared with the predictions for pedestrian movements in the area, both with the Oxford Street and Dean Street TCRw alignment.

The pedestrian flows predicted if the entrance were to be located on Oxford Street still shows large numbers of people using Oxford Street, and in some cases a higher percentage. This is particularly prominent when looking at the Oxford Street West to South movement, which is currently one of the major routes for people coming from the west. This location shows an increase from the current number of 13.4% to 16.5% in the AM peak entrance, and from 15.7% to 16.5% in the PM exit. This suggests that the number of people using Oxford Street as a commuter route would increase if the TCRw entrance were to be located here. As already stated, there is a high pedestrian footfall and congestion already on Oxford Street, and this situation must be eased rather than exacerbated.

In contrast, if the entrance were to be positioned on Dean Street, the numbers show a drop in pedestrians using Oxford Street, and a marked increase in those using Hollen Street, Great Chapel Street and Dean Street. However, if the necessary urban realm improvements that accompany the realignment of Fareham Street were not undertaken, pedestrians may begin to consider this route unfavourable, and therefore migrate back to Oxford Street.

In the Three Stations Study (Document Number CR-DD-BOS-CN-SR-00001) a percentage split of pedestrian movements away from the station was quoted as shown in Figure 4.2.

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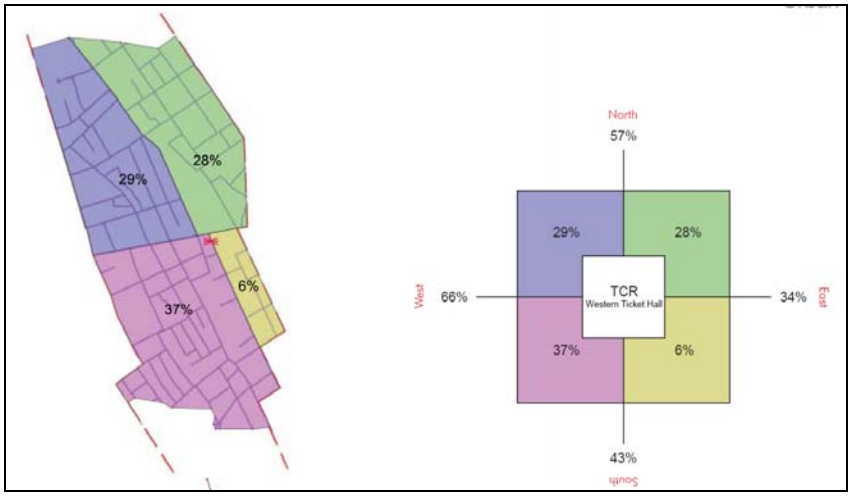

Figure 4.2 – Pedestrian Catchment Zones (Three Entrance Study)

Updated splits are shown in Figure 4.3 for both the entrance scenarios; Dean Street and Oxford Street. The main differences between the two scenarios are the transfer of pedestrian movements clockwise in the Oxford Street scenario, compared to Dean Street and the increase in the pedestrian movements on the southern footway east of the station because of the shorter routes to Soho Square and because the crossing over Oxford Street is only being provided in the Dean Street scenario.

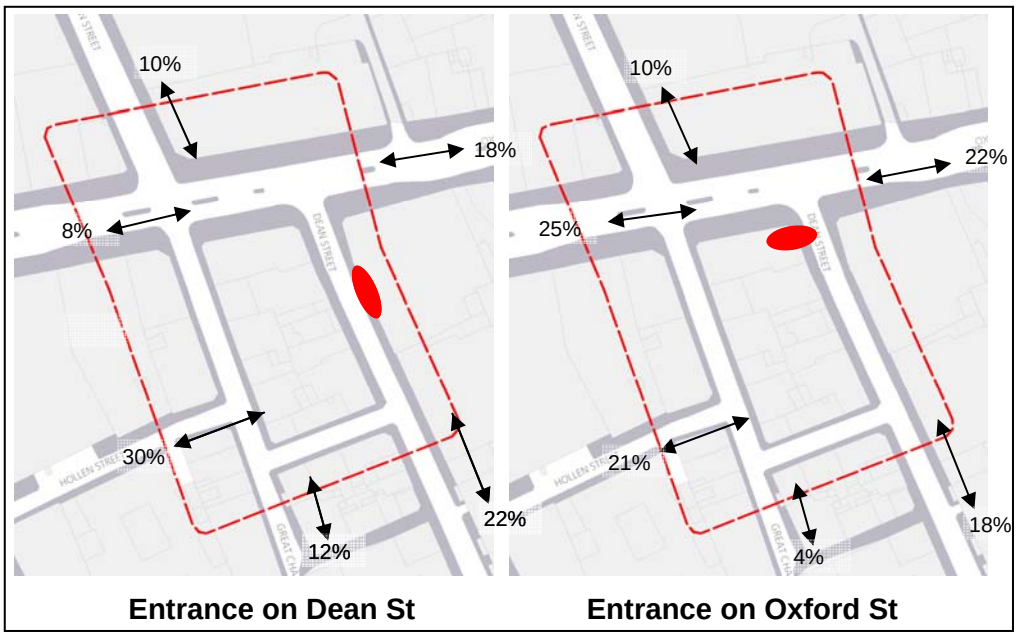

Figure 4.3 – Pedestrian Catchment Zones (Current Design)

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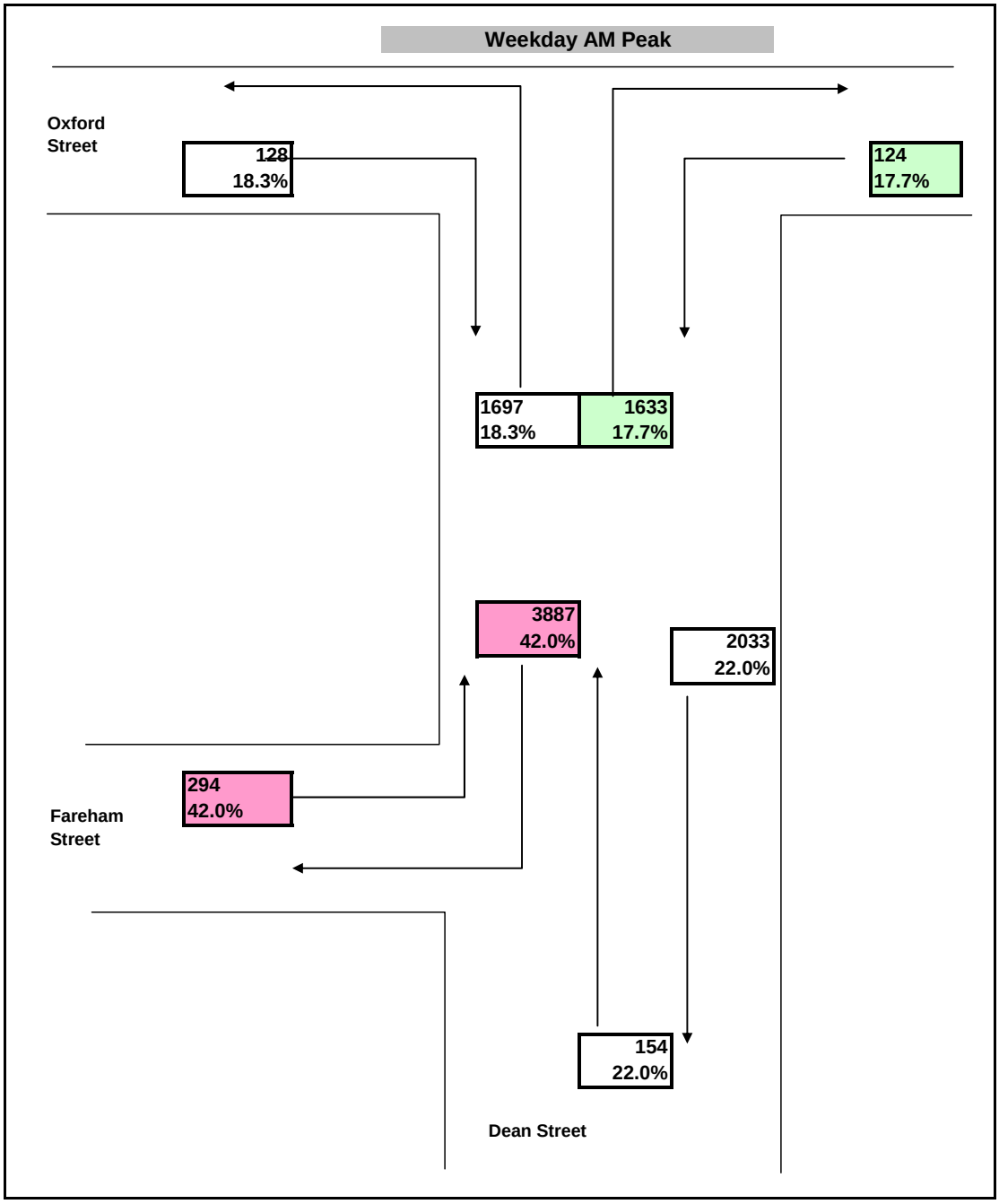

Figure 4.4 – Predicted Pedestrian Movements In and Out of Dean Street during the AM Peak

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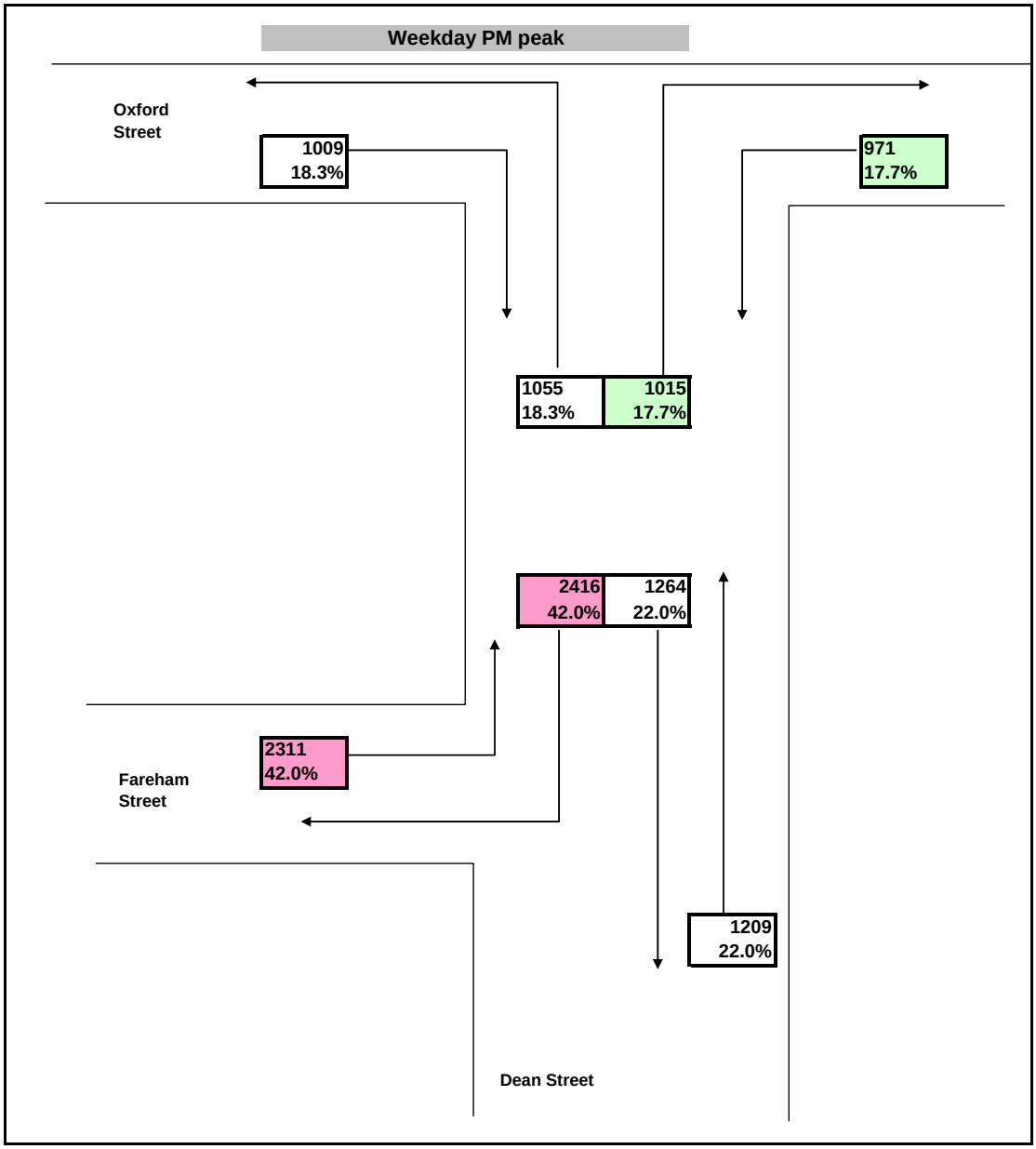

Figure 4.5 – Predicted Pedestrian Movements In and Out of Dean Street during the PM Peak

These figures reveal that the highest numbers of pedestrians in both peaks are coming to and from Fareham Street, whilst the lowest numbers are coming from Oxford Street East. The number of pedestrians coming from Oxford Street West is similarly low. This illustrates that the urban realm improvements in and around Dean Street are vital in order to accommodate this increase in pedestrian movement. (% age differences between Figure 4.3 and 4.4/4.5 due to rounding and being based on areas the percentage splits do not vary between the peaks)

Passenger demand data for three hour period for the AM and PM peak periods were supplied by CRL in CPFR v 4.1. The 15 minute entry flows for the station was calculated using the RODS data supplied by CRL as shown in Table 5.1 and 5.2 for the AM and PM peak periods respectively. The peaking factors from LU's 1-137 were used to derive the peak 15 minute exit flows from the station. The growth rates and methodology for the study were agreed in advance with CRL.

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5 Impacts of the Current Scheme compared to the Consented Scheme

5.1 Free Flow of Traffic

From observation and from the pedestrian surveys, it is clear that pedestrian activity is higher in the afternoon and the evening than in the morning, thus this has been chosen to demonstrate the impacts of the two entrance scenarios. Figure 5.1 shows the Levels of Service (LoS) for base +20%. Figure 5.2 shows the same information for the current, schedule 7, scheme.

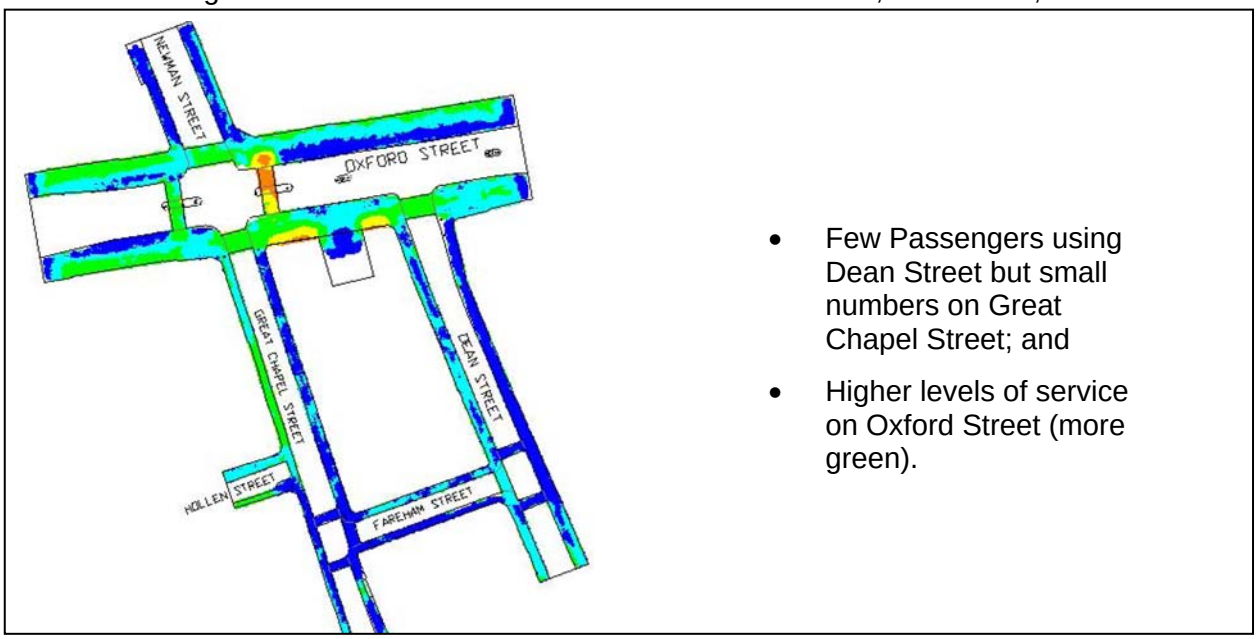

Figure 5.1 – Consented Scheme LoS

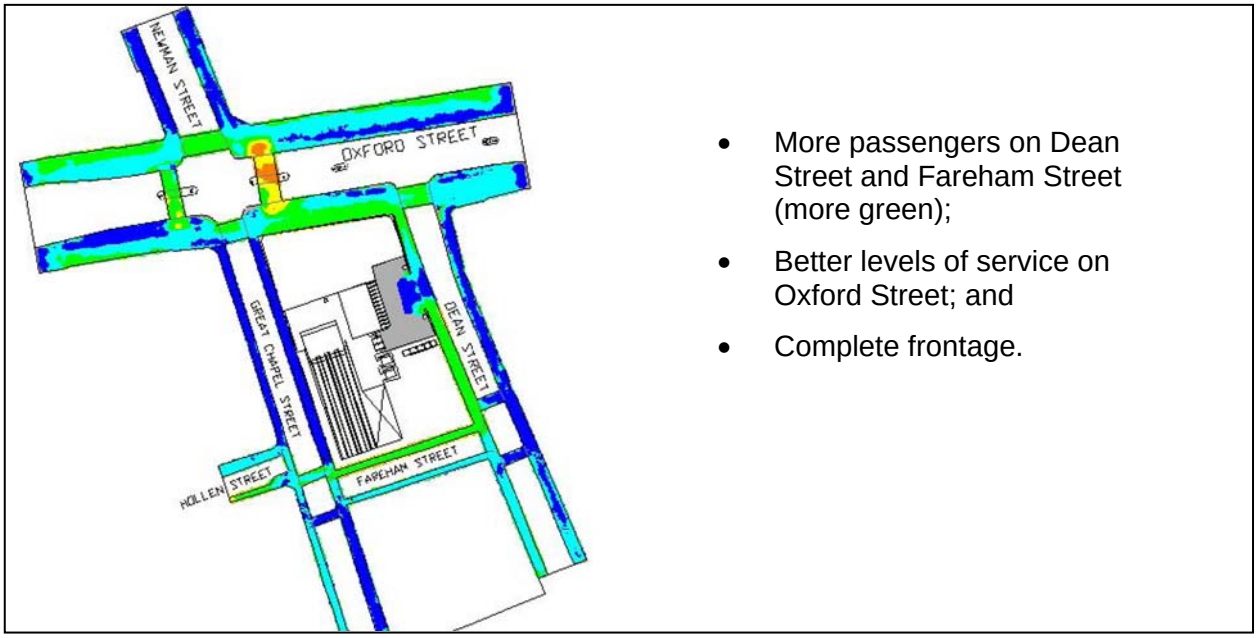

Figure 5.2 – Current Scheme LoS

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These assessments have been carried out using the Fruin criteria. This analysis, first developed for use in New York, is a well established methodology based on pedestrian comfort and density. Figure 5.2 shows that there is an improvement in the overall pedestrian LoS on the footway on Oxford Street adjacent to the Western ticket hall in the current scheme as compared to the consented scheme (Figure 5.1). There is clearly a relocation of pedestrian activity away from Oxford Street. However, the levels of service remain within acceptable levels although with an improvement on Oxford Street. Thus the current scheme is broadly similar, even slightly better, in pedestrian terms than the consented scheme. As indicated in Section 2 the current schedule 7 scheme is vehicle neutral, as is the consented scheme.

On the footways around the station the levels of service increase, generally to level C. There is one exception at the western end of Fareham Street where the level tips over into D. The assessment has been undertaken with the existing footway widths on Fareham Street, however, Fareham Street is being relocated. It will, in effect, be a new street and the highway cross section provided will take into account the results of the pedestrian analysis, as well as the other demands and aspirations for the street and the northern footway will be wider than it is for the current street. This has been discussed with Westminster and the London Fire Brigade.

The free flow of traffic and pedestrians is assured in the Schedule 7 scheme. The footways will become more crowded than they currently are and we have assessed the likelihood of pedestrian being tempted to step into the carriageway. Crowding on a footway is not, of itself, a safety issue at normal levels of service however if pedestrians step into the carriageway, the interaction between pedestrians and vehicles could be, albeit the vehicle speeds around the station are low, typically less than 10 mph.

The temptation to step into the carriageway will arise if walking speeds are reduced and faster walkers get frustrated. The walk speed compared with level of service from Fruin as is shown in Table 5.1.

Level of Service	Walking Speed (m/s)
A	> 1.32
B	> 1.27
C	> 1.22
D	> 1.15
E	> 0.77
F	< 0.77

Table 5.1 – Walk Speed by Level of Service

Until Level of Service E the walk speed is only reduced by 13% from the optimum at Level of Service A/B and at Level of Service C the speed has only dropped by 7%. Given the short length of the streets the change in walk speed will result in little disbenefits to pedestrians and thus the temptation to step into the carriageway will be low and safety will not be compromised.

5.2 Comparison with Static Analysis

We have undertaken a static analysis of the western footway of Dean Street as a reference to compare the capacity of the footways on Dean Street, adjacent to the proposed TCRw entrance, statically and with Legion. This section summarises the results of static analysis undertaken

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RODS Data	07:00	07:15	07:30	07:45	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	Total
Dean St Entry_AM	3.29%	4.29%	5.57%	7.00%	8.57%	9.71%	10.29%	9.86%	9.29%	9.29%	10.57%	12.29%	0	100.00%
AM Peak	23	30	39	49	60	68	72	69	65	65	74	86	0	700

Table 5.2 - Western Ticket Hall entry profile - AM Peak

RODS Data	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45	19:00	Total
Dean St Entry_PM	6.07%	6.44%	6.93%	7.60%	8.62%	9.40%	10.07%	10.22%	10.00%	9.20%	8.23%	7.24%	0	100.00%
PM Peak	334	354	381	418	474	517	554	562	550	506	453	398	0	5500

Table 5.3 - Western Ticket Hall entry profile - PM Peak

For the purposes of this study, it was assumed that the footways adjacent to the passenger entrance of the Western Ticket Hall will be clear of any street furniture or obstructions. Therefore, in order to obtain the effective width for footways, the total available footway width was reduced by 0.46m for the building edge, and 0.46m for the kerb edge as suggested by Fruin in Pedestrian Planning and Design, 1971. This means that on a footway with no street furniture the clear footway width is the total width minus 0.92m as shown in Figure 5.3 below.

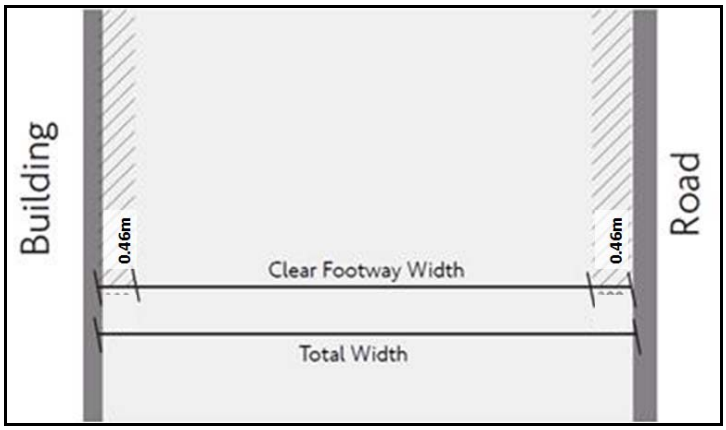

Figure 5.3 - Effective Width Calculation

Static analysis was used to assess the pedestrian flow levels and density on the footways adjacent to the proposed Western Entrance for the year 2016 and 2016 +20% passenger demand levels. Pedestrian density and flow rate on the footways for the AM and PM peak periods were calculated using spreadsheet method and the corresponding passenger levels of service reported.

Pedestrian flow rate per minute per metre was calculated using the formula:

Pedestrians/Minute/Metre = Pedestrians per minute / Effective width of footway in metres

Pedestrian density is measured using Fruin's Level of Service (LoS). Figure 5.4 shows the associated flow rate for each of the Fruin's level of service range used in this study. London

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Underground's (LU's) 1-371 states that, for a Two Way Passageway during Normal Operation, the LoS should not exceed 40 passengers/minute/metre. This is mid LoS C as shown in Figure 5.4.

Fruin Walkway LoS Pedestrians/metre/min	
A	<23.0
B	23.0 – 32.8
C	32.8 – 48.2
D	48.2 – 65.6
E	65.6 – 82.0
F	Above 82.0

Figure 5.4 - Fruin's Level of Service Criteria for Walkways
Source: J J Fruin, pedestrian Planning and Design, 1971

The footway widths as shown in Figure 5.5 below were obtained from the CAD drawings of the area.

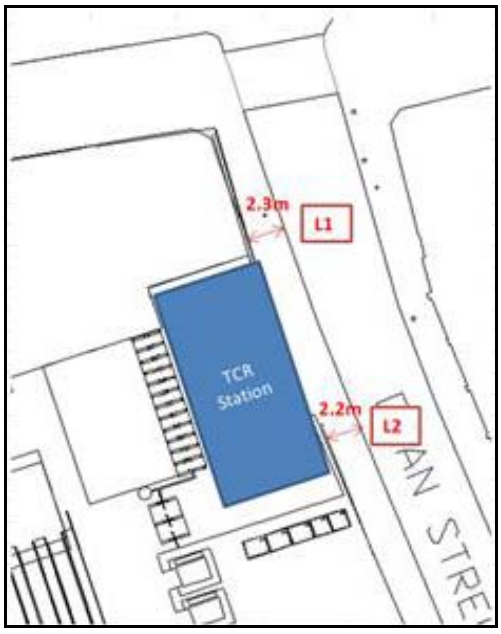

Figure 5.5 - Actual Footway Widths - Western Entrance

Figure 5.6 below shows the expected 15 minute peak passenger flows for the footways outside the Western entrance of TCR station for the year 2016. The peak 15 minute flow was divided by 15 to get the peak minute flow.

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Figure 5.6 - Peak 15 minute flows

Tables 5.4 and 5.5 below shows the pavement widths, peak minute pedestrian flows and corresponding levels of service for the two locations assessed.

Sites	Peak Period	Peak 15 minutes	Peak 1 minute (15minutes/ 15)	Total Width (m)	Edge Effect (m)	Effective Width (m)	LoS (Peds/m/min)
L1	AM Peak	451	30	2.3	0.92	1.38	22
L2		750	50	2.2	0.92	1.28	39
L1	PM Peak	446	30	2.3	0.92	1.38	22
L2		739	49	2.2	0.92	1.28	38

Table 5.4 - Static Analysis Results – 2016

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Sites	Peak Period	Peak 15 minutes	Peak 1 minute (15minutes/ 15)	Total Width (m)	Edge Effect (m)	Effective Width (m)	LoS (Peds/m/min)
L1	AM Peak	541	36	2.3	0.92	1.38	26
L2		899	60	2.2	0.92	1.28	47
L1	PM Peak	535	36	2.3	0.92	1.38	26
L2		887	59	2.2	0.92	1.28	46

Table 5.5 -Static Analysis Results - 2016 +20%

The tables show that location L1 is likely to experience LoS A and L2 will experience LoS C for the year 2016 and 2016+20% demand level. This is within the acceptable levels of criteria of LU's 1-371 standard for a two-way passageway during normal operation and broadly consistent with the Legion modelling.

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6 Urban Realm and Aspirations

The current scheme, if implemented within the existing street configuration (Fareham Street realignment notwithstanding), will be comparable with the Oxford Street entrance scenario. However, from a pedestrian movement and comfort perspective, it would be very much a 'Do-Minimum' solution.

Crossrail has a strong commitment to ensuring the new station entrances are fully integrated to the surrounding urban fabric through a process of engaging with the local community to deliver urban realm enhancements in the immediate vicinity of each station entrance. The Do-Minimum scenario is therefore seen as a starting point, and Crossrail is working in partnership with Westminster City Council, as well as other local stakeholders, to develop exemplary street design and urban realm around Tottenham Court Road station entrances. This commitment began with the Three Entrance Study (jointly commissioned with Westminster City Council), covering Tottenham Court Road western entrance and both Bond Street entrances, which looked at the strategic issues and opportunities along the Oxford Street corridor as a whole, and has been continued with the detail design work at Tottenham Court Road West.

6.1 Local Aspirations for the Built Environment

The conclusion of the Three Entrance Study, with regards to Tottenham Court Road was

"*At Tottenham Court Road [West] it has been considered that Option 5 would provide a good compromise solution between the building forms and the public realm. It allows for the creation of a clear pedestrian 'zone' where people feel they have priority over vehicles, but at the same time would only require the removal of traffic from the very northern end of Dean Street, immediately adjacent to the station entrance. This will have minimal impact on traffic flows, but greatly enhance the pedestrian experience for those arriving at the station*."

Figure 6.1 shows Option 5 from the Three Entrance Study

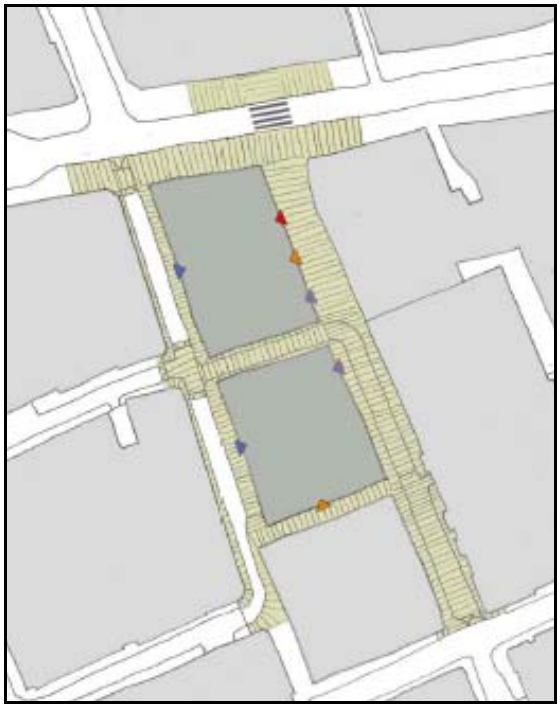

Figure 6.1 – Preferred Option for TCR w

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Other aspirations have been set out, particularly the ORB Action Plan which states

"*We recognise that the 'hustle and bustle' of the main streets is part of the excitement and draw of this district, however people also require breaks in the pace in order to sustain their enjoyment. We have therefore initiated a programme of creating quiet 'oasis' areas with a sense of place, where people can stop and enjoy a rest in a calm and, where possible, green atmosphere*."

The locations identified in the ORB Plan are

"*Street Christopher's Place, the Junction of Oxford Street with Balderton Street, (Leading To Brown Hart Gardens), the Junction Of Oxford Street with Woodstock Street, Argyll Street and Little Argyll Street, Golden Square, Cavendish Square Warwick Street, Swallow Street, Glasshouse Street and Air Street, Old Cavendish Street, Ramillies Place, Hanway Street and Place and Vere Street.*"

While these locations do not cover the streets around TCRw, the preferred option from the Three Entrance Study sits well with the aspirations, and the spirit, of ORB, see Figure 6.2.

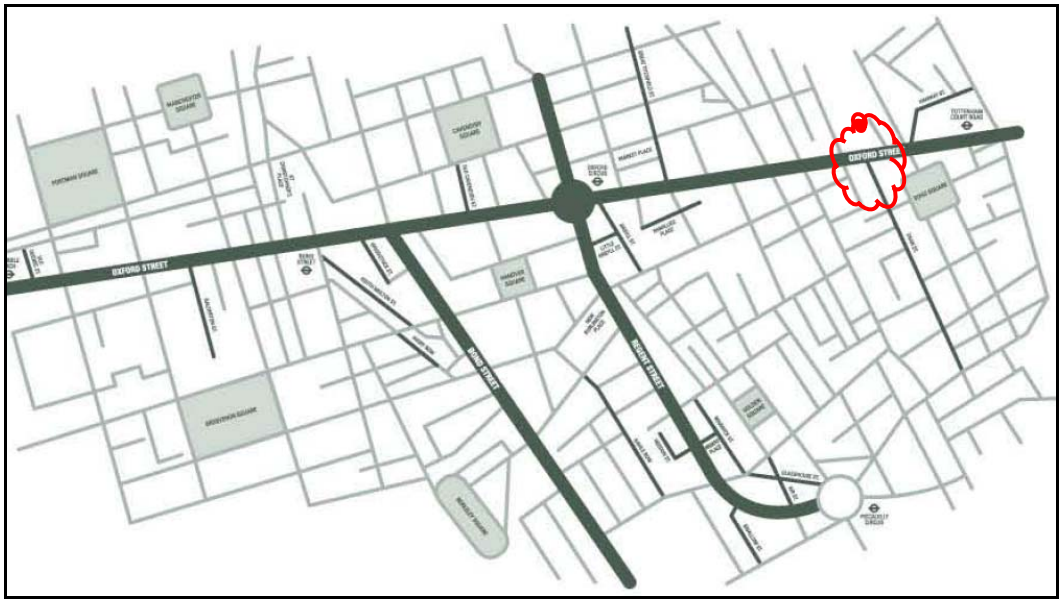

Figure 6.2 – The ORB Area of Interest

The ORB Plan refers to Crossrail;

"*Crossrail offers valuable opportunities for transport and public realm improvements, particularly around the eastern end of Oxford Street at the junction with Tottenham Court Road, and around New and Old Bond Sts . . . . . In addition, TfL is committed to looking at surface transport and ways to improve the balance between vehicles and pedestrians*"

6.2 London Wide Aspirations for Pedestrians

In addition to the local aspirations for the Area, Transport for London have developed new guidance for the levels of service that should be aspired to for pedestrians on street, "*Pedestrian Comfort Guidance for London*" see Figure 6.3. The pedestrian densities recommended for streets are lower than in the station planning guidance.

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Figure 6.3 – TfL Pedestrian Comfort Guidance for London

Figure 6.4 shows the comfort levels set in the Guidance, level B+ is recommended as a target.

Figure 6.4 – Comfort Levels from "Pedestrian Comfort Guidance for London"

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Comfort level B+ equates to LoS A from the Station Planning Guidance. The scale on the right shows the TfL Comfort Guidance Levels but associated them with the colours used in the station planning guidance.

The current Crossrail Aspirational Street changes are now being developed in line with the local and modal context as shown in Figure 6.5.

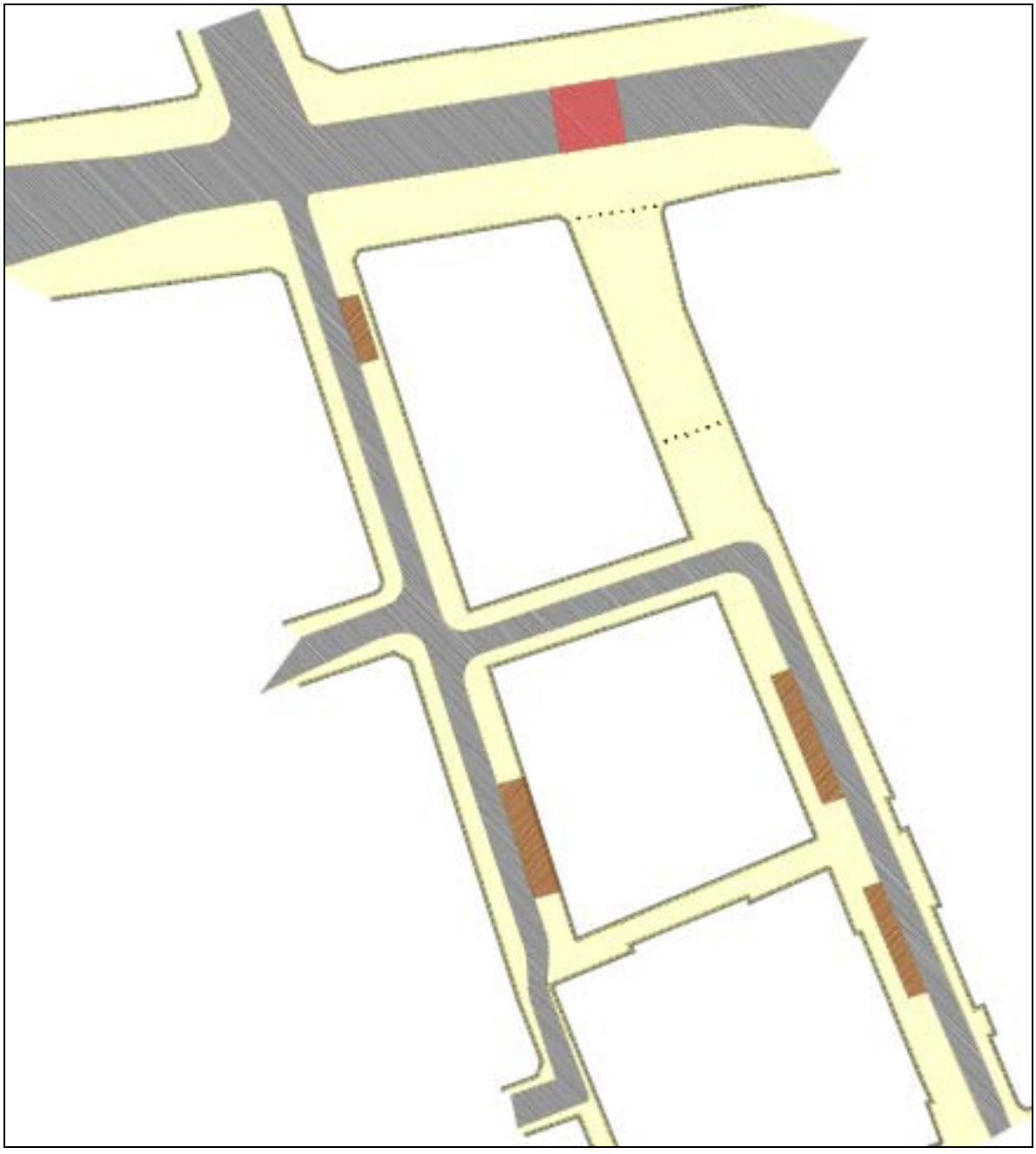

Figure 6.5 – Preferred Option for TCR w

Urban realm improvements are, principally

- the realignment of Fareham Street,
- increased pedestrian priority in Dean Street

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- widened footways, accommodating footway loading pads
- reduced carriageway widths to control speed and improve safety, and
- a new crossing over Oxford Street

Fareham Street currently meets Great Chapel Street approximately 14 metres south-east of the Great Chapel Street /Hollen Street junction, creating a disjointed and unclear route for pedestrians travelling from/to the west. With its current layout, pedestrians may choose to use the principal east-west link of Oxford Street. However moving Fareham Street northwards, closer to Hollen Street, would create a more readable route for pedestrians, leading through to Noel Street and Great Marlborough Street without removing the distinctive nature of the street pattern of Soho.

By pedestrianising Dean Street outside the Station, between Fareham Street and Oxford Street, an oasis (as aspired to by ORB) can be provided. The Dean Street space will be similar in character to Argyll Street. It will form not only an Oasis but also act as link joining the pedestrian environments of Soho and Oxford Street. It will provide a functionally more complex and interesting space when compared with an Oasis purely on Oxford Street if the entrance were located as in the Bill.

Removing vehicles from this short section will also enable a crossing over Oxford Street as close as possible to the station entrance relieving the other pedestrian crossing points close by.

The existing footways are narrow with street clutter and poor surface quality. Therefore, wider footways are proposed to allow for the increase in pedestrians numbers. Although all footways are improved the key improvements are increased footway widths on Dean Street south of Fareham Street, new Fareham Street and Great Chapel Street. On Great Chapel Street the widening included the footway on the western side of the street as the station buildings have no significant pedestrian accesses onto Great Chapel Street.

These footway changes will enhance the pedestrian routes to the station along Fareham Street and along Dean Street between Oxford Street and Carlisle Street.

The Urban Realm will be delivered as part of the restoration plan for the streets around the station.

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7 Benefits of the Aspirational Urban Realm

7.1 Pedestrian Benefits

The micro-simulation modelling was extended as shown in Figure 7.1 to assess the comfort levels for both the Do Minimum and the Aspirational Urban Realm. The pedestrian demand is base plus 20 percent.

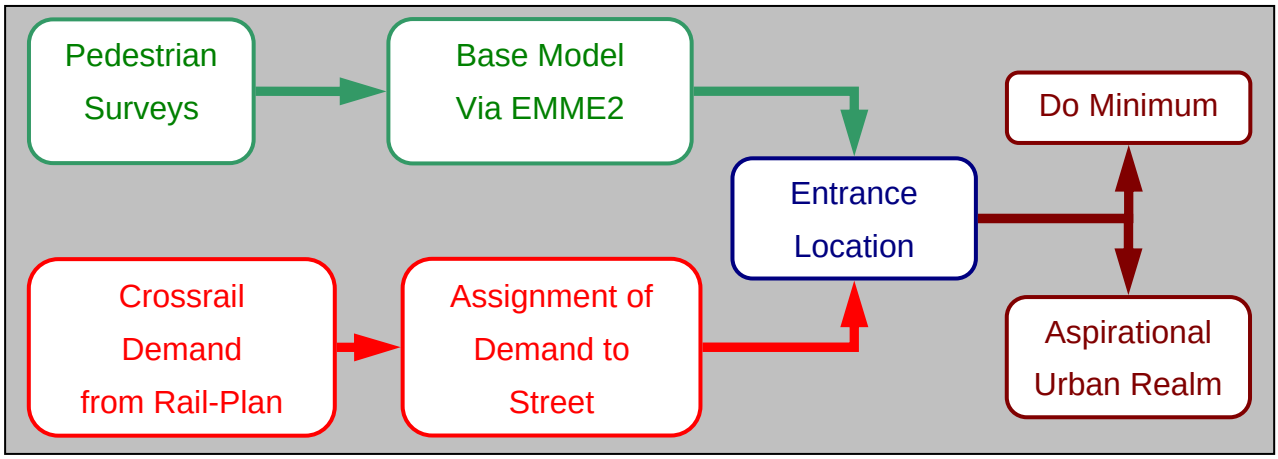

Figure 7.1 – Extended Modelling Process for the Aspirational Urban Realm

Figure 7.2 shows the Do-Minimum, Figure 7.3 shows the Aspirational Urban Realm in the evening, and Figure 7.4 shows the Urban Realm in the morning. The colours in these figures represent the Levels of Service shown in Figure 6.4.

In the base scheme the pedestrian density on Oxford Street and on the routes south from the entrance round into Fareham Street exceeds the levels in the TfL Comfort Guidance. The densities on the existing crossings are also higher.

The aspirational scheme targets these issues and, although it does not meet the TfL Guidance in full, significant improvements are delivered.

Even with the Urban Realm improvements the pedestrian density on Fareham Street is still above the TfL Guidance but, as this occurs principally in the morning peak this is mainly the walk from station to work is not unacceptable.

Apart from pedestrianising Dean Street the pedestrian benefits are delivered through increases in the footway widths. Care must be taken in the design of the Urban Realm and location of street furniture and way-finding signage not to erode this, especially on the east west route along Fareham Street and over Great Chapel Street.

Westminster's Supplementary Planning Document "Westminster Way - public realm strategy design principles and practice", currently at consultation draft stage defines a way as

1. a road, track or path for passing along, a course or route for reaching a place;
2. a method or plan for obtaining an object;
3. a custom or manner of behaving;
4. a space free of obstacles; and
5. a specified direction.

The width of the northern footway of Fareham Street will still be only 2.4 wide and placing any street furniture or signs on this footway will negate the benefits of the urban realm. The clearance to the kerb face of 0.45m, the post and the buffer pedestrians leave between

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themselves and furniture, buildings or the kerb (TfL's Pedestrian Comfort Guidance) would reduce the width down close to 1.5 metres. This covers replacing any existing bollards, or providing new, including the listed bollards. The implications of this on the Urban Realm, including the need for a variation to the existing heritage deed must be understood and worked through.

There are implications for vehicles with the aspirational street scheme these are discussed in section 8.

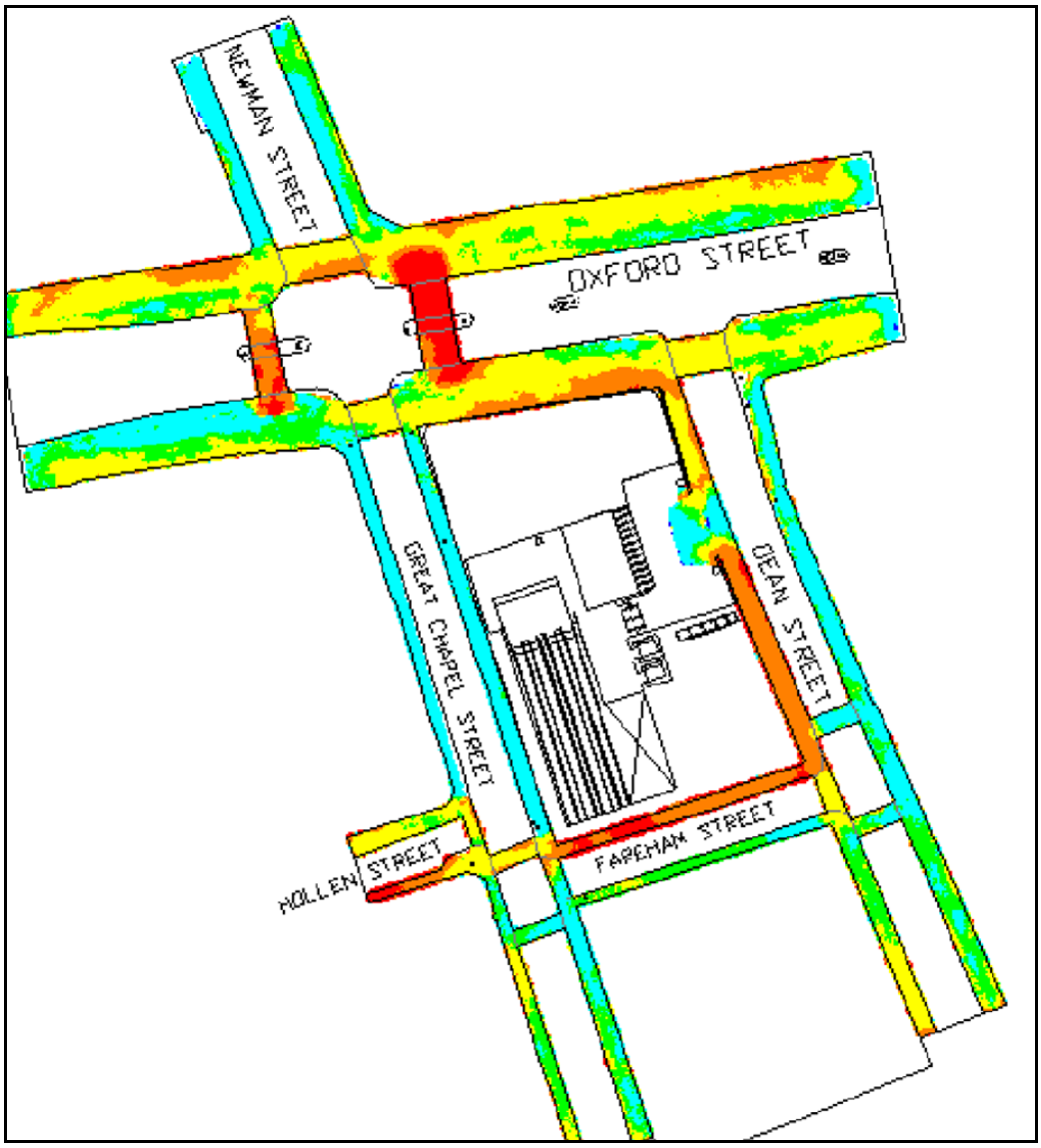

Figure 7.2 – Do-Minimum PM Base Demand +20%

Levels of service on Dean Street, Fareham Street and Great Chapel Street greatly exceed the TfL Comfort Guidance.

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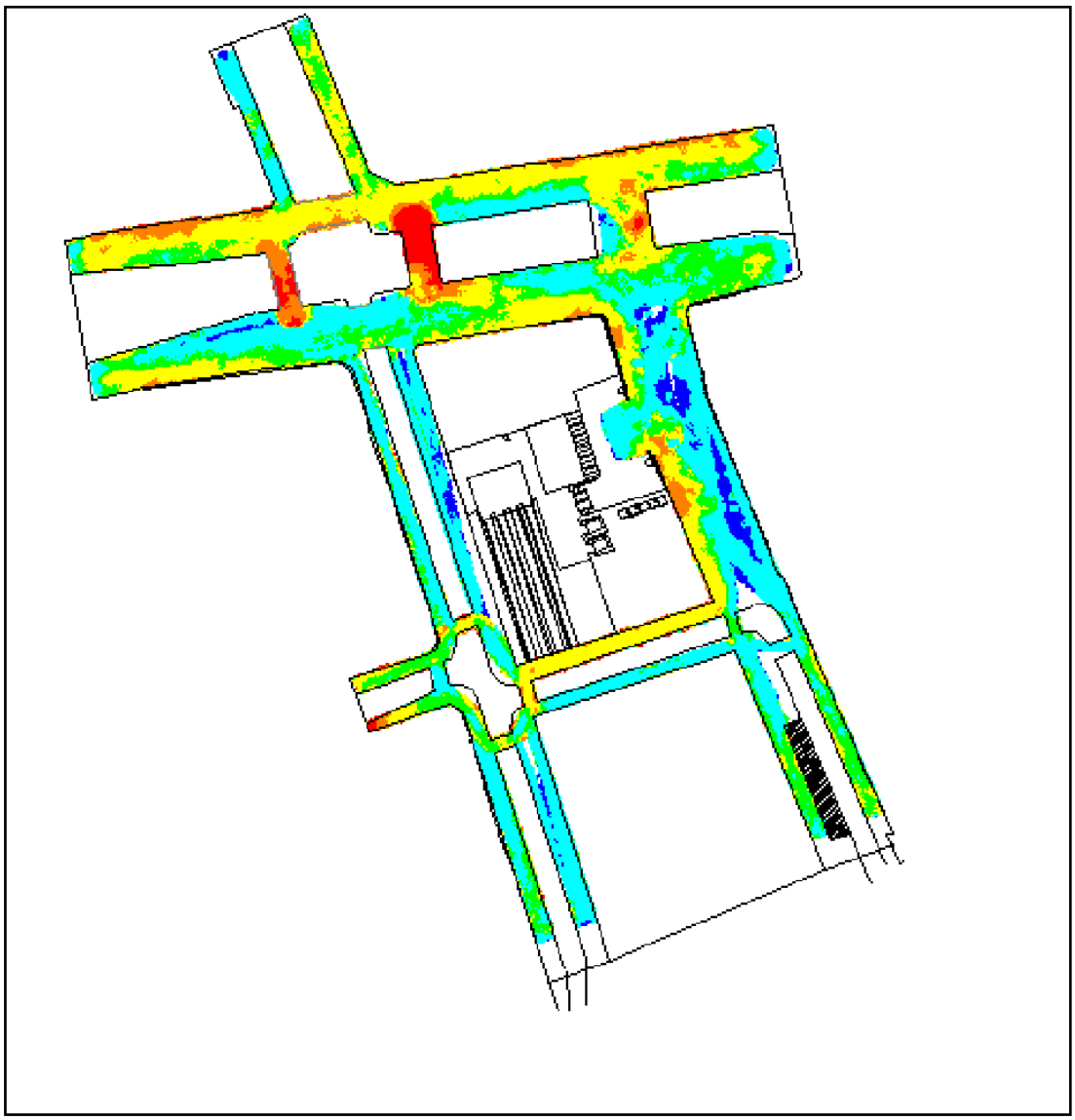

Figure 7.3 – Aspirational Scheme PM Base Demand +20%

The pedestrianisation of Dean Street creates a space in tune with the TfL Comfort Guidance and which meets the level of Service Aspiration. The new crossing over Oxford Street at Dean Street provide significant relief on Oxford Street The footway widening along Fareham Street and Great Chapel Street achieve the same goals in the context of an un-pedestrianised street.

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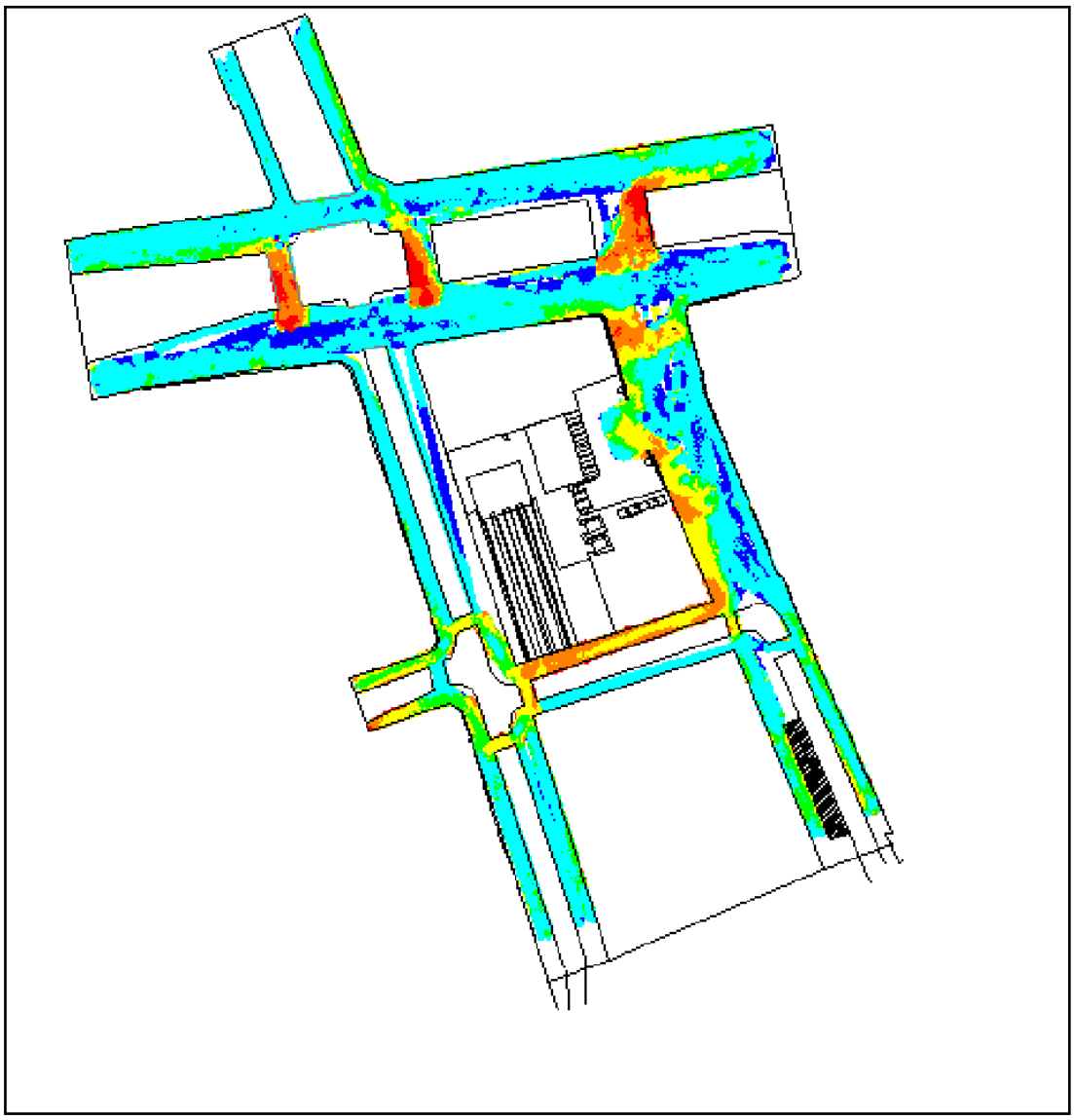

Figure 7.4 – Aspirational Scheme AM Base Demand +20%

The levels of service on Fareham Street in the morning peak is above the TfL Comfort Guidance but in the context of the morning rush hour this is not un-acceptable.

7.2 Highway Changes

The balance within the highway between carriageway and footway has been changed.

The overall highway width is defined by the building footprint which is in turn dependant on the activities and space that are necessary to meet the operation needs of the station. The northern block has shortened somewhat but the southern block needs to accommodate operational rooms, mechanical and electrical plant and the ventilation fans and ducts for the deep levels of the station and access for the Over Site Development (OSD). The station ground floor plan is shown in Fig 7.5.

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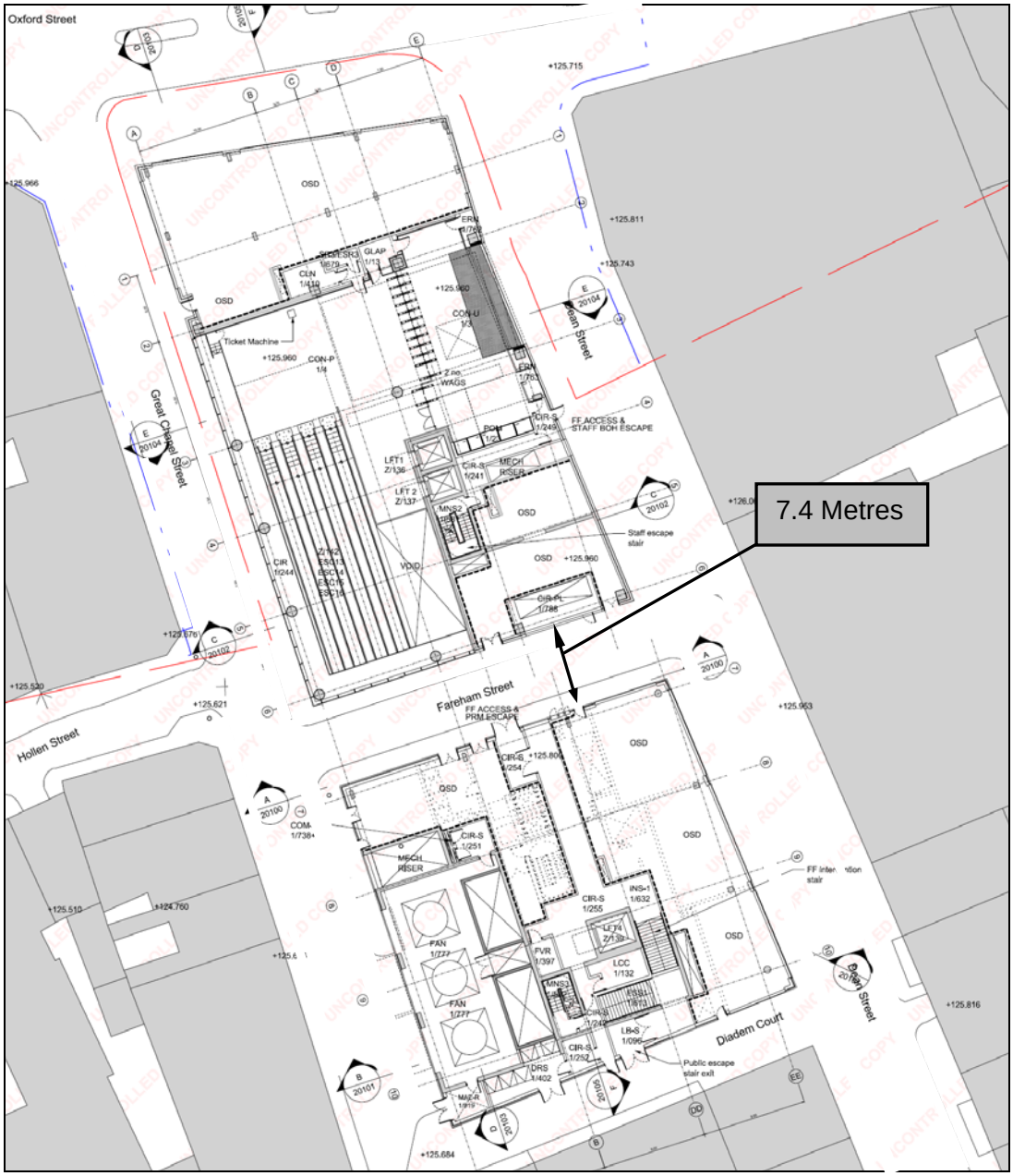

Figure 7.5 – Station Glound Floor Plan

The overall highway width in Fareham Street, Great Chapel Street and Dean Street has remained, essentially the same. Diadem Court has been widened from 3.2 to 4.4 metres.

The main drivers for the balance between carriageway and footway, apart for the needs of pedestrians, are safety and operational access for emergency and necessary services.

Safety

The proposed highway geometry is very similar to the existing geometry and traffic speeds are generally low. Manual timings of the street indicated that the vehicle speed reached 10 to 15 miles an hour on Fareham Street and 15 to 20 on Dean Street; although clearly reduced at corners. A reduced vehicle speed will be beneficial given the reduced kerb height and the pedestrian flows and is appropriate for areas such as Soho.

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Cycle safety is vital and in current TfL guidance, particularly on bus lane widths, preferred lane widths are up to 3.2 metres and above 4. The presumption against a lane of between 3.2 and 4 metres arises from the lack of clarity as to the ability of vehicles to overtake a cyclist or vice versa. Below 3.2 metres overtaking is obviously not possible while above 4 it is possible and safe. For the streets around the station this indicates that a width of less than 3.2 or more than 4 would be suitable.

However, a 4 metre wide carriageway would have other dis-benefits, in that it would

allow an increase vehicle speed,
permit overtaking, potentially dangerous for pedestrians, and
encourage informal waiting and loading, again with safety impacts for pedestrians.

The preferred option in the three stations study included a shared use area of street on Fareham Street and well as a pedestrianisation of Dean Street outside the station. The current layout does not have a shared use area but it does have a reduced kerb height, both to allow pedestrians better access to the carriageway when needed and to be in keeping with many of the other streets in Soho. A reduced vehicle speed is thus very important.

Overtaking by vehicles, whether cycles or other vehicles, presents uncertainty to other highway users. Given the length of the streets around the station there is little need for overtaking other than to pass a stationary vehicle, certainly the journey time benefit will be low or non-existent. Thus there is no need to make provision for overtaking.

Servicing of premises is covered in more detail in the next section. Sufficient provision is being made for the stations needs, the need to deliver to the OSD, for short term and resident parking and for servicing to the ground floor retail. As such informal stopping by vehicles should be discouraged, or at the very least not encouraged.

Thus the best choice from safety grounds is for a narrower carriageway.

Operational Access

The two key operational accesses are Westminster's need to collect waste and the London Fire Brigade (LFB) need appropriate access in an emergency.

The former has been addressed by the use of the Wesminster refuse lorry as a design vehicle. The highway design has been predicated on a large saloon car/small transit van for normal use but with a check at the corners for the refuse vehicle.

We have discussed the needs of the LFB with Jerry Andrews and Will Thompson, at LFB Headquarters on the 26th May, and at their suggestion with Tim Kyte station commander at the Fire Station on Shaftesbury Avenue on the 1st June.

The first meeting was to an extent superseded by the second but we did discuss the Fire Safety Guidance Note GN29. Para 3.1 does permit access to be along "highway" and not just carriageway.

At the second meeting we discussed the specific operational experience and requirements for the Soho area, the Shaftesbury Avenue station having responsibility for covering Soho. The key issues were the pedestrianisaton of Dean Street and the carriageway widths. Dean Street is principally used as a return route to the station after a call and as such is less important to them. An alternative via Hollen Street and Fareham Street is workable and thus the pedestrianisation is acceptable to them.

The carriageway width requirements are to allow their vehicles to pass along the highway. Normally there is kerbside furniture, railings, lighting columns, litter bins and panoply of street clutter. One of the main drivers for the Highway and Urban Realm design is to reduce and preferably eliminate such clutter. The Fire Brigade accepted this. There are however, operations widths needed for the larger appliances when deployed at an incident. The largest of these are

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the aerial platform vehicles which with their outriggers need 5.5 meters clear width. The overall highway width is 7.5 metes in Fareham Street and wider in the other streets and thus the large appliances will be able to operate. We will specify the footway such that it will be able to take to outrigger loads.

The conclusion is thus that on safety grounds a narrower (less than 3.2 metres not more than 4 metres) carriageway is appropriate and that the fire brigade accept this, subject to no street furniture and clutter, and accept the pedestrianisation of Dean Street.

Key Highway Design Features

- Carriageway Width – 3m;
- Footway Widths – various but maximised;
- Carriageway Materials – Asphalt, with the exception of Granite setts in Fareham Street and small element York stone/Granite setts at the junction of Fareham Street and Great Chapel Street;
- Kerbs 300mm wide, kerb height c60mm apart from flush routes at junction of Fareham Street and Great Chapel Street;
- Footways to be capable to taking outrigger loads, and over running by lorries at corners, vehicle weight 14 tonnes (GN29 – p3.2);
- Loading and parking bays to be at footway level with no dropped kerbs; to ensure no overhang and to aid mechanical and other street cleansing;
- Footway Materials – York Stone flags with Granite setts in the loading and parking bays;
- Street lighting to be on the building, particularly around the northern block;
- No fixed street furniture on footways, tables and chairs may be acceptable subject to Westminster Licensing; and
- Dean Street north of Fareham Street will be specified in conjunction with the Station Architects.

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8 Vehicles, Cycles, Access, Servicing and other Public Transport

8.1 Moving Vehicles

No changes are proposed as part of the GYB. For moving vehicles the main changes at TCRw are:

- The closure of Dean Street, north of Fareham Street; and
- The narrower carriageway, to allow wider footways.

The routes along Fareham Street and Dean Street both provide access to Soho Square, the former from north west Soho and the latter from Oxford Street. A third route, north on Dean Street provides access from Soho South and Covent Garden. Of these accesses to Soho Square, only Dean Street will be permanently affected by the Urban Realm proposals. The use of Dean Street for access to Soho Square is less that Fareham Street. Alternatives to Dean Street from the west, all via Fareham Street are:

- from the North: Wells Street → Berwick Street → D'Arblay Street → Wardour Street → Hollen Street → Fareham Street
- from the west: Great Marlborough Street → Noel Street→ Berwick Street → D'Arblay Street → Wardour Street → Hollen Street → Fareham Street, and
- from the south Wardour Street → Hollen Street → Fareham Street,

Routes from the east to Soho Square will relocate via Dean Street. As direct access to Dean Street north of Fareham Street servicing of premises in this section of Dean Street will be from Dean Street south of Fareham Street and vehicle routes in will be from the west via Fareham Street.

Currently, because of the works to build the station, only the Dean Street south route to the square is open; little in the way of complaints have been received either by Crossrail directly or via Westminster even from the taxi trade. Vehicle flows were surveyed at the Oxford Street/Dean Street junction and at the junction of Dean Street and Fareham Street; the two closest junctions to TCRw, in February 2009.

The results are shown in Appendix D but the key information is shown in Figures 8.1 to 8.3.

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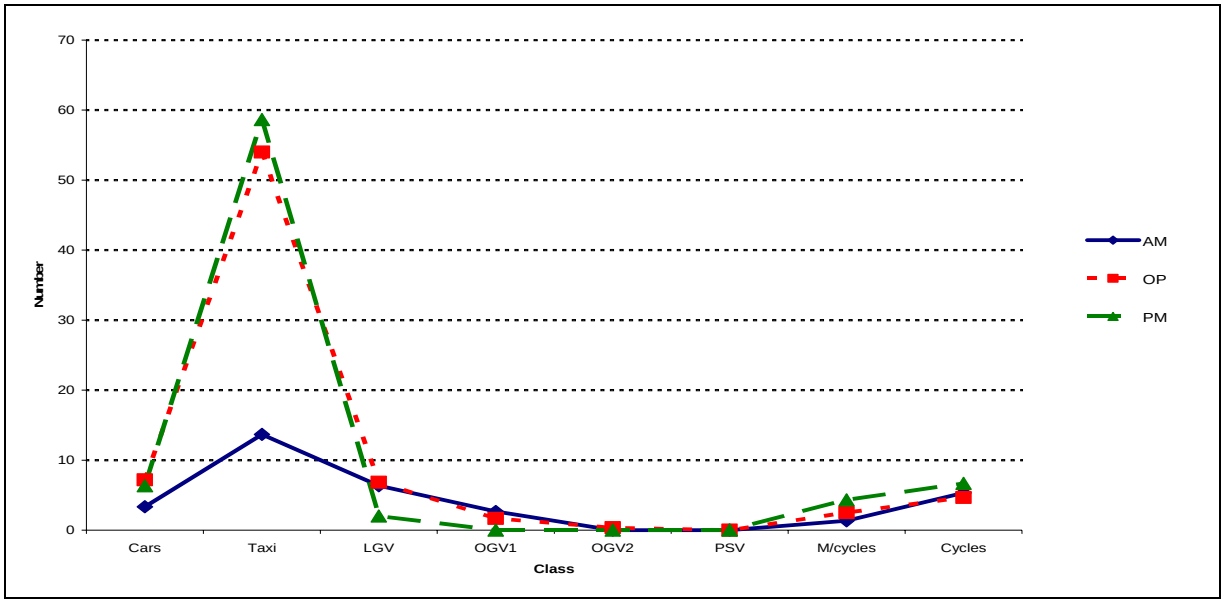

Figure 8.1 – Vehicles from the West Turning Right into Dean Street

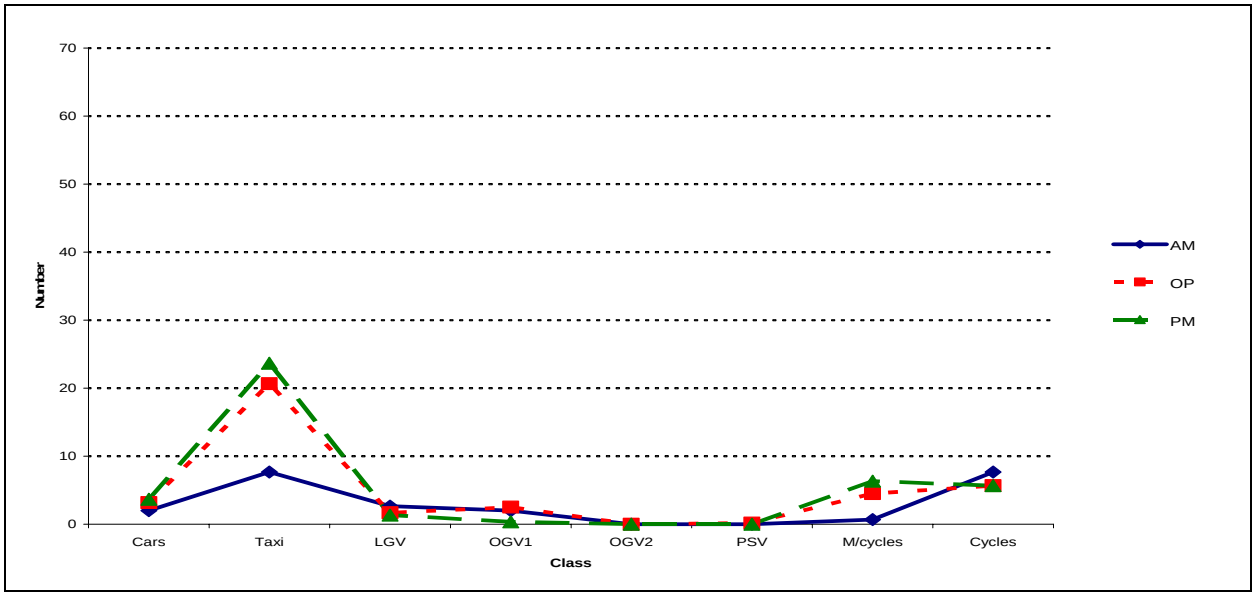

Figure 8.2 – Vehicles from the East Turning Left into Dean Street

Of these flow the largest proportion is Taxis.

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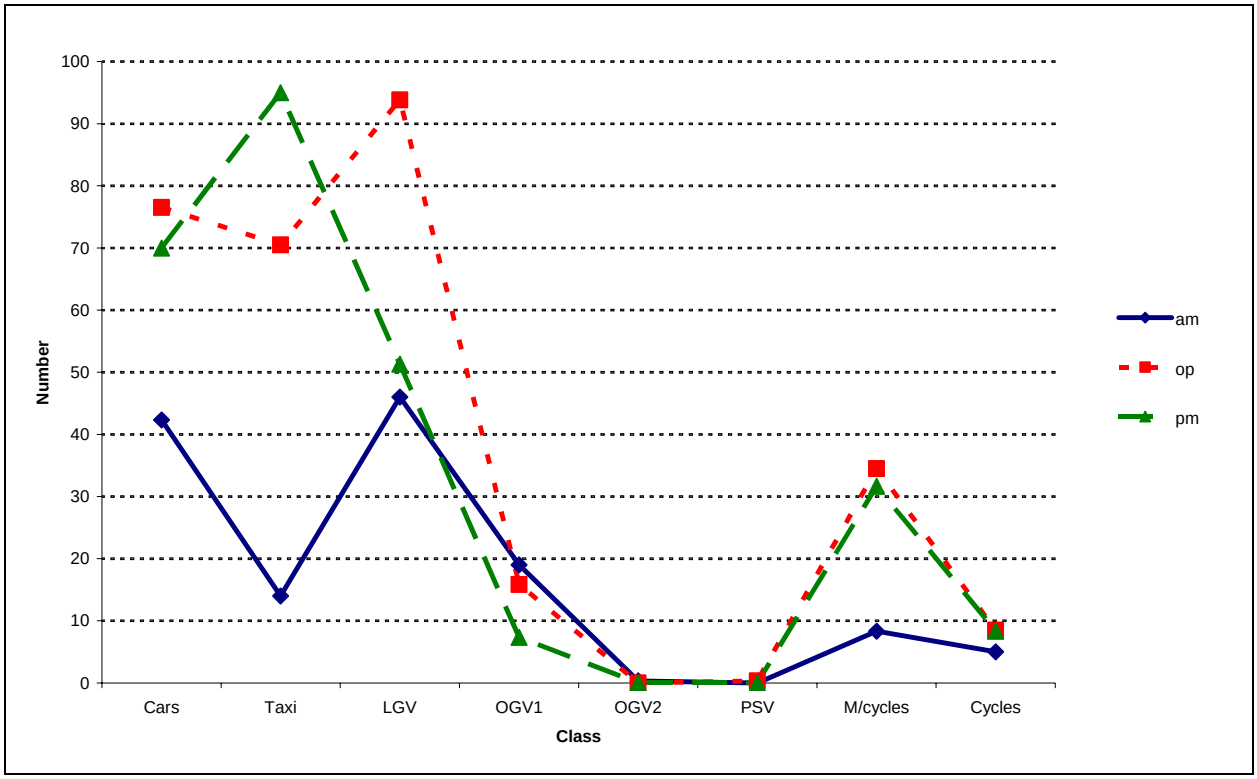

Figure 8.3 – Vehicles from Fareham Street Turning Right into Dean Street

The maximum number of vehicles an hour in Fareham Street is 300 in the off peak. In the AM it is 140 and the PM 260. This, and the level of LGV vehicles, demonstrates clearly the nature of Soho with the media and advertising industries.

The removal of Dean Street, north of Fareham Street would add less than 80 vehicles an hour to the flow of Fareham Street if all the trips stay as surveyed although somewhat less will be added if the routings being used while the station works are underway remain used, even in part. It is assumed that the traffic turning left into Dean Street from Oxford Street will not reassign to Fareham Street.

8.2 Hollen Street/ Great Chapel Street/Fareham Street

The application of the design criteria set out in Section 7 is relatively straight forward. There is the issue of finishes and detailing but this is being covered in the Highway Design, currently in RIBA Stage E/F, and supported by the Urban Realm study. One issue remains unresolved, the junction of Hollen Street, Great Chapel Street and Fareham Street.

The streets around the station can be divided into three groups based on the function; fully pedestrianised, pedestrian enhanced and standard. Dean Street is clearly the only street in the first group. The route along Fareham Street to Hollen Street and Dean Street south of Fareham Street and in the second and Great Chapel Street is in the third.

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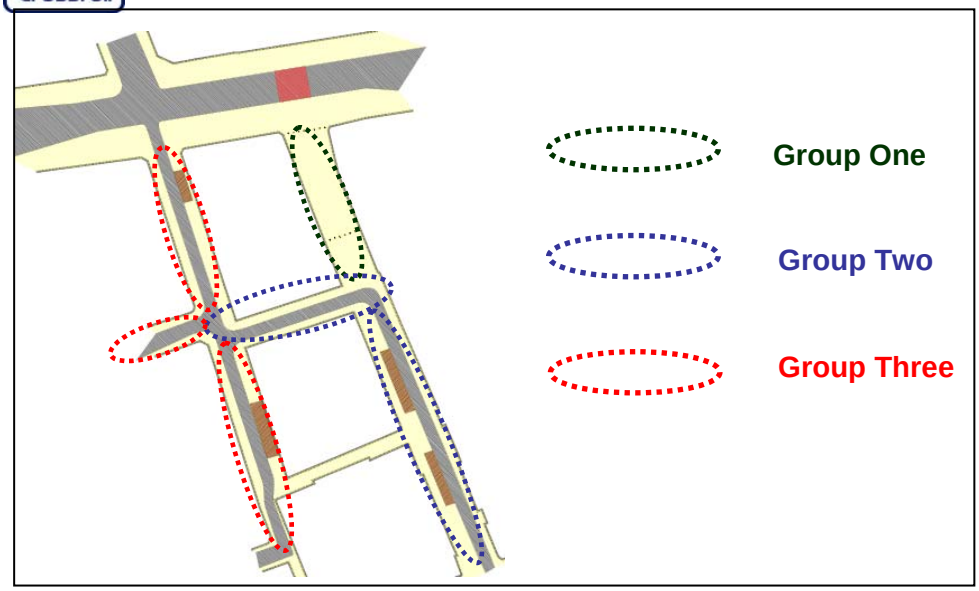

Figure 8.4- Street Groupings

The delineation between the three groups is central to the way the streets are used both by Drivers and Pedestrians. The first group is relatively simple, vehicles are excluded; the key delineation is between the second and third groups and particularly where vehicles are moving into group two and where pedestrians are moving into group three. The design of the delineation points must give the right messages as to the change in the balance of priority between drivers and pedestrians.

The traditional street in the UK is vehicle centred; a carriageway, normally in asphalt, with a footway on one or both sides and parallel to the building facades is appropriate to group three. Moving away from this, in either material or kerb line will change the balance in favour of pedestrians and enhance safety for them and be more appropriate for group two.

The layout of the junction must make the move from group three to group two clear. It must also make it clear to drivers that an alternative exists.

Four options have been identified based on different kerb lines and different extents of the table at the junction; these are shown diagrammatically in Figure 8.5:

- A - Kerb build-out opposite Hollen Street with table;
- B - No kerb-out opposite Hollen Street with table;
- C - Kerb build-out opposite Hollen Street with enlarged table; and
- D - No kerb build-out opposite Hollen Street with enlarged table.

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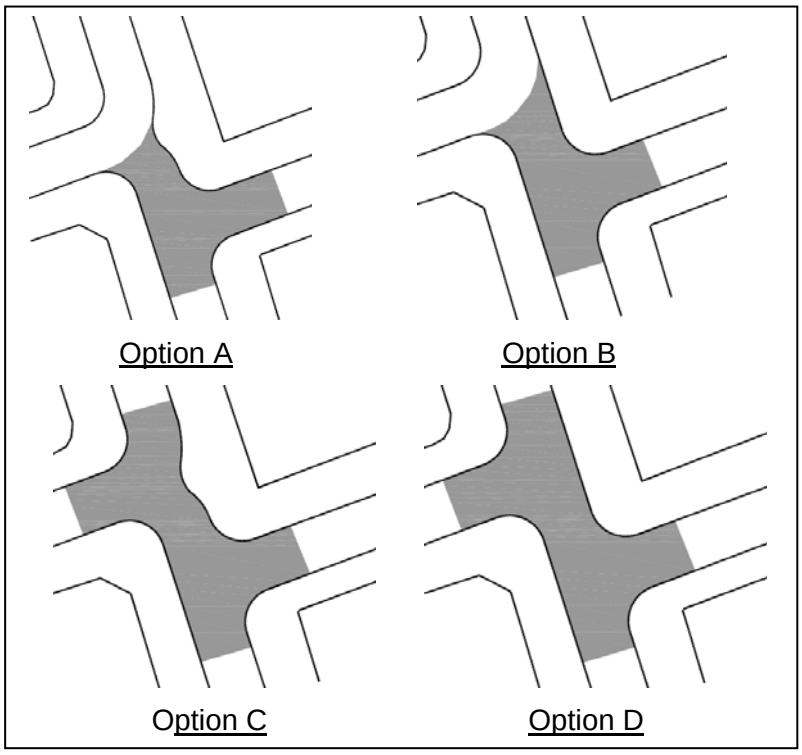

Figure 8.5 – Junction Options

All options are able provide a footway level route from the north side of Fareham Street to the south side of Hollen Street; however the readability of the route for drivers, will depend on the differentiation between the traditional carriageway and the table top as the leave the former and enter the latter.

This will be enhanced in Option A by the route from Hollen Street to Great Chapel Street being in asphalt, distinguishing it from the table, and making a clear distinction in the minds of drivers between which is vehicle centred and which isn't. In option B the distinction between asphalt and table is retained but not in Options C and D.

The non tradition kerbline in Options A and C will work with this effect. The move from group two to group three as pedestrians walk west will be clear.

If the table top is a different material, including a sett of a different material then the route will not read as carriageway. An example of a York Stone sett, from Moorfields EC2, is shown in Figure 8.6.

Figure 8.6 – York Stone Sett Example from Moorfields

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Given Crossrail is delivering public transport and that the more pedestrian friendly street layouts will support this we recommended layout A. Discussions have been held between Crossrail and Mark Hamill from The City of Westminster and option D has been instructed as the preferred option

8.3 Parking and Servicing

Part of policy 3C.25 of the London Plan states “ensure developments include appropriate servicing facilities, off-road wherever practicable”. Due to the presence of retail facilities and flats in the Over Site Development at TCRw there will undoubtedly be a need for loading facilities; this will ensure that businesses can operate properly and that people can deliver to and remove furniture and the like to and from the flats. However, there is no space within the station blocks for off-street loading thus servicing is only practical by providing adequate on street loading bays.

It is proposed to introduce footway loading bays in the area surrounding TCRw. The length of the loading bay should depend on demand, and the kerb length required for each vehicle that wishes to use the space.

Inset bays have been examined, however they are not considered to be suitable for this location. Guidance produced by TfL recommends a width of 3 metres for a loading vehicle, and that the remaining footways should not be less than 2 metres wide and assuming that a minimum road width of 3 metres is adopted as vehicles must be able to pass any loading vehicles a total minimum width of 10 metres is required. Given that the streets around TCRw are between 6 metres and 10 metres in total, this is not feasible in many locations. Half-on, half-off facilities are also recommended by TfL if they adopt similar placement principles, therefore they would not provide additional alternative locations. Furthermore, such facilities are not recommended in areas where pedestrians could be impeded. Thus loading pads completely on the footway are being recommended at TCRw.

There are several benefits to providing footway pad loading facilities:

- Beneficial when pedestrian footfall is high as the pad will be usable by pedestrians when not occupied;
- Allows for ample space for pedestrians in line with TfL guidance minimum of 2 metres;
- This layout around TCRw allows for a minimum carriageway width of 3 metres between kerbs to allow for emergency vehicles, in line with minimum traffic lane width in London generally; and
- Allows for fast and effective delivery without the need for small hand carts, sack trucks and the like to negotiate kerb up-stands.

With regards to the operational hours and length of pads, a number of factors will have to be carefully examined including the following:

- business operating hours;
- the nature of businesses using the pad;
- peak pedestrian flows to ensure that pads are situated in such a way as to not impede pedestrians;
- any environmental constraints, such as noise;
- average vehicle length and width, as this will effect the amount of space required;
- type of loading and other activity in the pad such as tables and chairs for restaurants to ensure appropriate surfacing is applied; and

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- vehicle's access for entering and exiting the pad.

Ample consideration should be given to surface materials to ensure that loading vehicles do not cause damage, hence the recommendation for setts. The location and nature of street furniture should also be given careful consideration. Signage should be clear and simple, and located in such a way as to reduce street clutter. Alternatives to post mounted signage may be possible, for example building mounted signs. Examples of this can be seen in Figure 8.7.

Wall Mounted

Post Mounted

Figure 8.7 – Signage Examples – Coleman Street EC2

In the TCRw area it may be appropriate, given the high level of pedestrian footfall, to introduce 20 minute loading bays, within set peak hours (as agreed in consultation with local businesses who may wish to use the pads for more than just loading). This will ensure vehicles do not stay longer than necessary, and will mean that several businesses can utilise the facility in a day. In addition, providing longer stay loading bays may encourage vehicles from adjacent streets, most notably Oxford Street, to use the facility.

There is potential space in the closed section of Dean Street for emergency vehicles and Cash-In-Transit. However the majority of servicing for the northern section of Dean Street will happen from loading bays south of Fareham Street.

The existing waiting and loading regime around the station allows for one parking space on Great Chapel Street and a presumption of loading being permitted generally. The proposed regime is to preclude waiting and loading except at the specified pads, which will be individually signed. The level of signing will need to be agreed with Westminster and the Police but the proposal is that the area around the station including Great Chapel Street, Fareham Street and Dean Street south to Carlisle Street will be a "Pedestrian Zone" which will allow the reduction of signs and road markings to a minimum.

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The final details of the street including the loading pads and signing will be developed in conjunction with Westminster Transport Planning and Highways and with input from key highway users such as the LFCDA and other emergency services.

At GYB servicing to the premises in the street will remain the same.

8.4 Crossrail Plant Servicing and Extraction

The majority of the servicing and maintenance of the MEP equipment in at TCRw and GYB will be undertaken within the station. Access will be from the street; skates and trolleys will be used where plant has to be moved from a lorry loading pad into the station. A lorry mounted grab, such as a hi-ab may be needed to lift plant over the bollard line into the north end of Dean Street to access the main station entrance. This will take place at night.

The exception will be the removal of the vent fans. Removal is in two stages

Stage 1 – Fans are moved horizontally out of the building onto the eastern footway, and

2 – Fans are lifted onto a lorry for transport away.

Reinstallation will be the same process in reverse.

Stage 1

The moving will be achieved using a skate or similar mechanism. The panels will be removed completely before the fans are removed.

At TCRw the footway Great Chapel Street is already being laid out as a loading pad, for general use by highway users, from the station, the Over Site Development or adjacent premises. As such the loading pad will be formed in small element paving, granite setts; to accommodate wheel and other local loading.

The photograph is of a similar arrangement recently installed in Shaftesbury Avenue. The only difference is that the bay in Great Chapel Street will extend right to the building line at the rear of the footway.

Figure 8.8 – Typical Loading Pad

The same arrangement would be used for GYB

Stage 2

The lifting onto a lorry will by a mobile crane.

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The lorry needs to have a capacity in excess of 6.8 tonnes and a vehicle such as one based on an Izusu 180/260 would be suitable. A crane would also need to be capable of lifting 6.8 tonnes and with a reach sufficient to move the fan between the footway and the footway. A Terex AC30 City, or similar, would meet these requirements.

The vehicles would approach down Hollen Street, turn left into Great Chapel Street and then reverse back down the street to reach the loading pad. This requires a movement against the general street operation but this can be covered in the licensing that will be required, in any case, to operate the crane. Cranes are a regular feature in Westminster and most London boroughs for operations such as fan removal.

The figure below shows these two vehicles in Great Chapel Street, and shows an 8 metres reach which suits the move and for which the safe working load, for the Terex, would be 8.2 tonnes. Both these vehicles are smaller than the design vehicle used for the streets around the station, a 10.5 tonnes refuse lorry.

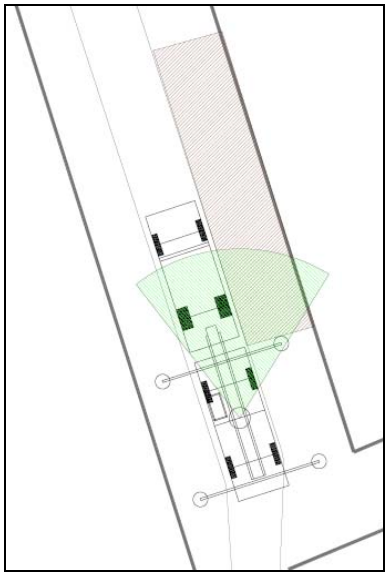

Figure 8.9 – Lorry and Crane in Great Chapel Street

The design vehicle has been tested on the streets – ref Drawing No C134-OVE-D-DDH-N105_1-00111. Footways have been maximised to provide as good an environment for pedestrians as possible but to facilitate servicing overrunning of the footway by larger vehicles has been allowed for in their design.

Auto Track Analysis of a rigid vehicle and a crane making the manoeuvre are shown below, these are based on commercially available templates but the demonstrate that the manoeuvres are achievable, albeit with some overrun in the case of the rigid lorry.

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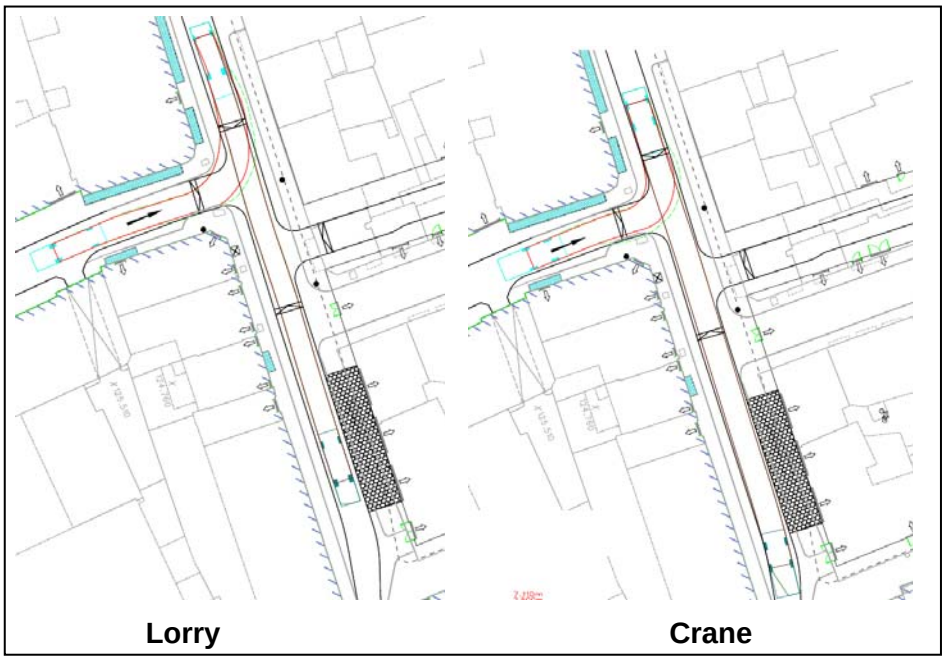

Lorry **Crane**

Figure 8.10 – TCRw Lorry and Crane AutoTrack Tests

Use of Larger Vehicles

If a lorry or a crane of a suitable size is not available, an alternative would be to reverse larger vehicles from Newman Street back down Great Chapel Street. This would require Great Chapel Street to be closed to other vehicles but this manoeuvre has been done to deliver and remove tower cranes from the site, as part of the demolition and will doubtless be used again during the station and Over Site Development. The following images show a 50 tonne crane in Great Chapel Street during the erection of the demolition contractor's tower crane and a full size articulated lorry that has reversed over Oxford Street into Great Chapel Street during the same tower crane's removal.

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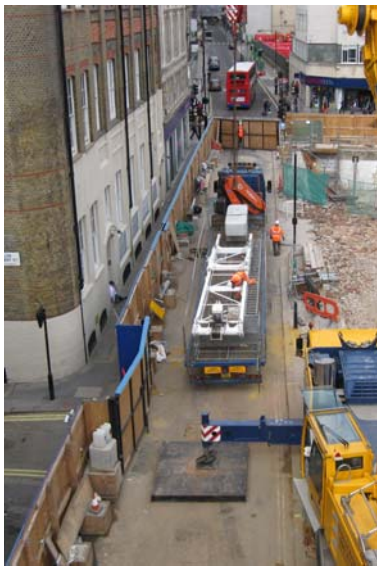
Crane in Great Chapel Street – Crane Erection



Articulated Lorry at Great Chapel Street for Crane Removal

Figure 8.11 – Examples of Cranes and Larger Vehicles

At GYB the rigid lorry would have to reverse into Goslett Yard; under control of a banksman. The crane will be able to enter the same way although it is likely to be able to make the manoeuvre with greater ease due to its rear wheel steering. An Autotrack analysis of the reverse is shown below in Figure 8.12.

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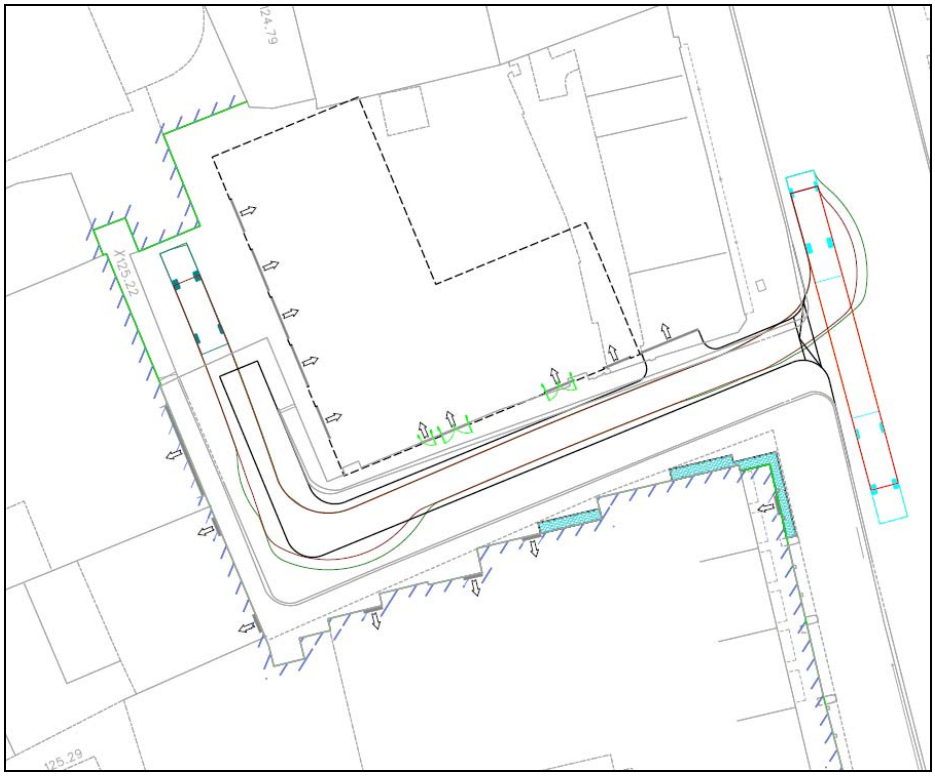

Figure 8.12 – GYB Lorry AutoTrack Test

The vehicle overruns the “carriageway” to allow room for the crane to lift the fan onto the lorry. The paving will be able to take this activity.

8.5 Interchange

While TCR forms an important interchange with other rail lines both east and west ticket halls provide interchange with other modes, Buses, Taxis and Cycles. Figure 8.13 shows the other key modes at TCRw.

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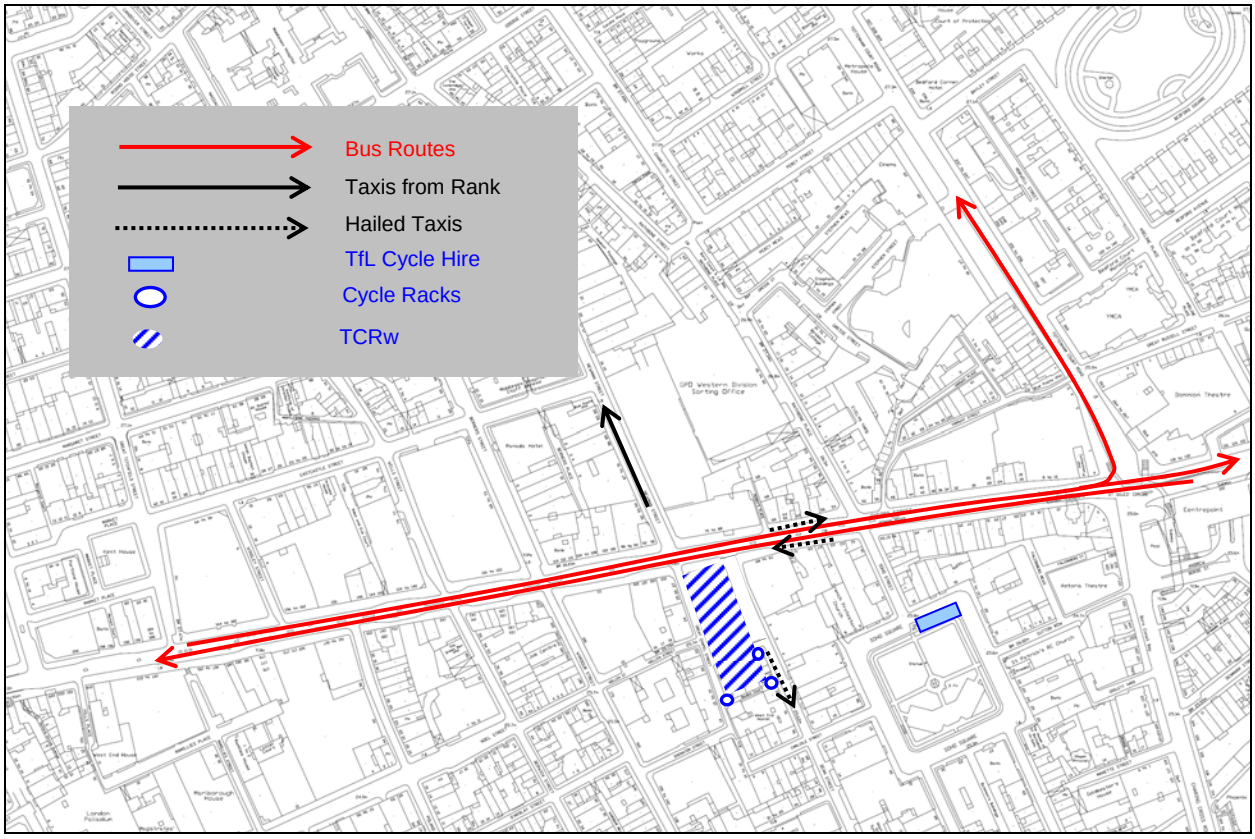

Figure 8.13 – Other Modes at TCRw

8.6 Buses

All the buses that stop close to TCRw run east west along Oxford Street. Given that Crossrail runs east west it is anticipated that there will be lower interchange with Buses at TCRw than at TCRe with the north south routes along Tottenham Court Road and Gower Street. There may, however be interchange with routes such as the 73 heading east to and from UCH, Euston and Kings Cross.

There are existing bus stops either side of TCRw, and they are not affected by the highway changes. Interchange with the eastbound stops will be helped by the new pedestrian crossing in the Aspirational Highway Layout.

8.7 Taxis

Unlike buses taxis will be able to provide penetration into the areas either side of Oxford Street. Improvements to the north south taxi movements across Oxford Street are being studied by TfL and the City of Westminster to improve this penetration and also the encourage taxis away from Oxford Street to aid the improvement of the overall environment in Oxford Street. Although Crossrail are not involved in this initiative it sits well with the Crossrail aspirations

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Locations for Taxi Ranks

Given the lack of turning facilities off Oxford Street and the preference of people to hail taxis already heading in the direction that they want to go it is likely that east-west taxis will still be hailed on Oxford Street and north south on the side streets.

It will not be possible to provide ranks in Dean Street or Great Chapel Street and thus the nearest suitable location for a rank, provided by Westminster in conjunction with the Public Carriage Office, would be Newman Street, northbound. This would allow movements to the north. Southbound movements are likely to be catered for by hailing in Dean Street; however the delay to other vehicles caused by this will be low and the demand for taxis in Dean Street may be low given the onward route through Soho Square.

Ranks on Oxford Street are likely to be resisted by TfL and London Buses. Hailing will still take place for taxis on Oxford Street in both directions and the proposed crossing over Oxford Street at the north end of Dean Street will assist eastbound travellers. However, footway width at the station is at a premium and thus formal ranks are not being proposed on Oxford Street - this is in line with City of Westminster aspirations.

8.8 Cycles

Cycling

Manual for Streets in para 6.4.1 says cyclists should generally be accommodated on the carriageway. In areas with low traffic volumes and speeds, there should not be any need for dedicated cycle lanes on the street.

Around the station flows and speed are indeed low and thus no dedicated facilities for cycles are needed.

Cycle Parking

There are distinct types of uses for cycle associated with the station. These are based around the difference between:

- Cycle → Train – people cycling to the station to catch Crossrail (or Underground) and
- Train → Cycle – people cycling way from the station after arriving via Crossrail.

For both scenarios there will be a spilt between those who use their own bike and those who use the cycle hire scheme.

For those using their own bikes, street stands will be provided, close to the station entrance, as part of the urban realm. These will be south of Fareham Street in Diadem Court. While there is space at the station entrance cycle parking will detract from the arrival space; see Figure 8.14.

Figure 8.14 – Street Cycle Parking in a "Pedestriansed" Area

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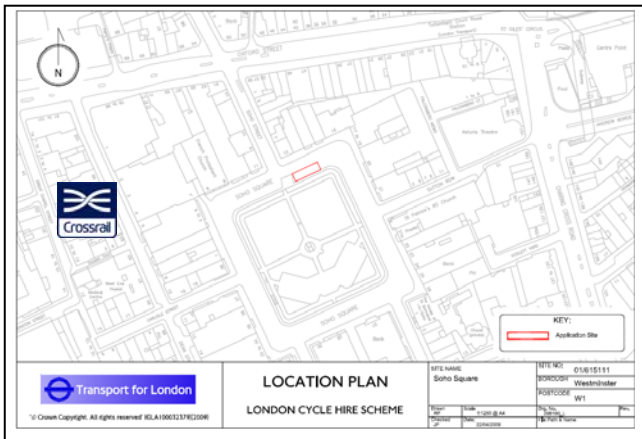
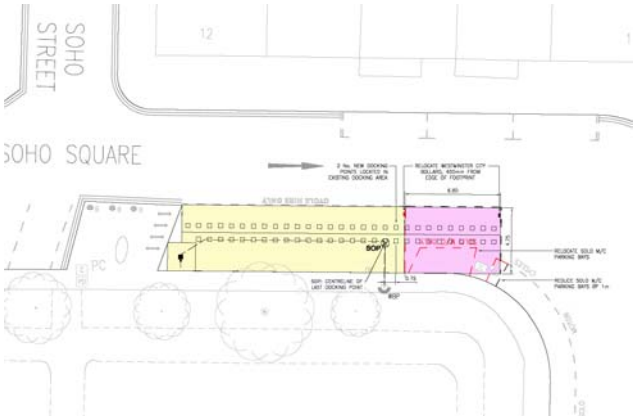
This is in line with the Crossrail Transport Integration Standards and Guidelines (CTISG) which highlights that cycle parking facilities should be as close as possible to the station entrance/exit. There is space in other adjacent streets, such as Soho Square and Newman Street and use of these will be developed in conjunction with Westminster.

Longer term cycle parking, in terms of lockers and the like will not be provided within the station buildings although space may be provided elsewhere by others, either public bodies, as at Finsbury Park, or commercially, as at London Bridge. Such facilities would also be usable by Train→ Cycle, picking up cycles close to the station after travelling in by rail although lack of a local site close by TCRw may initially preclude that. Such sites may be achievable though the planning process.

For Train→ Cycle who do not use their own bikes a cycle hire docking station is being provided in Soho Square (see Figure 8.15). Whilst at present this will be the only cycle hire dock in the area, plans are currently underway for its extension and more could be provided in due course, for example in Newman Street.



Current Scheme



Planned Extension

Figure 8.15 – TfL Cycle Hire Station in Soho Square

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9 Conclusions

9.1 Schedule 7

There is no impact on the free movement of vehicular traffic from the re-location of Fareham Street and the operational robustness of the station is not dependant on other changes to the street pattern. Pedestrian condition and routes are not compromised by the change in station entrance and the relocation north of Fareham Street. Thus there are no grounds for refusal of consent for the schedule 7 on grounds of free flow of traffic.

9.2 Urban Realm

In order to meet the aspiration of ORB, the Soho Area Action Plan and TfL's new pedestrian comfort guidance, changes to the streets, including footway widening and a pedestrianisation of Dean Street north of Fareham Street, are being recommended. These together with wayfinding, a new crossing over Oxford Street, parking and servicing strategies, and surface enhancements, collectively known as Urban Realm enhancements, are being developed as the final street restoration strategy.

Thus walking to and from the station will be as simple and pleasant as practicable.

9.3 Traffic and Servicing

Traffic effects of the Urban Realm are minor, and affect only the northern end of Dean Street. Servicing of the station and the over site development will be from street. Footway pads are recommended to allow maximum space for passengers.

9.4 Interchange

The key interchanges at TCRw are with Buses and Taxis.

Onward bus connections are available within a short walk of TCRw, consistent with the Crossrail aspiration for all interchanges to be located within a 2 minute walk of a station entrance/exit (as outlined in the Crossrail Transport Interchange Standards & Guidelines report dated April 2010.

Taxi ranks are available on Tottenham Court Road, however there is a high flow of taxis on surrounding streets so taxis should be easily accessible without provision of a formal taxi facility.

Cycle parking will be available close to the station, both as part of the Urban Realm and in the wider area. Secure parking is not possible in the station curtilage but may be deliverable, in the medium to long term, through planning gain. A cycle-hire docking station is provided in Soho Square.

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10 Consents

The permanent highway consents required for the Highway Restoration Plan and for the Urban Realm are shown in Figure 10.1 and set out in Table 10.1.

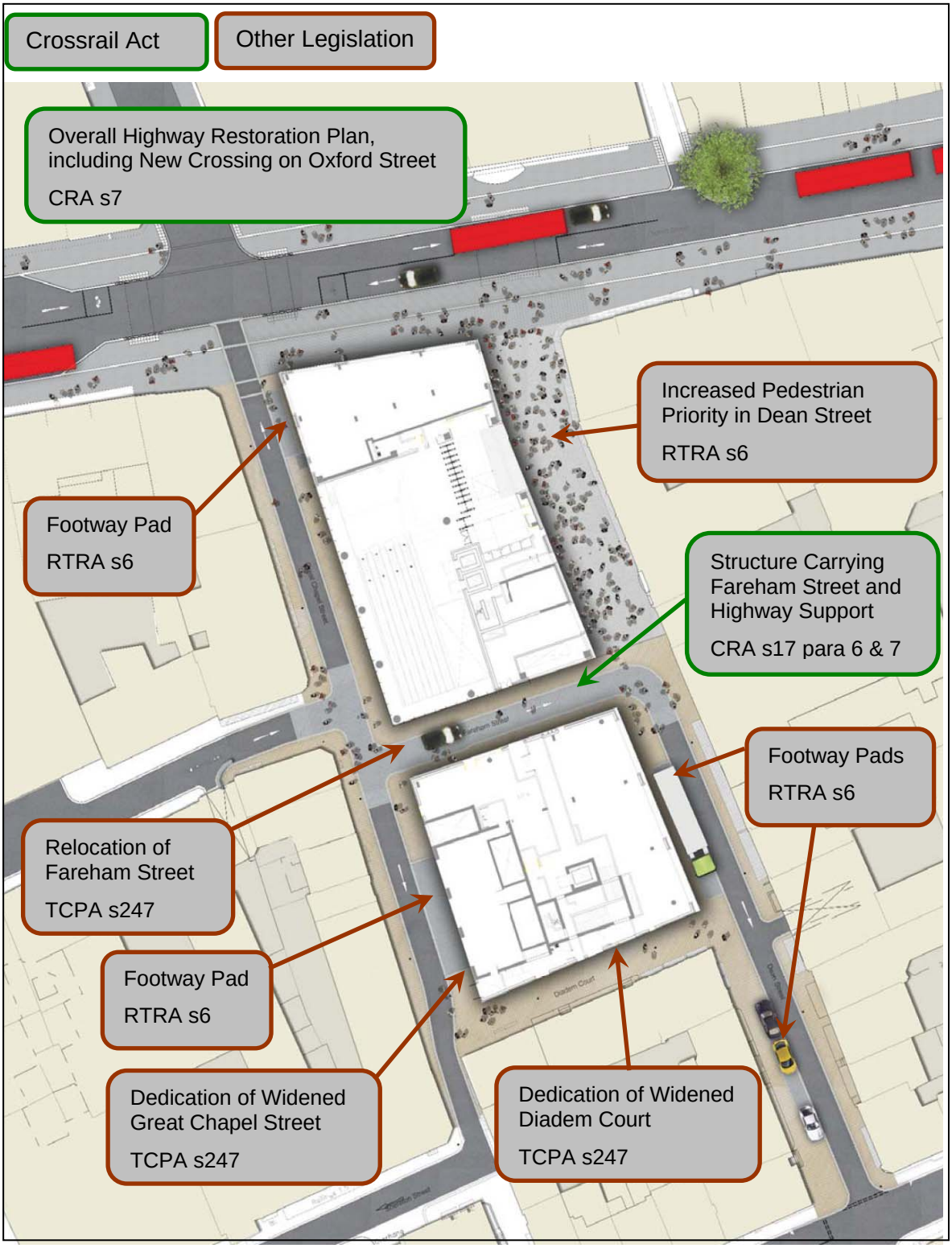

Figure 10.1 – Required Consents

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These consents are under both the Crossrail Act and general highway legislation and are, by and large, in the gift of Westminster. They will be formally applied for either in parallel with, or immediately following receipt of, the Schedule 7 consent, as with normal planning related highway consents, stopping ups, relocations and adoptions.

The approach to consent submissions and the type of consent required has been discussed with the relevant officers at Westminster. The details and format of the consent will be discussed further with Westminster to maximise the chances of a successful outcome.

Consent	Act	Comments
Final Highway Boundary (Fareham Street, Great Chapel Street and Diadem Court)	Town and Country Planning Act 1990 Section 247	Advice from Westminster is that all the changes to the highway extents should be covered by a single order under section 247 of the Town and Country Planning Act. In effect the old Fareham Street is to be stopped up and replaced by the new Fareham Street, a widening of Diadem Court and a widening of Great Chapel Street. This consent will be submitted either in parallel with, or immediately following receipt of, the Schedule 7 consent
Final Urban Realm Layout (Dean Street and Waiting and Loading)	Road Traffic Regulation Act 1984 Section 6	Dean Street is to remain public highway but vehicles will be excluded from using it through an order under section 6 of the Road Traffic regulation Act; which will also be used to manage waiting and loading. This consent will need to be in place by the time the highway restoration plan is implemented
Highway Projection Licence (over)	Highways Act 1980 Section177	No projections over the highway are currently part of the schedule 7 proposals
Highway and Highway Support Consent	Crossrail Act Schedule 17, Part 1 paragraph 4	The diaphragm and secant pile walls of the underground station box will support the highway from the side and project under the highway. The station structure will support the new Fareham Street and the utilities trench that underlies it. As such the structure will support the highway and will be covered by Schedule 17 part 1 paragraph 6 and 7 of the Crossrail Act – See Note 1 The consent will be in place by the end of RIBA Stage F
Highway Restoration Plan	Crossrail Act Schedule 7 paragraph 11 (2)	The reinstatement of the highways taken over by Crossrail under schedule 3 of the Crossrail Act, and the Urban Real changes set out in this and other reports is covered by Schedule 7 Paragraph 11 (2) of the Crossrail Act – See Note 2

Table 10.1- Permanent Highway Consents

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Note 1

Crossrail Act Schedule 17

Paragraph 6

The nominated undertaker shall not, without the consent of the highway authority, construct any part of the works authorised by this Act under and within 8 metres of the surface of any highway which comprises a carriageway except in accordance with plans submitted to, and approved by, the highway authority; and if within 28 days after such plans have been submitted the highway authority has not approved or disapproved them, it shall be deemed to have approved the plans as submitted.

Paragraph 7

The nominated undertaker shall secure that so much of the works authorised by this Act as is constructed under any highway shall be so designed, constructed and maintained as to carry the appropriate loading recommended for highway bridges by the Secretary of State at the time of construction of the works, and the nominated undertaker shall indemnify the highway authority against, and make good to the highway authority, the expenses which the highway authority may reasonably incur in the maintenance or repair of any highway, or any tunnels, sewers, drains or apparatus therein, by reason of non-compliance with the provisions of this paragraph.

Note 2

Crossrail Act Schedule 7 paragraph 11

(1) Where development consists of or includes the carrying out on any site of operations ancillary to the construction of any of the scheduled works, those operations shall be discontinued as soon as reasonably practicable after the completion of the relevant scheduled work or works.

(2) The nominated undertaker shall, following discontinuation of the use of any site for carrying out operations ancillary to the construction of any of the scheduled works, restore the site in accordance with a scheme agreed with the local planning authority.

(3) If, in relation to a site used for carrying out operations ancillary to the construction of any of the scheduled works, no scheme has been agreed for the purposes of sub-paragraph (2) within 6 months of the completion of the relevant scheduled work or works, the scheme shall be such as the appropriate Ministers may determine after consultation with the nominated undertaker and the local planning authority.

(4) Where, independently of any consultation under sub-paragraph (3), the appropriate Ministers ask the local planning authority for assistance in connection with the carrying out by them of their function under sub-paragraph (3), they may require the nominated undertaker to reimburse to the planning authority any expenses which it reasonably incurs in meeting the request.

(5) Sub-paragraph (2) shall not apply to a site to the extent that it consists of land to which a scheme under paragraph 8 applies.

(6) Sub-paragraph (2) shall not apply where the site is one in relation to which the nominated undertaker is subject to an obligation under paragraph 2(1) of Schedule 5.

(7) In this paragraph, references to the relevant scheduled work or works, in relation to any site, are to the scheduled work or works to which the operations carried out on that site were ancillary.

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11 Design Development

11.1 Urban Realm

The Urban Realm proposals are being developed in close co-ordination with the highways design, see Appendix E for the Highways General Arrangement Draiwngs, and the architectural design of the station entrance, and over the coming months we will seek to develop the detailed design of the areas covered by this study to the equivalent of RIBA stage E. This will include additional detail on paving materials, lighting strategy, wayfinding, and street furniture. All designs will be produced in liaison with Westminster City Council and other stakeholders, and will be in keeping with relevant design guidance such as Westminster Way.

The Urban Realm proposals will be incorporated in, and delivered on street as part of, the highway restoration plan and the detailed highway design to RIBA F will be developed to deliver the Urban Realm proposals.

The work on the Highways and Urban Realm has been, and will be, undertaken in conjunction and consultation with Westminster and other Stakeholders and will now include:

- Paving Materials;
- Street Furniture;
- Lighting; and
- Wayfinding.

Figure 11.1 – Paving Examples

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11.2 Highways Costs

The site restoration plan for the streets taken over for the TCRw works has two elements:

- the basic restoration and
- the urban realm enhancements

Basic

The basic restoration plan allows for the like for like replacement of the carriageways, kerbs and footways. The carriageways are currently asphalt and the footways mastic. It must be assumed that the level of utility works and the piling and diaphragm walling will mean that the streets will in effect need complete reconstruction. This has been allowed for the areas within the existing hoarding. An allowance has been made for carriageway resurfacing in Oxford Street and in the section of Dean Street between Diadem Court and Carlisle Street.

Urban Realm Enhancements

The main differences between the basic and enhanced layouts are the kerb lines and the change in materials. The change in kerbline will have a minimal effect on costs. The main effect will be from the materials and the key enhancements allowed for are:

- York Stone in the footways
- Sett carriageway in Fareham Street, and
- Enhanced paving in Dean Street outside the station entrance.

No allowance has been included for vehicle exclusion and security.

Comparative Costs

Indicative costs for each location and for both the basic highway reinstatement only and including the Urban Realm Enhancement are shown in Tables 11.1 and 11.2. The details are set out in Appendix F

Basic	£720k
Enhanced	£1,130k

Table 11.1 – Costs TCRw

Basic	£160k
Enhanced	£400k

Table 11.2 – Costs GYB

Oxford Street

On Oxford Street the only change in the enhanced layout is the provision of a new crossing opposite Dean Street and the footway works consequent on the changes in Dean Street.

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11.3 RIBA F Design Highway Layouts

Standards

The standards used in the highways are those applicable to streets work in Westminster, specifically the Westminster Way. The design has also been informed by the ORB Action plan and the Soho Action Plan.

Other guidance used included TfL Streetscape Manual and Streets for All. The design incorporated PRM needs via reference to the DfT Inclusive Mobility.

Reference should be made to the Urban Design Report C134-OVE-T-RGN-N105-00004

Thresholds

The thresholds used for the highways design are:

- for building that will remain → the existing thresholds; and
- for the Crossrail developments the internal floor levels used are:
    - Station Western Ticket Hall 125.96;
    - South Services Block 125.80; and
    - Goslett Yard Services Block 125.162.

Specification

As set out in Schedule 7 Para 11 (2) the specification will be agreed between Crossrail and the Planning Authority. The planning authority is the City of Westminster and they are also the highway authority; thus it should be anticipated that the specification to be used will that current at the date of the agreement.

Addenda to the specification will need to be agreed to cover the items not covered, particularly the paving for the section of Dean Street outside the station entrance, between Oxford Street and Fareham Street; refer to Para 3.4 and 4.6 of the Urban Design Report.

Drawings

The detailed highway design drawings are shown in table 11.3

Drawing Number	Drawing Title
C134-OVE-D-DDL-N105_1- 00100	General Arrangement Northwest
C134-OVE-D-DDL-N105_1- 00101	General Arrangement Southwest
C134-OVE-D-DDL-N105_1- 00102	General Arrangement Goslett Yard
C134-OVE-D-DDL-N105_1- 00106	Highway Land Use and Operation (West)
C134-OVE-D-DDL-N105_1- 00115	Highway Land West
C134-OVE-D-DDL-N105_1- 00125	Highway Works Key Plan
C134-OVE-D-DDA-N105_1- 00111	Surface Levels (Contours) Oxford Street 1 / Hollen Street
C134-OVE-D-DDA-N105_1- 00112	Surface Levels (Contours) Oxford Street 2
C134-OVE-D-DDA-N105_1- 00113	Surface Levels (Contours) Fareham Street / Dean Street
C134-OVE-D-DDA-N105_1- 00114	Surface Levels (Contours) Diadem Court / Dean Street

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C134-OVE-D-DDA-N105_1- 00117	Alignment Control Lines and Chainages (West)
C134-OVE-D-DDA-N105_1- 00118	Alignment Control Lines and Chainages Goslett Yard
C134-OVE-D-DDA-N105_1- 00120	Surface Levels (Contours) Goslett Yard
C134-OVE-D-DDA-N105_1- 00140	Traffic Signs Layout Northwest
C134-OVE-D-DDA-N105_1- 00141	Traffic Signs Layout Southwest
C134-OVE-D-DDA-N105_1- 00142	Traffic Signs Layout Goslett Yard
C134-OVE-D-DDA-N105_1- 00160	Pavements & Kerbs Layout Northwest
C134-OVE-D-DDA-N105_1- 00161	Pavements & Kerbs Layout Southwest
C134-OVE-D-DDA-N105_1- 00162	Pavements & Kerbs Layout Goslett Yard
C134-OVE-D-DDA-N105_1- 00166	Carriageway Surface Treatment
C134-OVE-D-DDA-N105_1- 00180	Drainage Layout West
C134-OVE-D-DDA-N105_1- 00181	Drainage Layout Goslett Yard
C134-OVE-D-DDA-N105_1- 00202	Topographical Survey Contours Northwest
C134-OVE-D-DDA-N105_1- 00203	Topographical Survey Contours Southwest
C134-OVE-D-DDA-N105_1- 00205	Topographical Survey Contours East
C134-OVE-D-DDA-N105_1- 00206	Topographical Survey Contours and Thresholds Oxford / Hollen Street
C134-OVE-D-DDA-N105_1- 00207	Topographical Survey Contours and Thresholds Fareham / Dean Street
C134-OVE-D-DDA-N105_1- 00208	Topographical Survey Contours and Thresholds Diadem Court / Dean Street
C134-OVE-D-DDA-N105_1- 00209	Topographical Survey Contours and Thresholds Goslett Yard
C134-OVE-D-DDB-N105_Z-00101	Cross Sections Great Chapel Street - Sheet 1
C134-OVE-D-DDB-N105_Z-00102	Cross Sections Great Chapel Street - Sheet 2
C134-OVE-D-DDB-N105_Z-00103	Cross Sections Great Chapel Street - Sheet 3
C134-OVE-D-DDB-N105_Z-00104	Cross Sections Great Chapel Street - Sheet 4
C134-OVE-D-DDB-N105_Z-00105	Cross Sections Great Chapel Street - Sheet 5
C134-OVE-D-DDB-N105_Z-00106	Cross Sections Great Chapel Street - Sheet 6
C134-OVE-D-DDB-N105_Z-00107	Cross Sections Dean Street -South Sheet 1
C134-OVE-D-DDB-N105_Z-00108	Cross Sections Dean Street -South Sheet 2
C134-OVE-D-DDB-N105_Z-00109	Cross Sections Dean Street -South Sheet 3
C134-OVE-D-DDB-N105_Z-00110	Cross Sections Dean Street -North Sheet 1
C134-OVE-D-DDB-N105_Z-00111	Cross Sections Dean Street -North Sheet 2
C134-OVE-D-DDB-N105_Z-00112	Cross Sections Fareham Street Sheet 1

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C134-OVE-D-DDB-N105_Z-00113	Cross Sections Diadem Court Sheet 1
C134-OVE-D-DDB-N105_Z-00114	Cross Sections Oxford Street -West Sheet 1
C134-OVE-D-DDB-N105_Z-00115	Cross Sections Oxford Street -West Sheet 2
C134-OVE-D-DDB-N105_Z-00116	Cross Sections Oxford Street -West Sheet 3
C134-OVE-D-DDB-N105_Z-00120	Cross Sections Goslett Yard Sheet 1
C134-OVE-D-DDB-N105_Z-00121	Cross Sections Goslett Yard Sheet 2
C134-OVE-D-DDB-N105_Z-00130	Long Sections Westside Sheet 1
C134-OVE-D-DDB-N105_Z-00131	Long Sections Westside Sheet 2
C134-OVE-D-DDB-N105_Z-00132	Long Sections Goslett Yard
C134-OVE-D-DDB-N105_Z-00140	Typical Construction Cross Sections
C134-OVE-D-DDH-N105_1-00110	Swept Paths for Large Fire Engine
C134-OVE-D-DDH-N105_1-00111	Swept paths for Bin Lorries Sheet 1
C134-OVE-D-DDH-N105_1-00112	Swept paths for Bin Lorries Sheet 2
C134-OVE-D-DDJ-N105_1-00100	Modular Pavement Schedule
C134-OVE-D-DDJ-N105_1-00101	Bituminous Pavement Schedule
C134-OVE-D-DDJ-N105_1-00105	Drainage Schedules

Table 11.3 – Detailed Highway Design Drawings

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Appendix A - Technical Note
Microsimulation Modelling Assumptions

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DRAFT Technical Note

Project:	Crossrail Dean St	**To:**	
Subject:	Microsimulation modelling assumptions	**From:**	Giorgio Salani
Date:	10/2/10	**cc:**	

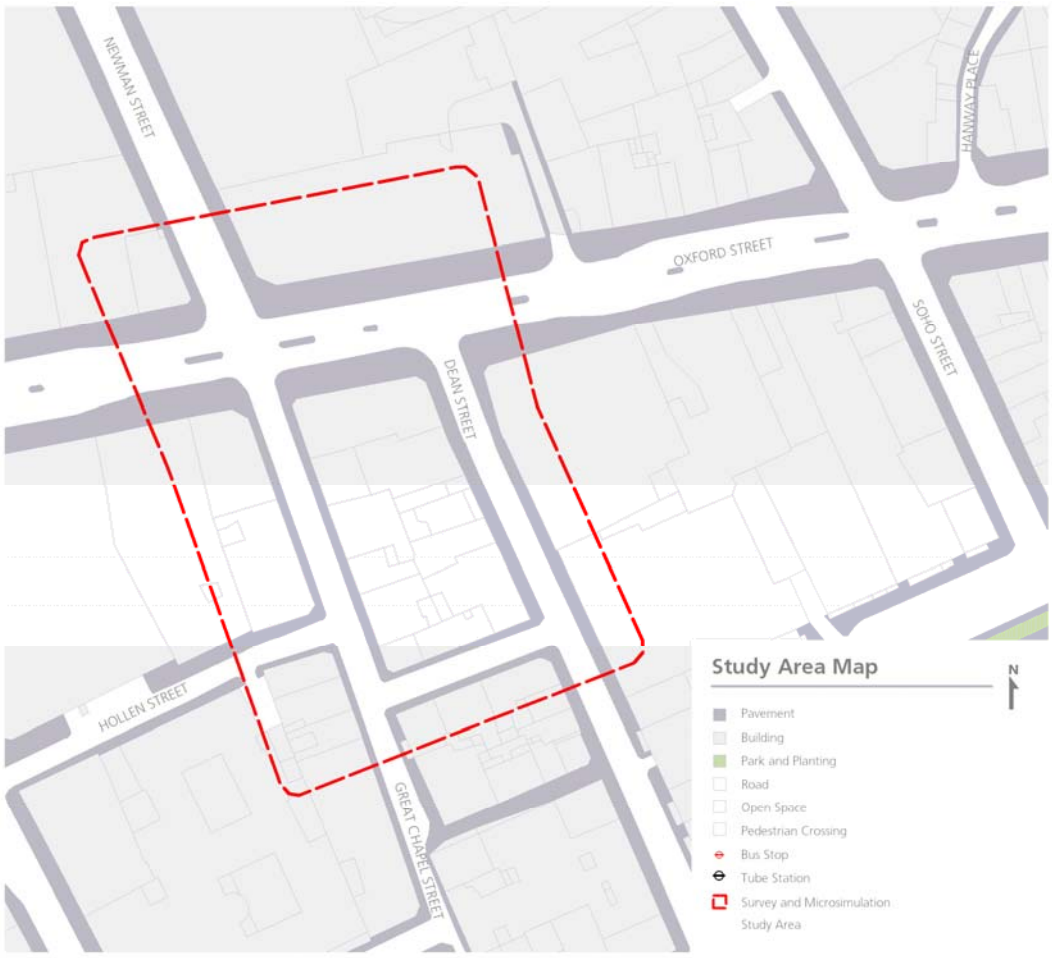
1. Background

This document contains a summary of the assumptions used in the Legion microsimulation modelling of the streets surrounding the proposed Dean Street Crossrail Station in London. The models have been created by Atkins to be used by Arup for modelling the scheme with the Crossrail station in place.

1.1 Study area

The study area is shown in Figure 1 below.

Figure 1 Study area



2. Microsimulation Modelling Assumptions

2.1 CAD drawings

The models are based on the CAD file named “1i0100-c1g00-s01-p-50002.dwg”. Where the file does not show the extent and width of the pedestrian crossing facilities they have been assumed to be at least 4 m wide and in line with the footways.

2.2 Modelling time periods and extent

The microsimulations assess worst case scenarios. A total of three models are produced to reflect the peak pedestrian activity at different times. These are:

- Weekday AM peak (09:00 - 10:00)
- Weekday PM peak (18:00 - 19:00)
- Saturday peak (16:00 - 17:00)

The peak hour flows considered in the models are based on observation studies conducted by Atkins on Thursday 14th and Saturday 16th January 2010.

The model time period is 80 minutes comprising:

- a 15-minute “warm up” period;
- the peak hour in question; and
- a 5-minute “cool down” period to allow people in the model to reach their destinations.

2.3 About the surveys

Pedestrian flow counts were conducted on Thursday 14th and Saturday 16th January. To identify the hour of peak pedestrian activity, the Thursday surveys were carried out from 08:00 to 10:00, and 17:00 to 19:00. On the Saturday, they were conducted between 14:30 and 17:30.

The map in Figure 2 shows the location of the flow gates where the counts were taken.

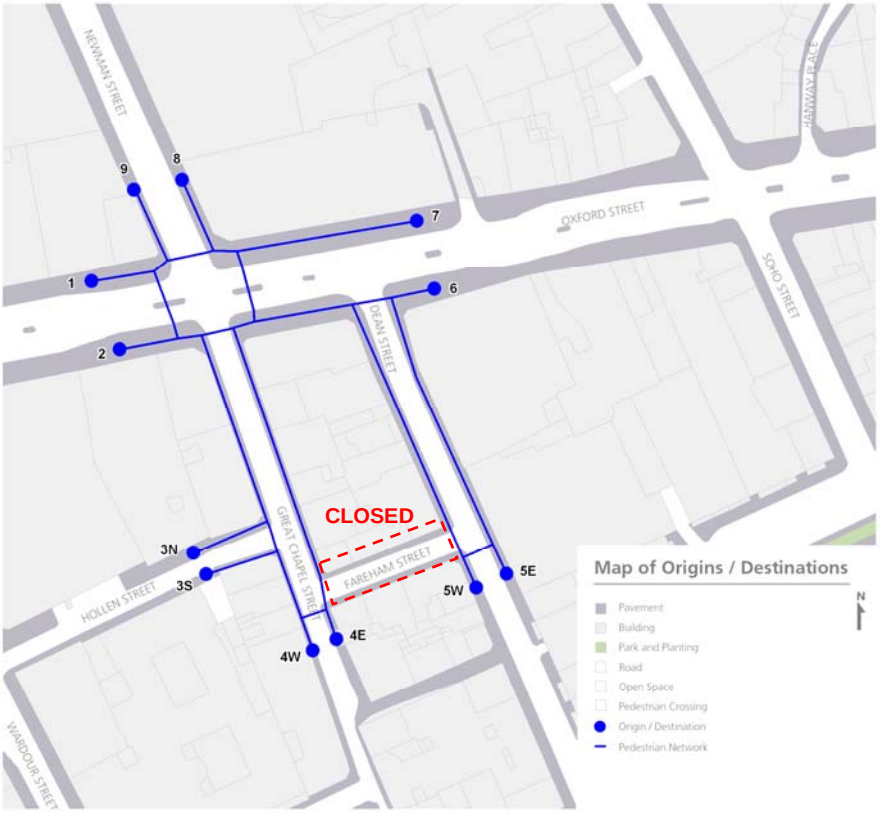
12-minute counts were taken every half hour at all locations with the exception of the crossing (X1, X2, X3 and X4) and the side streets south of Oxford Street (A3, A4 and A5), where 5-minute counts were taken instead.

Figure 2 Location of Flow Gates

2.4 Origin / Destination Points

The map in Figure 3 shows the location of the pedestrian origins / destinations and the pedestrian network considered in the models. Fareham Street was closed at the time of the surveys and is not included in the models.

Figure 3 Pedestrian network and ODs



2.5 Demand Data

The demand data for the three models has been calculated based on the results of the observation studies. The flows in and out of the modelled area during the three peak hours considered are shown in the table below. This data does not include demand for the “warm up” period.

	Weekday AM		Weekday PM		Saturday	
Location	**Flow IN**	**Flow OUT**	**Flow IN**	**Flow OUT**	**Flow IN**	**Flow OUT**
Oxford St West North	525	425	1787	1745	2177	2372
Oxford St West South	440	580	1437	1435	1852	1757
Hollen St	167	97	150	427	147	230
Great Chapel St	60	237	212	357	142	205
Dean St	282	465	611	661	595	437
Oxford St East South	847	297	1690	2225	2007	2532
Oxford St East North	837	510	1747	1944	2970	2715
Newman St East	87	240	535	215	112	82
Newman St West	37	225	185	110	50	50
TOTAL	**3282**	**3076**	**8354**	**9119**	**10052**	**10380**

2.5.1 OD Matrix

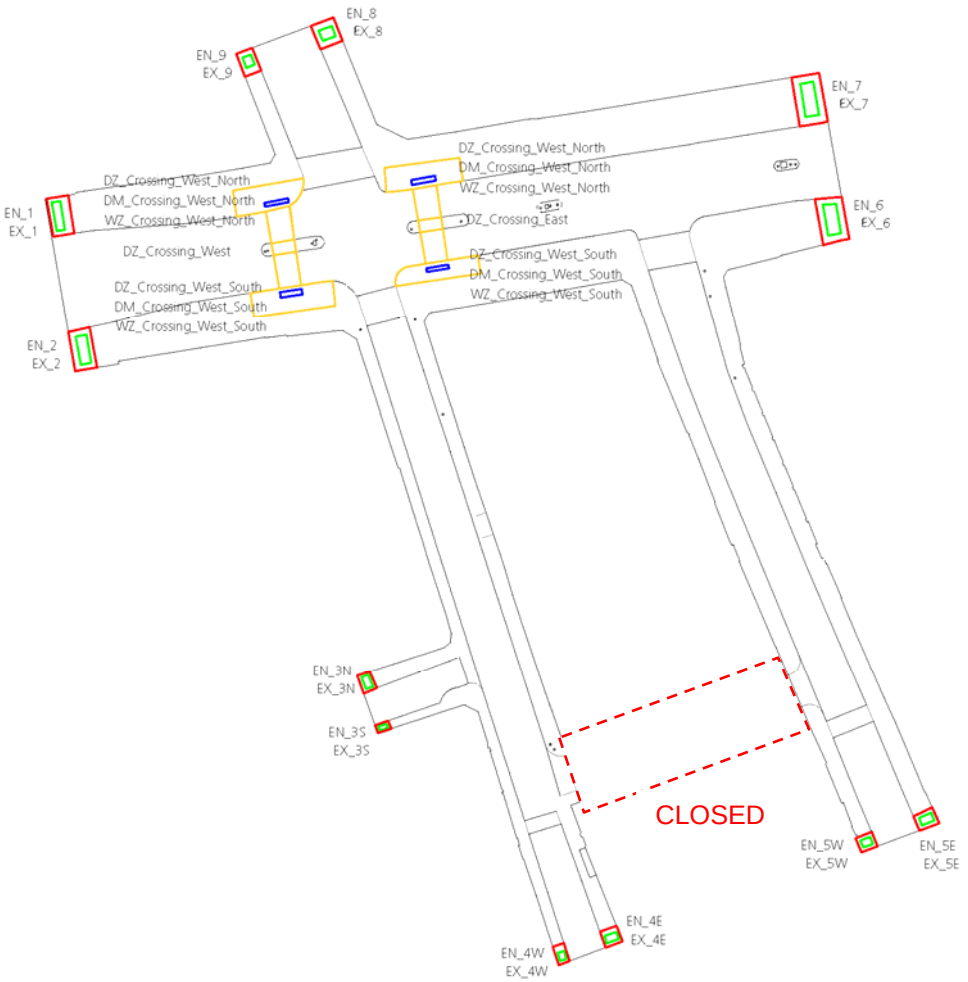
OD matrices were created using the flow data outlined above for each peak hour. These were further refined using Emme2 software to create the input matrices to be used in the microsimulation.

2.6 Activity Objects in Legion

The activity objects used in the microsimulation are shown in Figure 4 below. The figure can be used as a reference to the microsimulation model. The object labels shown are the same as those used in the .lgm file. The abbreviations are explained below:

- EN = entrance;
- EX = exit;
- DZ = drift zone;
- DM = direction modifier;
- WZ = waiting zone.

Figure 4 Legion activity objects



2.7 Operational Information

Pedestrians enter and exit the model space using the footways shown in Figure 3 on page 4.

2.7.1 Crossing facilities

A pedestrian formal crossing facility is in place at the junction of Oxford St with Newman St and Great Chapel St. Signal timings on the Eastern arm of the crossing were observed on site and listed below:

- Green man period: 4 seconds
- Blackout period: 5 seconds
- Red man period: 1 minute 2 seconds

These are used in the models for both the Eastern and the Western arms located between the two sides of Oxford St. The arms along Oxford Street itself are unsignalised and treated the same as footways.

The models do not take into account informal crossing.

2.7.2 Buildings

Flows to and from buildings are not included in the models.

2.7.3 Street pavements split

Due to the limitations encountered during the observation studies (e.g. presence of hoardings), flows on both pavements on Dean St, Hollen St and Great Chapel St were counted as one. A 50/50 split is assumed for these pavements. Fareham St was not accessible at the time of the surveys and is not part of the modelled pedestrian network.

2.8 People Profiles

Pedestrians have a walking speed profile of UK commuters. We assume that pedestrians are not encumbered with luggage (e.g. suitcases). Pedestrians are coloured according to their destinations, which are:

- RED: Oxford Street (South)
- ORANGE: Oxford Street (North)
- GREEN: Dean Street
- LIGHT BLUE: Great Chapel Street
- YELLOW: Newman Street
- PINK: Hollen Street

People with restricted mobility (PRM) are not taken into account in the model.

2.9 Validation

According to TfL street modelling guidelines the simulation was processed three times to identify errors.

The model result OD matrix was compared to the input OD matrix for each simulation run. The result OD matrices match the input OD matrix.

Appendix B - Number of People passing each Decision Point

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Example Worksheet: Weekday AM Figures

Information

Gate Line Flow	700 (Rail Plan Figure)
In By Percentage	85%
Off Percentage	15%
Total Trips - In By	**595**
Total Trips - Off	**105**

STEP 1

Outer Zone of Influence	DP used	Area Size (m2)	Percentage of Area Calcs	Percentage of Area Total	Percentage overall Calcs	Percentage overall Total
NE	Hanway	1060	=E18/(E18+E19)	0.09	=E18/E28	**0.41%**
	Rathbone	10980	=E19/(E19+E18)	0.91	=E19/E28	**4.21%**
N	Rathbone	9960	=E20/(E20+E21)	0.26	=E20/E28	**3.82%**
	Newman	27730	=E21/(E20+E21)	0.74	=E21/E28	**10.63%**
NW	Wells	5050	=E22/(E23+E22+E2	0.08	=E22/E28	**1.94%**
	Berners	38900	=E23/(E24+E23+E2	0.65	=E23/E28	**14.91%**
	Newman	15640	=E24/(E22+E23+E2	0.26	=E24/E28	**5.99%**
S	Broadwick	82980	=E25/(E27+E26+E2	0.55	=E25/E28	**31.80%**
	Soho S	28780	=E26/(E25+E27+E2	0.19	=E26/E28	**11.03%**
	Dean	39890	=E27/(E25+E26+E2	0.26	=E27/E28	**15.29%**
	TOTAL	260970				1

STEP 2

Sub Zone within Inner Area of Influence	DP used		INNER AREA (measured) (m2) NW	NE	SW	SE
NW1	Ox		13700			
NW2	Wells		38400			
NW3	Berners		8300			
NE1	Berners			12500		
NE2	Newman			28300		
NE3	Rathbone			21300		
NE4	Hanway			7000		
SW1	Ox				6500	
SW2	Noel				9400	
SW3	D'Arblay	Broadwick			16300	
(split)	0.71	0.29				
SE1	Noel					21400
SE2	D'Arblay					11000
SE3	D'Arblay	Broadwick				45900
(split)	0.35	0.65				
SE4	Dean					26400
SE5	Soho S					24900
SE6	Soho N					15200
TOTALS			60400	69100	32200	144800
						306500

DP	DP Total Area	Calcs
Ox	**20200**	=N19+P26
Wells	**38400**	=N20
Berners	**20800**	=N21+O22
Newman	**28300**	=O23
Rathbone	**21300**	=O24
Hanway	**7000**	=O25
Noel	**30800**	=P27+Q30
D'Arblay	**38638**	=(P28*L29)+(Q32*L33)+Q31
Dean	**26400**	=Q34
Soho S	**24900**	=Q35
Soho N	**15200**	=Q36
Broadwick	**34562**	=(P28*M29)+(Q32*M33)
TOTAL	**306500**	

STEP 3

DP	DP area size	Likely decision points met Outer NE	Outer N	Outer NW	Outer S	Inner Zone trip numbers Calcs	Total	Calcs	Outer Total	Calcs	Total No. Total
Ox	20200					=D11*(D46/D58)	39	N/A		=SUM(J46:L46)	39
Wells	38400			8%		=D11*(D47/D58)	75	=I22*D12	2	=SUM(J47:L47)	77
Berners	20800			66%		=D11*(D48/D58)	40	=I23*D12	16	=SUM(J48:L48)	56
Newman	28300		73%	26%		=D11*(D49/D58)	55	21*D12)+(I24*D	17	=SUM(J49:L49)	72
Rathbone	21300	9%	27%			=D11*(D50/D58)	41	19*D12)+(I20*D	8	=SUM(J50:L50)	50
Hanway	7000	91%				=D11*(D51/D58)	14	=I18*D12	0	=SUM(J51:L51)	14
Soho N	30800					=D11*(D52/D58)	60	N/A		=SUM(J52:L52)	60
Soho S	38638				19%	=D11*(D53/D58)	75	=I26*D12	12	=SUM(J53:L53)	87
Dean	26400				26%	=D11*(D54/D58)	51	=I27*D12	16	=SUM(J54:L54)	67
Broadwick	24900				55%	=D11*(D55/D58)	48	=I25*D12	33	=SUM(J55:L55)	82
D'Arblay	15200					=D11*(D56/D58)	30	N/A		=SUM(J56:L56)	30
Noel	34562					=D11*(D57/D58)	67	N/A		=SUM(J57:L57)	67
Totals	306500						595		105		700

Appendix C - Final Modelling Decision Points with Calculations

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Entrance

Decision Point	Route Name	Distance: On Ox St (m)	Distance: Off Ox St (m)	Distance: Total Walk Time Calculation	Distance: Result	Crossings: Traffic Signals	Crossings: Pelican	Crossings: Informal	Crossings: Total Wait Time Calculation	Crossings: Result	Total Travel Time	Number of People: Min	Number of People: Calculation	Number of People: Result	IS Decision Point
Hanway Street	Ox St A	114	62	=(D4*1)+(E4*1.33)	160	1	1	1	=(H5*40)+(I5*20)+(J5*5)	65	225	206	=IF(M5=MIN($M$5:$M$6),J59,0)	0	
	Ox St B	114	63	=(D5*1)+(E5*1.33)	161	1	0	1	=(H6*40)+(I6*20)+(J6*5)	45	206	206	=IF(M6=MIN($M$5:$M$6),J59,0)	14	6
Rathbone Place	Ox St A	97	20	=(D6*1)+(E6*1.33)	112	1	0	1	=(H7*40)+(I7*20)+(J7*5)	45	157	148	=IF(M7=MIN($M$7:$M$8),J58,0)	0	
	Ox St B	100	30	=(D7*1)+(E7*1.33)	123	0	1	1	=(H8*40)+(I8*20)+(J8*5)	25	148	148	=IF(M8=MIN($M$7:$M$8),J58,0)	50	7
	Ox St A	46	23	=(D8*1)+(E8*1.33)	63	0	1	1	=(H9*40)+(I9*20)+(J9*5)	25	88	88	=IF(M9=MIN($M$9:$M$11),J57,0)	72	8
Newman Street	Ox St B	36	20	=(D9*1)+(E9*1.33)	51	1	0	0	=(H10*40)+(I10*20)+(J10*5)	40	91	88	=IF(M10=MIN($M$9:$M$11),J57,0)	0	
	Ox St C	57	23	=(D10*1)+(E10*1.33)	74	1	0	0	=(H11*40)+(I11*20)+(J11*5)	40	114	88	=IF(M11=MIN($M$9:$M$11),J57,0)	0	
	Ox St A	128	20	=(D11*1)+(E11*1.33)	143	2	0	0	=(H12*40)+(I12*20)+(J12*5)	80	223	187	=IF(M12=MIN($M$12:$M$17),J56,0)	0	
	Ox St B	140	23	=(D12*1)+(E12*1.33)	157	1	1	1	=(H13*40)+(I13*20)+(J13*5)	65	222	187	=IF(M13=MIN($M$12:$M$17),J56,0)	0	
	Ox St C	132	20	=(D13*1)+(E13*1.33)	147	1	0	0	=(H14*40)+(I14*20)+(J14*5)	40	187	187	=IF(M14=MIN($M$12:$M$17),J56,0)	56	1
	Ox St D	104	109	=(D14*1)+(E14*1.33)	186	1	0	1	=(H15*40)+(I15*20)+(J15*5)	45	231	187	=IF(M15=MIN($M$12:$M$17),J56,0)	0	
Berners Street	Wardour St	15	207	=(D15*1)+(E15*1.33)	171	1	0	1	=(H16*40)+(I16*20)+(J16*5)	45	216	187	=IF(M16=MIN($M$12:$M$17),J56,0)	0	
	Great Chapel St	106	121	=(D16*1)+(E16*1.33)	197	1	0	0	=(H17*40)+(I17*20)+(J17*5)	40	237	187	=IF(M17=MIN($M$12:$M$17),J56,0)	0	
	Berwick St	18	286	=(D17*1)+(E17*1.33)	233	1	0	2	=(H18*40)+(I18*20)+(J18*5)	50	283	277	=IF(M18=MIN($M$18:$M$25),J55,0)	0	
	Wardour St A	76	207	=(D18*1)+(E18*1.33)	232	1	0	1	=(H19*40)+(I19*20)+(J19*5)	45	277	277	=IF(M19=MIN($M$18:$M$25),J55,0)	77	3
	Wardour St B	71	216	=(D19*1)+(E19*1.33)	233	1	0	2	=(H20*40)+(I20*20)+(J20*5)	50	283	277	=IF(M20=MIN($M$18:$M$25),J55,0)	0	
	Wardour St C	77	207	=(D20*1)+(E20*1.33)	233	2	0	1	=(H21*40)+(I21*20)+(J21*5)	85	318	277	=IF(M21=MIN($M$18:$M$25),J55,0)	0	
	Ox St A	202	22	=(D21*1)+(E21*1.33)	218	2	1	1	=(H22*40)+(I22*20)+(J22*5)	105	323	277	=IF(M22=MIN($M$18:$M$25),J55,0)	0	
	Ox St B	191	20	=(D22*1)+(E22*1.33)	206	3	0	0	=(H23*40)+(I23*20)+(J23*5)	120	326	277	=IF(M23=MIN($M$18:$M$25),J55,0)	0	
	Ox St C	193	20	=(D23*1)+(E23*1.33)	208	2	0	0	=(H24*40)+(I24*20)+(J24*5)	80	288	277	=IF(M24=MIN($M$18:$M$25),J55,0)	0	
Wells Street	Ox St D	190	22	=(D24*1)+(E24*1.33)	207	2	0	0	=(H25*40)+(I25*20)+(J25*5)	80	287	277	=IF(M25=MIN($M$18:$M$25),J55,0)	0	
	Berwick St	0	285	=(D25*1)+(E25*1.33)	214	0	0	2	=(H26*40)+(I26*20)+(J26*5)	10	224	224	=IF(M26=MIN($M$26:$M$29),J54,0)	39	3
	Wardour St A	62	274	=(D26*1)+(E26*1.33)	269	0	0	2	=(H27*40)+(I27*20)+(J27*5)	10	279	224	=IF(M27=MIN($M$26:$M$29),J54,0)	0	
	Wardour St B	65	207	=(D27*1)+(E27*1.33)	220	1	0	1	=(H28*40)+(I28*20)+(J28*5)	45	265	224	=IF(M28=MIN($M$26:$M$29),J54,0)	0	
Oxford Street	Ox St	180	19	=(D28*1)+(E28*1.33)	194	2	0	0	=(H29*40)+(I29*20)+(J29*5)	80	274	224	=IF(M29=MIN($M$26:$M$29),J54,0)	0	
Noel St	Hollen St	0	140	=(D29*1)+(E29*1.33)	105	0	0	1	=(H30*40)+(I30*20)+(J30*5)	5	110	110	=IF(M30=MIN($M$30:$M$30),J65,0)	67	3
	Hollen St	0	188	=(D30*1)+(E30*1.33)	141	0	0	1	=(H31*40)+(I31*20)+(J31*5)	5	146	146	=IF(M31=MIN($M$31:$M$33),J64,0)	30	3
D'Arblay Street	Sheraton St A	0	206	=(D31*1)+(E31*1.33)	155	0	0	1	=(H32*40)+(I32*20)+(J32*5)	5	160	146	=IF(M32=MIN($M$31:$M$33),J64,0)	0	
	Sheraton St B	0	207	=(D32*1)+(E32*1.33)	156	0	0	2	=(H33*40)+(I33*20)+(J33*5)	10	166	146	=IF(M33=MIN($M$31:$M$33),J64,0)	0	
	Hollen St	0	288	=(D33*1)+(E33*1.33)	217	0	0	2	=(H34*40)+(I34*20)+(J34*5)	10	227	214	=IF(M34=MIN($M$34:$M$37),J63,0)	0	
	Sheraton St A	0	278	=(D34*1)+(E34*1.33)	209	0	0	1	=(H35*40)+(I35*20)+(J35*5)	5	214	214	=IF(M35=MIN($M$34:$M$37),J63,0)	82	4
Broadwick Street	Sheraton St B	0	279	=(D35*1)+(E35*1.33)	210	0	0	2	=(H36*40)+(I36*20)+(J36*5)	10	220	214	=IF(M36=MIN($M$34:$M$37),J63,0)	0	
	St Anne's Court	0	272	=(D36*1)+(E36*1.33)	205	0	0	3	=(H37*40)+(I37*20)+(J37*5)	15	220	214	=IF(M37=MIN($M$34:$M$37),J63,0)	0	
Dean Street	Dean St	0	195	=(D37*1)+(E37*1.33)	147	0	0	2	=(H38*40)+(I38*20)+(J38*5)	10	157	157	=IF(M38=MIN($M$38:$M$38),J62,0)	67	5
Soho South	Dean St	0	220	=(D38*1)+(E38*1.33)	165	0	0	2	=(H39*40)+(I39*20)+(J39*5)	10	175	175	=IF(M39=MIN($M$39:$M$39),J61,0)	87	5
	Soho St	109	65	=(D39*1)+(E39*1.33)	158	0	0	1	=(H40*40)+(I40*20)+(J40*5)	5	163	163	=IF(M40=MIN($M$40:$M$41),J60,0)	60	6
Soho North	Dean St	0	247	=(D40*1)+(E40*1.33)	186	0	0	1	=(H41*40)+(I41*20)+(J41*5)	5	191	163	=IF(M41=MIN($M$40:$M$41),J60,0)	0	
														700	

DP	DP area size	Likely decision points met: Outer NE	Outer N	Outer NW	Outer S	Inner Zone trip	Outer Zone Trip	Total No. People per
Ox	20200					39		39
Wells	38400			8%		75	2	77
Berners	20800			66%		40	16	56
Newman	28300		73%	26%		55	17	72
Rathbone	21300	9%	27%			41	8	50
Hanway	7000	91%				14	0	14
Soho N	30800					60		60
Soho S	38638				19%	75	12	87
Dean	26400				26%	51	16	67
Broadwick	24900				55%	48	33	82
D'Arblay	15200					30		30
Noel	34562					67		67
Totals	306500					595	105	700

DP	Total People
1	56
2	0
3	212
4	82
5	154
6	74
7	50
8	72
9	0

Notes

Walk time = 1.33m/s off Ox St and 1.0m/s on Ox St.
Traffic Signals: assumes a 40 second delay time. Also assumes all green phases run simultaneously so 2 arms can be crossed in one phase.
Pelican Crossing: assumes a 20 second delay time.
Informal crossing: assumes a 5 second delay time. Takes the fewest number possible.
CRL station entrance taken as 22m from Oxford St.
Assumes new Pelican crossing on Oxford St to the north-west of Dean St is operational.
Route names relate to maps in Appendix C

Exit

Decision Point	Route Name	Distance: On Ox St (m)	Distance: Off Ox St (m)	Distance: Total Walk Time Calculation	Distance: Result	Crossings: Traffic Signals	Crossings: Pelican	Crossings: Informal	Crossings: Total Wait Time Calculation	Crossings: Result	Total Travel Time	Min	Number of People Calculation	Number of People Result	IS Decision Point
Hanway	Ox St A	114	62	=(D4*1)+(E4*1.33)	160	1	1	1	=(H5*40)+(I5*20)+(J5*5)	65	225	206	=IF(M5=MIN($M$5:$M$6),J59,0)	0	
Street	Ox St B	114	63	=(D5*1)+(E5*1.33)	161	1	0	1	=(H6*40)+(I6*20)+(J6*5)	45	206	206	=IF(M6=MIN($M$5:$M$6),J59,0)	**185**	6
Rathbone	Ox St A	97	20	=(D6*1)+(E6*1.33)	112	1	0	1	=(H7*40)+(I7*20)+(J7*5)	45	157	148	=IF(M7=MIN($M$7:$M$8),J58,0)	0	
Place	Ox St B	100	30	=(D7*1)+(E7*1.33)	123	0	1	1	=(H8*40)+(I8*20)+(J8*5)	25	148	148	=IF(M8=MIN($M$7:$M$8),J58,0)	**658**	7
	Ox St A	46	23	=(D8*1)+(E8*1.33)	63	0	1	1	=(H9*40)+(I9*20)+(J9*5)	25	88	88	=IF(M9=MIN($M$9:$M$11),J57,0)	**957**	8
Newman	Ox St B	36	20	=(D9*1)+(E9*1.33)	51	1	0	0	=(H10*40)+(I10*20)+(J10*5)	40	91	88	=IF(M10=MIN($M$9:$M$11),J57,0)	0	
Street	Ox St C	57	23	=(D10*1)+(E10*1.33)	74	1	0	0	=(H11*40)+(I11*20)+(J11*5)	40	114	88	=IF(M11=MIN($M$9:$M$11),J57,0)	0	
	Ox St A	128	20	=(D11*1)+(E11*1.33)	143	2	0	0	=(H12*40)+(I12*20)+(J12*5)	80	223	187	=IF(M12=MIN($M$12:$M$17),J56,0)	0	
	Ox St B	140	23	=(D12*1)+(E12*1.33)	157	1	1	1	=(H13*40)+(I13*20)+(J13*5)	65	222	187	=IF(M13=MIN($M$12:$M$17),J56,0)	0	
	Ox St C	132	20	=(D13*1)+(E13*1.33)	147	1	0	0	=(H14*40)+(I14*20)+(J14*5)	40	187	187	=IF(M14=MIN($M$12:$M$17),J56,0)	**740**	1
	Ox St D	104	109	=(D14*1)+(E14*1.33)	186	1	0	1	=(H15*40)+(I15*20)+(J15*5)	45	231	187	=IF(M15=MIN($M$12:$M$17),J56,0)	0	
Berners	Wardour St	15	207	=(D15*1)+(E15*1.33)	171	1	0	1	=(H16*40)+(I16*20)+(J16*5)	45	216	187	=IF(M16=MIN($M$12:$M$17),J56,0)	0	
Street	Great Chapel St	106	121	=(D16*1)+(E16*1.33)	197	1	0	0	=(H17*40)+(I17*20)+(J17*5)	40	237	187	=IF(M17=MIN($M$12:$M$17),J56,0)	0	
	Berwick St	18	286	=(D17*1)+(E17*1.33)	233	1	0	2	=(H18*40)+(I18*20)+(J18*5)	50	283	277	=IF(M18=MIN($M$18:$M$25),J55,0)	0	
	Wardour St A	76	207	=(D18*1)+(E18*1.33)	232	1	0	1	=(H19*40)+(I19*20)+(J19*5)	45	277	277	=IF(M19=MIN($M$18:$M$25),J55,0)	**1012**	3
	Wardour St B	71	216	=(D19*1)+(E19*1.33)	233	1	0	2	=(H20*40)+(I20*20)+(J20*5)	50	283	277	=IF(M20=MIN($M$18:$M$25),J55,0)	0	
	Wardour St C	77	207	=(D20*1)+(E20*1.33)	233	2	0	1	=(H21*40)+(I21*20)+(J21*5)	85	318	277	=IF(M21=MIN($M$18:$M$25),J55,0)	0	
	Ox St A	202	22	=(D21*1)+(E21*1.33)	218	2	1	1	=(H22*40)+(I22*20)+(J22*5)	105	323	277	=IF(M22=MIN($M$18:$M$25),J55,0)	0	
	Ox St B	191	20	=(D22*1)+(E22*1.33)	206	3	0	0	=(H23*40)+(I23*20)+(J23*5)	120	326	277	=IF(M23=MIN($M$18:$M$25),J55,0)	0	
	Ox St C	193	20	=(D23*1)+(E23*1.33)	208	2	0	0	=(H24*40)+(I24*20)+(J24*5)	80	288	277	=IF(M24=MIN($M$18:$M$25),J55,0)	0	
Wells Street	Ox St D	190	22	=(D24*1)+(E24*1.33)	207	2	0	0	=(H25*40)+(I25*20)+(J25*5)	80	287	277	=IF(M25=MIN($M$18:$M$25),J55,0)	0	
	Berwick St	0	285	=(D25*1)+(E25*1.33)	214	0	0	2	=(H26*40)+(I26*20)+(J26*5)	10	224	224	=IF(M26=MIN($M$26:$M$29),J54,0)	**518**	3
	Wardour St A	62	274	=(D26*1)+(E26*1.33)	269	0	0	2	=(H27*40)+(I27*20)+(J27*5)	10	279	224	=IF(M27=MIN($M$26:$M$29),J54,0)	0	
	Wardour St B	65	207	=(D27*1)+(E27*1.33)	220	1	0	1	=(H28*40)+(I28*20)+(J28*5)	45	265	224	=IF(M28=MIN($M$26:$M$29),J54,0)	0	
Oxford Street	Ox St	180	19	=(D28*1)+(E28*1.33)	194	2	0	0	=(H29*40)+(I29*20)+(J29*5)	80	274	224	=IF(M29=MIN($M$26:$M$29),J54,0)	0	
Noel St	Hollen St	0	140	=(D29*1)+(E29*1.33)	105	0	0	1	=(H30*40)+(I30*20)+(J30*5)	5	110	110	=IF(M30=MIN($M$30:$M$30),J65,0)	**887**	3
	Hollen St	0	188	=(D30*1)+(E30*1.33)	141	0	0	1	=(H31*40)+(I31*20)+(J31*5)	5	146	146	=IF(M31=MIN($M$31:$M$33),J64,0)	**390**	3
D'Arblay	Sheraton St A	0	206	=(D31*1)+(E31*1.33)	155	0	0	1	=(H32*40)+(I32*20)+(J32*5)	5	160	146	=IF(M32=MIN($M$31:$M$33),J64,0)	0	
Street	Sheraton St B	0	207	=(D32*1)+(E32*1.33)	156	0	0	2	=(H33*40)+(I33*20)+(J33*5)	10	166	146	=IF(M33=MIN($M$31:$M$33),J64,0)	0	
	Hollen St	0	288	=(D33*1)+(E33*1.33)	217	0	0	2	=(H34*40)+(I34*20)+(J34*5)	10	227	214	=IF(M34=MIN($M$34:$M$37),J63,0)	0	
	Sheraton St A	0	278	=(D34*1)+(E34*1.33)	209	0	0	1	=(H35*40)+(I35*20)+(J35*5)	5	214	214	=IF(M35=MIN($M$34:$M$37),J63,0)	**1080**	4
Broadwick	Sheraton St B	0	279	=(D35*1)+(E35*1.33)	210	0	0	2	=(H36*40)+(I36*20)+(J36*5)	10	220	214	=IF(M36=MIN($M$34:$M$37),J63,0)	0	
Street	St Anne's Court	0	272	=(D36*1)+(E36*1.33)	205	0	0	3	=(H37*40)+(I37*20)+(J37*5)	15	220	214	=IF(M37=MIN($M$34:$M$37),J63,0)	0	
Dean Street	Dean St	0	195	=(D37*1)+(E37*1.33)	147	0	0	2	=(H38*40)+(I38*20)+(J38*5)	10	157	157	=IF(M38=MIN($M$38:$M$38),J62,0)	**889**	5
Soho South	Dean St	0	220	=(D38*1)+(E38*1.33)	165	0	0	2	=(H39*40)+(I39*20)+(J39*5)	10	175	175	=IF(M39=MIN($M$39:$M$39),J61,0)	**1144**	5
	Soho St	109	65	=(D39*1)+(E39*1.33)	158	0	0	1	=(H40*40)+(I40*20)+(J40*5)	5	163	163	=IF(M40=MIN($M$40:$M$41),J60,0)	**790**	6
Soho North	Dean St	0	247	=(D40*1)+(E40*1.33)	186	0	0	1	=(H41*40)+(I41*20)+(J41*5)	5	191	163	=IF(M41=MIN($M$40:$M$41),J60,0)	0	
														9250	

Total	No. of people
1	740
2	0
3	2807
4	1080
5	2033
6	975
7	658
8	957
9	0

9250

Notes

Walk time = 1.33m/s off Ox St and 1.0m/s on Ox St
Traffic Signals: assumes a 40 second delay time. Also assumes all green phases run simultaneously so 2 arms can be crossed in one phase
Pelican Crossing: assumes a 20 second delay time
Informal crossing: assumes a 5 second delay time. Takes the fewest number possible
CRL station entrance taken as 22m from Oxford St
Assumes new Pelican crossing on Oxford St to the north-west of Dean St is operational

DP	DP area size	Likely decision points met: Outer NE	Outer N	Outer NW	Outer S	Inner Zone trip	Outer Zone	Total No.
Ox	20200					39		39
Wells	38400			8%		75	2	77
Berners	20800			66%		40	16	56
Newman	28300		73%	26%		55	17	72
Rathbone	21300	9%	27%			41	8	50
Hanway	7000	91%				14	0	14
Soho N	30800					60		60
Soho S	38638				19%	75	12	87
Dean	26400				26%	51	16	67
Broadwick	24900				55%	48	33	82
D'Arblay	15200					30		30
Noel	34562					67		67
Totals	306500					595	105	700

Appendix D - Traffic Counts at Dean Street and Fareham Street

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Count On Us	Job Number: L 37875 B13
Bond Street Junction Counts	Client: Atkins Global
Site 5 Dean Street Fareham Street Junction	Date: Wednesday 11 Feb 2009

	Movement A - Dean Street								Movement B - Fareham Street							
Times	Cars	Taxi	LGV	OGV1	OGV2	PSV	M/cycles	Cycles	Cars	Taxi	LGV	OGV1	OGV2	PSV	M/cycles	Cycles
07:00 - 07:15	2	1	3	1				1	6		5	5				
07:15 - 07:30		5	3						3	3	8	8				
07:30 - 07:45		2	1	1					8	1	11	8				
07:45 - 08:00	1	3	2	1				2	12	1	7	4				
Hourly Total	3	11	9	3				3	29	5	31	25				
08:00 - 08:15	1	5	1					2	7	1	4	5				1
08:15 - 08:30		8	1	2				6	12	1	16	6			3	
08:30 - 08:45	4	6	3				2	4	17	4	11	2	1		4	1
08:45 - 09:00		9	4	1			2	7	12	1	11	4			3	1
Hourly Total	5	28	9	3			4	19	48	7	42	17	1		10	3
09:00 - 09:15	1	6	1	1				8	15	7	16	3			2	3
09:15 - 09:30	2	8	4	2				5	14	9	11	2			7	1
09:30 - 09:45		6	3	2				4	12	6	18	6			4	5
09:45 - 10:00	2	7		2			1	1	9	8	20	4			2	3
Hourly Total	5	27	8	7			1	18	50	30	65	15			15	12
10:00 - 10:15	3	11	2	1				4	10	9	27	4			7	6
10:15 - 10:30	5	14	3	2			1	5	18	10	21	5			9	1
10:30 - 10:45	3	10	1	2			4	3	11	11	16	4			12	
10:45 - 11:00	4	14	3	2			4	2	23	9	32	8			7	3
Hourly Total	15	49	9	7			9	14	62	39	96	21			35	10
11:00 - 11:15	2	22	4	2			2	2	13	11	21	5			9	2
11:15 - 11:30		10	3	2			2	4	13	12	27	6			14	3
11:30 - 11:45	2	21	3	1				2	11	15	28	3			10	1
11:45 - 12:00	1	13	4					5	19	13	29	2			9	
Hourly Total	5	66	14	5			4	13	56	51	105	16			42	6
12:00 - 12:15	2	23	3	1				1	25	21	38	7			13	1
12:15 - 12:30	2	25	3	1			3	4	24	11	25	6			8	
12:30 - 12:45		27		1			1	2	16	17	32	7			4	3
12:45 - 13:00	1	27	3				5	2	32	23	31	8			8	1
Hourly Total	5	102	9	3			9	9	97	72	126	28			33	5
13:00 - 13:15	3	30	4	1			2		31	23	25	1			5	4
13:15 - 13:30	2	18	1	1			2	3	16	24	15	3			6	
13:30 - 13:45	5	18	2				1	2	21	21	20	2			8	2
13:45 - 14:00	1	24	1	3			1	2	25	15	20	2			15	2
Hourly Total	11	90	8	5			6	7	93	83	80	8			34	8
14:00 - 14:15		18		2			4	1	24	24	13	4		1	10	4
14:15 - 14:30		24	1	1		1	2		24	17	16	5		1	6	4
14:30 - 14:45	1	12	4	1			1	1	17	17	22	3			7	1
14:45 - 15:00	2	15	2					5	17	18	21	4			8	2
Hourly Total	3	69	7	4		1	7	7	82	76	72	16		2	31	11
15:00 - 15:15	3	10	1					4	9	26	21	3			8	3
15:15 - 15:30	1	23					1	1	20	29	22	2			10	4
15:30 - 15:45	4	20	1	1			1	2	20	19	19				9	2
15:45 - 16:00	3	19	1	1			1	3	20	28	22	1			5	2
Hourly Total	11	72	3	2			3	10	69	102	84	6			32	11
16:00 - 16:15		16					6	2	17	28	20	4			14	2
16:15 - 16:30	2	20	1				4	3	10	30	26	2			8	
16:30 - 16:45	3	14					3	2	14	31	13	3			12	3
16:45 - 17:00	2	25	1				10	2	13	28	19	4			3	1
Hourly Total	7	75	2				23	9	54	117	78	13			37	6
17:00 - 17:15		24	3				1	3	15	26	10	1			5	3
17:15 - 17:30	2	30					1	4	16	28	14	1			12	4
17:30 - 17:45	5	23	1				1	5	18	17	15	2			8	2
17:45 - 18:00	3	12	2				1	2	23	16	10	1			10	1
Hourly Total	10	89	6				4	14	72	87	49	5			35	10
18:00 - 18:15	5	18	1				4	5	14	22	5				8	1
18:15 - 18:30	1	31		1			1	1	20	20	6	1			8	5
18:30 - 18:45	5	20	1				1	8	31	8	10	2			4	2
18:45 - 19:00	3	14						5	19	31	6	1			3	1
Hourly Total	14	83	2	1			6	19	84	81	27	4			23	9

Appendix E - Highway General Arrangements

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N

Newman Street

Oxford Street

Perry Place

Works by others

Works by others

7.00

Pelican crossing

36100N

36100E

Block C

Block D

Great Chapel Street

Dean Street

Service vehicle area

Hollen Street

Fareham Street

36050N

36050E

2.40

3.00

3.30

3.00

Continued on Drawing No. C134-OVE-D-DDL-N105_1-00101

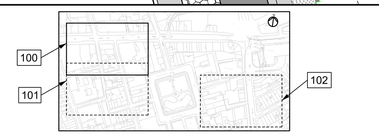
Key

- New kerbline
- Existing kerb to be removed (where located in new pavement areas)
- New carriageway or existing carriageway to be reconstructed or resurfaced
- New footway or existing footway to be reconstructed
- New loading bays
- Tactile paving
- Ramp
- New building facade
- Extent of new basement or foundation within the highway
- VSB bollards
- Traffic signal
- New parking bays (cars)
- Drainage channel in footway
- Building entrance / exit
- Listed bollard
- Access hatch in footway
- Limit of pavement works
- Traffic flow direction

Rev.	Date	Description	By	Chkd	App	Auth
P01	22/07/2010	Issued for RIBA Stage E	RH	RT	SR	
P02	01/12/2010	Issued for RIBA Stage F	GK	DD	ST	---

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid, heights to the London height datum which is 100 metres below Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in metres unless specified otherwise.



Key Plan (NTS)

4m 0 4m 8m 12m 16m 20m

Crossrail

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

© Crossrail

www.crossrail.co.uk

Contract : Tottenham Court Road Station Design

Originator : Ove Arup & Partners Limited

Location : Tottenham Court Road Stn

Title : Highway Works
General Arrangement
Northwest

By : G.KAVANAGH

Chk : D.DAVIES

App : S.TANK

Auth : ---

Scale : 1:200@ A1

Drawing and CAD file No : C134-OVE-D-DDL-N105_1-00100

Rev : P02

Suitability : S4

Fit for authorisation

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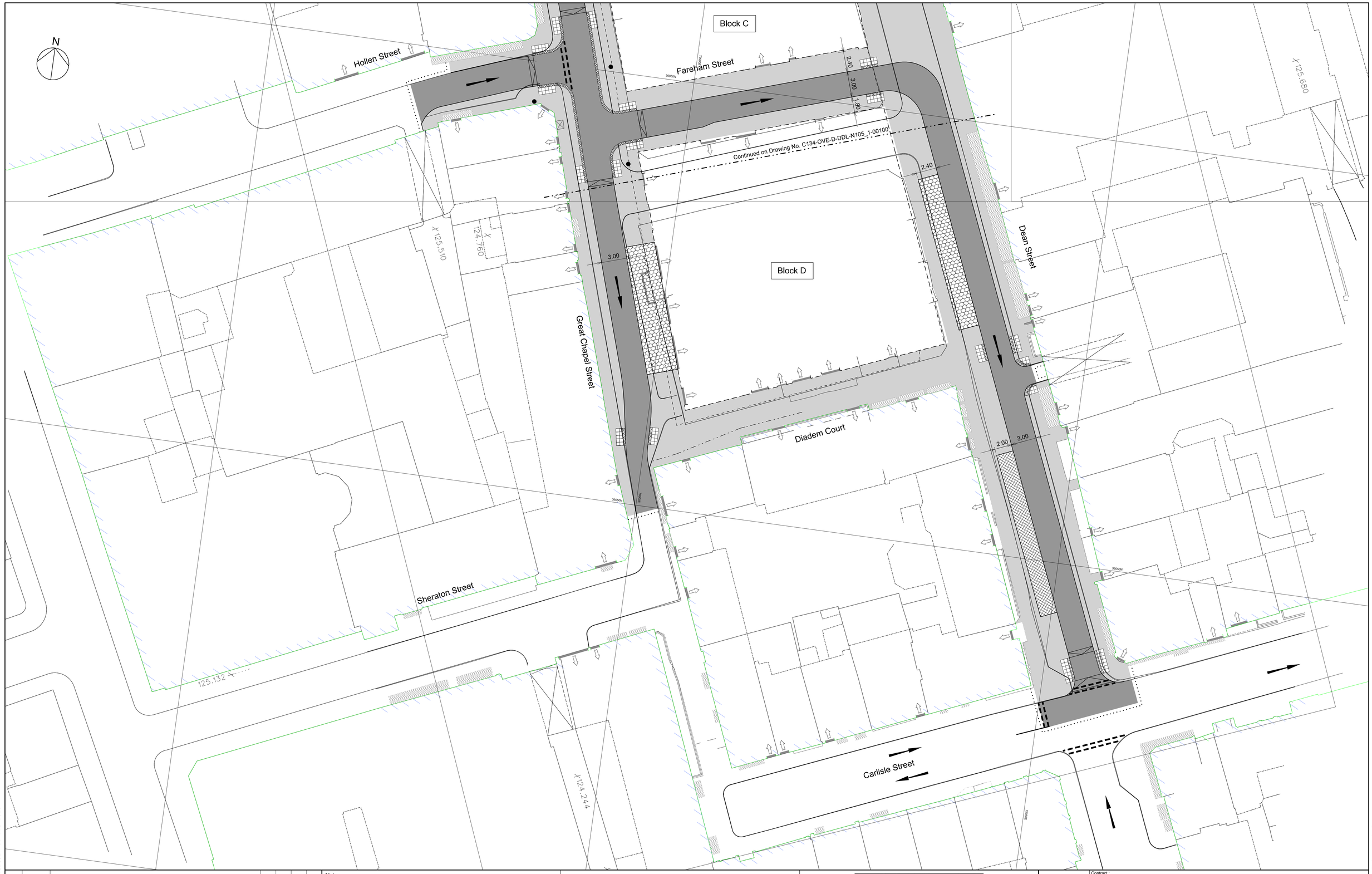
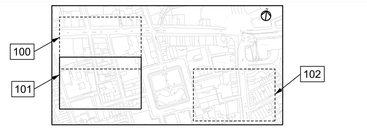


Rev.	Date	Description	By	Chkd	App	Auth
P01	22/07/2010	Issued for RIBA Stage E	RH	RT	SR	
P02	01/12/2010	Issued for RIBA Stage F	GK	DD	ST	---

Notes

1. For key & general notes refer to DRG No. C134-OVE-D-DDL-N105_1-00100.



Key Plan (NTS)

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4m 0 4m 8m 12m 16m 20m

Crossrail

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

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www.crossrail.co.uk

Contract : Tottenham Court Road Station Design

Originator : Ove Arup & Partners Limited

Location : Tottenham Court Road Stn

Title : Highway Works
General Arrangement
Southwest

By : G.KAVANAGH
Chk : D.DAVIES
App : S.TANK
Auth : ---

Scale : 1:200@ A1

Drawing and CAD file No : C134-OVE-D-DDL-N105_1-00101

Rev : P02

Suitability : S4

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Fit for authorisation

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N

Yard

St Patrick's
RC Church

Over Site Development
by others

Eastern Entrance

Goslett Yard

3.00

3.00

Charing Cross Road

36000N

36000N

Key

- New kerbline
- Existing kerb to be removed (where located in new pavement areas)
- New carriageway or existing carriageway to be reconstructed or resurfaced
- New footway or existing footway to be reconstructed
- Tactile paving
- Ramp
- New building facade
- Extent of new basement or foundation within the highway
- Building entrance / exit
- Limit of pavement works
- Fence and sliding gate

Rev.	Date	Description	By	Chkd	App	Auth
P01	29/07/2010	Issued for RIBA Stage E	GK	RT	SR	
P02	01/12/2010	Issued for RIBA Stage F	GK	DD	ST	---

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid, heights to the London height datum which is 100 metres below Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in metres unless specified otherwise.

Key Plan (NTS)

100 101 102

4m 0 4m 8m 12m 16m 20m

Crossrail

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

© Crossrail

www.crossrail.co.uk

Contract : Tottenham Court Road Station Design

Originator : Ove Arup & Partners Limited

Location : Tottenham Court Road Stn

Title : Highway Works
General Arrangement
Goslett Yard

By : G.KAVANAGH

Chk : D.DAVIES

App : S.TANK

Auth : ---

Scale : 1:200@ A1

Drawing and CAD file No : C134-OVE-D-DDL-N105_1-00102

Rev : P02

Suitability : S4

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Fit for authorisation

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Appendix F - Cost Estimates

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TCR Highways Cost Estimates TCRw Restoration Only

Item no	Description	Unit		Rate	Total
	Remove				
1	Kerb	m	250.0	£10	£2,500
2	Footway	m2	600.0	£5	£3,000
3	Carriageway	m2	900.0	£15	£13,500
4	Surfacing	m2	750.0	£14	£10,500
5	General Excavation	m3	90.0	£25	£2,250
	Provide				
1	Kerb	m	450.0	£80	£36,000
2	Footway	m2	580.0	£75	£43,500
2a	Urban Realm	m2	700.0	£120	£84,000
3	Carriageway	m2	700.0	£120	£84,000
3a	Carriageway plus	m2	160.0	£120	£19,200
4	Surfacing	m2	750.0	£25	£18,750
5	Coloured Surface Dressing	m2	0.0	£25	£0
6	Non Illuminated Signs	No	20.0	£400	£8,000
7	Illuminated Signs	No	16.0	£900	£14,400
8	Road Markings	No	500.0	£2	£1,000
9	Drainage (per gully)	No	18.0	£1,500	£27,000
	Junctions DTO Costs				
1	Crossing	No	0.0	£20,000	£0
2	2/3 Arms	No	1.0	£50,000	£50,000
3	4+ Arms	No	0.0	£80,000	£0
4	UTC/Scoot/MoC	No	0.0	£25,000	£0
	Sub Total				£420,000
	Unknowns %age		25	25%	£105,000
	Traffic management %age		10	10%	£42,000
	Works Total				£570,000
	Contingency %age		20	20%	£114,000
	Budet Cost				£684,000
	Statutory Undertakers Diversions		5	5%	£35,000
	Total Estimated Cost			Total	**£720,000**

TCR Highways Cost Estimates TCRw Including UR

Item no	Description	Unit		Rate	Total
	Remove				
1	Kerb	m	250.0	£10	£2,500
2	Footway	m2	600.0	£5	£3,000
3	Carriageway	m2	900.0	£15	£13,500
4	Surfacing	m2	750.0	£14	£10,500
5	General Excavation	m3	90.0	£25	£2,250
	Provide				
1	Kerb	m	450.0	£80	£36,000
2	Footway	m2	580.0	£100	£58,000
2a	Urban Realm	m2	700.0	£300	£210,000
3	Carriageway	m2	700.0	£120	£84,000
3a	Carriageway plus	m2	160.0	£250	£40,000
4	Surfacing	m2	750.0	£25	£18,750
5	Coloured Surface Dressing	m2	0.0	£25	£0
6	Non Illuminated Signs	No	20.0	£400	£8,000
7	Illuminated Signs	No	16.0	£900	£14,400
8	Road Markings	No	500.0	£2	£1,000
9	Drainage (per gully)	No	18.0	£1,500	£27,000
	Junctions DTO Costs				
1	Crossing	No	1.0	£20,000	£20,000
2	2/3 Arms	No	1.0	£50,000	£50,000
3	4+ Arms	No	0.0	£80,000	£0
4	UTC/Scoot/MoC	No	1.0	£25,000	£25,000
	Sub Total				£625,000
	Unknowns %age		25	25%	£156,250
	Traffic management %age		10	10%	£62,500
	Works Total				£850,000
	Contingency %age		20	20%	£170,000
	Budet Cost				£1,020,000
	Statutory Undertakers Diversions		10	10%	£102,500
	Total Estimated Cost			Total	**£1,130,000**

TCR Highways Cost Estimates GYB Restoration Only

Item no	Description	Unit		Rate	Total
	Remove				
1	Kerb	m	120.0	£10	£1,200
2	Footway	m2	320.0	£5	£1,600
3	Carriageway	m2	300.0	£15	£4,500
4	Surfacing	m2	100.0	£14	£1,400
5	General Excavation	m3	30.0	£25	£750
	Provide				
1	Kerb	m	110.0	£80	£8,800
2	Footway	m2	450.0	£75	£33,750
2a	Urban Realm	m2	0.0	£120	£0
3	Carriageway	m2	150.0	£120	£18,000
3a	Carriageway plus	m2	0.0	£120	£0
4	Surfacing	m2	100.0	£25	£2,500
5	Coloured Surface Dressing	m2	0.0	£25	£0
6	Non Illuminated Signs	No	5.0	£400	£2,000
7	Illuminated Signs	No	2.0	£900	£1,800
8	Road Markings	No	100.0	£2	£200
9	Drainage (per gully)	No	4.0	£1,500	£6,000
	Junctions DTO Costs				
1	Crossing	No	0.0	£20,000	£0
2	2/3 Arms	No	0.0	£50,000	£0
3	4+ Arms	No	0.0	£80,000	£0
4	UTC/Scoot/MoC	No	0.0	£25,000	£0
	Sub Total				£85,000
	Unknowns %age		25	25%	£21,250
	Traffic management %age		10	10%	£8,500
	Works Total				£120,000
	Contingency %age		20	20%	£24,000
	Budet Cost				£144,000
	Statutory Undertakers Diversions		5	5%	£7,500
	Total Estimated Cost			Total	**£160,000**

TCR Highways Cost Estimates GYB Including UR

Item no	Description	Unit		Rate	Total
	Remove				
1	Kerb	m	120.0	£10	£1,200
2	Footway	m2	320.0	£5	£1,600
3	Carriageway	m2	300.0	£15	£4,500
4	Surfacing	m2	100.0	£14	£1,400
5	General Excavation	m3	30.0	£25	£750
	Provide				
1	Kerb	m	110.0	£80	£8,800
2	Footway	m2	450.0	£300	£135,000
2a	Urban Realm	m2	0.0	£300	£0
3	Carriageway	m2	150.0	£300	£45,000
3a	Carriageway plus	m2	0.0	£120	£0
4	Surfacing	m2	100.0	£25	£2,500
5	Coloured Surface Dressing	m2	0.0	£25	£0
6	Non Illuminated Signs	No	5.0	£400	£2,000
7	Illuminated Signs	No	2.0	£900	£1,800
8	Road Markings	No	100.0	£2	£200
9	Drainage (per gully)	No	4.0	£1,500	£6,000
	Junctions DTO Costs				
1	Crossing	No	0.0	£20,000	£0
2	2/3 Arms	No	0.0	£50,000	£0
3	4+ Arms	No	0.0	£80,000	£0
4	UTC/Scoot/MoC	No	0.0	£25,000	£0
	Sub Total				£215,000
	Unknowns %age		25	25%	£53,750
	Traffic management %age		10	10%	£21,500
	Works Total				£300,000
	Contingency %age		20	20%	£60,000
	Budet Cost				£360,000
	Statutory Undertakers Diversions		10	10%	£37,500
	Total Estimated Cost			Total	**£400,000**